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A TAXONOMIC STUDY OF BORNEO PSYCHODINAE

(Diptera: Psychodidae)[1]

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ABSTRACT

Sixty-eight species of the Psychodinae are recorded from Borneo, 45 of which are new. The species are contained in seven genera, *Telmatoscopus* (14 spp.), *T.* (*Neotelmatoscopus*) (1), *Paratelmatoscopus* (2), *Notiocharis* (3), *Brunettia* (3), *Trichopsychoda* (2), *Philosepedon* (5), and *Psychoda* (38). Keys are given for the genera and species; descriptions and illustrations are provided for all new species. *Lepidopsychoda* Edwards and *Telmatoscopus* (*Minioceros*) Quate are synonymized with *Philosepedon* Eaton. The now known range of *Paratelmatoscopus* is extended to Borneo from Australia; the gap in the range of *Notiocharis* between the Seychelles Is. and Australia is bridged by the new Borneo records.

INTRODUCTION

Borneo, the third largest island in the world, is one of the few sparsely populated regions in the Orient. There has been relatively little biological exploration and insect collections in particular have been scanty. Because of its low population, much virgin country remains and offers a rich fauna of native invertebrates. To exploit this opportunity and gather raw data for research, the B. P. Bishop Museum had staff members in Borneo during most of 1958–59. The work was coordinated with the overall program of studies of the zoogeography and evolution of Pacific insects with particular attention given to the arthropods of medical significance.

From the Borneo field work has come a large collection of Psychodidae which, for the first time, permits a fairly comprehensive study of this dipterous family in Borneo. Specimens were collected by T. C. Maa in Sarawak and North Borneo and myself in North Borneo. Support was provided by a National Institutes of Health Grant (E–1723) to the Bishop Museum for the project, "South Pacific Insects of Public Health Importance."

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Examination of certain type specimens of Psychodidae pertinent to this study, which are at the Zoological Survey of India, Calcutta and the British Museum (Natural History), was made possible by grants from the American Philosophical Society (Grant No. 2614, Penrose Fund) and National Academy of Sciences (Grant No. 130, Marsh Fund). The author is grateful for the financial assistance received, which has aided the attempts to stabilize the taxonomy of the psychodids by examining important type specimens.

ZOOGEOGRAPHY

Only a brief outline of the zoogeography of Borneo Psychodidae can be given, for we know so little of the psychodids from surrounding areas. These gaps will be filled when existing collections are studied, but in the meantime a summary of what the known Borneo psychodids show will give a broader perspective to future studies.

Nearly half of the presently known Borneo psychodids belong to the genus *Psychoda*. This is not regarded as particularly significant, for species of *Psychoda* are most easily collected since they often are found in large numbers around human habitations and probably a higher percentage of the total species of this genus is now known than of the other genera. While many of the species have a very wide distribution and are undoubtedly transported by man, a number of others are limited to the Indo-Pacific area and undoubtedly have their origins in the Oriental Region. While previously considered of little zoogeographic significance, it now appears that the genus *Psychoda* may be of considerable importance in this respect but conclusions will have to wait upon further studies.

Second to *Psychoda*, *Telmatoscopus* is the dominant genus. Other than the ubiquitous *albipunctatus*, the species are limited to Borneo. The genus is cosmopolitan in range and is a conspicuous element of the family in both tropical and temperate regions. One Borneo species (*quadripenis*) shows a strong relationship to an Indian species; the range of the aquatic subgenus *Neotelmatoscopus* is extended from India and Java to Borneo and almost certainly occurs throughout the Malayan subregion[2]. The relations of the remaining species to other faunal units are not clear, although they appear to be distantly related to Palaearctic species and without a close relationship to the known Indian or Australian species.

The Borneo species of *Brunettia* (including several which are undescribed and not treated in this paper) are closely related to members of the genus extending from Polynesia and Micronesia to New Zealand and across the tropics west to Africa. The number of species found in Borneo was far less than expected in view of the number found elsewhere in the Old World tropics, but future work will undoubtedly reveal many more Borneo species of *Brunettia*.

Perhaps the most significant feature of this study is the finding of *Notiocharis* and *Paratelmatoscopus* in Borneo. Previously, *Notiocharis* was known only from the Seychelle Islands and Australia. The Borneo species partly bridge the gap in this discontinous dis-

2. In this paper "Malayan" is used in the zoogeographic sense as defined by Gressitt (1956, Syst. Zool. **5**: 13) and includes Borneo, Malaya, Sumatra and Java.

tribution and would lead to the conclusion the genus will eventually be found to range continuously from the Ethiopian to the Australasian Region.

Paratelmatoscopus was formerly known only from Australia. Its range is now extended northwest to the Malayan area and quite likely will be found to have a continuous range through New Guinea.

The finding of intermediate species between *Philosepedon* and *Lepidopsychoda* and the consequent synonymizing of the two has led to a considerable extension of the range of *Philosepedon.* The genus is well developed in the Holarctic and Ethiopian Regions. It is now known to range eastwards through the Malayan subregion to Polynesia and Micronesia. Species in the latter three areas seem to form a unit within the genus and constitute an Indo-Pacific section that might be recognized taxonomically at a later date.

The absence of *Pericoma* from Borneo is noteworthy. Although it is well represented in temperate regions on both sides, it has not been found in the Oriental region (except two species in Taiwan) and our failure to find members of the genus strengthens my belief that the group has not penetrated the Old World tropics. If this is true, it would indicate that the Australasian *Pericoma* have been derived from a southern faunal stock as already suggested by the apparent relations of Australian and South American species.

There are few members of the subfamily Trichomyiinae in Borneo, but perhaps more than would be expected from their scarcity in other parts of the world. We collected at least six species of this subfamily in Borneo, but as there are only a few specimens of each they are not being treated in this paper.

The Phlebotominae (Quate and Fairchild, 1961) are represented by more than 10 (including some undescribed) Borneo species. These seem equally related to other Oriental and to the few known New Guinea species.

The approximately 90 species of Borneo Psychodidae now known must be but a small part of the total psychodid fauna. If this many could be collected in a few months' work, there certainly must be many more awaiting discovery. This work, then, is only preliminary and merely gives a glimpse of the whole fauna, but does indicate it is Oriental (as defined by Gressitt, 1956) and is a part of that fauna extending east to Oceania and is weakly related to the Australasian region.

COLLECTING AREAS

Tawau, No. Bor. A port on the east coast of North Borneo at the mouth of the Kalabakan River near the border of Indonesian Borneo. Specimens were collected during a brief stay here at lights and by sweeping in the air at dusk while walking along the beach.

Kalabakan River, No. Bor. 50 kilometers from Tawau near sea level is a lumber camp of the Bombay Burmah Trading Corp., which was the base of operations for nearly two weeks. Collecting was done in the nearby secondary forests, along the river, and in the primary dipterocarp forests where lumbering operations were underway.

Gomantong Caves, No. Bor. Caves in a limestone ridge near sea level about 30 kilometers south of Sandakan. Large populations of swiftlets (*Collocalia*) and bats occupy the caverns and the birds nests are harvested by nearby villagers. Primary dipterocarp forest surrounds the caves. Psychodids were found in the caves, apparently breeding in the moist guano, as well as in the surrounding jungle.

Ranau, No. Bor. A village in an interior valley about 70 kilometers east of Jesselton at an elevation of 500 meters. The valley floor is largely utilized for wet padi culture. There are rubber trees and secondary and primary forest on the surrounding hills.

Paring Hot Springs, No. Bor. A clearing around hot water springs 12 kilometers north of Ranau at 500 meters. The hot water has a slight sulfurous smell, but the flow is small and no thermophilous species were found. The dense forest in this area is chiefly primary.

Kundasan, No. Bor. An agricultural station between Tenompok and Ranau at about 1200 meters surrounded by experimental plantings and dryland rice with forest on distant ridges.

Tenompok, No. Bor. About 50 kilometers east of Jesselton in the hills near the southern base of Mt. Kinabalu at 1460 meters. The site is no more than a bamboo hut on the road from Jesselton to Ranau on a ridge above Bundu Tuhan. On the south side of the ridge are agricultural clearings and on the north primary forest. The ridge drops off steeply on either side. The pass in which the hut was located was apparently an insect "flyway," for many insects were found resting on the walls both day and night. Observations indicated the insects largely moved against the prevailing winds.

Santubong, Sarawak. A village on the coast about 50 kilometers north of Kuching. Rubber trees, secondary forest and mangrove are in the immediate vicinity. All psychodids were collected by Maa by sweeping on the beach at dusk.

Bau, Sarawak. A very humid, gold mining area about 60 kilometers southwest of Kuching at 150 meters. Nearby are agricultural clearings, primary and secondary forest and many, small artifical lakes made during mining operations.

TAXONOMY

The species treated herein belong to the subfamily Psychodinae and the study is based on more than 1100 slide-mounted specimens. The Phlebotominae are treated in a separate paper (Quate and Fairchild, 1961). There are at least six species of Trichomyiinae in the Borneo collections, but because of the short series and complexity displayed, their study has been postponed until larger series are available.

All primary types (except one as noted) will be deposited at the Bernice P. Bishop Museum, Honolulu (BISHOP). Of species with adequate specimens, paratypes will be deposited at the U. S. National Museum (USNM), California Academy of Sciences, San Francisco (CAS), British Museum (Natural History) (BMNH), the Bishop Museum, and in the author's collection.

Two terms used in the descriptions need explanation. The *cibarium* (often described for *Phlebotomus*) appears to be of some taxonomic value in the Psychodinae and is described herein for many species. It is the passageway from the oral opening to the pharynx and the sclerotized walls are easily seen below the clypeus of cleared specimens. The *leg ratio* is the relative lengths of the femur, tibia, basitarsus and last four tarsal segments combined.

The camera lucida has been used for all illustrations executed by Mrs. Stella Quate. Particular attention has been paid to the details of the male and female genitalia. The female genitalia is shown in dorsal view on the right and ventral on the left; in some in-

stances, as noted, one male coxite is shown in dorsal view and the other in ventral and the whole aedeagus from either dorsal or ventral view.

List of Borneo Psychodidae

(Species marked with * not found in Borneo)

Telmatoscopus Eaton
1. ejundicus, n. sp.
2. eximius, n. sp.
3. praecipuus, n. sp.
4. maai, n. sp.
5. kalabakensis, n. sp.
6. pennulus, n. sp.
7. taleolus, n. sp.
8. pholidotes, n. sp.
9. albipunctatus (Williston)
10. ramosus, n. sp.
11. claviculus, n. sp.
12. rivularis, n. sp.
13. kinabalensis, n. sp.
14. quadripenis, n. sp.

Telmatoscopus (Neotelmatoscopus) Tonnoir
15. inachus, n. sp.

Paratelmatoscopus Satchell
16. floricolus, n. sp.
17. borneensis, n. sp.
18. canadius (Satchell)*

Notiocharis Eaton
19. kalabakensis, n. sp.
20. stellae, n. sp.
21. sarawakensis, n. sp.

Brunettia Annandale
22. orchestris, n. sp.
23. longipalpis Satchell
24. brevifurca Satchell

Trichopsychoda Tonnoir
25. tenompoca, n. sp.
26. tropicalis, n. sp.

Philosepedon Eaton
27. parciproma, n. sp.
28. tineiformis (Edwards)
29. fratruelis, n. sp.
30. trimicra (Edwards)*
31. operosa, n. sp.
32. pudica, n. sp.

Psychoda Latreille
33. kea, n. sp.
34. fucosa, n. sp.
35. fucastra, n. sp.
36. celebris, n. sp.
37. aponesos Quate
38. crenula, n. sp.
39. harrisi Satchell
40. trilobata Tokunaga
41. kalabanica, n. sp.
42. ocellata, n. sp.
43. alternata Say
44. acanthostyla Tokunaga
45. formosiensis Tokunaga
46. alia, n. sp.
47. vagabunda, n. sp.
48. jucunda, n. sp.
49. cochlearia Satchell
50. savaiiensis Edwards
51. floscula, n. sp.
52. nya, n. sp.
53. ochra Quate
54. platilobata Tokunaga
55. quadrifilis Edwards
56. torquata, n. sp.
57. aderces, n. sp.
58. paraderces, n. sp.
59. helotes, n. sp.
60. makati del Rosario
61. caudata, n. sp.
62. formosana Tokunaga
63. malleola Tokunaga and Komyo
64. vanga, n. sp.
65. alabangensis del Rosario
66. ichthycerca Quate
67. mediocris Quate
68. parsivena Quate
69. innotabilis, n. sp.
70. byblis, n. sp.

KEY TO BORNEO GENERA OF PSYCHODIDAE

1. Eye bridge (median extension of eyes above antenna) absent 2
Eye bridge present 3

2 (1). Radial and medial wing forks basad of Cu apex; antenna 16-segmented in both sexes; ♂ surstyle with single tenaculum; metanotum long, extending to abdominal segment 4 or 5 ..... **Paratelmatoscopus**
Radial and medial forks distad of Cu apex; antenna of ♂ 12-segmented, of ♀ 15- or 16-segmented; ♂ surstyle with multiple tenacula, dististyle with basal, inner appendage; metanotum extending to about abdominal segment 3... **Notiocharis**

3 (1). Vertex (anterior surface of head above eyes) on midline much longer than width of eye bridge; palpal segment 2 about 2× length of 1; labellum bulbous apically 4
Vertex on midline shorter than width of eye bridge; palpal segment 2 subequal to or little longer than 1; labellum flattened apically; antennal segments beyond 13 reduced and much smaller than preceding; ♂ surstyle with single tenaculum ..... **Psychoda**

4 (3). Wing membrane bare 5
Wing membrane with vestiture (hair sockets in bare, slide-mounted specimens) ... 6

5 (4). Terminal 3 antennal segments reduced to about 1/2 size of preceding; antennal ascoids Y-shaped; R_5 ending in acute wing apex; gray or yellowish colored species ..... **Philosepedon**
Terminal antennal segments not or only slightly reduced; antennal ascoids variable from pair of single rods to multibranched filaments, but not Y-shaped; dark or varicolored species ..... **Telmatoscopus**

6 (4). Radial and medial forks complete, or only 1 incomplete 7
Radial and medial forks incomplete, R_3 very short; ♂ surstyle short, not much longer than wide and with many long, slender, bell-tipped tenacula... **Trichopsychoda**

7 (6). Terminal 3 antennal segments reduced, about 1/2 size of preceding; wing slender, 2–1/2× to 3× as long as wide; radial fork distad of medial; ♂ surstyle with 1 or 2 tenacula ..... **Philosepedon**
Terminal antennal segments not markedly reduced; wing broad, especially in ♂ and often 2× as long as wide; radial fork mesad of medial and close to base; ♂ surstyle with many, clavate tenacula ..... **Brunettia**

Genus **Telmatoscopus** Eaton

Telmatoscopus Eaton, 1904, Ent. Mo. Mag., ser. 2, **15** : 58. — Quate, 1955, Univ. Calif. Publ. Ent. **10** : 157 (descr., keys). — Jung, 1956, Deutsche Ent. Zeitschr., N. F. **3** : 172 (descr., keys).

RANGE: Cosmopolitan.

KEY TO BORNEO SPECIES OF TELMATOSCOPUS

1. Eyes contiguous on midline 2
Eyes clearly separated on midline by 1 or more facets 5

2 (1). Radial fork distad of medial; R_5 ending beyond rounded wing apex; eye bridge with 4 rows of facets; palpal segment 2 considerably longer than 1, cylindrical; large species with wing length 2.0 mm or more 3
Radial fork at same level as medial or little basad; R_5 ending in acute wing apex; eye bridge with 3 rows of facets; palpal segments 1 and 2 subequal, 2 flattened and bearing patch of hairs on mesal surface; ♂ aedeagus very complex, with 2 pairs of sclerotized, pointed shafts in addition to main shaft; small species with wing length about 1.5 mm ..... **4. maai**

3 (2). Wing very broad, about 2× as long as wide; radial fork near base of wing, so R_2 3× length of R_{2+3}; palpal segment 4 about 1.5× length of 3; ♂ surstyle not greatly elongate 4
Wing moderately broad, about 2.5× as long as wide; R_2 about 2× length of R_{2+3}; palpal segments 3 and 4 subequal (11 : 13); ♂ surstyle greatly elongate, slender, a little sinuous; surstyle furcate near tip ..... **1. ejundicus**

4 (3). Male genitalia with digitiform process arising from mesal surface of dististyle longer than dististyle proper; ♀ unknown ..... **2. eximius**
Digitiform process shorter than dististyle; ♀ unknown ..... **3. praecipuus**

5 (1). Radial fork clearly distad of Cu apex 6
Radial fork usually basad of Cu apex, sometimes nearly on same level, but never distad 8

6 (5). Eye bridge with 4 rows of facets; medial fork distad of Cu apex 7
Eye bridge with 2 rows of facets; medial fork basad of Cu apex; ♂ aedeagus with broadly expanded base and ending in 4 sharp points; ♂ surstyle with 2 black, short spines at base on upper margin ..... **6. pennulus**

7 (6). Wing moderately broad, 2 to 2.5× as long as wide; R_4 ending in acute apex; ♂ aedeagus paddle-shaped; larger species, wing length 2.2 to 2.6 mm..... ..... **5. kalabakensis**
Wing slender, about 3× as long as wide; R_4 ending before rounded wing apex; ♂ aedeagus simple, Y-shaped; small species, wing length less than 2.0 mm..... **7. taleolus**

8 (5). Eye bridge connected by strong interocular suture; wing almost always 2–1/2 × or more as long as wide, forks at or beyond basal 1/3 9
Interocular suture entirely absent, eyes widely separated by 6 or more facets; wing narrow, 3× as long as wide, forks at basal 1/4; basal flagellar segments weakly nodiform; R_5 ending in acute apex..... **14. quadripenis**

9 (8). Scape 2× length of pedicel; distal flagellar internodes shorter than nodes; wing apex rounded, R_5 ending beyond apex 10
Scape and pedicel subequal in length; distal flagellar internodes subequal to or longer than nodes; wing apex acute, R_5 ending in apex 12

10 (9). Cu apex well before R_1 apex; wing slender, about 3× as long as wide..... 11
Cu apex at level of R_1 apex; wing broad, 2–2.5× as long as wide; ♂ aedeagus ending in bifurcate process ..... **8. pholidotes**

11 (10). Eyes separated by 3 or 4 facets; vertex with all hair sockets of equal size; ♂ aedeagus ending in bifurcate process..... **12. rivularis**
Eyes separated by 6 facets; vertex with row of large sockets along posterior margin of eyes; ♂ aedeagus tubular, dististyle with recurved, apical hook

..... **13. kinabalensis**

12 (9). Base of R_{2+3} nearly at same level as base of R_5, no farther distad than width of basal cell; R_2 and often R_3 with enlargement just beyond fork..... 13

Base of R_5 distad of base of R_{2+3} by at least 2× width of basal cell; ♂ aedeagus racquet-shaped; ♀, subgenital plate weakly concave apically. Common tropicopolitan species ..... **9. albipunctatus**

13 (12). Flagellar segment 1 compact, without internode; ♂ dististyle ending in small, expanded club; ♀ subgenital plate with apical lobes much smaller than base, heavily sclerotized plate under spermathecae ..... **11. claviculus**

Flagellar segment 1 with short but distinct internode; ♂ dististyle simple, ending in rounded, unexpanded apex; ♀ unknown ..... **10. ramosus**

1. Telmatoscopus ejundicus Quate, n. sp. Fig. 1.

Male. Body integument brown. Eyes broadly contiguous, no spur on midline, bridge with 4 rows of facets; frons with hairs on anterior 2/3 only, thicker than clypeus without median band; cibarium with weakly sclerotized margin and posterior arms short and divergent, not reaching base of pharynx; palpal segment 4 more slender and paler than other segments, ratio of segments = 6 : 12 : 12 : 14. Scape 2× length of pedicel; flagellar nodes eccentric, internodes shorter than nodes.

Thorax without patagia. Wing broad, with some spatulate hairs on basal half; membrane lightly tinged with brown, costal cell darker; radial fork distad of medial and at about level of Cu apex. Ratio of fore leg=6 : 8 : 5 : 5, hind leg=8 : 14 : 5 : 5. Genitalia with appendages unusually elongate; aedeagus with 2-branched piece joined subapically to main shaft and ending in dark, bulbous enlargement with number of spines projecting dorsally; dististyle bifurcate near tip; surstyle very long, slender and sinuate, with 7 tenacula, tenacula bifurcate apically.

Wing length 2.0 mm; wing width 0.9 mm.

Female. Similar to ♂; flagellar nodes symmetrical; wing without spatulate hairs; subgenital plate thickly fringed with hairs apically, inner face with strongly developed, looped ridges as figured.

Wing length 2.4 mm; wing width 1.1 mm.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3083), Ranau, North Borneo, 6–X–58, tree buttress and seepage area, Quate.

2. Telmatoscopus eximius Quate, n. sp. Fig. 2e–i.

Male. Body integument brown. Eyes broadly contiguous, no spur on midline, bridge with 4 rows of facets; frons with hairs on anterior 1/2 only, thicker than on clypeus, no median band; cibarium with heavy margins, posterior arms short and divergent, reaching level of base of pharynx; palpal segment 4 more slender and paler than other segments, ratio of segments=7 : 13 : 12 : 17. Scape little more than 2× length of pedicel; first 3 flagellar segments with 3 or 4 large hairs on median side arising from large, dark sockets; flagellar segment 1 without internode, 2 with short internode, internodes progressively becoming longer until on flagellar segment 7 internodes as nodes.

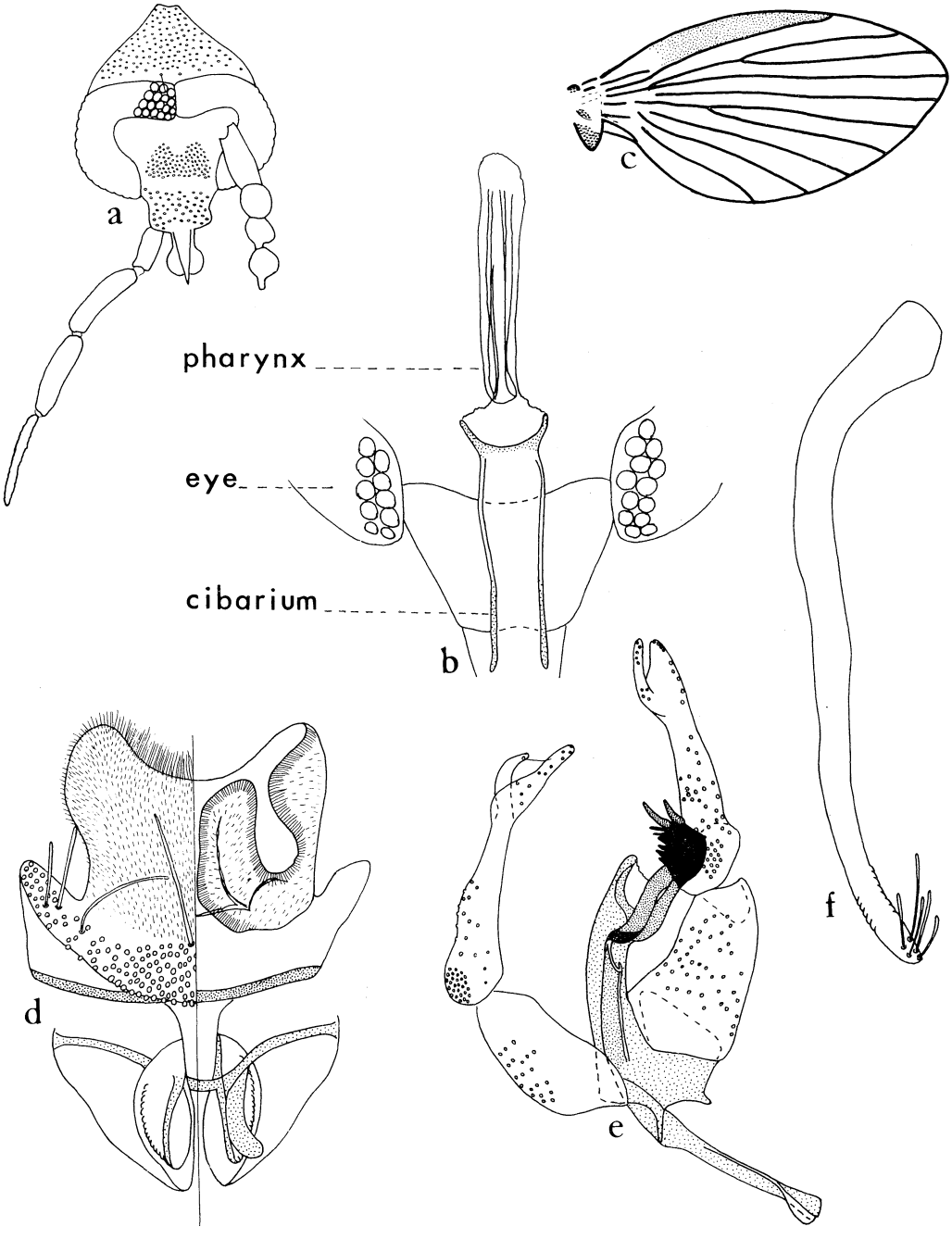

Fig. 1. *Telmatoscopus ejundicus.* a, head, ♂; b, cibarium and pharynx; c, wing, ♂; d, ♀ genitalia; e, ♂ genitalia, dorsal; f, ♂ surstyle.

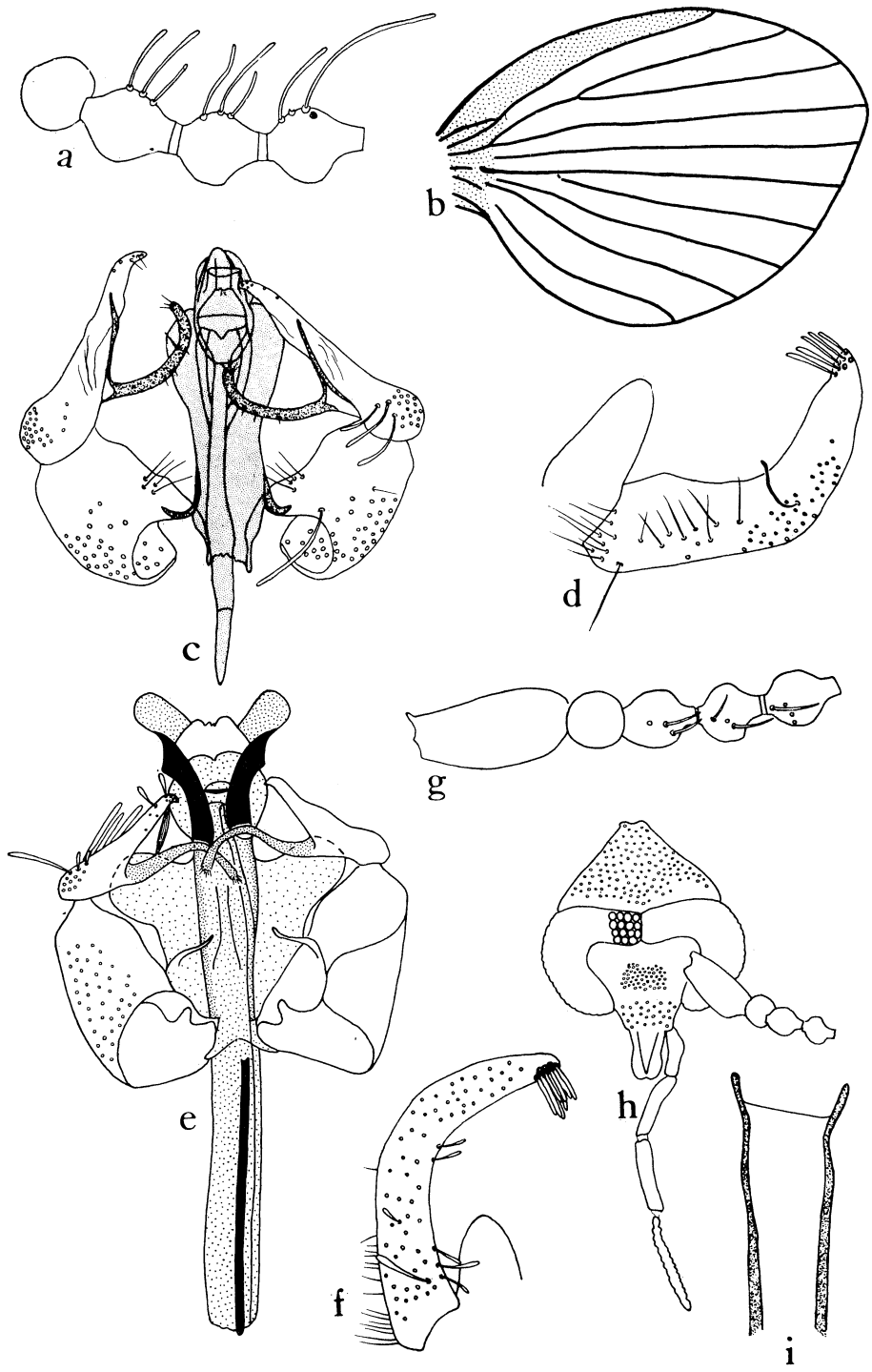

Fig. 2. a–d. *Telmatoscopus praecipuus*, ♂. a, scape and flagellum base; b, wing; c, genitalia, dorsal; d, surstyle. e–i. *T. eximius*, ♂. e, genitalia, dorsal; f, surstyle; g, antenna base; h, head; i, cibarium.

Thorax without patagia. Wing very broad, upper surface entirely covered with spatulate hairs; membrane lightly tinged with brown, costal cell darker; radial and medial forks about on same level, considerably basad of Cu apex, medial fork weakened at junction. Ratio of fore leg = 10 : 12 : 6 : 6, mid leg = 11 : 16 : 8 : 7, hind leg = 11 : 19 : 8 : 6. Dististyle of genitalia with long, digitiform process near center of median margin, process longer than style proper; aedeagus terminating in pair of jointed, blade-like, heavily sclerotized processes attached apically to lobate processes (aedeagus capable of folding at base of blade-like processes and in some preparations apical blades and lobes are folded back against shaft of aedeagus giving entirely different appearance than shown in fig. 2e).

Wing length 2.4 mm; wing width 1.7 mm.

Female. Unknown.

DISTRIBUTION: Borneo.

Holotype ♂ (BISHOP 3085), Ranau, North Borneo, 6–X–58, hillside seepage area, Quate. Paratypes (USNM): 3 ♂♂, same data.

3. **Telmatoscopus praecipuus** Quate, n. sp. Fig. 2a–d.

Male. Almost identical to *eximius*, differing in larger size and striking features of genitalia as figured.

Wing length 2.9 mm; wing width 2.0 mm.

Female. Unknown.

DISTRIBUTION: Borneo.

Holotype ♂ (BISHOP 3086), Tenompok, about 50 km E of Jesselton, North Borneo, 18–X–58, Quate. Paratype ♂, same locality, 20–X–58.

4. **Telmatoscopus maai** Quate, n. sp. Fig. 3a–e.

Male. Body integument brown. Eyes broadly contiguous, margin extending posteriorly in short spur on midline, bridge with 4 rows of facets; frons rather evenly covered with hairs and without posterior band, hairs thicker than on clypeus; cibarium box-like with strongly sclerotized margins and posterior arms strong, projecting posteriorly to level of base of pharynx; palpus short, segment 2 expanded and bearing dense patch of hairs on median surface, ratio of segments = 5 : 6 : 6 : 10. Scape little longer than pedicel; flagellar segments with eccentric nodes, internodes slender but not very long.

Thorax without patagia. Wing slender, lightly infuscated, darker infuscation in basal 1/2 of cell R_1 beyond fold and at apex; distal 1/2 of R_1 and R_2 and all of R_5 and M_4 heavier than other veins; radial and medial forks on about level of Cu apex. Ratio of mid leg = 5 : 7 : 4 : 4. Tergite 9 with slender apical projection between base of surstyli and disc with posterior border darkly sclerotized and center less heavily sclerotized in form of thick, arrow-shaped bar. Genitalia with heavily sclerotized, multipartite aedeagus; surstyle short, with 5 tenacula.

Wing length 1.5 mm; wing width 0.5 mm.

Female. Unknown.

DISTRIBUTION: Borneo.

Holotype ♂ (BISHOP 3084), Labuan I., North Borneo, 29–XI–58, Maa. Paratype ♂, Santubong, 50 km N of Kuching, Sarawak, 18 to 30–VI–58, Maa.

This species is named in recognition of Tsing-Chao Maa, who collected many interesting unusual psychodids in Borneo.

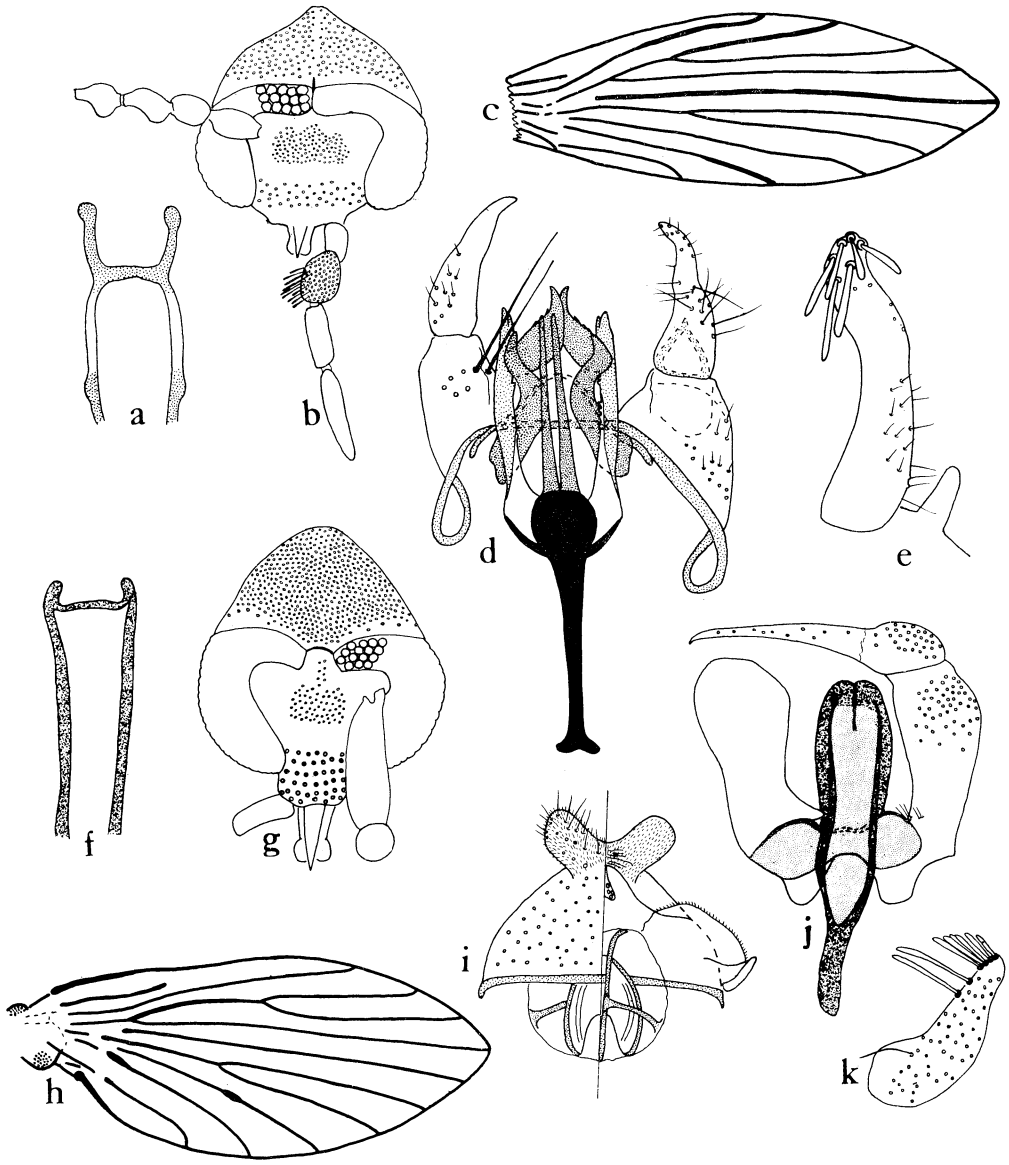

Fig. 3. a–e. *Telmatoscopus maai*, ♂. a, cibarium; b, head; c, wing; d, genitalia, dorsal; e, surstyle and lobe of tergite 9. f–k. *T. kalabakensis*. f, cibarium; g, head, ♂; h, wing, ♂; i, ♀ genitalia; j, ♂ genitalia, dorsal; k, ♂ surstyle.

5. Telmatoscopus kalabakensis Quate, n. sp. Fig. 3f–k.

Male. Body integument brown. Eyes separated by distance equal to about 2–1/2 facets, eye bridge narrowing medially and only 2 facets wide at median margin, bridges connected by interocular suture without median spur; vertex very long, 3–1/2× widest part of eye bridge measured from interocular suture to top of head; frons with sparse band of hairs extending posteriorly on midline to upper 1/4 of eye bridge; cibarium with heavy margins, posterior arms curved; palpus broken. Scape very long, 3–1/2× length of pedicel; remainder of antenna lacking.

Thorax without patagia. Wing membrane lightly tinged with brown with brown spots at forks and tips of veins; radial fork distad of medial and both distad of level of Cu apex; Sc long, extending beyond base of R_{2+3}. Genitalia as figured.

Wing length 2.6 mm; wing width 1.1 mm.

Female. Similar to ♂; eyes separated by distance equal to 3 facets; ratio of palpal segments=8 : 14 : 12 : 15; scape shorter, about 3× length of pedicel; Cu longer and thus medial fork at level of Cu apex. Genitalia as figured.

Wing length 2.2 mm; wing width 0.9 mm.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3087), Kalabakan R., 50 km W of Tawau, North Borneo, 9 to 18–XI–58, secondary forest, Quate.

6. Telmatoscopus pennulus Quate, n. sp. Fig. 4.

Male. Integument dark brown; spatulate hairs on head, palpus, thorax, legs and abdomen (wings denuded). Eyes separated by distance equal to about 2 facets, bridge narrow, with 2 rows of facets and attenuate towards midline, no interocular suture; hairs on frons in shape of trapezoid, sides convergent posteriorly; cibarium with weak sides, posterior arms stronger; palpal segment 4 more slender than other segments, ratio of segments=6 : 8 : 8 : 11. Antenna 16-segmented; scape little less than 2× length of pedicel; flagellar segments strongly nodiform, nodes large, longer than internodes; apiculis broad basally and tapering to rounded apex; ascoids on flagellar segments 1 to 12 a series of rods encircling nodes, few bifurcate, ascoids on 13 and 14 V-shaped.

Thorax without patagia. Wing slender; membrane clear, light brown basally and in costal cell; radial fork far distad of medial and distad of Cu apex; medial fork little basad of Cu apex. Ratio of fore leg = 7 : 8 : 3 : 4, mid leg = 7 : 12 : 4 : 5, hind leg = 8 : 14 : 4 : 5. Genitalia as figured; aedeagus with expanded base, ending in 4 projection; dististyle slenderly elongate apically; surstyle moderately elongate, with 13 tenacula and 2 dark, stout, short spines near base on upper margin.

Antenna 1.2 mm; wing length 2.0 mm; wing width 0.6 mm.

Female. Similar to ♂; without spatulate hairs on head and body; flagellum much less nodiform, nodes smaller; all ascoids V-shaped; genitalia as figured.

Wing length 2.0 mm; wing width 0.6 mm.

DISTRIBUTION: Borneo.

Holotype ♂ (BISHOP 3088), Tenompok, 50 km E of Jesselton, North Borneo, 10–II–59,

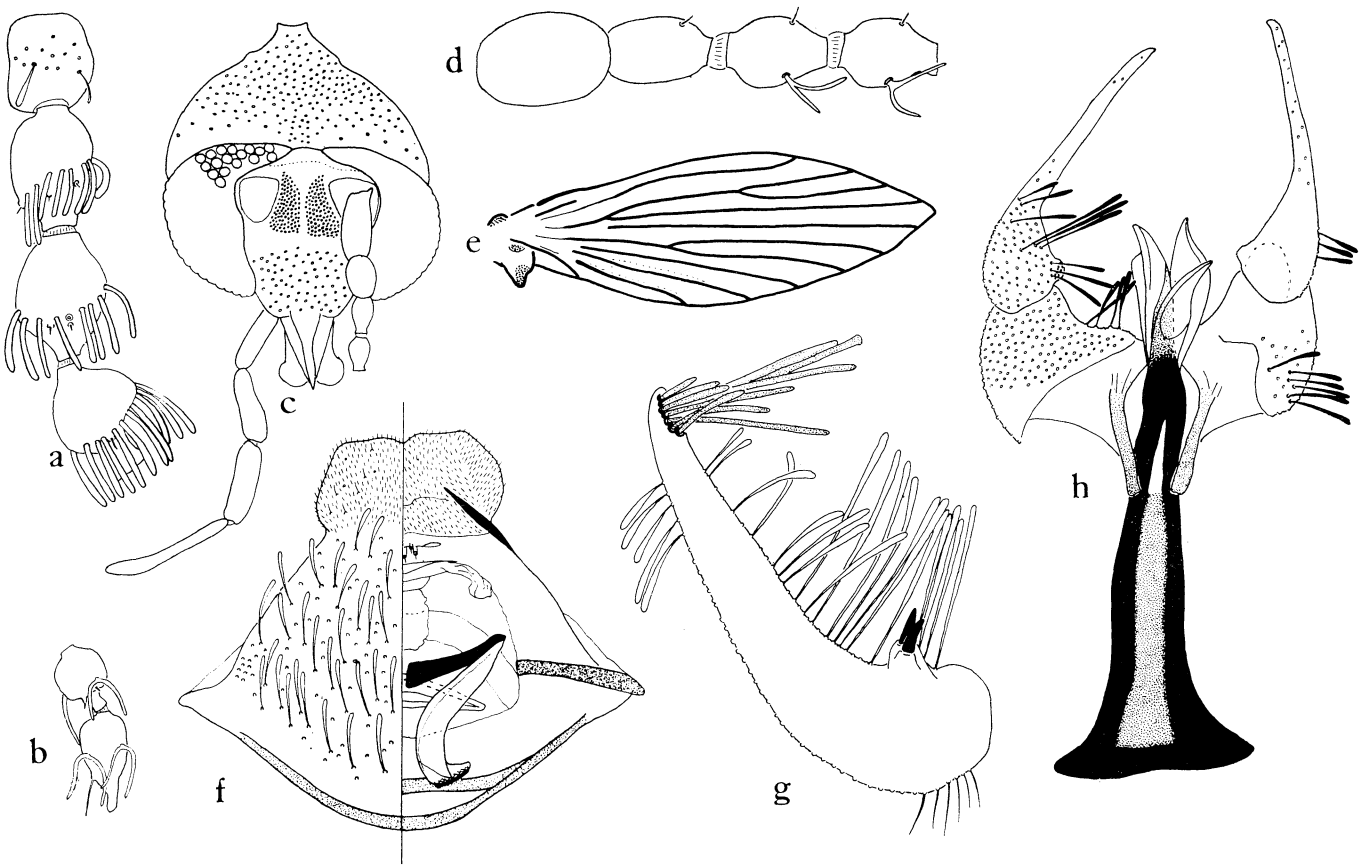

Fig. 4. *Telmatoscopus pennulus.* a, scape and flagellum base, ♂; b, antenna tip, ♂; c, head, ♀; d, scape and flagellum base, ♀; e, wing, ♂; f, ♀ genitalia; g, ♂ surstyle; h, ♂ genitalia, dorsal.

on wet rock, Maa. Allotype ♀ (BISHOP), Kiau, about 40 km E of Jesselton, 4–II–59, on wet rock in small waterfall, Maa.

7. **Telmatoscopus taleolus** Quate, n. sp. Fig. 5.

Male. Body integument brown. Eyes separated by distance equal to 2 facets, eye bridge with 4 rows of facets, bridges connected by curved interocular suture, suture with

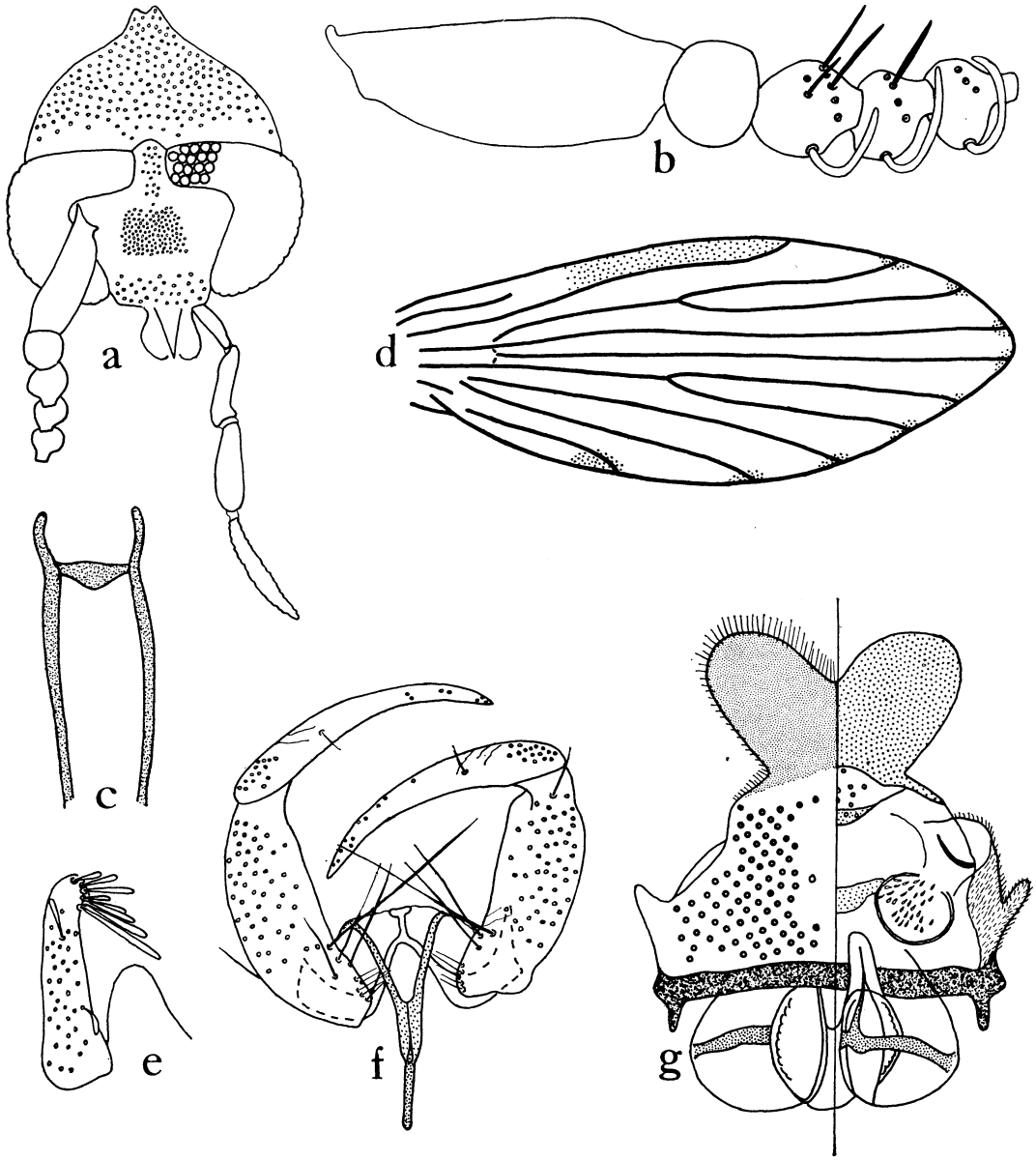

Fig. 5. *Telmatoscopus taleolus.* a, head, ♂; b, antenna base, ♂; c, cibarium; d, wing, ♂; e, ♂ surstyle and lobe of tergite 9; f, ♂ genitalia, dorsal; g, ♀ genitalia.

small median projection and usually weakened at center; vertex 3× as long as width of eye bridge; frons with wide, but sparse, band of hairs extending posteriorly on midline to upper eye margin; cibarium with heavy margins and curved posterior arms extending beyond base of pharynx; ratio of palpal segments=5 : 9 : 10 : 12. Scape 4× length of pedicel; flagellum with large nodes and short internodes, basal segments without internodes, internodes progressively lengthening until at flagellar segment 10 about 1/2 length of node; first 3 flagellar segments with 4 to 7 large hairs arising from dark sockets; ascoids composed of a single, sinuate branch.

Thorax without patagia. Wing membrane lightly tinged with brown with costal cell brown and brown spots at base of R_5 and tips of veins; radial fork little distad of medial and both distad of level of Cu apex; Sc long, extending beyond base of R_{2+3}, sometimes joined to costa, but usually free. Ratio of fore leg=6 : 7 : 3 : 5, mid leg=7 : 10 : 5 : 5, hind leg=7 : 12 : 5 : 5. Genitalia with small, simple, Y-shaped aedeagus; dististyle slender, tapering to acute apex.

Wing length 1.7 mm; wing width 0.6 mm.

Female. Similar to ♂: eyes separated by 3 facets; antenna without large hairs on flagellum, scape shorter, about 2× length of pedicel. Genitalia as figured.

Wing length 1.7 mm; wing width 0.6 mm.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3089), Ranau, North Borneo, 1–X–58, stream margin, Quate. Paratypes (USNM): 3 ♂♂, ♀, same data; ♂, Bau, Bau Dist., Sarawak, 29, 30–VIII–58, open forest, Maa.

8. Telamatoscopus pholidotes Quate, n. sp. Fig. 6.

Male. Integument brown. Head, palpus, scape and pedicel thickly covered with spatulate hairs; eyes separated by distance equal to 6 facets, eye bridge with 4 rows of facets, but attenuate medially, bridges connected by nearly straight interocular suture, suture without median projection; vertex 3× as long as maximum width of eye bridge; frons with sparse, triangular band projecting posteriorly on midline to about lower eye margin; cibarium with moderately strong margins, posterior arms divergent, reaching base of pharynx; palpal segment 4 very slender, ratio of segments=8 : 11 : 11 : 17. Antenna 16-segmented; scape 2–1/2× length of pedicel; basal flagellar segments without internodes, following segments with internodes progressively lengthening until at flagellar segment 9 about 1/2 length of node; terminal node elongate, apiculius thick, about 1/2 length of node; ascoids composed of a single, long, looped rod.

Thorax without patagia. Wing membrane brown, darker in costal and cubital cells; radial fork basad of medial, both considerably basad of Cu apex; Sc ending at base of R_{2+3}; basal 1/2 of wing thickly covered with spatulate hairs. Ratio of fore leg=6 : 6 : 3 : 5, mid leg=8 : 11 : 5 : 6, hind leg=8 : 12 : 5 : 6. Genitalia with bifurcate aedeagus (see discussion below); dististyle slender and blunt apically.

Antenna 1.1 mm; wing length 1.9–2.3 mm; holotype 2.1; wing width 0.9–1.2 mm, holotype 1.1.

Female. Similar to ♂; head and wings without as dense coat of spatulate hairs; wing

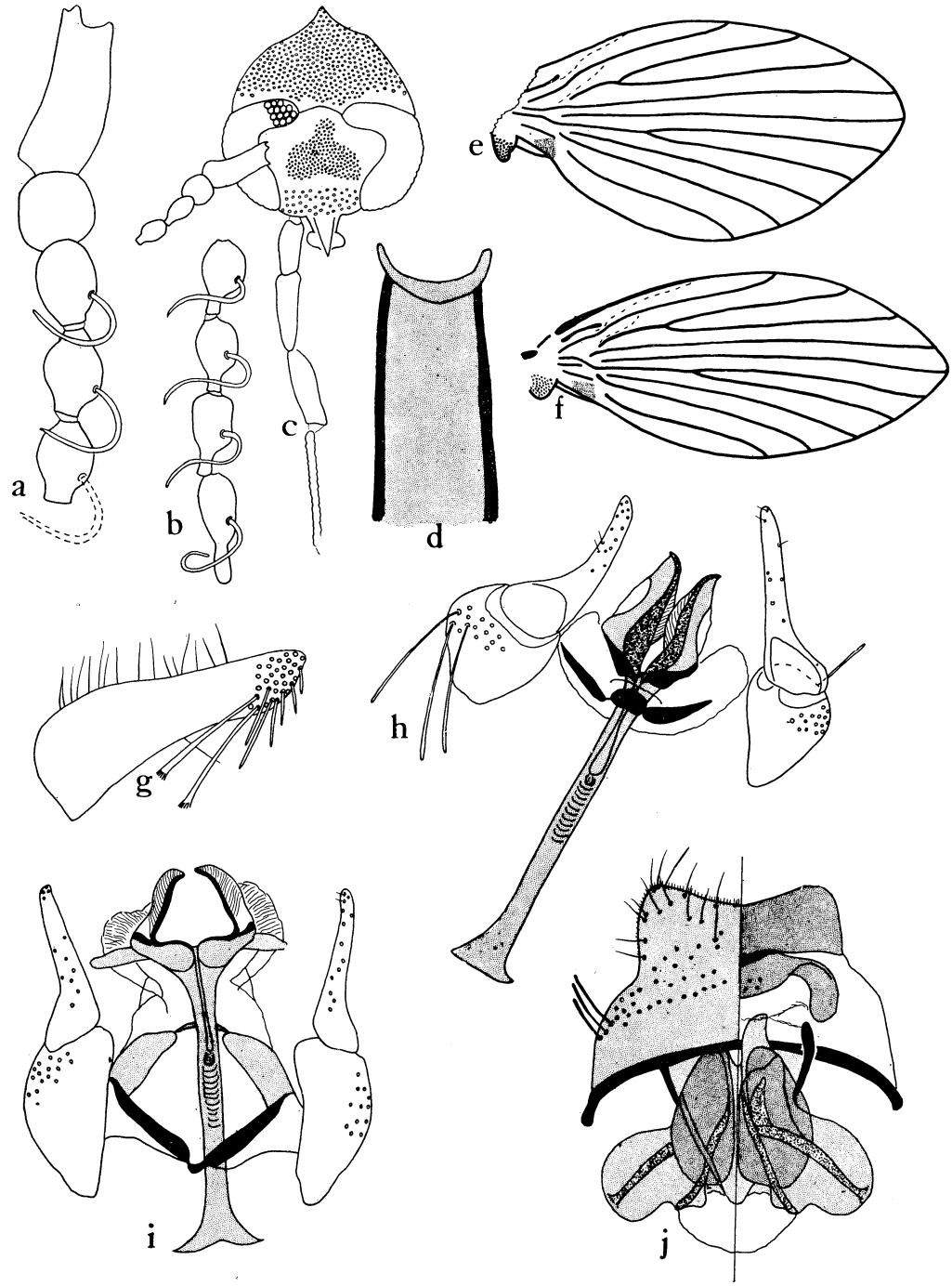

Fig. 6. *Telmatoscopus pholidotes.* a, antenna base, ♂; b, antenna tip, ♂; c, head, ♂; d, cibarium; e, wing, ♂; f, wing, ♀; g, ♂ surstyle; h, ♂ genitalia, dorsal, holotype; i, ♂ genitalia, dorsal, paratype; j, ♀ genitalia.

much narrower; genitalia as figured.

Wing length 2.1 mm; wing width 0.9 mm.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3090), Gomantong Caves, 30 km S of Sandakan, North Borneo, 22–XI–58, stream margin, Quate and Maa. Paratypes (USNM, CAS, BMNH): 31 ♂♂, 6 ♀♀, same locality, 22 to 26–XI–58, Maa and Quate, some in cave; 5♂♂, ♀, Ranau, North Borneo, 1, 3, 6–X–58, stream margin and hillside seepage area, Quate.

Several of the males show the aedeagus in an entirely different aspect than the holotype and other males (fig. 6h). I believe this illustrates the position of the aedeagus during copulation and interpret the action in this way: As the aedeagus is protruded backward out of the abdomen, the dorsal band across the stem moves forward and a ventral band becomes visible which was hidden from view. At the same time the two, black bars, apical in the resting stage (as in fig. 6h), move laterally and their bases backward so in a protruded state they are at right angles to the stem. As this happens, the two bars with feathery margins, which are under the former bars in the resting state, swing upwards and backwards into the position shown in fig. 6i. This is important taxonomically, of course, for the aedeagus in the two positions appears quite dissimilar and different methods of slide preparations could produce what appears to be different species.

9. Telmatoscopus albipunctatus (Williston).

Psychoda albipunctatus Williston, 1893, Ent. News **4** : 113.

Telmatoscopus albipunctatus, Quate, 1959a : 452.

DISTRIBUTION: Widespread and common in tropics.

NORTH BORNEO: Labuan I., 29–XI–58, sweeping at dusk, Maa and Quate; ♂, 3 ♀♀.

10. Telmatoscopus ramosus Quate, n. sp. Fig. 7a–e.

Male. Large species resembling *albipunctatus.* Integument brown to dark brown. Eyes narrowly separated by distance equal to 1 facet, eye bridge wide, with 4 rows of facets, truncate on median margin, bridges connected by arcuate interocular suture with small knob at midline; vertex nearly 2× as long as width of bridge; frons with irregular double row of hairs extending posteriorly on midline to upper eye margin. Scape short, subequal to length of pedicel; flagellum with internodes well developed; ascoids composed of 2 branches, each branch dividing into varying number of branches distally.

Thorax without patagia. Wing membrane lightly tinged with brown, darker in costal and subcostal cells and along hind margin; radial and medial forks on same level basad of Cu apex; Sc ending at base of R_{2+3}; base of M_2 weakened. Genitalia as figured.

Wing length 2.4 mm; wing width 1.2 mm.

Female. Unknown.

DISTRIBUTION: Borneo.

Holotype ♂ (BISHOP 3091), Tenompok, 50 km E of Jesselton, North Borneo, 2–XI–58, Quate.

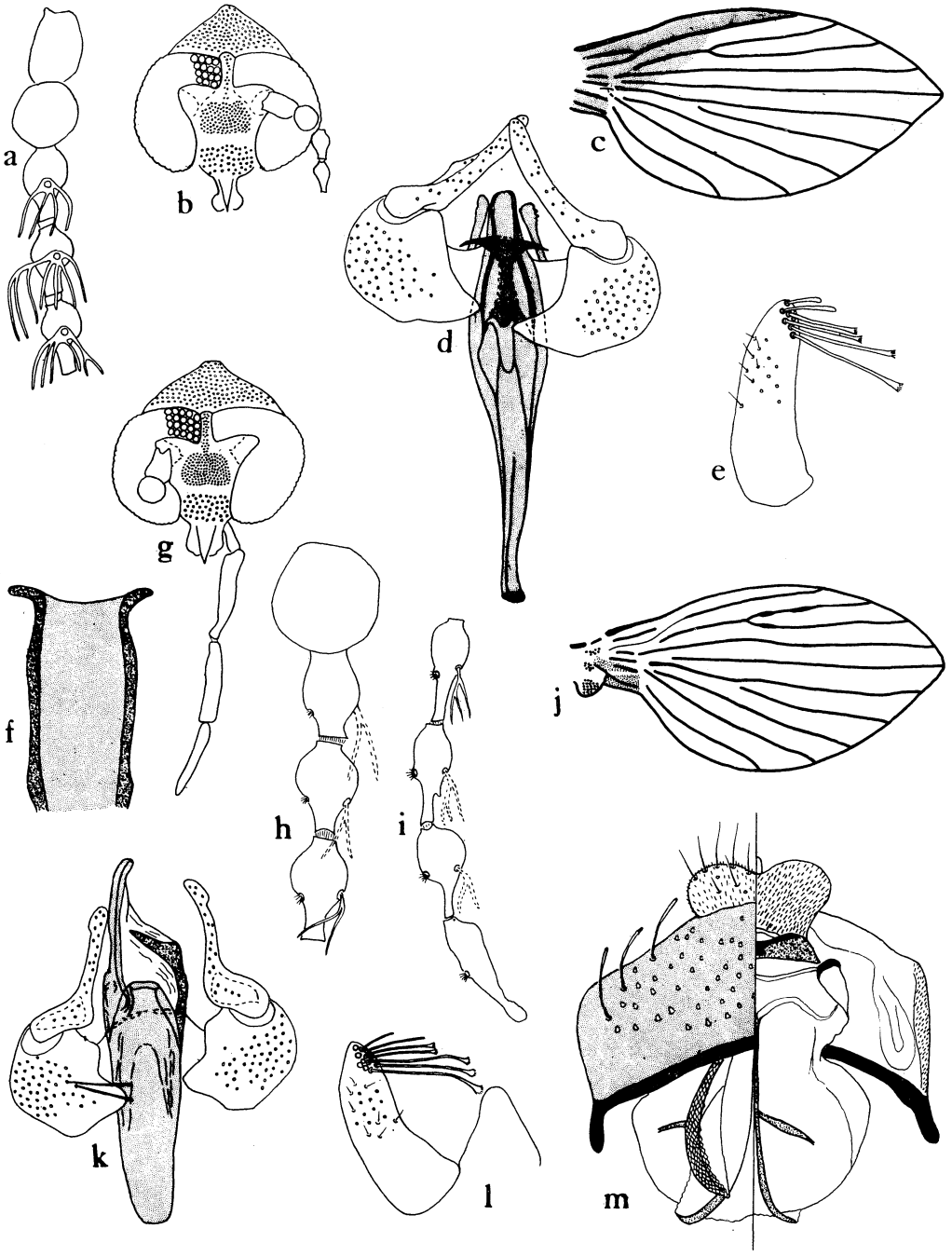

Fig. 7. a–e. *Telmatoscopus ramosus*, ♂. a, antenna base; b, head; c, wing; d, genitalia, dorsal; e, surstyle. f–m. *T. claviculus*. f, cibarium; g, head, ♂; h, scape and flagellum base, ♀; i, antenna tip, ♀; j, wing, ♂; k, ♂ genitalia, dorsal; l, ♂ surstyle and lobe of tergite 9; m, ♀ genitalia.

11. Telmatoscopus claviculus Quate, n. sp. Fig. 7f–m.

Male. Large species resembling *albipunctatus.* Eyes narrowly separated by distance equal to 1 facet, bridge wide, with 4 rows of facets, truncate on median margin, bridges connected by arcuate interocular suture without median projection; vertex about 1–1/2× as long as width of bridge; most of frons covered with hair, narrow median band extending posteriorly to upper eye margin; cibarium with strong margins, posterior arms strongly divergent, nearly at right angle to margins; ratio of palpal segments=6 : 22 : 20 : 18. Scape short, subequal to length of pedicel; flagellar segment 1 barrel-shaped without node (remaining segments lacking, see ♀).

Thorax without patagia. Wing membrane very lightly tinged with brown, little darker in costal cell; R_2 and R_3 with enlargement just distad of fork; radial and medial fork at same level, basad to Cu apex; Sc ending little before base of R_{2+3}; base of M_2 weakened. Ratio of fore leg = 8 : 11 : 5 : ?, mid leg = 10 : 15 : 7 : 7, hind leg = 10 : 16 : 7 : 7. Genitalia with peculiar, asymmetrical aedeagus with foramen in distal 1/3; dististyle slender, with small, apical, clavate enlargement.

Wing length 2.5 mm; wing width 1.4 mm.

Female. Similar to ♂; eyes separated by 3 facets; ratio of palpal segments=6 : 16 : 14 : 16; antenna 16-segmented, flagellar segment 1 compact, without internode, internodes progressively lengthening beyond 2 until as long as node on flagellar segment 10; apiculis thick, elongate and with clavate tip; ascoids originate as single stalk and branch into 2–4 branches; wing with veins heavier than in ♂; genitalia as figured; plate below spermathecae heavily sclerotized; apical lobes of subgenital plate small.

Antenna 1.2 mm; wing length 2.3 mm; wing width 0.9 mm.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3092), Tenompok, 50 km E of Jesselton, North Borneo, 17 to 21–XI–58, at light, Maa and Quate.

12. Telmatoscopus rivularis Quate, n. sp. Fig. 8.

Male. Integument brown. Eyes separated by distance equal to 3 facets, eye bridge with 4 rows of facets, bridges connected by slightly curved interocular suture, suture with small median projection; vertex 3× as long as width of eye bridge; frons with wide, dense band of hairs extending posteriorly on midline to upper eye margin, band as dense as hairs on anterior part of frons and filling space between eyes; cibarium with heavy margins and divergent posterior arms extending to base of pharynx; ratio of palpal segments=5 : 9 : 9 : 12. Scape 2× length of pedicel; flagellum with large nodes and short internodes, basal segment without internode, internodes progressively lengthening until at flagellar segment 4 about 1/2 length of node; ascoids composed of a single sinuate branch.

Thorax without patagia. Wing membrane lightly tinged with brown with little darker brown in anterior part of costal cell; radial fork basad of medial and both well basad of Cu apex; Sc ending at base of R_{2+3} but fold extends distad from end to radial fork; base of R_2 (not R_3) usually weakened at junction. Ratio of fore leg=6 : 6 : 3 : 5, mid leg = 7 : 9 : 5 : 6, hind leg=7 : 12 : 5 : 6. Genitalia with bifurcate aedeagus, yoke-like support projecting posteriorly from base of basistyle under stem of aedeagus.

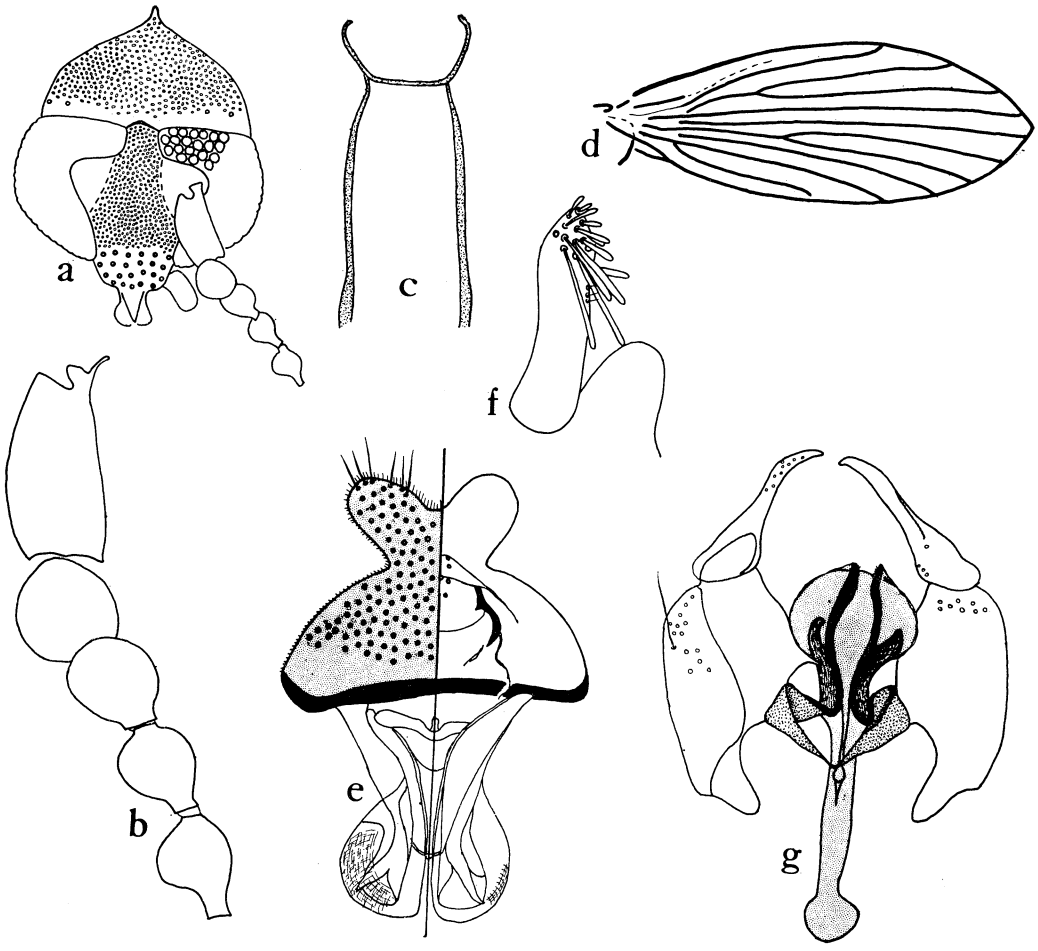

Fig. 8. *Telmatoscopus rivularis.* a, head, ♂; b, antenna base, ♂; c, cibarium; d, wing, ♂; e, ♀ genitalia; f, ♂ surstyle and lobe of tergite 9; g, ♂ genitalia, dorsal.

Wing length 1.7–1.9 mm, holotype 1.9; wing width 0.6–0.7 mm, holotype 0.7.

Female. Similar to ♂, eyes separated by 4 facets, band of hairs on frons not as dense, scape about 1-1/2× length of pedicel; genitalia as figured.

Wing length 1.7–1.9 mm, allotype 1.8; wing width 0.7 mm.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3093), Ranau, North Borneo, 1–X–58, stream margin, Quate. Paratypes (USNM, CAS, BMNH): 8 ♂♂, 14 ♀♀, same data; 2♂♂, 2♀♀, same locality, 3–X–58, roadside vegetation; ♀, 9 km E of Ranau, 28–IX to 7–X–58, Quate.

13. Telmatoscopus kinabalensis Quate, n. sp. Fig. 9.

Male. Integument dark brown; long, spatulate hairs dense on head and base of antenna

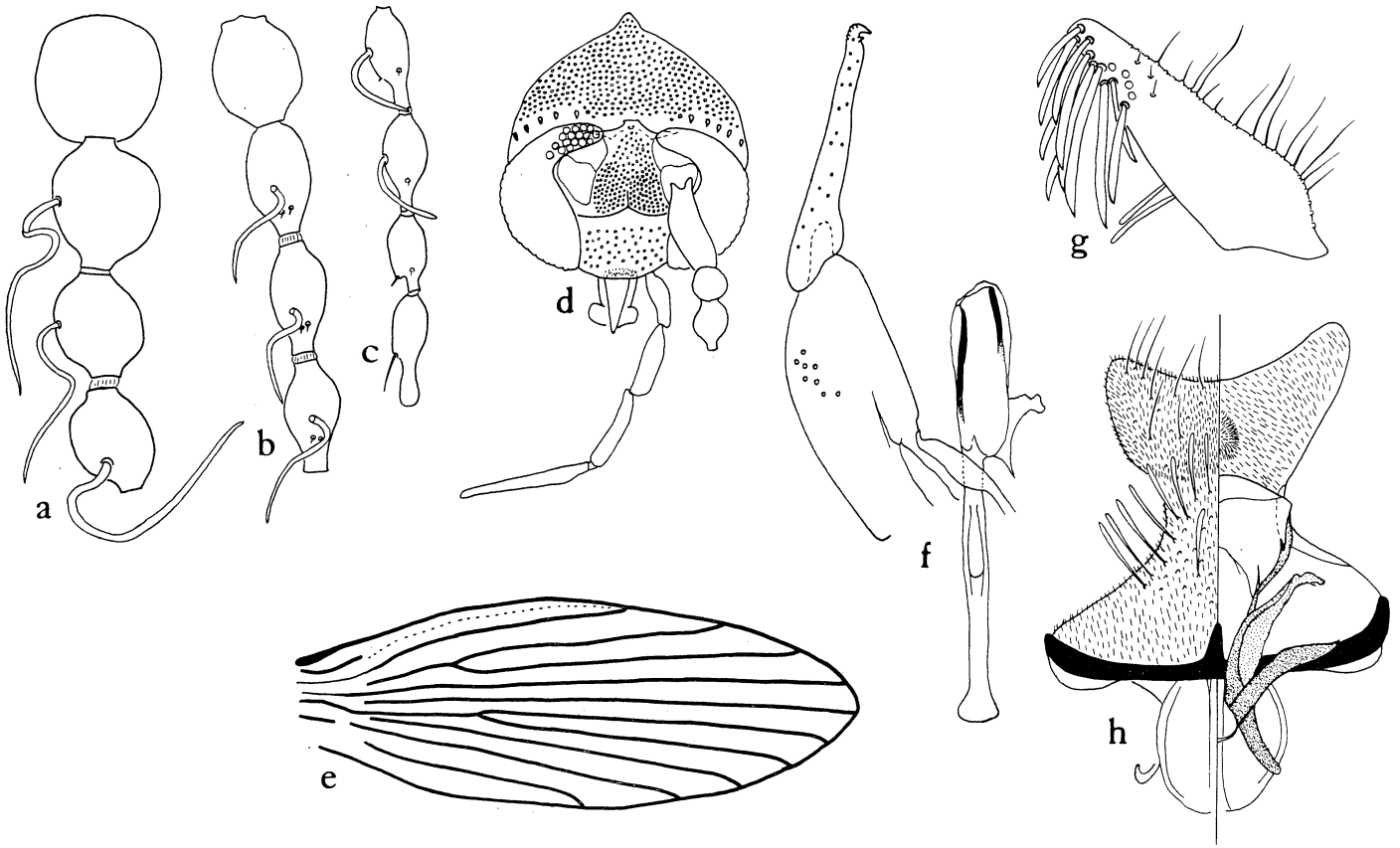

Fig. 9. *Telmatoscopus kinabalensis.* a, scape and flagellum base, ♂; b, scape and flagellum base, ♀; c, antenna tip, ♀; d, head, ♂; e, wing, ♀; f, ♂ genitalia, dorsal; g, ♂ surstyle; h, ♀ genitalia.

(body and wings denuded). Eyes separated by distance equal to 6 facets, bridge with 4 rows of facets, but rounded and narrowed medially; row of large hair sockets along posterior margin of bridge; vertex protuberant apically; interocular suture broadly V-shaped, with small spur midline, broader fold or thickening under suture, additional suture extending towards antennal base from anteriomedian edge of bridge; hairs dense on frons, indistinctly divided into 2 bands posteriorly; strong median projection from frontoclypeal suture; cibarium with margins strongly sclerotized, posterior surface sclerotized, posterior arms divergent; palpal segment 4 longer, more slender, and paler than other segments, ratio of segments=6 : 8 : 10 : 15. Antenna (tip lacking, see ♀) with scape little more than 2 × length of pedicel; first 3 flagellar segments compact, with short internodes, densely covered with spatulate and normal hairs, remaining segments with longer internodes, but internodes shorter than nodes, without thick vestiture; ascoids much longer than segments, curled basally and straight apically.

Thorax without patagia; anterior anepisternum large, semicircular, covered evenly with hair sockets, small patch of about 30 sockets on posteriodorsal corner more than 2× as large as other sockets. Wing slender; membrane light brown with margins little darker, Sc continued to margin as dark brown line; dark brown, elongate spot between bases of R_1 and R_{2+3}; forks near base of wing well before center and basad of Cu apex, radial basad of medial; apex rounded with R_5 ending beyond apex. Ratio of fore leg=8 : 8 : 4 : 5, hind leg=9 : 14 : 5 : 6. Genitalia as figured; aedeagus tubular, surstyle straight, tapering, with about 15 tenacula.

Wing length 1.9 mm; wing width 0.6 mm.

Female. Similar to ♂; without spatulate hairs on head; ratio of palpal segments= 7 : 10 : 12 : 16; antenna 16-segmented, basal flagellar segments without dense hair covering, all internodes shorter than nodes, apiculis thick and nearly as long as node, ascoids little longer than segments, curved; anepisternum as in ♂, but without enlarged sockets on posteriodorsal corner; genitalia as figured, subgenital plate constricted in center, with broad apical lobes.

Antenna 1.1 mm; wing length 2.0 mm; wing width 0.7 mm.

DISTRIBUTION: Borneo.

Holotype ♂ (BISHOP 3094), Tenompok, 50 km E of Jesselton, North Borneo, 10–II–59, on wet rock, Maa; allotype ♀ (BISHOP), Kiau, about 40 km E of Jesselton, 4–II–59, rock in small waterfall, Maa. Paratypes: ♂, same as holotype; ♀, same as allotype.

14. Telmatoscopus quadripenis Quate, n. sp. Fig. 10.

Male. Body integument light brown. Eyes widely separated by distance equal to 6 facets, bridge rounded on median border, interocular suture absent; vertex about 2× as long as widest part of bridge; frons with hairs dense on anterior 1/2, wide band of scattered hairs extending posteriorly to upper eye margin, not joining hair on vertex; cibarium with weak margins and without definite posterior margin, sides concave, posterior arms divergent and extending little beyond base of pharynx; gular ridges strong, irregularly H-shaped; ratio of palpal segments=7 : 10 : 10 : 13. Scape little less than 2× length of pedicel; flagellar segments 1 and 2 elongate barrel-shaped; remainder lacking.

Thorax without patagia. Wing slender with acute apex; membrane tinged with brown;

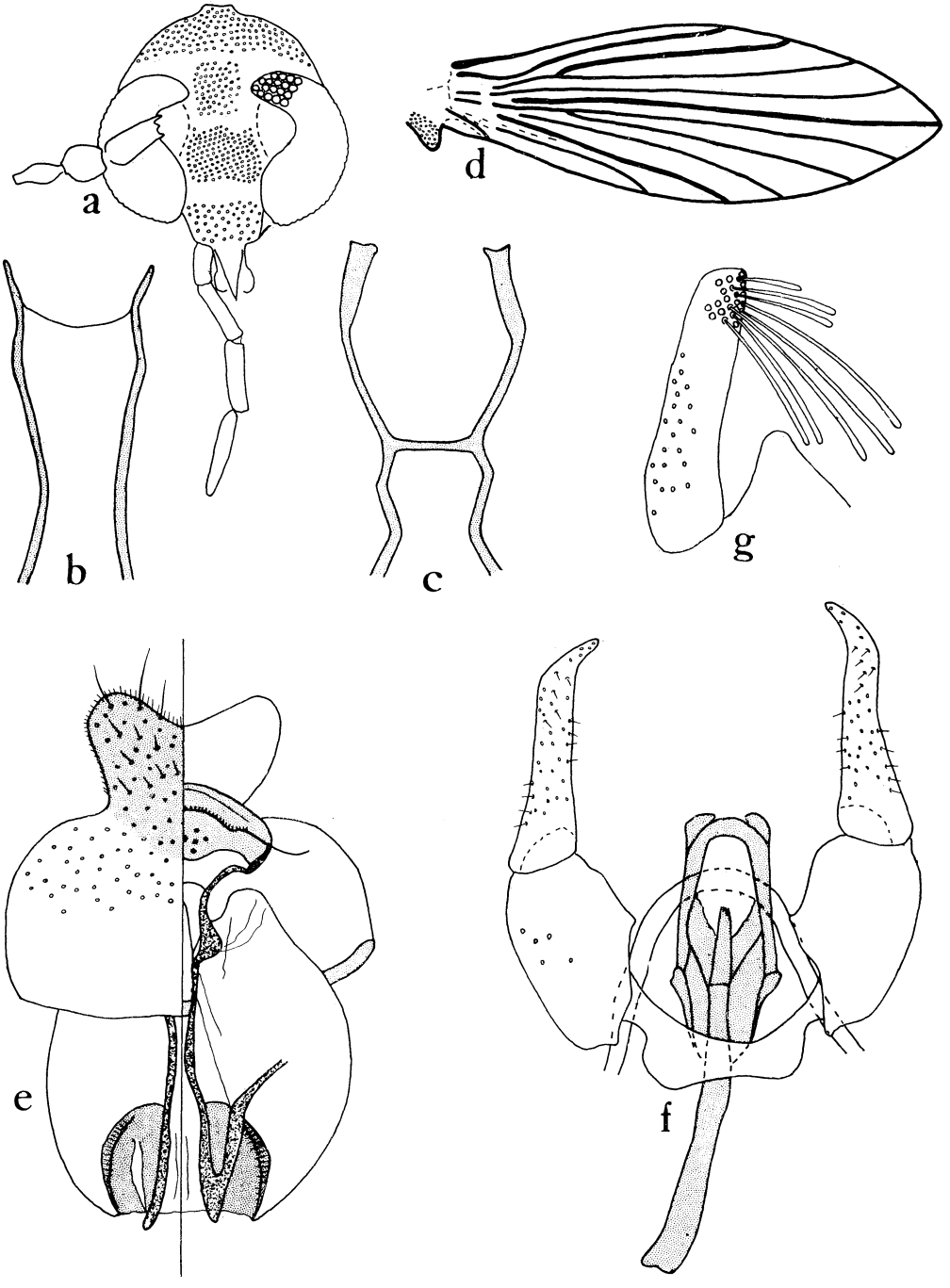

Fig. 10. *Telmatoscopus quadripenis.* a, head, ♂; b, cibarium; c, gula; d, wing, ♂; e, ♀ genitalia; f, ♂ genitalia, dorsal; g, ♂ surstyle and lobe of tergite 9.

radial and medial forks very near base of wing, well before Cu apex, radial little basad of medial. Ratio of fore legs=8 : 9 : 6 : 6, mid leg=8 : 11 : 6 : 6, hind leg=8 : 14 : 7 : ?. Genitalia with dististyle abruptly tapered to acute and slender apex; aedeagus racquet-shaped.

Wing length 2.1–2.4 mm; wing width 0.7–0.9 mm.

Female. Similar to ♂; genitalia as figured.

Wing length 2.5 mm; wing width 0.9 mm.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3095), Ranau, North Borneo, 6–X–58, hillside seepage and 3–X–58, Quate. Paratypes (USNM): 3 ♂♂, same as holotype.

This species is divergent from other species of *Telmatoscopus* on the basis of the widely separated eyes without the interocular suture and the wing venation. If the distal flagellar segments are similar to the barrel-shaped first two, *quadripenis* probably belongs to another genus, but for the present is placed in *Telmatoscopus* where it has its closest relatives. In spite of the abbreviated eye bridges, I do not believe it belongs to *Paratelmatoscopus*, in which the eye bridges are completely absent and which differs in other respects; however, *quadripenis* may prove to be intermediate between *Telmatoscopus* and *Paratelmatoscopus*.

Subgenus **Neotelmatoscopus** Tonnoir

Telmatoscopus (*Neotelmatoscopus*) Tonnoir, 1933, Rec. Ind. Mus. **35** : 65 (type species—*T.* (*N.*) *horai* Tonnoir; India).

RANGE: India, Java, Borneo.

This subgenus was erected to receive those species of *Telmatoscopus* which have the immature stages provided with ventral suckers and live in swift flowing streams attached to rocks at the surface of turbulent water. In habitat and superficial appearance they resemble the immatures of the western hemisphere genus *Maruina*, the Indian genus *Horaiella*, and the Blepharoceridae. There are no subgeneric characters which separate the adults from other subgenera of *Telmatoscopus*.

This is a group in which only two species, *horai* Tonnoir in India and *indica* (Feuerborn) in Java, were previously known.

15. **Telmatoscopus** (**Neotelmatoscopus**) **inachus** Quate, n. sp. Fig. 11.

Male. Eyes contiguous, bridge with 4 rows of facets, except median row with only 3 facets; hairs on frons in quadrangular patch without median band; hairs on clypeus sparse. Antenna 16-segmented; scape apparently considerably larger than pedicel; flagellum strongly nodiform, internodes shorter than nodes, terminal segment with long, slender apiculis. Genitalia (fig. 11 f, g) with dististyle simple, tapering to rounded apex, not bifurcate; surstyle subequal to length of dististyle, with 18 tenacula; lobe of tergite 9 triangular.

Female. Unknown.

Larva (fig. 11a–e). Venter with six suckers; thoracic segments fused, but interabdominal divisions deeply incised laterally; thoracic segments with 1 tergal plate each; abdomen I with 2 tergal plates, remaining with 3 plates each, rugulose band between pro- and

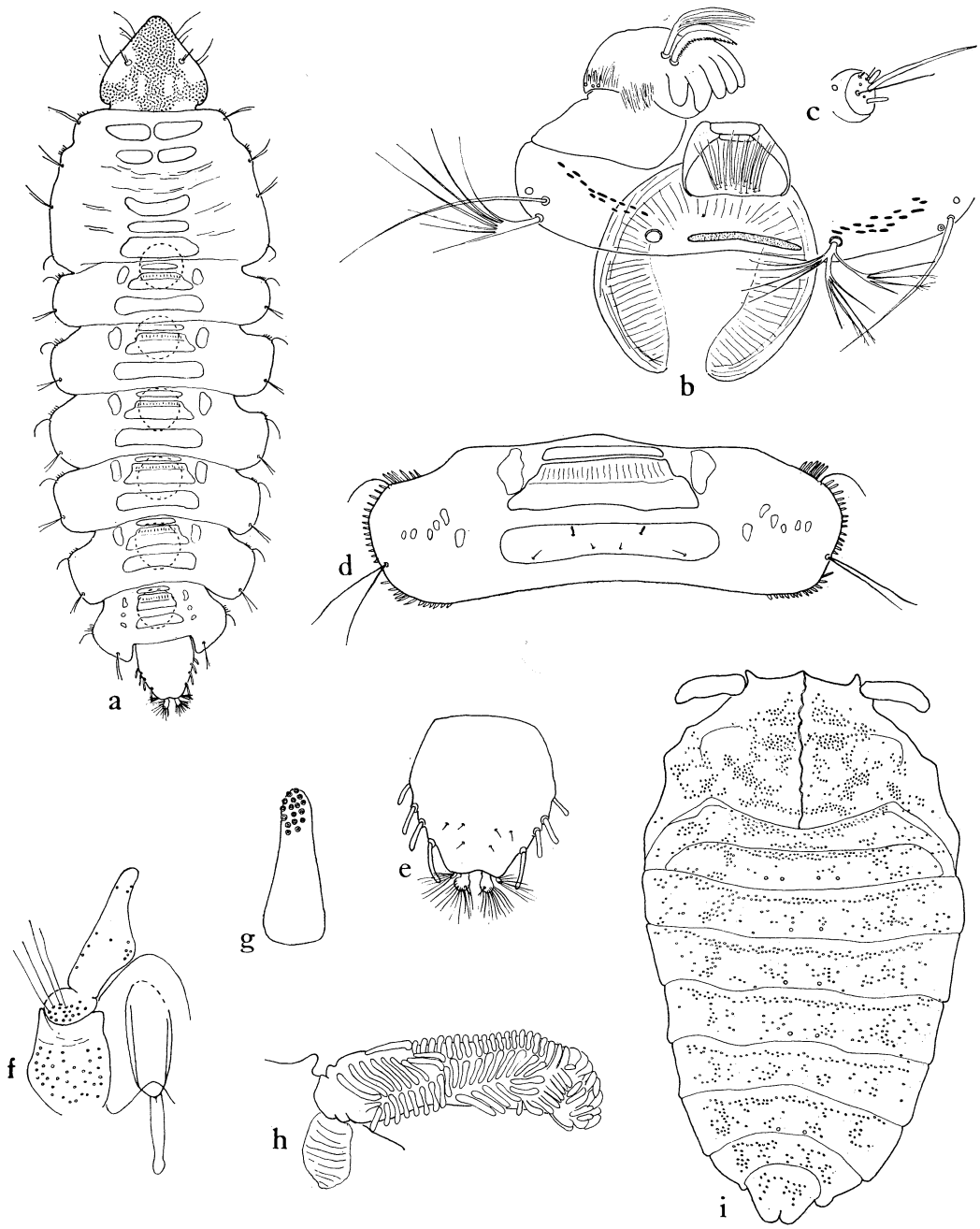

Fig. 11. *Telmatoscopus* (*Neotelmatoscopus*) *inachus*. a–e, larva. a, dorsal view (ventral suckers shown in broken lines); b, oral opening and mandible, ventral; c, antenna; d, abdominal segment 2; e, respiratory siphon, dorsal. f, g. ♂ genitalia. f, dorsal; g, surstyle. h, i. pupa. h, respiratory horn; i, dorsal view.

mesotergal plates; respiratory tube short, a little longer than wide (9 : 7), 3 or 4 thick, blunt bristles on side; other details as figured.

Length of mature larva: 2.1–2.4 mm.

Pupa (fig. 11h, i). Convex dorsally and flattened ventrally; respiratory horn short, about 2–1/2× as long as maximum width, surface with numerous, elongate, rod-like openings; dorsum with few spines and pattern of round dots on each segment; as figured.

Length: 1.5–1.8 mm.

DISTRIBUTION: Borneo.

Holotype, larva (BISHOP 3096), Paring Hot Springs, 13 km N of Ranau, North Borneo. Paratypes (USNM, CAS, BMNH): 2 ♂♂ pupae, 29 larvae, same data.

Adults were not collected, but one male was dissected from a pupa; however it was quite immature and only a few adult characters are visible.

This species agrees well with Tonnoir's (1933) description of *Neotelmatoscopus* and without doubt belongs to that subgenus. It differs most conspicuously from the other two species by the bristles on the side of the larval respiratory tube and the pattern of dots on the pupa. More detailed studies of *horai* and *indica* and better adult specimens of *inachus* will probably show more specific differences than are now evident.

Genus **Paratelmatoscopus** Satchell, NEW STATUS

Telmatoscopus (*Paratelmatoscopus*) Satchell, 1953b : 393 (type species—*Telmatoscopus variegatus* Satchell; Australia).

Adult. Eye bridges lacking, eyes connected by interocular suture; palpus long, thicker than antenna, palpal segment 1 about 1/2 as long as 2; labellum bulbous. Antenna 16-segmented; basal flagellar segment barrel-shaped, following weakly nodiform with slender internodes; ascoids simple, single-branched. Metanotum long, extending to abdominal segment 4 or 5. Wing membrane without vestiture; Rs pectinate; forks before Cu apex in anterior 1/2 of wing, radial little basad of medial, R_5 ending in acute apex. Aedeagus inflated distally; surstyle with single tenaculum.

RANGE: Malaya, Borneo and Australia.

Related to *Telmatoscopus* and distinguished in adults mainly by lack of eye bridges; at the generic level, larvae and pupae are not separable from *Telmatoscopus* and *Pericoma.*

KEY TO MALAYAN SPECIES OF PARATELMATOSCOPUS

1. Medial fork nearer Cu apex than R_4 base, radial about equidistant between medial and R_4 base; wing apex evenly curved on fore and hind margins 2
   Wing forks very near base, both closer to R_4 base than Cu apex; wing apex sharply pointed and slightly concave on hind margin; ♂ dististyle very broad at base and abruptly narrowed before center, basistyle with bilobed, apically rounded appendage (often concealed below basistyle); wing length 2.5 mm or more. Borneo. ..... **16. floricolus**
2. R_1 ending at level between Cu and M_4 apex; flagellum with internodes shorter than nodes; ♂ dististyle tapering to beak-like apex; ♀ unknown. Borneo. .....

.....**17. borneensis**

R_1 longer, ending a little beyond M_4 apex; flagellum with internodes of median segments subequal to length of nodes; ♀ subgenital plate with row of about 8 strong setae along lateral margin before apical concavity; ♂ unknown. Malaya. .....**18. candidus**

16. Paratelmatoscopus floricolus Quate, n. sp. Figs. 12, 13.

Vestiture dark brown (appears black in live specimens) with bright, snow-white patches on first 2 tarsal segments, on upper surface of wing over fold and subapically on wing between tips of M_1 and M_2; vestiture of antenna sparse.

Male. Integument brown. Interocular suture curving upwards on midline and ending in sharp projection; frons with hairs divided into 2 bands on either side of midline covering all but about upper 1/5; cibarium with margins strong, diverging anteriorly, posterior arms curved, extending well above base of pharynx; ratio of palpal segments = 5 : 10 : 8 : 9. Scape and pedicel subequal in length; basal flagellar segments with very short internode, internodes progressively lengthening until by flagellar segment 6 nearly as long as node, subterminal segment barrel-shaped, terminal with long apiculis; ascoids single-branched.

Thorax without patagia; scutum with setose knob on lower margin at base of hind wing margin. Wing membrane brown; radial fork very close to base of R_4, removed by distance no more than width of basal cell; medial fork little distad of radial. Legs with terminal 2 tarsal segments enlarged, terminal very large; ratio of fore leg = 10 : 10 : 4 : 6, mid leg = 10 : 13 : 5 : 6, hind leg = 12 : 14 : 5 : 6. Genitalia with aedeagus complex, but symmetrical; dististyle 1/2 length of basistyle, curved and acute apically; surstyle very long and slender; lobe of tergite 9 (between bases of surstyli) very broad, nearly quadrate.

Antenna 1.6–1.7 mm, holotype 1.65; wing length 2.6–3.2 mm, holotype 2.6; wing width 1.1–1.3 mm, holotype 1.1.

Female. Almost identical to ♂, except genitalic characters; genitalia as figured.

Antenna 1.6–1.7 mm, allotype 1.6; wing length 2.8–3.3 mm, allotype 2.8 mm; wing width 1.1–1.4 mm, allotype 1.1.

Larva (fig. 13). Pedicel of anterior spiracle short. Tergal plates with row of 11–14 short, black, thorn-like accessory setae, arranged in rows in center of thoracic plates, on posterior border of mesotergal plate and anterior border of metatergal plate of abdomen I, near anterior border in remaining plates; prothorax with 3 setulae and 2 true setae on mesotergal plate and 2 setulae and 3 true setae on metatergal; mesotergal plates of meso-, metathorax and abdomen I with 2 setulae and 2 true setae, metatergal plates with 2 setulae and 4 true setae; abdomen II–VII with no setulae and 2 true setae on protergal plate, 2 setulae and 2 true setae on mesotergal plate, 3 setulae and 4 true setae on metatergal plate; other details as figured.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3097), Tenompok, North Borneo, 18–X–58, on ginger leaves, Quate. Paratypes (USNM, CAS, BMNH): 9♂♂, 39♀♀, same, 17–X to 2–XI–58.

Larvae were found in the infloresence of a large (2–3 m) ginger plant (*Amomum* ?) living between the flower part in the sticky liquid of the flower and apparently not feeding on the plant tissues but on the organic matter of the liquid.

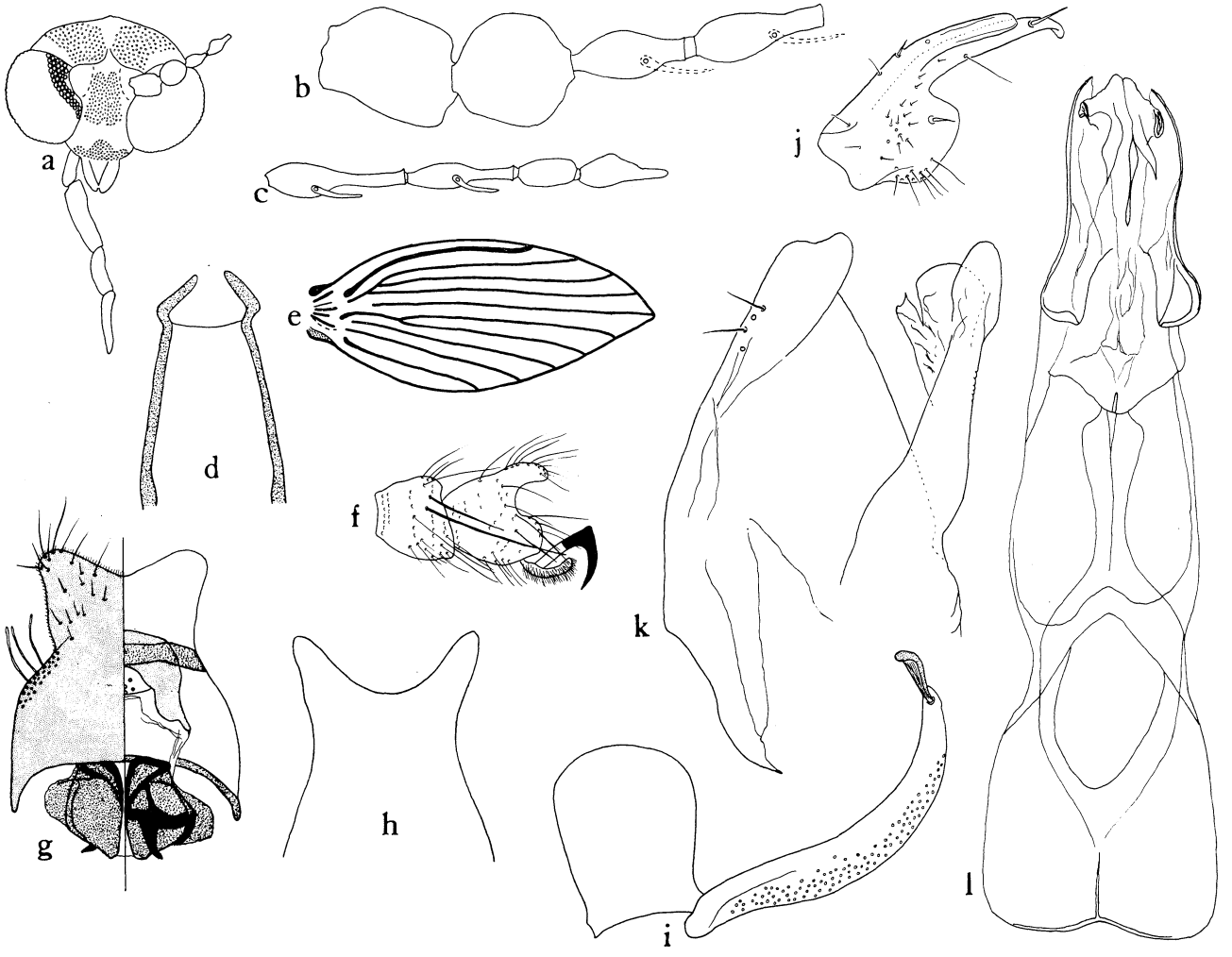

Fig. 12. *Paratelmatoscopus floricolus.* a, head, ♂; b, antenna base, ♂; c, antenna tip, ♂; d, cibarium; e, wing, ♂; f, mid-tarsal segments 4 and 5; g, ♀ genitalia; h, outline of ♀ subgenital plate; i, ♂ surstyle and lobe of tergite 9 (smaller scale than rest of genitalia); j, ♂ dististyle, lateral; k, ♂ basistyle, dorsal; l, ♂ adeagus, dorsal.

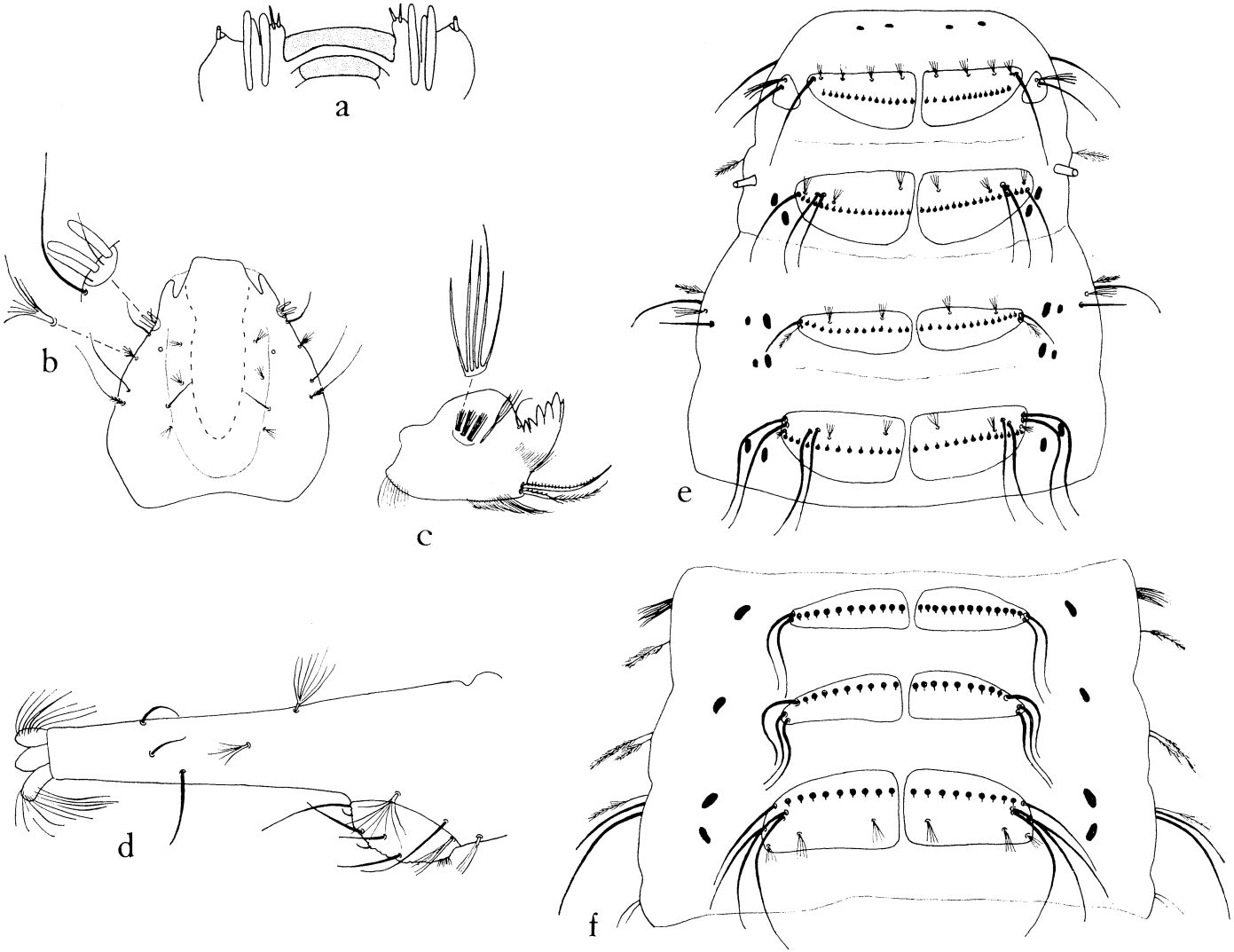

Fig. 13. *Paratelmatoscopus floricolus*, larva. a, labium; b, head, dorsal; c, mandible; d, respiratory siphon, lateral; e, thoracic segments 1 and 2, dorsal; f, abdominal segment 2, dorsal.

17. Paratelmatoscopus borneensis Quate, n. sp. Fig. 14.

Male. Integument brown. Interocular suture curving upward on midline and ending in sharp projection; frons with hairs divided into 2 bands on either side of midline covering all but about upper 1/5; cibarium with margins strong, diverging anteriorly, posterior arms little curved near apex, extending little above base of pharynx; ratio of palpal segments = 6 : 14 : 11 : 11. Scape and pedicel subequal in length; basal flagellar segments with very short internode, internodes progressively lengthening until by flagellar segment 6

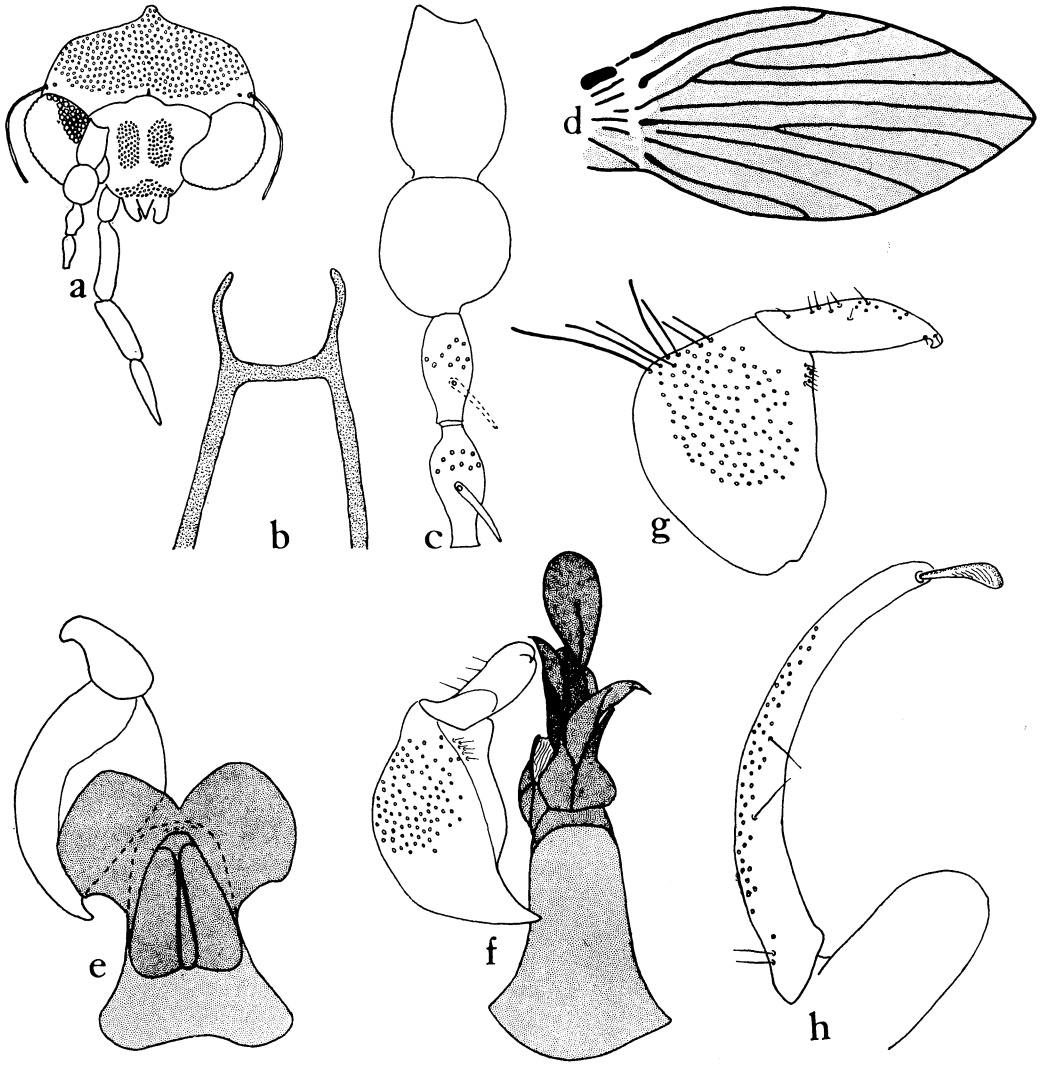

Fig. 14. *Paratelmatoscopus borneensis*, ♂. a, head; b, cibarium; c, antenna base; d, wing; e, coxite and paramere, ventral; f, coxite and aedeagus, dorsal; g, coxite, lateral; h, surstyle and lobe of tergite 9.

nearly as long as node; ascoids simple, rod-like.

Thorax without patagia; scutum with setose knob on lower margin at base of hind wing margin. Wing membrane brown; radial fork distad of base of R_4 by distance equal to about 2× width of basal cell; medial fork distad of radial, about equidistant between level of radial fork and Cu apex. Legs with terminal 2 tarsal segments enlarged, terminal very large; ratio of fore leg = 8 : 8 : 4 : 6, mid leg = 8 : 10 : 4 : 6, hind leg = 8 : 12 : 4 : 6. Aedeagus with very broad base, pair of subapical, lateral spurs and terminus a projecting, paddle-like process; dististyle about 2/3 length of basistyle, ending in sharp hook, surstyle long and slender with single tenaculum; lobe of tergite 9 broad, but not quadrate, about 1/3 longer than wide.

Wing length 1.8–2.0 mm; holotype 2.0; wing width 0.7–0.8 mm; holotype 0.8.

Female. Unknown.

DISTRIBUTION: Borneo.

Holotype ♂ (BISHOP 3098), Gomantong Caves, 30 km S of Sandakan, North Borneo, 22–XI–58, Maa and Quate. Paratypes, 2 ♂♂, same data.

18. Paratelmatoscopus candidus (Satchell), NEW COMBINATION.

Telmatoscopus candidus Satchell, 1958: 33.

DISTRIBUTION: Malaya.

There can be little question that this species belongs to *Paratelmatoscopus* with its lack of eye bridges and pectinate radial sector. I take this opportunity to transfer the species and show the range of *Paratelmatoscopus* extends to Malaya.

Genus **Notiocharis** Eaton

Notiocharis Eaton, 1913, Linn. Soc. London, Trans., ser. 2, **15**: 427 (type species by monotype—*Notiocharis insignis* Eaton; Seychelle Is.).

Adult. Eye bridges very short or lacking, eyes connected by interocular suture; palpus nearly as long as antenna and much thicker, palpal segment 1 less than 1/2 as long as 2; labellum bulbous. Antenna of ♂ 12-segmented, flagellar segment 1 elongate, ♀ antenna 15- or 16-segmented, flagellar segment 1 similar to others, not elongate; flagellar segments barrel-shaped; ascoids simple, rod-like. Wing usually slender; membrane with brown and white pattern, without vestiture; Rs pectinate; forks distad of Cu apex; R_5 ending in acute apex. Coxites complex, dististyle subdivided into 2 segments with inner appendage at base; surstyle with multiple tenacula.

RANGE: Seychelle Is., Borneo, Australia.

Previously known from one species in Seychelles and two in Australia. The genus is the nearest relative of *Pericoma* in the Oriental region, but markedly divergent from that group.

KEY TO BORNEO SPECIES OF NOTIOCHARIS

1. Radial and medial forks on same level at level of M_4 apex; palpal segment 1 about 1/2 length of 2 2

Radial and medial forks basad of M_4 apex; palpal segment 1 about 2/3 length of 2, ♂ genitalia with basal piece of dististyle longer than distal, digitiform process with 2 long, apical setae..... **19. kalabakensis**

2. Male genitalia with dististyle longer than basal piece, aedeagus straight and extending well beyond dististyle; apical lobes of ♀ subgenital plate longer than wide ..... **20. stellae**

Male genitalia with 2 pieces of dististyle subequal in length, aedeagus curved upwards at base and not extending beyond dististyle; apical lobes of ♀ subgenital plate about as long as wide..... **21. sarawakensis**

19. Notiocharis kalabakensis Quate, n. sp. Fig. 15a–f.

Male. Integument brown. Interocular suture slightly convex, expanded and weakened on midline; vertex a little produced and truncate posteriorly; frons with all hairs confined to quadrate patch; cibarium with margins strong and straight; ratio of palpal segment = 8 : 11 : 11 : 13. Antenna (damaged), scape more than 2× length of pedicel, clavate.

Thorax without patagia. Wing slender; membrane pale, light brown in basal part of costal cell and at vein tips; base of R_4 distad of base of R_5; radial and medial forks on same level basad of M_4 apex; R_5 ending beyond wing apex. Legs with tarsi normal; ratio of fore leg=8 : 7 : 3 : 5. Genitalia with dististyle composed of cylindrical, basal piece and shorter, nearly straight apical piece and with bi-setose digitiform process arising from base; aedeagus strongly curved at base, exceeding tip of dististyle; surstyle short, with multiple tenacula.

Wing length 2.1 mm; wing width 0.7 mm.

Female. Similar to ♂; interocular suture of even thickness and strength throughout; genitalia comparatively simple, apical lobes of subgenital plate longer than wide, about 10 small pits on inner face of plate arranged in patch on either side of midline.

Wing length 1.7 mm; wing width 0.6 mm.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3099), Kalabakan R., 50 km W of Tawau, North Borneo, 9 to 18–XI–58, Maa.

20. Notiocharis stellae Quate, n. sp. Fig. 15g–l.

Male. Integument brown. Interocular suture divided and convex medially; vertex a little produced and truncate posteriorly; frons rather evenly covered with hairs; cibarium with margins weak, a little concave below posterior arms; ratio of palpal segments = 6 : 10 : 9 : 12. Antenna (damaged), scape about 2× length of pedicel.

Thorax without patagia. Wing slender; membrane pale with light brown spots around vein tips; veins heavy; base of R_4 far distad of base of R_5; radial and medial forks on same level at about level of M_4 apex; R_5 ending beyond wing apex. Legs with tarsi normal; ratio of fore leg=8 : 7 : 3 : 4, mid leg=8 : 10 : 4 : 5, hind leg=8 : 11 : 4 : 5. Genitalia with dististyle composed of basal piece inflated medially and longer, more slender apical piece and with trisetose digitiform process arising from base; aedeagus straight, exceeding tip of dististyle; surstyle with multiple tenacula.

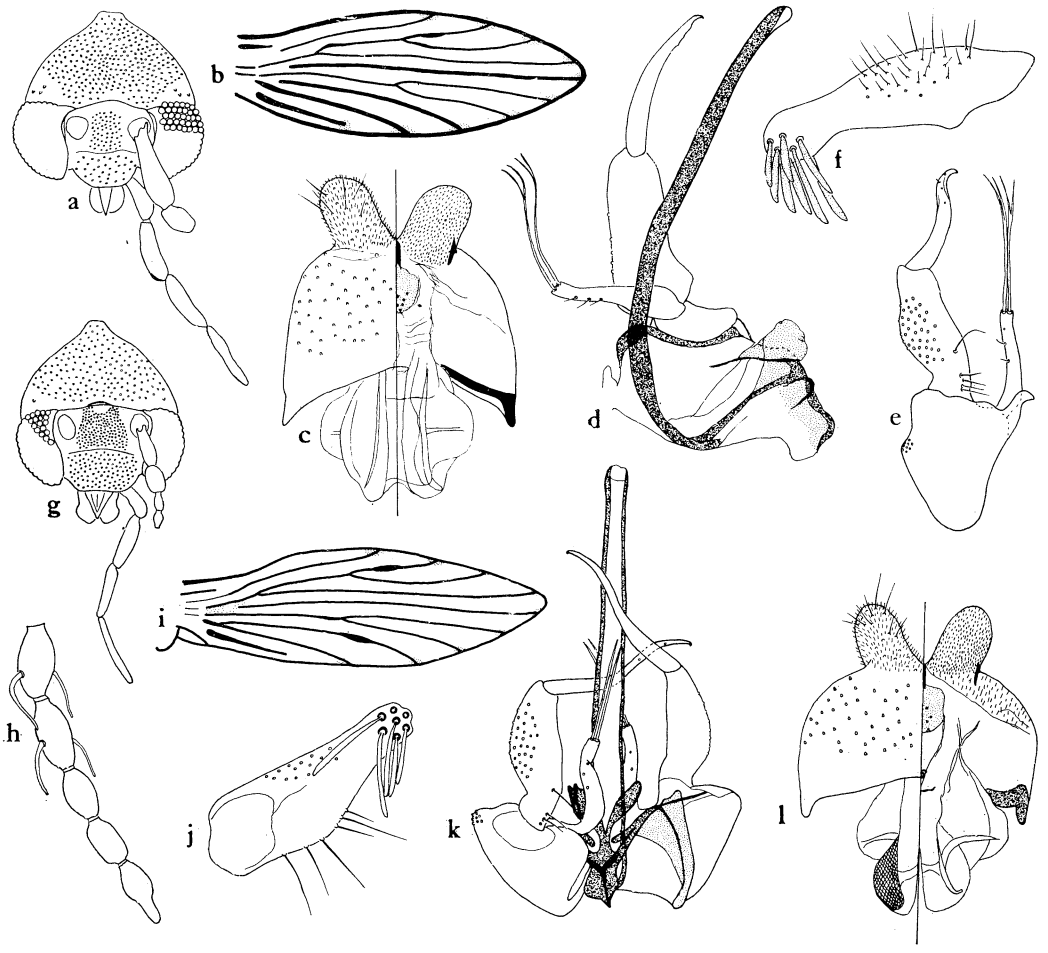

Fig. 15. a–f. *Notiocharis kalabakensis.* a, head, ♂; b, wing, ♀; c, ♀ genitalia; d, ♂ coxite and aedeagus, lateral; e, ♂ coxite, lateral; f, ♂ surstyle. g–l. *N. stellae.* g, head, ♀; h, antenna tip, ♂; i, wing, ♀; j, ♂ surstyle; k, ♂ genitalia, dorsal; l, ♀ genitalia.

Wing length 1.8 mm; wing width 0.6 mm.

Female. Similar to ♂; antenna 16-segmented, scape 1.3× length of pedicel, flagellar segments barrel-shaped, ascoids simple and rod-like; genitalia simple, subgenital plate with lobes longer than wide, 8 small pits on inner face arranged in 2 rows.

Antenna 0.6 mm; wing length 1.7 mm; wing width 0.5 mm.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3100), Ranau, North Borneo, 12 and 7–X–58, at light, Maa and Quate.

It is with pleasure that I name this species in recognition of my wife, Stella, who has greatly aided this study with her meticulous drawings, assistance in making the slides,

and her continued interest.

21. Notiocharis sarawakensis Quate, n. sp. Fig. 16.

Male. Integument light brown. Interocular suture straight; vertex with small, truncate, posterior projection; frons with quadrangular, undivided patch of hairs; cibarium with margins rather weak, a little concave below posterior arms; ratio of palpal segments= 8 : 14 : 12 : 14. Antenna 12-segmented; scape long, about 1–2/3× length of pedicel; flagellar segment 1 very long, cylindrical, little more than 2× length of pedicel, remaining flagellar segments barrel-shaped, apiculis bulbous; ascoids simple, rod-like.

Thorax without patagia; scutum without setose knob. Wing slender; membrane light

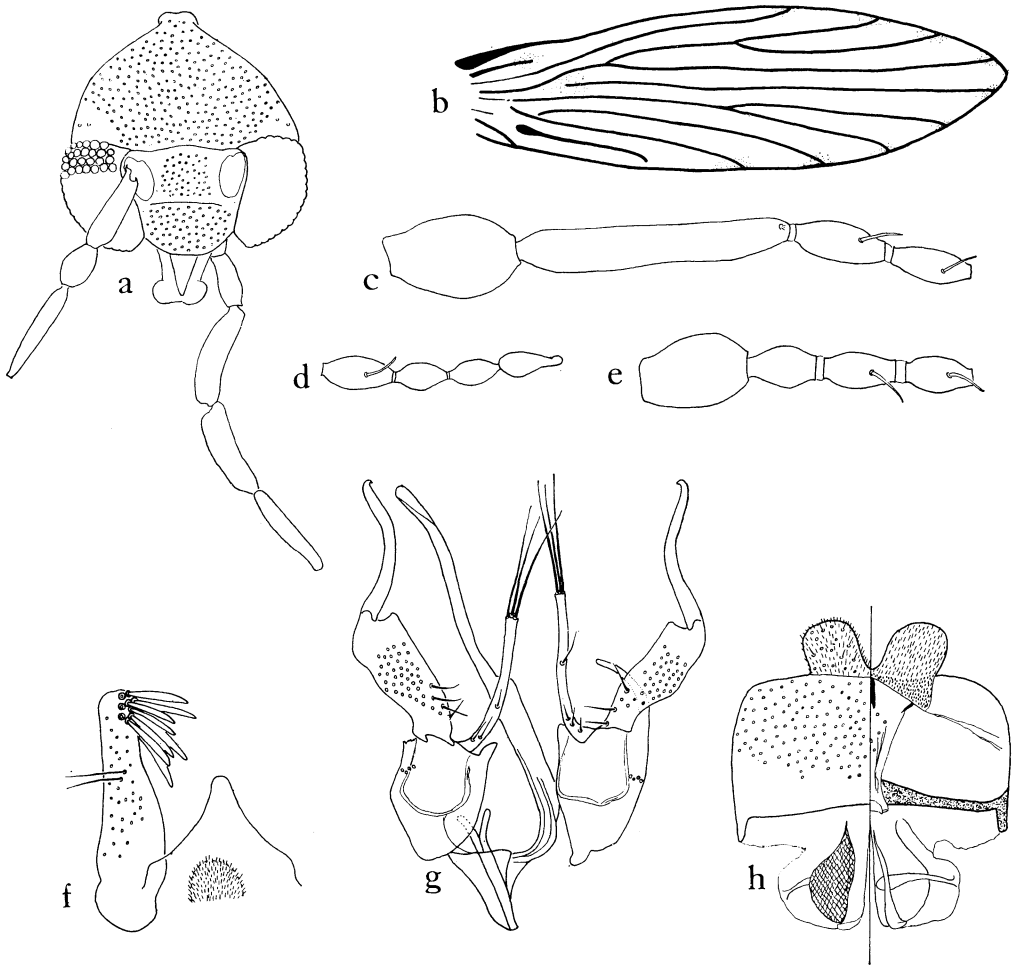

Fig. 16. *Notiocharis sarawakensis.* a, head, ♂; b, wing, ♂; c, scape and flagellum base, ♂; d, antenna tip, ♂; e, scape and flagellum base, ♀; f, ♂ surstyle and lobe of tergite 9; g, ♂ genitalia, dorsal; h, ♀ genitalia.

brown, little darker around vein tips; base of R_4 far distad of base of R_5; radial and medial forks on about same level, nearly on level of M_4 apex. Legs with tarsi normal; ratio of fore leg = 8 : 8 : 3 : 5, mid leg = 9 : 11 : 5 : 5, hind leg = 9 : 12 : 5 : 5. Genitalia with dististyle composed of cylindrical basal piece and long, slender apical piece with long, slender, trisetose, digitiform appendage arising from base; aedeagus very long, but not exceeding tip of dististyle, sinuous, curving upwards at base; surstyle with multiple tenacula.

Antenna 0.8 mm, wing length 2.0 mm; wing width 0.6 mm.

Female. Similar to ♂; antenna (broken, but probably 16-segmented) with flagellar segments barrel-shaped, 1 not longer than others; genitalia simple, subgenital plate with lobes about as long as wide, 7 small pits on inner face arranged ovoidally.

Wing length 1.9 mm; wing width 0.6 mm.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3101), Bau, Bau Dist., Sarawak, 29, 30–VIII–58, sweeping in open forest, Maa. Paratypes (USNM, BMNH): 3♂♂, same data.

Very similar to *stellae*, but separable on the male and female genitalic structures.

Genus **Brunettia** Annandale

Brunettia Annandale, 1910, Rec. Ind. Mus. **5**: 141.—Quate, 1959a: 443 (descr., key).

RANGE: Tropicopolitan (only 2 spp. in west. hemisphere).

Members of this genus are often the most conspicuous (but not the most numerous) psychodids in the tropics, especially those species related to *biformis* Edwards, which have black (or dark brown) vestiture and white spots on the wing margins. In damp areas they are often seen performing a characteristic dance on the upper surface of broad-leafed plants, particularly the ginger family, Zingiberaceae. The dance consists of a series of quick, jerky movements in a figure 8 pattern covering a space of about 15 centimeters. It is performed by both males and females. Interestingly, some acalypterate flies and small, diurnal moths do the same dance, which seems indistinguishable from that of *Brunettia*.

KEY TO BORNEO SPECIES OF BRUNETTIA

1. Flagellum with nodes spherical (and eccentric), considerably wider than internodes; eyes separated by no more than 5 facets and may be contiguous in ♂; palpal segment 2 subequal to 3; palpus 1/2 length of antenna in ♂ and 3/4 in ♀; antenna 14- or 15-segmented 2
   Flagellum with nodes cylindrical and not much wider than internodes; eyes of ♀ separated by distance equal to 1/4 head width; palpal segment 2 twice as long as 3; palpus of ♀ longer than antenna (and probably at least as long in ♂); antenna 16-segmented; ♂ unknown ..... **23. longipalpis**
2. Radial fork distad of medial; eyes of ♂ separated by 3 facets; palpal segment 2 about 3–1/3× length of 1; ♀ unknown ..... **24. brevifurca**
   Radial fork basad of medial; eyes of ♂ contiguous; palpal segment 2 about 5× length of 1 ..... **22. orchestris**

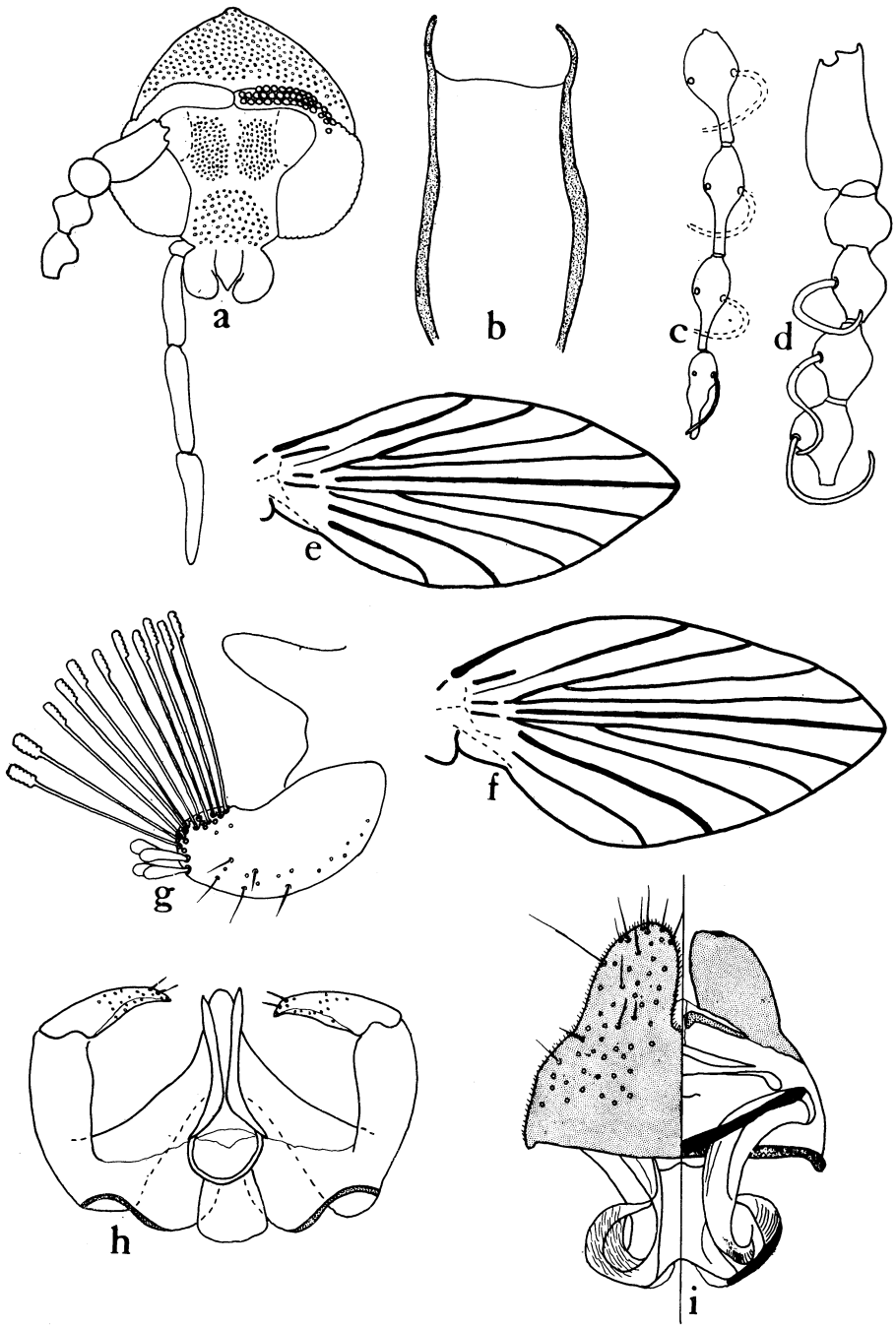

Fig. 17. *Brunettia orchestris.* a, head, ♂; b, cibarium; c, antenna tip, ♂; d, antenna base, ♂; e, wing, ♀; f, wing, ♂; g, ♂ surstyle and lobe of tergite 9; h, ♂ genitalia, dorsal; i, ♀ genitalia.

22. Brunettia orchestris Quate, n. sp. Fig. 17.

Vestiture brown, dark brown on head and thorax. Wing densely covered with hairs and scales on membrane, scales on basal 2/3 of lower surface; alula with long tuft of hairs; small patch of white hairs on upper surface at base and 7 white spots at vein tips, 1 at each vien except R_5 and Cu; leg vestiture brown with white apical ring on mid tarsus.

Male. Eyes contiguous, bridges narrow, 3 facets wide; frons with hairs confined to pair of adjoining patches on anterior 3/4; cibarium with moderately strong and convex margins, posterior arms short and curved; labellum with circle of large setae subapically; palpus 1/2 length of antenna, ratio of segments = 3 : 14 : 14 : 16. Antenna 14-segmented; scape 2× length of pedicel; flagellum strongly nodiform, nodes eccentric, basal internodes short, distal as long as node; terminal segment with double node (fused segments 14 and 15) and long, thick apiculis; ascoids single-branched, sinuous, about 2× length of segments.

Thorax with patagium immediately behind anterior spiracle, patagium about as long as pedicel, lobular, evenly covered with clear pits (gland cell openings) and interspaces with microtrichia. Wing moderately broad, hairs and scales on membrane as well as veins; Sc short and free from radius; radial fork little basad of medial, both basad of Cu apex. Tarsi not enlarged; mid tibia with double row of erect bristles on central 2/3 of anterior margin, 7 or 8 bristles in each row; ratio of fore leg = 7 : 6 : 4 : 5, mid leg = 9 : 9 : 6 : 5, hind leg = 8 : 11 : 5 : 6.

Antenna 1.3–1.4 mm, holotype 1.35; wing length 1.7–2.1 mm, holotype 1.9; wing width 0.8–1.0 mm, holotype 0.9.

Female. Similar to ♂; eyes separated by distance equal to 4 facets, median margin rounded and attenuate, interocular suture present; palpus 3/4 length of antenna; antenna also 14-segmented; thorax without patagia; wing narrower; mid tibia also with bristles; genitalia as figured.

Antenna 0.9–1.0 mm, allotype 0.9; wing length 1.8–2.1 mm, allotype 1.9; wing width 0.7–0.8 mm, allotype 0.8.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3102), Tenompok, 50 km E of Jesselton, North Borneo, 18–X–58, on *Alpinia*, Quate. Paratypes (USNM, CAS, BMNH): 27♂♂, 12♀♀, same locality, 18 to 21–X–58.

Adults were taken from the upper surface of ginger (*Alpinia*) leaves along a hill trail at the edge of forest and above a clearing. They were engaged in the characteristic "figure 8" dance described above. Related to *biformis*, *orchestris* differs in the 14-segmented antenna and genitalic characters.

23. Brunettia longipalpis Satchell, 1958: 25.

DISTRIBUTION: Borneo (Sandakan, North Borneo).

24. Brunettia brevifurca Satchell, 1958: 24.

DISTRIBUTION: Borneo (Mt. Kinabalu).

Genus **Trichopsychoda** Tonnoir

Trichopsychoda Tonnoir, 1922, Soc. Ent. Belgique, Ann. **62**: 59.—Satchell, 1955: 50 (revi-

sion).—Quate, 1959b: 446 (descr., key).

RANGE: In all zoogeographical regions except Neotropical.

KEY TO BORNEO SPECIES OF TRICHOPSYCHODA

Palpal segment 1 about 2/3 length of 2; ♂ dististyle clavate, surstyle with about 5 short tenacula and 5 very long, bell-tipped ones ..... **25. tenompoca**

Palpal segment 1 subequal to length of 2; ♂ dististyle tapered, surstyle with very long, bell-tipped tenacula only ..... **26. tropicalis**

25. Trichopsychoda tenompoca Quate, n. sp. Fig. 18a–e.

Male. Integument brown. Eyes narrowly separated by distance equal to less than 1 facet; eye bridges connected by short interocular suture which projects into median line extending from eye margin to posterior margin of head, bridge with 4 rows of facets, wider than distance from eye margin to antenna; frons with hairs dense on anterior 2/3, elongate, triangular band of hairs on midline reaching lower eye margin and few scattered hairs between eyes; line from anteriomedian eye margin extending 2/3 distance to posteriomedian margin of antennal socket. Labellum expanded, with 3 short setae on either side of midline and 3–4 longer setae laterally, but without apical teeth; ratio of palpal segments = 4 : 6 : 7 : 9. Antenna 16-segmented; terminal 3 reduced, separated, equal in size; ascoids Y-shaped.

Wing densely covered with hairs on membrane; radial and medial forks incomplete, R_3 very short, beginning beyond tip of R_1, M_2 beginning at about level of tip of Cu. Aedeagus expanded bulb-like apically; dististyle clavate with sharp, slender process laterally at base of apical enlargement (left dististyle of paratype as in fig. 18d, which is an aberration; right appendage normal); surstyle with about 5 short tenacula and 5 very long ones with bell-like tips, ventral projection unarmed except for lateral, submarginal seta.

Antenna 1.1 mm; wing length 1.65 mm; wing width 0.7 mm.

Female. Unknown.

DISTRIBUTION: Borneo.

Holotype ♂ (BISHOP 3103), Tenompok, 50 km E of Jesselton, North Borneo, 17 to 21–XI–58, at light, Maa & Quate. Paratype ♂, same locality, 2–XI–58.

26. Trichopsychoda tropicalis Quate, n. sp. Fig. 18f–i.

Male. Body integument brown. Eyes narrowly separated by distance equal to less than 1/2 facet; interocular suture faint, with short, sharp projection in midline above suture; eye bridge with 4 rows of facets, median margin truncate, bridge wider than distance from margin to antenna; frons with hairs concentrated on anterior 2/3, few scattered hairs on midline extending posteriorly to middle of eye bridge, no line from eye margin towards antenna; labellum expanded, with number of short and long setae, but number and arrangement of short median setae indistinct, without apical teeth; palpus extends to internode of antennal segment 7, ratio of segments = 5 : 5 : 8 : 7. Antenna 16-segmented; terminal 3 reduced, separated, subequal in size; ascoids Y-shaped.

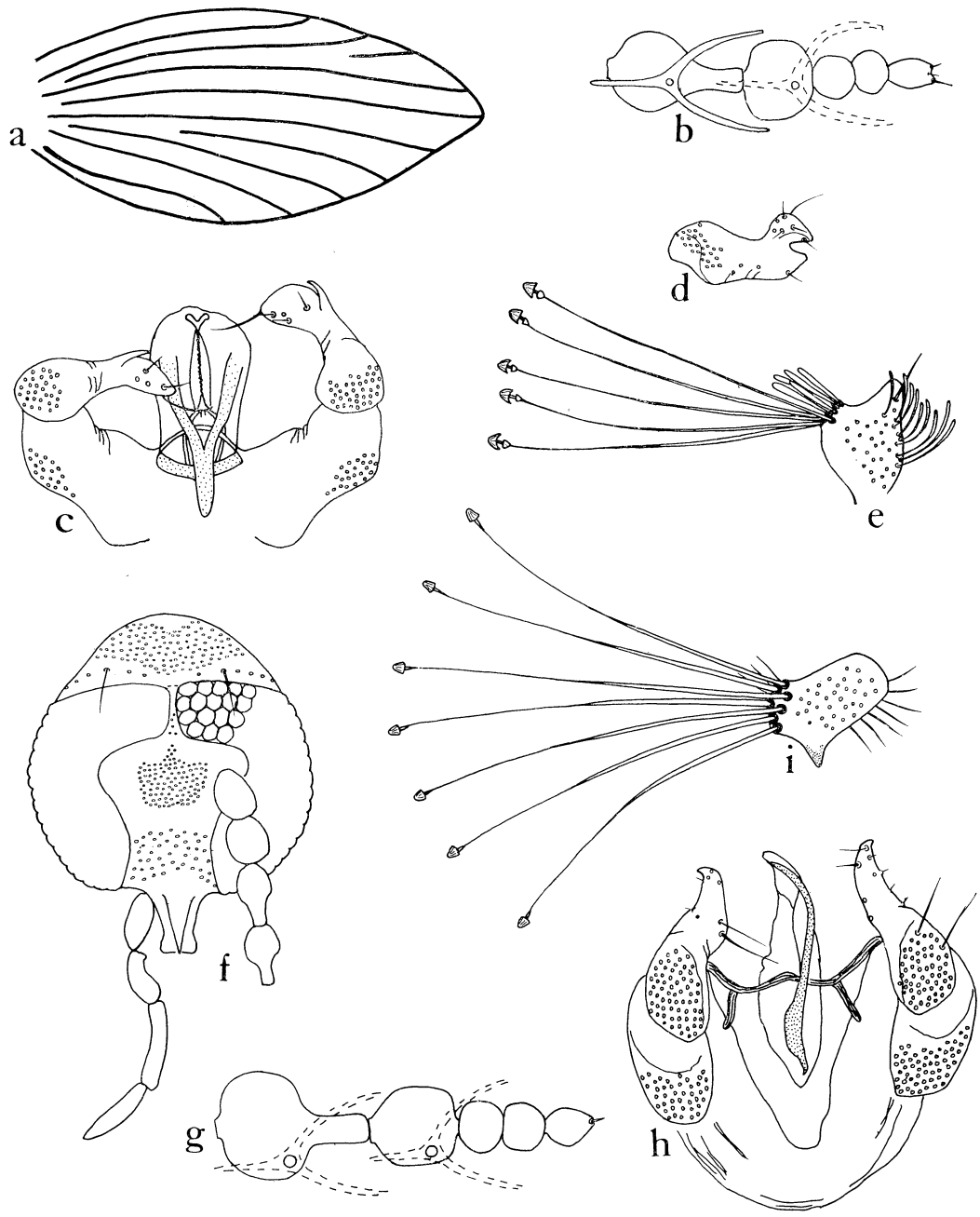

Fig. 18. a–e. *Trichopsychoda tenompoca*, ♂. a, wing; b, antenna tip; c, genitalia, dorsal; d, dististyle, lateral, aberration; e, surstyle. f–i. *T. tropicalis*, ♂. f, head; g, antenna tip; h, genitalia, dorsal; i, surstyle.

Wing densely covered with hairs on membrane; radial and medial forks incomplete, R_3 very short, beginning beyond tip of R_1, M_2 beginning little before level of tip of Cu. Surstyle only with about 10 long, bell-tipped tenacula apically and with sharp, unarmed ventral process.

Antenna 0.9 mm; wing length 1.4 mm; wing width 0.5 mm.

Female. Unknown.

DISTRIBUTION: Borneo.

Holotype ♂ (BISHOP 3104), Ranau, North Borneo, 14–XI–58, at light, Maa.

Genus **Philosepedon** Eaton

Philosepedon Eaton, 1904, Ent. Mo. Mag., ser. 2, **15**: 57.—Quate, 1959b: 448 (type species—*Psychoda humeralis* Meigen).

Lepidopsychoda Edwards, 1928: 71 (type species—*Lepidopsychoda tineiformis* Edwards). **New Synonymy.**

Telmatoscopus (*Minioceros*) Quate, 1959a: 455 (type species — *Telmatoscopus squamalatus* Quate). **New Synonymy.**

RANGE: Holarctic, Ethiopian, Oriental (incl. Polynesia and Micronesia).

The distinguishing characters of *Philosepedon* are: The nodiform antenna with the terminal three segments reduced, the large, Y-shaped ascoids, the bulbous labellum, the large palpus with the first segment much shorter than the following, the radial fork distad of the medial, and R_5 ending in the wing apex. The wing membrane is bare, haired, or scaled and the male surstyle is with one or several tenacula.

The redefinition of *Philosepedon* (Quate, 1959b) must be modified now to include species with scales on the wing membrane. The species discussed below form a series of related taxa between the extremes of the genus, represented by *Philosepedon humeralis* with a bare membrane and *Lepidopsychoda tineiformis* with a scaled membrane. When fewer species were known, there appeared to be a gap between these two groups, but the new species fill the gap with intermediate forms. Consequently, *Lepidopsychoda* falls as a synonym of *Philosepedon* with the expansion of the latter.

Telmatoscopus (*Minioceros*) was erected for a single species before *Lepidopsychoda tineiformis* was adequately known. A study of the types of *tineiformis* shows it to be the same species as the type species of *Minioceros* and, thus, the latter also falls as a synonym of *Philosepedon.*

KEY TO BORNEO SPECIES OF PHILOSEPEDON

1. R_{2+3} without tumor-like enlargement near center, usually much longer than R_2.....2
   R_{2+3} with tumor-like enlargement near center, R_2 and R_{2+3} subequal; ♂ surstyle with 2 tenaculae, 1 subterminal; ♀ subgenital plate with apical indentation evenly concave..... **27. parciproma**
2. Eyes separated by at least 4 facets; sides of eye bridge convergent medially, median border rounded.....3
   Eyes separated by no more than 3 facets, usually less; sides of eye bridge parallel, median margin truncate 4

3. R_{2+3} distinctly longer than R_2; ♂ dististyle evenly tapering from base to apex, with very long bristle at base, bristle longer than dististyle; ♀ subgenital plate strongly bilobate with marked apical indentation.....**28. tineiformis**
   R_{2+3} and R_2 subequal; ♂ dististyle a little enlarged on basal 1/2 and abruptly tapering to apex, without very long bristle at base; ♀ unknown. Java...**29. trimicra**
4. Eyes separated by no more than 1–1/2 facets; facets on eye bridge compact, lower row not scattered..... 5
   Eyes separated by about 3 facets; facets on bridge not always compact, those on lower row scattered and separated; ♂ surstyle with 1 tenaculum ..... **30. fratruelis**
5. Palpus much longer than head height (including proboscis); large species, wing length 2.7 mm or more; ♂ surstyle with 1 tenaculum; ♀ unknown..... **31. operosa**
   Palpus subequal to head height (including proboscis); smaller species, wing length 2.3 mm; ♂ surstyle with 2 tenacula; ♀ unknown.....**32. pudica**

27. Philosepedon parciproma Quate, n. sp. Fig. 19a–f.

Male. Eyes separated by distance equal to less than 1 facet; bridge with 4 rows of facets, all facets compact, width subequal to vertical distance from lower margin to antenna socket, margins parallel, median margin broadly truncate; interocular suture straight, thick and with thick posterior projection; vertex with sparse row of larger sockets along anterior margin parallel to eye margin, without cluster near interocular suture, apex bituberculate; suture on back of head from center of vertex tubercles extending to foramen; frons with hairs concentrated on anterior 2/3, with several sockets on midline posteriorly, without laterioposterior patches; cibarium with margins weak, slightly concave below posterior arms; palpus lacking.

Thorax without patagia. Wing acutely pointed; membrane light brown, little darker in costal cell; R_{2+3} with enlargement near center; R_{2+3} and R_2 subequal. Ratio of fore leg = 9 : 8 : 3 : 6, mid leg = 10 : 12 : 5 : 6, hind leg = 9 : 15 : 5 : 6. Genitalia tubular, expanded at center, flanked by slender parameres; dististyle nearly straight, evenly tapering; surstyle with 2 tenacula, 1 subterminal 1/5 distance from apex.

Wing length 2.3 mm; wing width 0.9 mm.

Female. Similar to ♂; vertex tubercles not as strongly developed; subgenital plate with pair of circular, striated lobes on inner face.

Wing length 2.4 mm; wing width 1.0 mm.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3105), Tenompok, 50 km E of Jesselton, North Borneo, 2 to 4–II–59, Maa.

28. Philosepedon tineiformis (Edward), NEW COMBINATION.

Lepidopsychoda tineiformis Edwards, 1928: 72.

Telmatoscopus (Minioceros) squamalatus Quate, 1959a: 455. **New Synonymy.**

Comparison of *squamalatus* with the types of *tineiformis* shows that the two are synonymous.

DISTRIBUTION: Caroline Is., Mariana Is., Samoa, Fiji, Borneo.

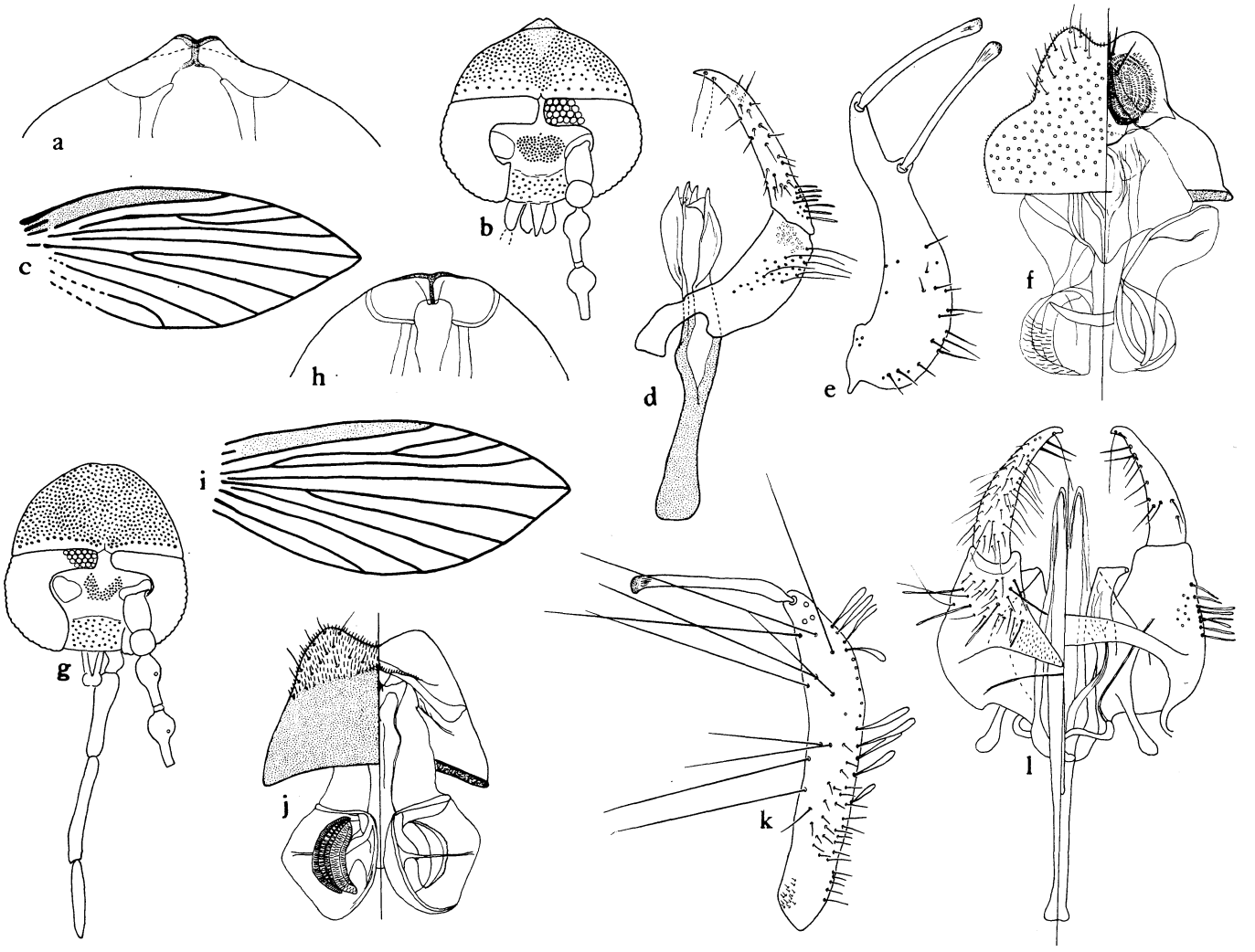

Fig. 19. a–f. *Philosepedon parciproma.* a, posterior view of apex of head, ♂; b, head, ♂; c, wing, ♂; d, ♂ genitalia, dorsal; e, ♂ surstyle; f, ♀ genitalia. g–l. *P. fratruelis.* g, head, ♂; h, posterior view of apex of head, ♂; i, wing, ♂; j, ♀ genitalia; k, ♂ surstyle;, l, ♂ genitalia dorsal on left, ventral on right.

NORTH BORNEO: Gomantong Caves, 30 km S of Sandakan, 22 to 26-XI-58, Maa; Kalabakan R., 50 km W of Tawau, 11-XI-58, Maa and Quate; 5♂♂, 2♀♀.

29. Philosepedon trimicra (Edwards), NEW COMBINATION. Fig. 20.

Brunettia (*Parabrunettia*) *trimicra* Edwards, 1927, Treubia **9**: 364.

Brunettia trimicra, Enderlein, 1937, Deutsch. Ent. Zeitschr. 1936: 105.

Lepidopsychoda trimicra, Edwards, 1928: 72.

DISTRIBUTION: Java.

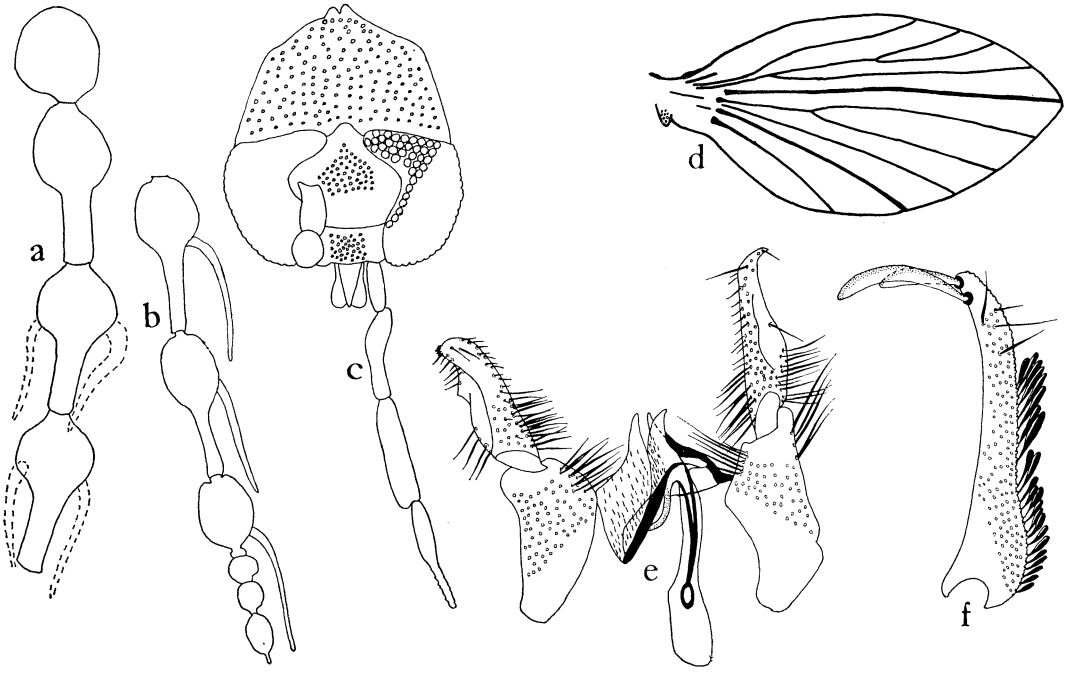

Fig. 20. *Philosepedon trimicra*, ♂. a, scape and flagellum base; b, antenna tip; c, head; d, wing; e, genitalia, dorsal; f, surstyle.

Although this species does not occur in Borneo, it is included here for comparison with other species of *Philosepedon* and, also, the opportunity is taken to publish the illustrations drawn of the holotype at the British Museum (Natural History).

30. Philosepedon fratruelis Quate, n. sp. Fig. 19g–l.

Male. Eyes separated by distance equal to 3 facets; bridge with 4 rows of facets, lower row separated and scattered, width of bridge subequal to vertical distance from lower margin to antennal socket, margins parallel, median border truncate; interocular suture Y-shaped, stem as long as arms; vertex with larger row of sockets along anterior margin parallel to eye margin, cluster of 5–6 sockets on either side of interocular suture, apex indented but not tuberculate, suture extending from vertex indentation to foramen on back of head; frons with hairs concentrated on anterior part and pair of posterior projections, midline bare; cibarium with margins weak, concave below posterior arms; pal-

pus longer than head height (including proboscis) ratio of segments = 6 : 18 : 22 : 16. Antenna typical of genus.

Thorax without patagia. Wing acutely pointed; membrane light brown, brown basally and in costal cell; R_{2+3} without enlargement; ratio of R_{2+3}: R_2 = 16 : 11. Ratio of fore leg = 9 : 12 : 4 : 8, mid leg = 11 : 12 : 5 : 8, hind leg = 11 : 20 : 6 : 8. Genitalia with many setae and bristles; aedeagus straight, simple, split near center; dististyle evenly tapering; surstyle with single tenaculum.

Wing length 2.7 mm; wing width 1.1 mm.

Female. Similar to ♂; subgenital plate with shallow concavity.

Wing length 2.5 mm; wing width 1.0 mm.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3106), Tenompok, 50 km E of Jesselton, North Borneo, 14 and 13–II–59, Maa. Paratype ♂, same locality, 13–II–59.

31. Philosepedon operosa Quate, n. sp. Fig. 21a–f.

Male. Eyes separated by distance equal to about 1 facet; bridge with 4 rows of facets, all facets compact, width greater than vertical distance from lower margin to antennal socket, margins parallel, median margin broadly truncate; interocular suture Y-shaped, stem little shorter than arms; vertex with sparse row of larger sockets along anterior margin parallel to eye margin, without cluster near interocular suture, apex indented but not tuberculate; suture on back of head short, not reaching foramen, bounded by sclerotized area; frons with hairs concentrated on anterior 2/3, without posterior patches, with several sockets on either side of midline posteriorly; cibarium with margins moderately strong, straight; palpus considerably longer than head height (including proboscis), ratio of segments = 10 : 19 : 22 : 18.

Thorax without patagia. Wing acutely pointed; membrane light brown, darker in costal cell; R_{2+3} without enlargement; ratio of R_{2+3} : R_2 = 16 : 14. Ratio of fore leg = 10 : 12 : 4 : 7, mid leg = 11 : 17 : 6 : 8, hind leg = 11 : 20 : 6 : 8. Genitalia with aedeagus ending in upturned point flanked by large parameres with expanded, plate-like tips; dististyle parallel-sided until near apex and ending in curved, beak-like process; surstyle densely covered with deciduous hairs and fewer setae, with single tenaculum.

Antenna 1.9 mm; wing length 2.9 mm; wing width 1.1 mm.

Female. Unknown.

DISTRIBUTION: Borneo.

Holotype ♂ (BISHOP 3127), Tenompok, 50 km E of Jesselton, North Borneo, 2–XI–58, Quate. Paratype ♂, same locality, 19–II–59, Maa.

32. Philosepedon pudica Quate, n. sp. Fig. 21g–k.

Male. Eyes narrowly separated by distance equal to less than 1 facet; bridge with 4 rows of facets, all facets compact, width much greater than vertical distance from lower margin to antennal socket, margins parallel, median border broadly truncate; interocular suture Y-shaped, stem as long as arms; vertex with row of larger sockets along anterior margin parallel to eye margin, cluster of about 10 sockets on either side of interocular su-

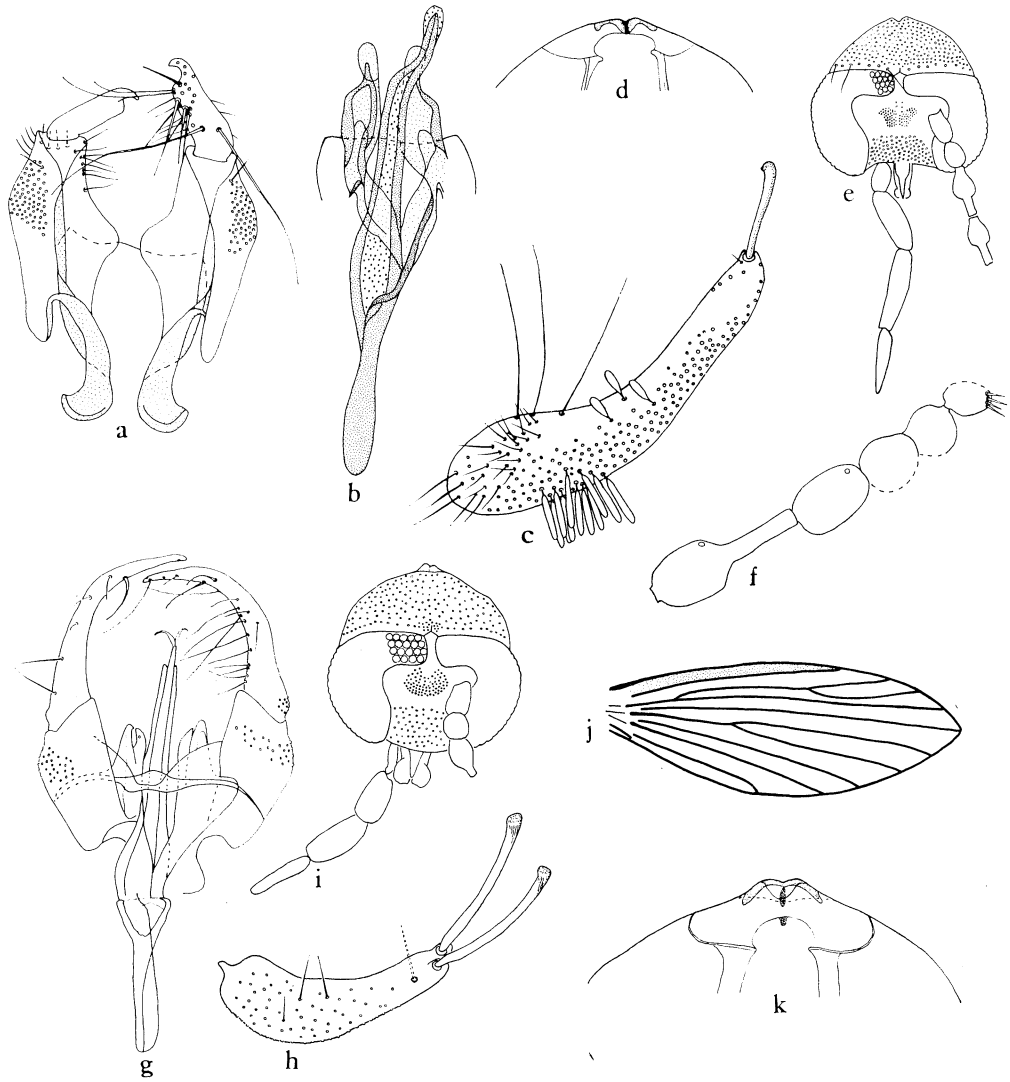

Fig. 21. a–f. *Philosepedon operosa*, ♂. a, coxites, ventral; b, aedeagus, dorsal; c, surstyle; d, posterior view of apex of head; e, head; f, antenna tip. g–k. *P. pudica*, ♂. g, genitalia, dorsal; h, surstyle; i, head; j, wing; k, posterior view of apex of head.

ture, apex bituberculate; short suture on back of head from center of tubercles not reaching foramen; frons with hairs concentrated on anterior part and pair of posterior projections, midline bare; cibarium with margins weak, slightly concave below posterior arms; palpus subequal to head height (including proboscis), segments 2 and 3 enlarged, ratio of segments = 6 : 10 : 12 : 11.

Thorax without patagia. Wing acutely pointed; membrane very pale brown, light brown in costal cell; R_{2+3} without enlargement; ratio of $R_{2+3} : R_2 = 13 : 10$. Ratio of fore

leg=7 : 7 : 3 : 5, mid leg = 9 : 11 : 4 : 6, hind leg = 8 : 12 : 4 : 6. Genitalia with aedeagus simple, tubular, expanded at center; dististyle evenly tapering, sharply incurved near center; surstyle short, with 2 terminal tenacula.

Wing length 2.3 mm; wing width 0.8 mm.

Female. Unknown.

DISTRIBUTION: Borneo.

Holotype ♂ (BISHOP 3107), Tenompok, 50 km E of Jesselton, North Borneo, 13–II–59, Maa.

Genus **Psychoda** Latreille

Psychoda Latreille, 1796, Precis. caract. gen. ins. p. 152.—Quate, 1959b: 450 (descr., key).

RANGE: Cosmopolitan.

Members of this genus are small, grayish or yellowish species without color markings or only with brown spots or bands on the wings. Apparently easily distributed by human transportation, many species of *Psychoda* have an amazingly wide distribution and seldom is there local differentiation of populations.

Association of the sexes of *Psychoda* is often difficult, because the separation of closely related species depends on genitalic characters. The correct association of males and females often depends on certain group characters and the common occurrence of the two sexes in several different localities at the exclusion of close relatives. In the present collections there are sometimes several related species from a single locality and the association of sexes cannot be made with certainty. Therefore, a number of the new species are described from the female only, the sex which is usually more abundant and which I find easier to identify.

KEY TO BORNEO SPECIES OF PSYCHODA

1. Eyes contiguous on midline 2
   Eyes clearly separated on midline 4
2 (1). Wing banded, in cleared specimens veins alternately light and dark brown with traces of brown bands on membrane..... 3
   Wing unbanded, veins uniformly brown ..... **33. kea**
3 (2). Labellum with 2 setae; ♀ subgenital plate with elongate apical part which is longer than base; ♂ unknown..... **34. fucosa**
   Labellum with only 1 seta; ♀ subgenital plate with short apical part, which is shorter than base; ♂ aedeagus straight and simple, dististyle ending in curved, beak-like apex and with long seta near center ..... **35. fucastra**
4 (1). Radial and medial forks incomplete, bases of R_3 and M_2 absent for some distance after normal point of junction with R_2 and M_1 respectively..... 5
   Radial and medial forks complete, at most R_3 and/or M_2 only weakened at base and absent a very short distance beyond junction 22
5 (4). Males..... 6
   Females 12
6 (5). Antenna 16-segmented..... 7

Antenna 14- or 15-segmented 10
7 (6). Coxite without accessory lobes 8
Coxite with large, saccular lobe from dorsal surface ..... **63. malleola**
8 (7). Base of R_2 at level of R_1 apex 9
Base of R_2 clearly distad of R_1 apex; dististyle slender, evenly tapered; aedeagus with lateral shaft simple, straight ..... **61. caudata**
9 (8). Dististyle longer than basistyle; lateral shaft of aedeagus sinuous and sharply curved at distal 1/4 so apex overlies main shaft ..... **60. makati**
Dististyle little shorter than basistyle; structure of aedeagus unknown (after Tokunaga) ..... **62. formosana**
10 (6). Aedeagus straight, without sharp twist 11
Aedeagus sharply twisted at about distal 1/3 ..... **65. alabangensis**
11 (10). Dististyle inflated on basal 1/3; paramere truncate apically ..... **68. parsivena**
Dististyle evenly tapering; paramere rounded apically ..... **67. mediocris**
12 (5). Antenna 16-segmented 13
Antenna 14- or 15-segmented 16
13 (12). Eyes rather narrowly separated by 1 facet or less; subgenital plate not Y-shaped 14
Eyes separated by nearly 2 facets; subgenital plate Y-shaped with long, slender stem ..... **61. caudata**
14 (13). Subgenital plate wider than long with small apical lobes or thickly V-shaped 15
Subgenital plate quadrate without differentiated apical lobes, much longer than wide ..... **62. formosana**
15 (14). Subgenital plate thickly V-shaped; genital digit before center, not extending beyond apex of plate ..... **60. makati**
Subgenital plate quadrate with small apical lobes; genital digit near apex, extending beyond plate ..... **63. malleola**
16 (12). Antenna 15-segmented 17
Antenna 14-segmented; subgenital plate with lightly sclerotized, quadrate basal piece and more heavily sclerotized apical lobes with deep apical concavity and convergent sides ..... **70. byblis**
17 (16). Terminal 2 antennal segments equal in size and separated 18
Subterminal segment (14) distinctly smaller than terminal (15) and partly fused to 13; subgenital plate spade-shaped with excavated apex ..... **64. vanga**
18 (17). Subgenital plate bilobed, but not Y-shaped 19
Subgenital plate Y-shaped with broad base ..... **66. ichthycerca**
19 (18). All ascoids Y-shaped 20
Ascoids on flagellar segments 1 and 2 fusiform or pad-like, remainder Y-shaped ..... **65. alabangensis** (?)
20 (19). Subgenital plate approximately quadrate (exclusive of narrow, expanded base) with apical concavity; eyes separated by about 1 facet; veins of usual development 21
Subgenital plate bilobate with constriction at base of lobes; wide reticulate band across plate at base of lobes on inner face; eyes separated by about 2 facets; veins unusually prominent ..... **68. parsivena**

21 (20). Subgenital plate with quadrate, apical part arising from expanded base, base much narrower than apical part, but clearly present; spermatheca of normal size ..... **67. mediocris**
Subgenital plate consisting of only apical quadrate part and without base; spermatheca small ..... **69. innotabilis**
22 (4). Radial fork clearly distad of medial; ♂ and ♀ wing of about same size 23
Radial fork clearly basad of medial (♂) or on about same level (♀); ♂ wing very broad, about 2× as long as wide, ♀ wing about 2–1/2× as long as wide..... **36. celebris**
23 (22). Eye bridge with 3 rows of facets 24
Eye bridge with 4 rows of facets 25
24 (23). Eyes widely separated by 4 facets; veins without spots at tips..... **42. ocellata**
Eyes separated by about 2–1/2 facets; veins R_1, R_4, R_5, M_4, and Cu with infuscated spots at tips..... **48. jucunda**
25 (23). All ascoids Y-shaped or 4-branched 26
Ascoids on flagellar segments 1 and 2 fusiform and somewhat triangular; vein R_5 prominent; infuscated spots at tips of veins (♀ only)..... **54. platilobata**
26 (25). Wing with brown spots at tips of all veins (evident in pinned and slide-mounted specimens); antenna 15-segmented, terminal antennal segments smallest, button-like..... 27
Wing without brown spots at tips; antenna not as above, 14-, 15-, or 16-segmented 32
27 (26). Veins R_5 and M_4 not or but little thicker than others..... 28
Veins R_5 and M_4 considerably thicker than others..... **54. platilobata**
28 (27). Wing membrane without lighter areas along margin; apex of ♀ subgenital plate deeply excavated 29
Wing membrane light yellow with clear spots along margins between tips of veins; apex of ♀ subgenital plate concave, but not deeply excavated; ♂ unknown ..... **45. formosiensis**
29 (28). Radial fork little distad of medial, almost on same level; ♀ subgenital plate not consisting entirely of V-shaped structure 30
Radial fork distad of medial by 2–3× width of cell R_3; subgenital plate consisting only of V-shaped piece ..... **43. alternata**
30 (29). Female subgenital plate with sides subparallel 31
Subgenital plate consisting of V-shaped piece attached to wide base, sides divergent; ♂ unknown ..... **46. alia**
31 (30). Subgenital plate with deep apical concavity, deeper than 1/2 length of plate; ♂ dististyle short, clavate with sharp, spur-like apex and bearing about 15 setae on distal 1/2 of inner face ..... **44. acanthostyla**
Subgenital plate quadrate with V-shaped apical notch, notch less than 1/2 length of plate; ♂ unknown ..... **47. vagabunda**
32 (26). Males..... 33
Females..... 39
33 (32). Antenna 16-segmented 34
Antenna 14- or 15-segmented 36
34 (33). Apex of aedeagus straight, not recurved..... 35

Apex of aedeagus strongly recurved and ending in peculiar, beak-like process ..... **39. harrisi**

35 (34). Long seta of dististyle distad of center ..... **37. aponesos**
Long seta of dististyle near base, seta as long as style ..... **40. trilobata**

36 (33). Antennal ascoids 4-branched; antenna 15-segmented.....37
Ascoids 3-branched or Y-shaped; antenna 14- or 15-segmented.....38

37 (36). Lateral shaft of aedeagus very short, ending well before apex of main shaft ..... **50. savaiiensis**
Lateral shaft long, extending beyond tip of main shaft, slightly to strongly curved ..... **55. quadrifilis**

38 (36). Antenna 14-segmented; surstyle long and slender, longer than tergite 9 ..... **49. cochlearia**
Antenna 15-segmented, segment 14 small and fused to 13; surstyle short and stocky, about as long as tergite 9 ..... **53. ochra**

39 (32). Antenna 16-segmented.....40
Antenna 14- or 15-segmented 44

40 (39). Eyes separated by no more than 1–1/2 facets..... 41
Eyes widely separated by 2–1/2 facets; spermatheca small with long, dorsal bar protruding cephalad ..... **41. kalabanica**

41 (40). Central lobe, or disc, of subgenital plate wider than long..... 42
Central lobe of plate longer than wide 43

42 (41). Subgenital plate with sides of apical lobes parallel, inner face with prominent ridge extending from anteriobasal corner to base of genital digit, without rugose circle near digit ..... **37. aponesos**
Subgenital plate with sides of apical lobes convergent, inner face without ridge, rugose circle near base of digit ..... **38. crenula**

43 (41). Basal band of subgenital plate with small, hairy tubercle on either side of midline on distal margin; disc of plate somewhat Y-shaped with short, thick stem and divergent sides..... **39. harrisi**
Basal band of plate without tubercle; disc subquadrate with sides straight and a little divergent ..... **40. trilobata**

44 (39). Ascoids 4-branched..... 45
Ascoids 3-branched or Y-shaped.....49

45 (44). Subgenital plate Y-shaped, base much narrower than apex 46
Subgenital plate broader basally than apically and not Y-shaped 48

46 (45). Stem of Y-shaped plate longer than apical lobes, simple 47
Stem of plate short and with collar-like structure at base..... **56. torquata**

47 (46). Internal face of plate with hairy, arched, longitudinal ridge on either side of stem..... **57. aderces**
Internal face of plate with hairy, transverse ridge across stem at base of genital digit ..... **58. paraderces**

48 (45). Subgenital plate with rosette-like structure at base of each lobe on inner face; basal margin without median projection ..... **51. floscula**
Subgenital plate without rosette-like structure on inner face; basal margin with dark, posterior projection on midline about 1/4 as long as plate ..... **55. quadrifilis**

49 (44). Subgenital plate broad basally, not elongate and slender; terminal 2 antennal segments clearly unequal in size 50
Subgenital plate with slender stem much narrower than apical lobes; terminal 2 antennal segments equal ..... **59. helotes**
50 (49). Subgenital plate without rosette-like structures on inner face; apical lobes with straight sides 51
Subgenital plate with rosette-like structure on inner face at base of each lobe; plate subovoid in general outline with shallow apical concavity... **50. savaiiensis**
51 (50). Eyes narrowly separated by about 1/2 facet; genital digit tubular 52
Eyes separated by 1 or more facets: genital digit triangular..... **49. cochlearia**
52 (51). Sides of subgenital plate convergent; genital digit constricted at center and apical part more slender than basal; spermatheca elongate ..... **52. nya**
Sides of subgenital plate a little divergent; genital digit cylindrical; spermatheca semicircular; hairy flap on either side of digit ..... **53. ochra**

33. Psychoda kea Quate, n. sp. Fig. 22a–f.

Female. Eyes broadly joined on midline; eye bridge with 4 rows of facets; frons with band of hairs extending posteriorly on midline into V-shaped notch of eye bridges a little beyond lower eye margin. Labellum with 2 setae and 4 teeth; palpus extends to internode of antennal segment 5, ratio of segments=6 : 5 : 5 : 8. Antenna 15-segmented; 13 and 14 with seta at tip of anteriolateral tubercle; 14 partly fused to 13, subequal to size of 15; ascoids Y-shaped.

Wing infuscated, darker infuscation in costal and cubital cells; forks complete. Ratio of fore leg=5 : 5 : 2 : 3, mid leg=6 : 7 : 2 : 4, hind leg=7 : 8 : 2 : 4. Genitalia as figured; subgenital plate small, strongly bilobed with deep apical concavity, holotype with 2 spines at base of lateral margin, but some paratypes with 4 or 5 spines in same position; without genital digit.

Antenna 1.2–1.4 mm, holotype 1.2; wing length 1.8–2.3 mm, holotype 1.9; wing width 0.8–0.9 mm, holotype 0.8.

Male. Similar to ♀; aedeagus with main shaft long and distal 2/3 broad and slightly sinuate, lateral shaft long and slender with small curvature on distal 1/2.

Antenna 1.3 mm; wing length 1.9–2.0 mm, allotype 2.0; wing width 0.7–0.8 mm, allotype 0.8.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3108), Tenompok, 50 km E of Jesselton, 2–XI–58, Quate; allotype ♂ (BISHOP), same locality, 20–X–58, Quate. Paratypes (USNM, CAS, BMNH): 5 ♀♀, 3 ♂♂, same as holotype; 2 ♀♀, ♂, same as allotype; ♀, same locality, 17 to 21–X–58, light trap, Maa and Quate; ♀, same locality, 3–XI–58, Maa.

Distinguished by contiguous eye bridges, 15-segmented antenna, infuscated wings, and genitalia. Only two other Borneo *Psychoda*, *fucosa* and *fucastra*, have contiguous eye bridges, but they have banded wings.

34. Psychoda fucosa Quate, n. sp. Fig. 22g–i.

Female. Eyes broadly joined on midline; eye bridge with 4 rows of facets; frons with

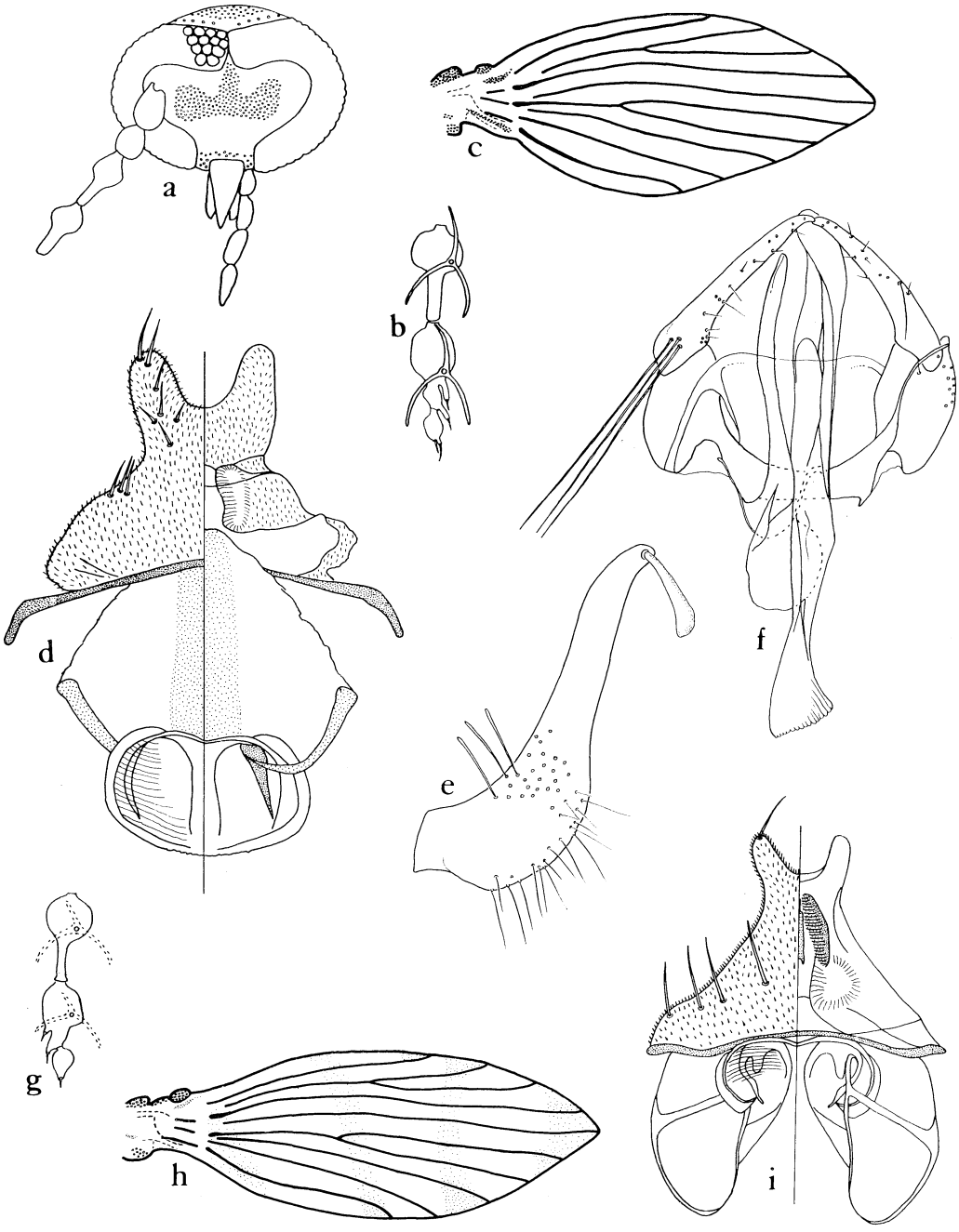

Fig. 22. a–f. *Psychoda kea.* a, head, ♀; b, antenna tip, ♀; c, wing, ♀; d, ♀ genitalia; e, ♂ surstyle; f, ♂ genitalia, left coxite dorsal, right coxite ventral, aedeagus dorsal. g–i. *P. fucosa*, ♀. g, antenna tip; h, wing; i, genitalia.

hairs forming posterior, triangular projection on midline ending well before lower eye margin. Labellum with 2 setae and 4 (?) teeth; palpus extends to node of antennal segment 5, segment 3 short and bulbous, ratio of segments = 5 : 5 : 3 : 5.5. Antenna 15-segmented, 13 and 14 with seta at tip of anteriolateral tubercle; 14 small, solidly fused to 13; 15 separated, larger than 14; ascoids Y-shaped.

Wing with 4 brown bands located at base near fold, at level of medial fork, at level of apices of M_3 and R_2, and subapically; forks complete. Ratio of fore leg=5 : 5 : 2 : 3, mid leg=5 : 7 : 2 : 4, hind leg=6 : 8 : 2 : 3. Genitalia as figured; subgenital plate with elongate apical part, strongly bilobed; pair of elongate ovoid, striated structures on inner face at distal 1/3.

Antenna 1.1 mm; wing length 1.8 mm; wing width 0.7 mm.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3109), Tenompok, 50 km E of Jesselton, North Borneo, 2–XI–58, Quate. Paratypes (USNM), 2 ♀♀, same data and 3–XI–58, at light, Maa.

35. Psychoda fucastra Quate, n. sp. Fig. 23a–c.

Female. Eyes broadly joined on midline; eye bridge with 4 rows of facets; frons with hairs forming posterior, triangular projection on midline ending well before lower eye margin. Labellum with 1 seta and 4 (?) teeth; ratio of palpal segments=6 : 4 : 4 : 5. Antenna 15-segmented, 13 and 14 with apicilateral setose tubercle; 14 partly fused to 13; 15 separated, larger than 14; ascoids Y-shaped.

Wing with 4 brown bands, located at base of R_5, at level of medial fork, at level of tip of R_2 and M_3 and subapically; forks complete. Ratio of fore leg=5 : 5 : 2 : 3, mid leg=6 : 7 : 2 : 4, hind leg=7 : 8 : 2 : 4. Genitalia as figured; subgenital plate with rather small apical part subquadrangular; spermatheca large.

Antenna 1.1 mm; wing length 2.0 mm; wing width 0.8 mm.

Male. Similar to ♀; labellum almost always with only 1 seta, but one paratype has additional small seta posterior to large one; dististyle with many strong hairs, inflated basally and suddenly tapering to elongate, hooked apex; aedeagus composed of laterally flattened main shaft (seen in dorsal aspect, but a paratype shows broad blade in lateral aspect) and shorter, slender lateral shaft.

Antenna 1.0 mm; wing length 1.6 mm; wing width 0.6 mm.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3110), Tenompok, 50 km E of Jesselton, North Borneo, 17 to 21–X–58, light trap, Maa and Quate; allotype ♂ (BISHOP), same locality, 3–XI–58, at light, Maa. Paratypes (USNM, BMNH): 2 ♂♂, same data as allotype; 2 ♀♀, ♂, same locality, 20–X–58, 2–XI–58, Quate.

Closely allied to *fucosa*, but differs in genitalic characters and in having but one seta on the labellum rather than two. Both species are related to *adumbrata* Satchell (1953; Micronesia and Polynesia) and females are separable only on the genitalic characters and position of the wing forks; the radial and medial forks of *adumbrata* are nearly on the same level, but in the usual position in the other two species.

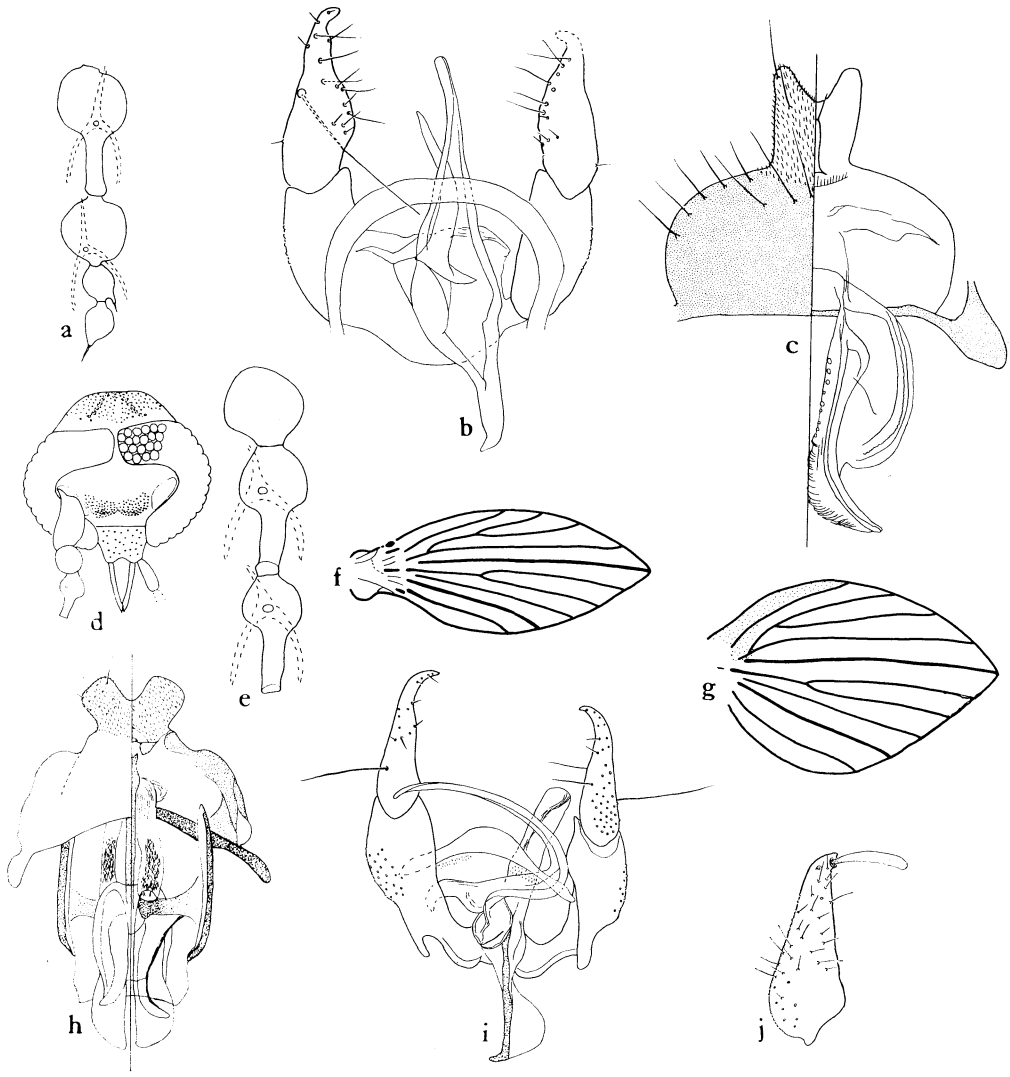

Fig. 23. a–c. *Psychoda fucastra.* a, antenna tip, ♀; b, ♂ genitalia, dorsal; c, ♀ genitaila. d–j. *P. celebris.* d, head, ♂; e, scape and flagellum base, ♂; f, wing, ♀; g, wing, ♂; h, ♀ genitalia; i, ♂ genitalia, left coxite ventral, right coxite dorsal, aedeagus dorsal; j, ♂ surstyle.

The above three species, and perhaps *P. subimmaculata* Tonnoir (1929 : 6), form a group which may be termed the "*adumbrata* complex." The group is recognized by the contiguous eyes in both sexes, the banded wings and small female subgenital plate. Perhaps it will prove to be comparable to the "*alternata* complex" as more species are added to *Psychoda* with future collecting in unexplored areas.

36. Psychoda celebris Quate, n. sp. Fig. 23d–j.

Male. Body integument brown; eyes narrowly separated by distance equal to less than

1/2 facet; eye bridge broad, with 4 rows of facets, truncate on median margin; frons with hairs on anterior 1/2 only, very dense anteriorly and progressively less dense near center, hairs on clypeus sparse; vertex bilobed at apex. Labellum with 2 setae and 4 (?) teeth. Antenna broken (presumed to be 16-segmented).

Wing very broad; membrane light brown and little darker in costal cell and along R_5 and M_4; radial fork far basad of medial; R_1, R_5, and M_4 thicker than other veins. Genitalia as figured; lateral shaft of aedeagus very long, slender and curved; surstyle short and stocky.

Wing length 1.7–2.0 mm, holotype 1.9; wing width 0.9–1.1 mm, holotype 1.05.

Female. Similar to ♂; eyes separated by about 1–1/2 facets; frons with hairs concentrated on anterior 1/2, but not as dense as ♂; wing not as broad, radial fork little basad or on same level as medial; subgenital plate with broad, lightly sclerotized base and small, subquadrate, more heavily sclerotized lobes, genital digit triangular; spermatheca elongate, supporting structures well developed.

Wing length 1.6–1.9 mm, allotype 1.8; wing width 0.5–0.8 mm, allotype 0.7.

DISTRIBUTION: Borneo.

Holotype ♂, allotype ♀ (BISHOP 3111), Kalabakan R., 50 km W of Tawau, North Borneo, 15–XI–59, sweeping at dusk, Quate. Paratypes (USNM, CAS, BMNH): 5 ♂♂, 22 ♀♀, same data; ♀, Tawau, North Borneo, 19–XI–58, at light, Maa.

The nearest relatives of this species appear to be several New Zealand species, *P. pulchrima*, *formosa* and *tridens* (Satchell, 1954), in which the size is larger than most *Psychoda*, the antennae are 16-segmented, the male aedeagus is complex with a long, slender lateral shaft, the male surstyle is short and stocky and the female subgenital plate has a broad base with small lobes. *P. plaesia* and several other Micronesian species (Quate, 1959 a) also seem to be related to this group. Whether these species form a natural unit within *Psychoda* or not is unknown.

37. **Psychoda aponesos** Quate, 1959a : 465 (illus.).

DISTRIBUTION: Micronesia, Borneo.

NORTH BORNEO: Gomantong Caves, 30 km S of Sandakan, 23–XI–58, in cave on moist, slimy rock wall, Quate; 2 ♀♀.

38. **Psychoda crenula** Quate, n. sp. Fig. 24a, b.

Female. Eyes separated by distance equal to 1 facet; eye bridge with 4 rows of facets, truncate on median margin; frons with band of hairs extending posteriorly to and nearly joining hairs on vertex. Labellum with 2 setae and 4 teeth; palpus extends to internode of antennal segment 7, ratio of segments=5 : 5 : 5 : 7. Antenna 16-segmented; 14 and 15 slightly fused, 16 separate, smaller than preceding; ascoids Y-shaped.

Wing with forks complete, costal cell lightly infuscated, veins without spots at tips. Ratio of fore leg = 5 : 5 : 2 : 4, mid leg=6 : 7 : 2.5 : 4, hind leg=7 : 8 : 2.5 : 4. Genitalia as figured; subgenital plate broad, apical concavity moderate, genital digit rod-like; rugose circle at center of inner face near base; spermatheca small.

Antenna 0.9–1.1 mm, holotype 1.1; wing length 1.5–1.7 mm, holotype 1.7; wing width

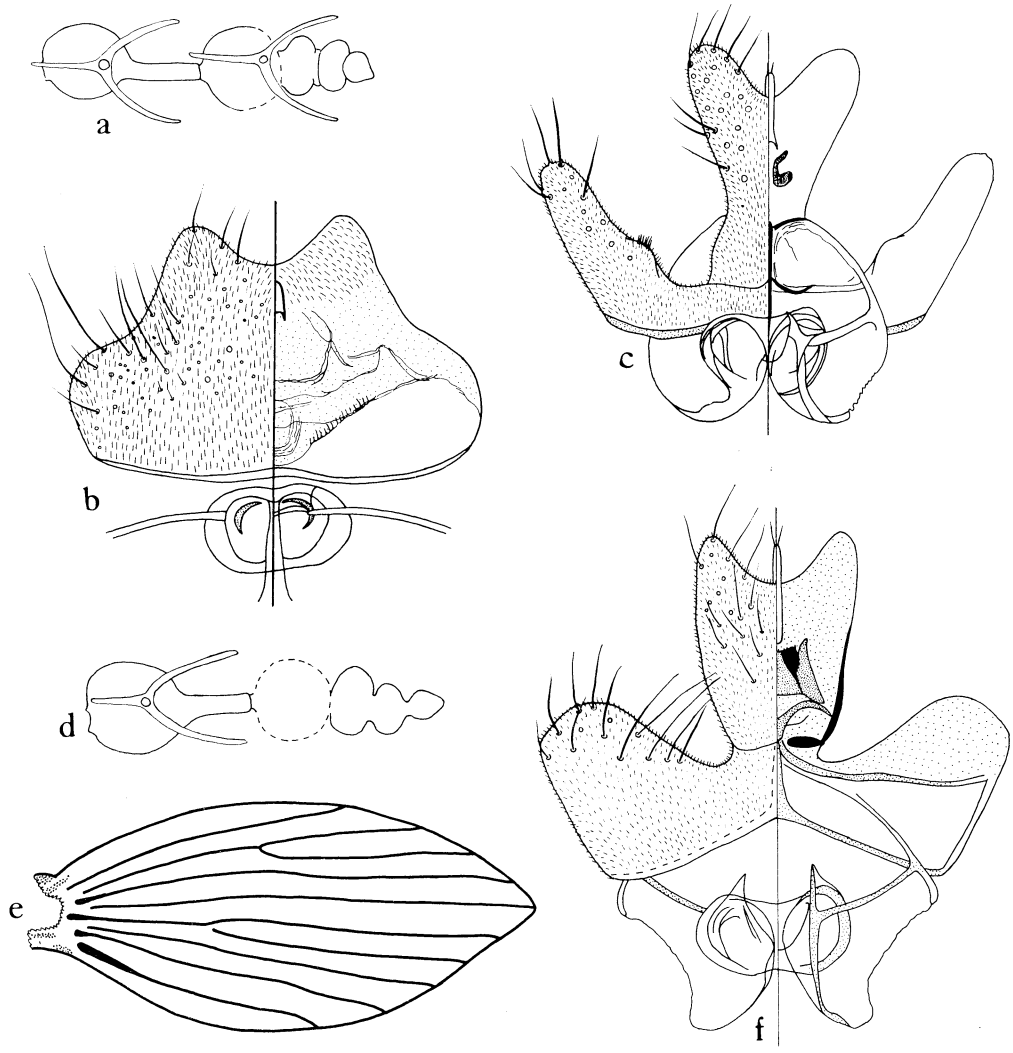

Fig. 24. a–b. *Pshycoda crenula*, ♀. a, antenna tip; b, ♀ genitalia. c, *P. harrisi*, ♀ genitalia. d–f. *P. trilobata*, ♀. d, antenna tip; e, wing; f, genitalia.

0.6–0.7 mm, holotype 0.7.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3112), Tenompok, 50 km E of Jesselton, North Borneo, 2–XI–58, on side of bamboo hut, Quate. Paratypes (USNM, CAS, BMNH): 7 ♀♀, same data as holotype; 4 ♀♀, same locality, 20–X–58 and 3–XI–59, Maa.

Very similar to *P. nigriventris* Tokunaga (1958 : 392), but differs in having the rugose circle on the inner face and other minor differences in the internal face of the subgenital plate. Confirmation of these differences made by examination of the allotype of *nigriventris*.

39. Psychoda harrisi Satchell, 1950: 171.—Quate, 1954: 354. Fig. 24c.

DISTRIBUTION: Australia, New Zealand, Hawaii, Borneo, Japan (Ryukyus).

NORTH BORNEO: Labuan, 29–XI–58, Maa; Tenompok, 50 km E of Jesselton, 27–XI–58, at light and 19–II–59, Maa; Ranau, 2–X–58, sweeping at dusk, Quate; Gomantong Caves, 30 km S of Sandakan, 23–XI–58, in cave on moist, slimy rock wall, Quate; Tawau, 19–XI–58, at light, Maa; ♀, Kalabakan R., 50 km W of Tawau, 18–XI–58, primary forest, Maa; 2 ♂♂, 8 ♀♀.

SARAWAK: Pangkalan Tebang, Bau Dist., 5–IX–58, at light, Maa; ♀.

The widespread distribution of this species must be due to spread by commerce and it is expected that the species will be found in other parts of the Malayan area.

An illustration of the female genitalia is given to show details on the inner face of the subgenital plate that have not been shown in previous drawings.

40. Psychoda trilobata Tokunaga, 1958: 389. Fig. 24d–f.

DISTRIBUTION: Japan, Borneo.

NORTH BORNEO: Tenompok, 17 to 21–X and 2–XI–58, at light, Maa and Quate; 2♀♀ (compared with allotype).

41. Psychoda kalabanica Quate, n. sp. Fig. 25a–c.

Female. Body integument light brown; eyes widely separated by distance equal to 2–1/2 facets; eye bridge with 4 rows of facets, rounded on median margin; frons with wide band of hairs extending posteriorly on midline and nearly joining vertex hairs. Labellum with 2 setae and 4 teeth; palpus extending to node of antennal segment 6, ratio of segment = 4 : 5.5 : 5 : 5.5. Antenna 16-segmented; node of flagellar segment 1 pyriform, following nodes globular and smaller; segments 14, 15, 16 subequal, clearly separated; ascoids Y-shaped.

Wing with forks complete, veins strong, membrane colorless, veins without spots at tips. Ratio of fore leg=4 : 4.5 : 2 : 3, mid leg = 5 : 7 : 2.5 : 3, hind leg = 5.5 : 7.5 : 2.5 : 3. Genitalia as figured; spermatheca rather small with long dorsal bar protruding cephalad.

Antenna 0.8 mm; wing length 1.4 mm; wing width 0.5 mm.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3113), Kalabakan R., 50 km W of Tawau, North Borneo, 17–XI–58, Maa. Paratype ♀, same data.

42. Psychoda ocellata Quate, n. sp. Fig. 25d–g.

Female. Integument light brown. Eyes widely separated by distance equal to about 4 facets; eye bridge narrow, with 3 rows of facets, rounded on median margin; frons with

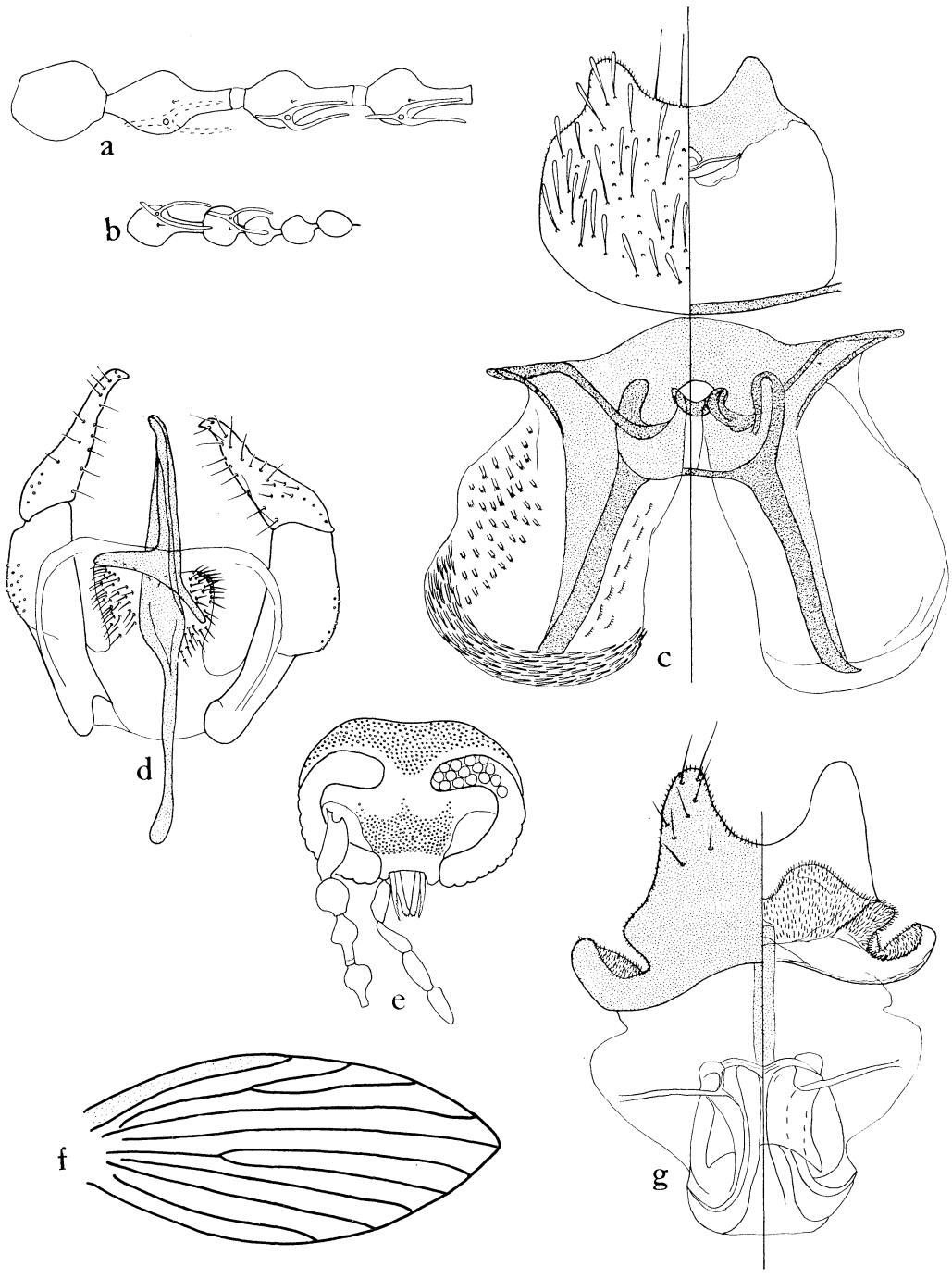

Fig. 25. a–c. *Psychoda kalabanica*, ♀. a, scape and flagellum base; b, antenna tip; c, genitalia. d–g. *P. ocellata*. d, ♂ genitalia, ventral; e, head, ♀; f, wing, ♀; g, ♀ genitalia.

hairs concentrated on anterior part and with small posterior projection on midline, large area on frons below vertex devoid of hairs. Labellum with 2 setae and 4 small teeth; ratio of palpal segments = 4 : 4 : 4 : 4.5. Antenna 15-segmented (?, tip damaged); ascoids Y-shaped.

Wing with forks complete; membrane light brown, little darker in costal cell; radial cell little distad of medial. Ratio of fore leg = 4 : 4 : 2 : ?, mid leg = 5 : 6 : 2 : ?, hind leg = 5 : 7 : 2 : 3. Genitalia as figured; subgenital plate deeply concave apically, emarginate basally, without genital digit.

Wing length 1.2–1.5 mm, holotype 1.45; wing width 0.5–0.6 mm, holotype 0.55.

Male. Similar to ♀; genitalia with aedeagus simple, slender, without lateral shaft; hairy paramere below aedeagus.

Wing length 1.2 mm; wing width 0.5 mm.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3114), Tenompok, 50 km E of Jesselton, North Borneo, 2–XI–58, Quate; allotype ♂ (BISHOP), same locality, 21–XI–58, in tree crevice, Maa. Paratypes (USNM): ♀, same as holotype; ♀, same as allotype.

In addition to genitalic characters, the chief distinguishing features of this species are the widely separated eyes with narrow bridges and the absence of hairs on the upper part of the frons.

43. Psychoda alternata Say.—Quate, 1959a: 469 (distr., descr., illus., key).

DISTRIBUTION: Cosmopolitan.

NORTH BORNEO: Labuan I., 29–XI–58, sweeping at dusk, Maa and Quate; Tenompok, 50 km E of Jesselton, 2–XI–58, Quate; same locality, 26–I–59, 8, 15, 19–II–59, Maa; Bundu Tuhan, 50 km E of Jesselton, 18–II–59, in house, Maa; Tawau, 19–XI–58, sweeping at dusk and at light, Maa and Quate; Kalabakan R., 50 km W of Tawau, 11 to 18–XI–58, sweeping at dusk and at light, Maa and Quate. 100+ ♂♂ and ♀♀.

SARAWAK: Santubong, 50 km N of Kuching, 18 to 30–VI–58, flying over intertidal zone, Maa; Pangkalan Tebang, Bau Dist., 5, 7–IX–58, Maa. Many ♂♂, ♀♀.

44. Psychoda acanthostyla Tokunaga, 1957: 53.—Quate, 1959a: 471. Fig. 26a.

DISTRIBUTION: Taiwan, Micronesia, Borneo.

NORTH BORNEO: Labuan I., 29–XI–58, sweeping at dusk, Maa and Quate; Liawan, about 9 km NW of Keningau, 15–I–59, Maa; Tenompok, 50 km E of Jesselton, 21–XI–58, at light, Quate; Ranau, 1 to 12–X–58, 14–XI–58, at light and on roadside vegetation, Maa and Quate; Tawau, 19–XI–58, at light and sweeping at dusk, Maa and Quate; Kalabakan R., 50 km W of Tawau, 9 to 18–XI–58, primary forest and sweeping at dusk, Maa and Quate. 12 ♂♂, 37 ♀♀.

SARAWAK: Santubong, 50 km N of Kuching, 18 to 30–VI–58, flying over intertidal zone at dusk, Maa; Pangkalan Tebang, Bau Dist., 7–IX–58, Maa. ♂, 3 ♀♀.

45. Psychoda formosiensis Tokunaga. NEW EMENDATION. Fig. 26b, c.

Psychoda formosiense Tokunaga, 1957: 66.

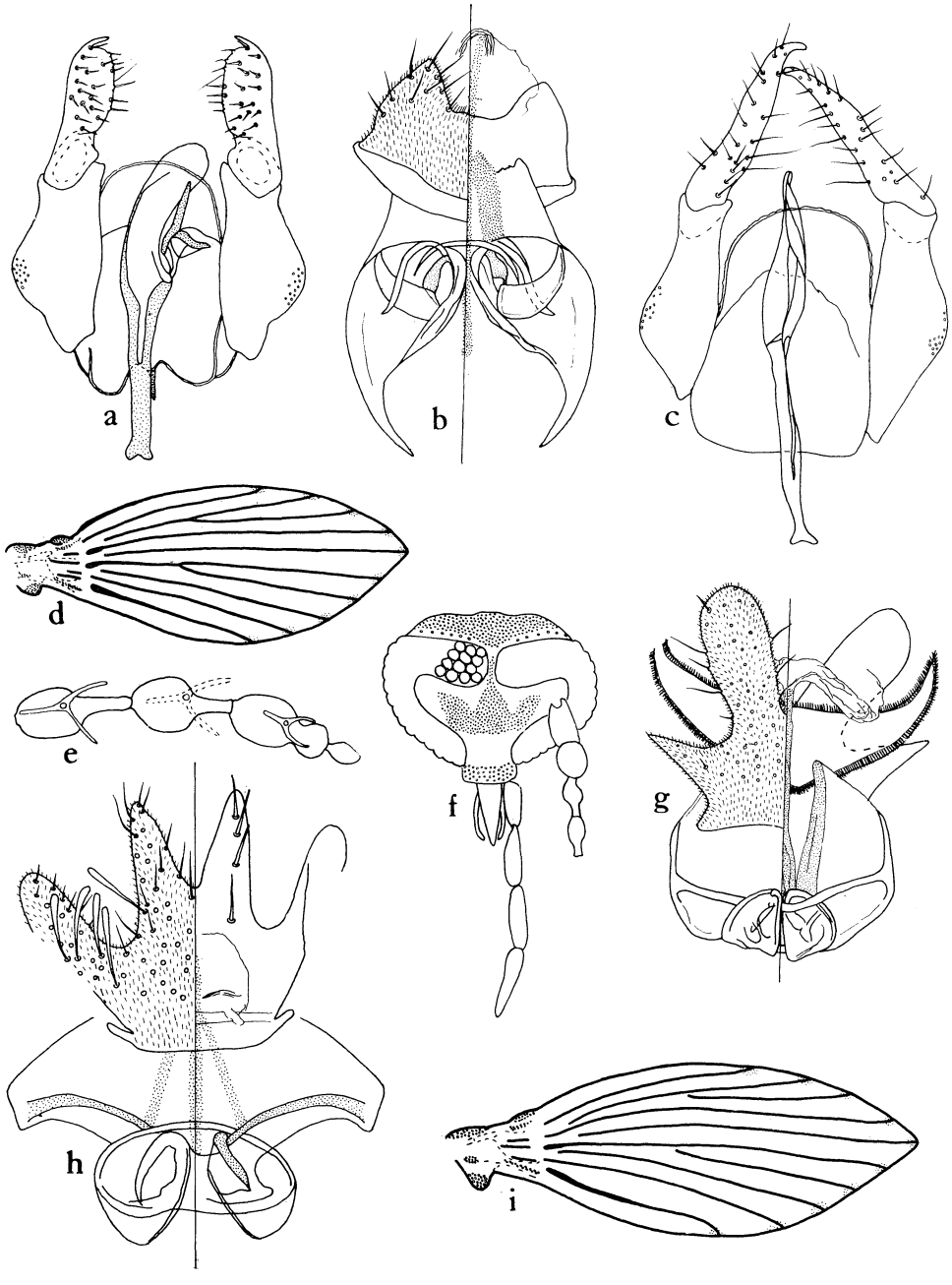

Fig. 26. a, *Psychoda acanthostyla*, ♂ genitalia, dorsal. b, c. *P. formosiensis*. b, ♀ genitalia; c, ♂ genitalia, dorsal. d-g. *P. alia*, ♀. d, wing; e, antenna tip; f, head; g, genitalia. h, i. *P. vagabunda*, ♀. h, genitalia; i, wing.

DISTRIBUTION: Taiwan, Borneo.

NORTH BORNEO: Labuan I., 29–XI–58, sweeping at dusk, Maa and Quate; Ranau, 6 to 14–X–58, at light, Maa and Quate; Tawau, 19–XI–58, sweeping at dusk, Quate; 6 ♀♀, 2 ♂♂.

SARAWAK: Pangkalan Tebang, Bau Dist., 7–IX–58, Maa; 2 ♀♀, ♂.

This is another member of the "*alternata* complex" and, on the basis of the female genitalia, might be the most primitive known to date.

The name "*formosiense*" is changed to "*formosiensis*," since the former is of neuter gender and *Psychoda* requires the feminine ending, being of feminine gender.

46. Psychoda alia Quate, n. sp. Fig. 26d–g.

Female. Body integument pale brown. Eyes separated by distance equal to 1 facet; eye bridge with 4 rows of facets, rounded on median margin; frons with sparse band of hairs extending posteriorly to near upper eye margin, but clearly separated from vertex hairs. Labellum with 2, occasionally 3, setae and 4 teeth; palpus slender, extending to internode of antennal segment 8, ratio of segments = 6 : 7 : 7 : 9. Antenna 15-segmented; 14 fused to 13; 15 button-like, smaller than 14; ascoids Y-shaped with short branches.

Wing membrane light yellowish, brown spots at tips of veins and spot along either side of R_5 on basal 1/5; forks complete; radial fork little distad of medial, nearly at same level. Ratio of fore leg=6 : 6 : 2 : ?, mid leg=6 : 6 : 2 : 4, hind leg=7 : 8 : ?. Genitalia as figured; subgenital plate hairy, consisting of V-shaped apical part resting on wide base; spermatheca small; no genital digit.

Antenna 0.9 mm; wing length 1.7 mm; wing width 0.7 mm.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3115), Tenompok, 50 km E of Jesselton, North Borneo, 3–XI–58, at light, Maa. Paratypes (USNM, BMNH): 8 ♀♀, same data and 2–XI–58, Quate, and 28–I–59, 19–II–59, Maa.

Another member of the "*alternata* complex," *alia* is separable from its close relatives by the hairy, V-shaped female subgenital plate.

47. Psychoda vagabunda Quate, n. sp. Fig. 26h, i.

Female. Body integument yellowish brown. Eyes separated by distance equal to 1–1/2 facets (distorted in type), eye bridge with 4 rows of facets, truncate on median margin; frons with band of hairs extending posteriorly to upper 3/4 of eye bridge and well separated from vertex hairs. Labellum with 2 setae and 4 teeth; palpus slender, extends to internode of antennal segment 7, ratio of segments=6 : 7 : 7 : 9. Antenna broken, but undoubtedly 15-segmented with 13 and 14 fused and 15 smallest; ascoids Y-shaped with short branches.

Wing membrane light yellowish, brown spots at tips of veins; forks complete, radial fork distad of medial by distance equal to width of cell R_3 at point of bifurcation. Subgenital plate with central part subparallelsided and with deep, V-shaped, apical notch;

row of 4 heavy setae on inner face of plate near margin of central part; spermatheca and 3 inner rods of genitalia similar to *alternata*.

Antenna 0.8 (±) mm; wing length 1.7 mm; wing width 0.7 mm.

Male. Unknown.

DISTRIBUTION: Ceylon, Borneo.

Holotype ♀ (Zoological Survey of India, Calcutta), Peradeniya, Ceylon, 23–VI–16 (no collector), Srl. No. 100.

Other specimens, BORNEO: Sapagaya Lumber Camp, Sandakan Bay (SW), 5–XI–57, Gressitt; Tawau, 19–XI–59, at light, Maa; Kalabakan R., 50 km W of Tawau, 9 to 18–XI–58, sweeping at dusk and at light, Maa and Quate; 8 ♀♀. SARAWAK: Pangkalan Tebang, Bau Dist., 5–IX–58, secondary forest, Maa; ♀.

Another member of the "*alternata* complex," *vagabunda* is separable from related species by the straight-sided subgenital plate with its deep, V-shaped, apical notch.

In view of the wide distribution of other members of *Psychoda*, the finding of this species in Ceylon and Borneo is not surprising. As with many others, it is believed commercial transportation has accounted for the spread of this species.

48. Psychoda jucunda Quate, n. sp. Fig. 27f–h.

Female. Body integument pale brown. Eyes separated by distance equal to 2~2–1/2 facets; eye bridge with 3 rows of facets, rounded on median margin; frons without band of hairs on midline. Labellum with 2 setae (teeth indistinct); palpus extending to internode of antennal segment 6, segment 3 short and a little thickened, ratio of segments = 5 : 4 : 3.5 : 4. Antenna 14-segmented; ascoids Y-shaped.

Wing membrane lightly infuscated, brown spots at tips of R_1, R_4, R_5, M_4, and Cu; forks complete; radial fork a little distad of medial. Ratio of fore leg=5 : 4 : 1 : 3, mid leg=6 : 6 : 2 : 3, hind leg=5 : 7 : 2 : 3. Genitalia as figured; apical part rectangular with deep apical concavity.

Antenna 0.9 mm; wing length 1.25 mm; wing width 0.5 mm.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3116), Gomantong Caves, 30 km S of Sandakan, North Borneo, 23–XI–58, in cave on moist, slimy rock wall, Quate. Paratypes, 2 ♀♀, same locality, 22 to 26–XI–58, Maa and Quate.

Similar to members of the "*alternata* complex" but not a true member of this group, for it differs in the structure of the antennal tip, lacks brown spots at the tips of all the veins, and lacks the three bars in the female genitalia above the spermathecae.

49. Psychoda cochlearia Satchell, 1950: 181.—Quate, 1959a: 467.

DISTRIBUTION: Micronesia, Polynesia, Borneo.

NORTH BORNEO: Tawau, 19–XI–58, at light and sweeping at dusk, Maa and Quate; Kalabakan R., 50 km W of Tawau, 18–XI–58, primary forest, Maa; 17 ♀♀, ♂.

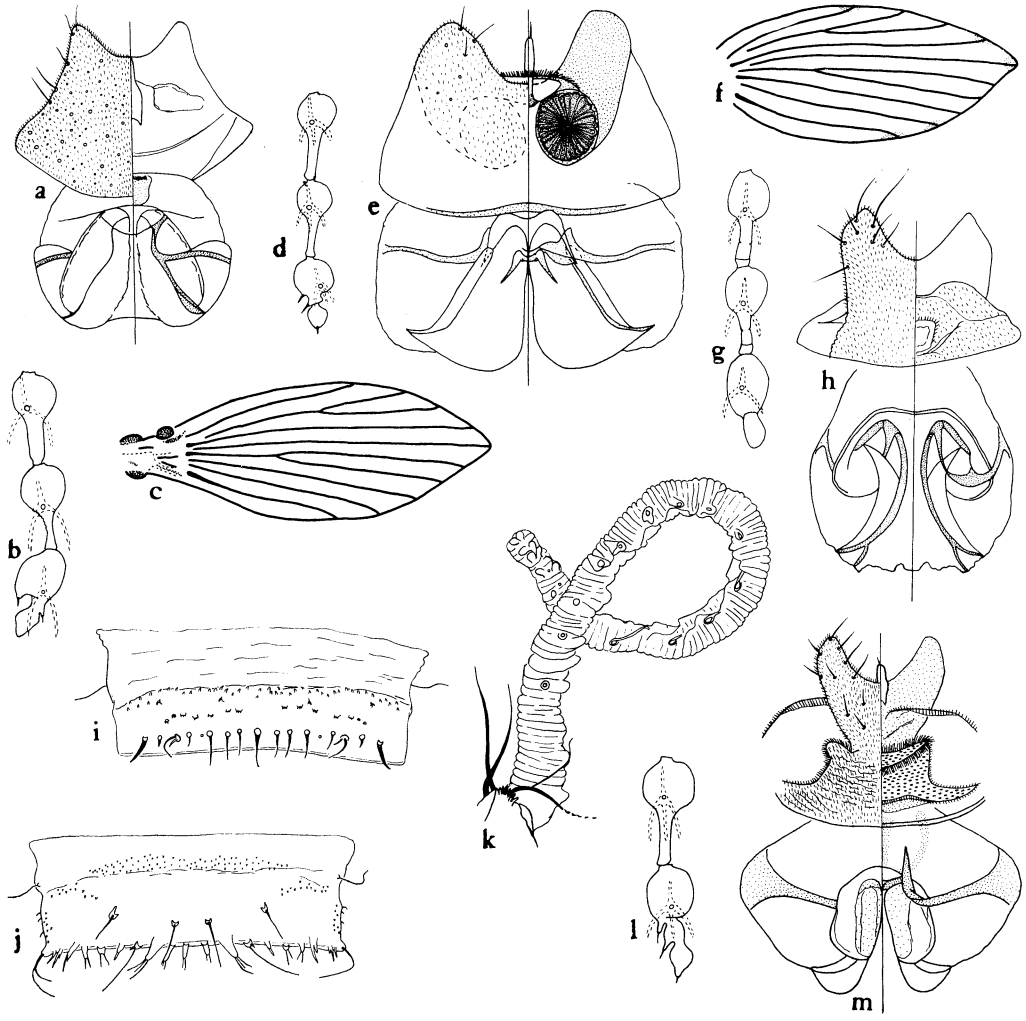

Fig. 27. a–c. *Psychoda nya*, ♀. a, genitalia; b, antenna tip; c, wing. d, e. *P. floscula*, ♀. d, antenna tip; e, genitalia. f–h. *P. jucunda*, ♀. f, wing; g, antenna tip; h, genitalia. i–k. *P. ochra*, pupa. i, tergite 7; j, sternite 7; k, respiratory horn. l, m. *P. torquata*, ♀. l, antenna tip; m, genitalia.

50. Psychoda savaiiensis Edwards, 1928: 74.

Psychoda rarotongensis Satchell, 1953: 183. **New Synonymy.**

DISTRIBUTION: U. S., West Indies, Hawaii, Micronesia, Polynesia, Okinawa, Ryukyu Is., Borneo.

NORTH BORNEO: Labuan I., 29–XI–58, Quate; Gomantong Caves, 30 km S of Sandakan, 22 to 26–XI–58, in cave on moist, slimy rock wall, Maa and Quate; Kalabakan R., 50 km W of Tawau, 15–XI–58, Quate; numerous specimens.

SARAWAK: Santubong, 50 km N of Kuching, 26–VI–58, intertidal zone, Maa; Pangkalan Tebang, Bau Dist., 7–IX–58, Maa; 2 ♂♂, 5 ♀♀.

The suspicion that *savaiiensis* and *rarotongensis* are synonymous (Quate, 1960, Pac. Ins. **1**: 439) was confirmed by an examination of the type of *savaiiensis* at the British Museum (Natural History). The 14th antennal segment of the type male is shrunken and hence not visible, but genitalic characters confirm the above synonymy.

51. Psychoda floscula Quate, n. sp. Fig. 27d, e.

Female. Body integument brown. Eyes separated by distance equal to 1 facet; eye bridge with 4 rows of facets, rounded on median margin; frons with band of hairs extending posteriorly on midline to about upper 1/3 of eye bridge, separated from vertex hairs. Labellum with 1 seta and 4 teeth; palpus slender, extending to node of antennal segment 7, ratio of segments = 5 : 5 : 6 : 8. Antenna 15-segmented; segment 14 smaller than 15, sometimes appears merely as a swelling between 13 and 15; very long setose tubercle on apicilateral margin of 13, smaller setose tubercle on 14; ascoids 4-branched.

Wing membrane clear, except light infuscation in costal cell; forks complete; no spots at vein tips. Ratio of fore leg=5 : 5 : 2 : 3, mid leg=6 : 7 : 2.5 : 4, hind leg=7 : 8 : 3 : 4. Subgenital plate short and broad with deep apical concavity, pair of pronounced, dark rosette-like structures on inner face of plate, genital digit moderately long; spermatheca small, slender.

Antenna 0.9–1.0 mm, holotype 1.0; wing length 1.6–1.7 mm, holotype 1.7; wing width 0.6–0.7 mm, holotype 0.7.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3117), Tenompok, 50 km E of Jesselton, North Borneo, 2–XI–58, Quate. Paratypes (USNM, CAS, BMNH): 15 ♀♀, same locality, but 20–X to 2–XI–58.

Similar to *savaiiensis* female with an almost identical antenna and similar female genitalia, but in *floscula*, the ascoids are 4-branched, the apical concavity of the subgenital plate is deep and well marked, the rosettes are close to the plate margin and the spermathecae are slender; in *savaiiensis* the female ascoids are 3-branched, the apical concavity is very shallow, the rosettes are well removed from the margin and the spermathecae are quite wide.

52. Psychoda nya Quate, n. sp. Fig. 27a–c.

Female. Body integument pale brown, legs brown. Eyes separated by distance equal to about 1/2 facet; eye bridge with 4 rows of facets, truncate on median margin; frons with band of hairs extending posteriorly on midline to upper eye margin nearly to vertex hairs. Labellum with 1 seta and 4 teeth; palpus slender, extending to node of antennal segment 7, ratio of segments=5 : 6 : 6 : 8. Antenna 14-segmented; segment 13 with short internode, internode slightly swollen and bearing small setose tubercle laterally; ascoids Y-shaped.

Wing membrane clear; forks complete; no spots. Ratio of fore leg = 4.5 : 5 : 2 : 3, mid leg=5 : 6.5 : 2 : 3, hind leg = 6 : 7 : 2 : 4. Subgenital plate broad with tapering sides and marked apical concavity; genital digit narrowed near middle and apical 1/2 more

slender than basal.

Antenna 1.0 mm; wing length 1.7 mm; wing width 0.6 mm.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3118), Tenompok, 50 km E of Jesselton, North Borneo, 20–X–58, Quate. Paratypes (USNM): 4 ♀♀, same locality, 2–XI–58.

53. Psychoda ochra Quate, 1959a: 480. Fig. 27i–k.

Pupa. Respiratory horn very long and slender, coarsely wrinkled, with pits along entire length and cluster at apex; other details as figured.

DISTRIBUTION: Samoa, Fiji, Micronesia, Borneo.

NORTH BORNEO: Paring Hot Springs, 12 km N of Ranau, 11–X–58, Quate; 3 ♂♂, 4 ♀♀, 5 pupae in sap from freshly cut tree stump.

The specimens from Borneo are like those from Micronesia and Polynesia except the female have the hairs on the vertex confined to a band parallel to the upper eye margin; the hairs are distributed all over the vertex in the males.

54. Psychoda platilobata Tokunaga, 1957: 65.—Quate, 1959, Pan-Pac. Ent. **35**: 214 (♂).

DISTRIBUTION: West Indies, Formosa, Borneo.

NORTH BORNEO: Ranau, 1–X–58, sweeping at side of shaded stream, Quate. Kalabakan R., 50 km W of Tawau, 9 to 18–XI–58, sweeping at dusk, Quate; 2 ♀♀.

SARAWAK: Pangkalan Tebang, Bau Dist., 7–IX–58, Maa; 23 ♀♀.

55. Psychoda quadrifilis Edwards, 1928: 73.—Quate, 1959a: 477.

DISTRIBUTION: Micronesia, Polynesia, Borneo.

NORTH BORNEO: Tenompok, 50 km E of Jesselton, 17–X to 3–XI–58, at light, Maa and Quate, and 19–II–59, Maa; Ranau, 14–XI–58, at light, Maa; Kundasan, 4–XI–58, Maa and Quate; Tawau, 19–XI–58, at light, Maa; 32 ♂♂, 13 ♀♀.

SARAWAK: Bau Lake area, 29–VIII–58, at light, Maa; ♀.

The Borneo specimens are conspecific with *quadrifilis* from Micronesia, but differ in some particulars of the genitalia. In view of the subspecific differentiation found in Micronesia (Quate, 1959a), the Borneo specimens probably represent another subspecies. Formal naming of these populations, however, is deferred until other collections of Malayan psychodids have been studied to have a more complete understanding of the intraspecific variation of this species.

56. Psychoda torquata Quate, n. sp. Fig. 27 l, m.

Female. Body integument light brown. Eyes separated by distance equal to 1 facet; eye bridge with 4 rows of facets, rounded on median margin; frons with band of hairs extending to upper 4/5 of eye bridge, not joining vertex hairs. Labellum with 2 setae and 4 teeth; palpus extending to node of antennal segment 6, ratio of segments 4 : 5 : 5 : 6. Antenna 15-segmented; 14 a little smaller than 15; 13 and 14 with slender, setose tu-

bercles on apicilateral margins; 15 separated; ascoids 3-branched.

Wing membrane clear; forks complete; no spots. Ratio of fore leg=5 : 5 : 2 : 3, mid leg=6 : 7 : 2 : 4, hind leg = 7 : 8 : 2.5 : 4. Subgenital plate compact Y-shaped, with conspicuous collar-like enlargement on stem.

Antenna 0.9–1.0 mm, holotype 1.0; wing length 1.5–1.7 mm, holotype 1.55; wing width 0.6–0.7 mm, holotype 0.6.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3119), Tenompok, 50 km E of Jesselton, North Borneo, 2–XI–58, Quate. Paratypes (USNM, CAS, BMNH): 5 ♀♀, same data; 4 ♀♀, same locality, 17 to 21–XI–58, at light, Maa and Quate; and 3 ♀♀, same locality, 20–XI–58, Quate.

57. Psychoda aderces Quate, n. sp. Fig. 28a–d.

Female. Body integument light brown. Eyes separated by distance equal to little more than 1 facet; eye bridge with 4 rows of facets, rounded on median margin; frons with band of hairs extending posteriorly on midline to near upper margin of eye bridge, not joining vertex hairs. Labellum with 2 long setae and 4 teeth; palpus moderately slender with segment 3 shortest, extending to internode of antennal segment 6, ratio of segments = 5 : 5 : (4.5) : 4.5. Antenna 15-segmented; 14 smaller than 15, with setose tubercle on apicilateral margin; 15 separated; ascoids 4-branched.

Wing membrane lightly infuscated; forks complete but weakened (fig. 28c); no spots. Ratio of fore leg=5 : 5 : 2 : 3, mid leg=6 : 6.5 : 2 : 4, hind leg = 6 : 8 : 2 : 4. Subgenital plate Y-shaped with long, slender stem; dark, elongate cross-like structure on inner face of plate; inner face also with hairy, arched, longitudinal ridge on either side of stem.

Antenna 0.9–1.1 mm, holotype 0.9; wing length 1.3–1.5 mm, holotype 1.45; wing width 0.5–0.6 mm, holotype 0.6.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3120), Gomantong Caves, 30 km S of Sandakan, North Borneo, 23–XI–58, in cave, Quate. Paratypes (USNM, CAS, BMNH): 9 ♀♀, same locality, 22 to 26–XI–58, Maa and Quate; 2 ♀♀, Tawau, North Borneo, 19–XI–58, at light, Maa; ♀, Kalabakan R., 50 km W of Tawau, 14–XI–58, Maa.

Similar to *dennesi* Satchell (1953b : 375; Australia) and *ichthycerca* Quate (1959a : 472; Oceania), but differs in genitalic details as figured and in having a 15-segmented antenna with the terminal two unequal in size and 4-branched ascoids (16-segmented in *dennesi* and 15-segmented in *ichthycerca* with terminal two equal and ascoids 3-branched in both) and complete wing forks (incomplete in *ichthycerca*).

58. Psychoda paraderces Quate, n. sp. Fig. 28e.

Female. Apparently indistinguishable from *aderces*, except in structures of genitalia; subgenital plate Y-shaped, but stem little thicker than in *aderces* and apical margin smooth, inner structures consisting of simple, transverse, hairy, membranous lobe, genital digit much thicker than in *aderces* and bulging in center, spermathecae little larger.

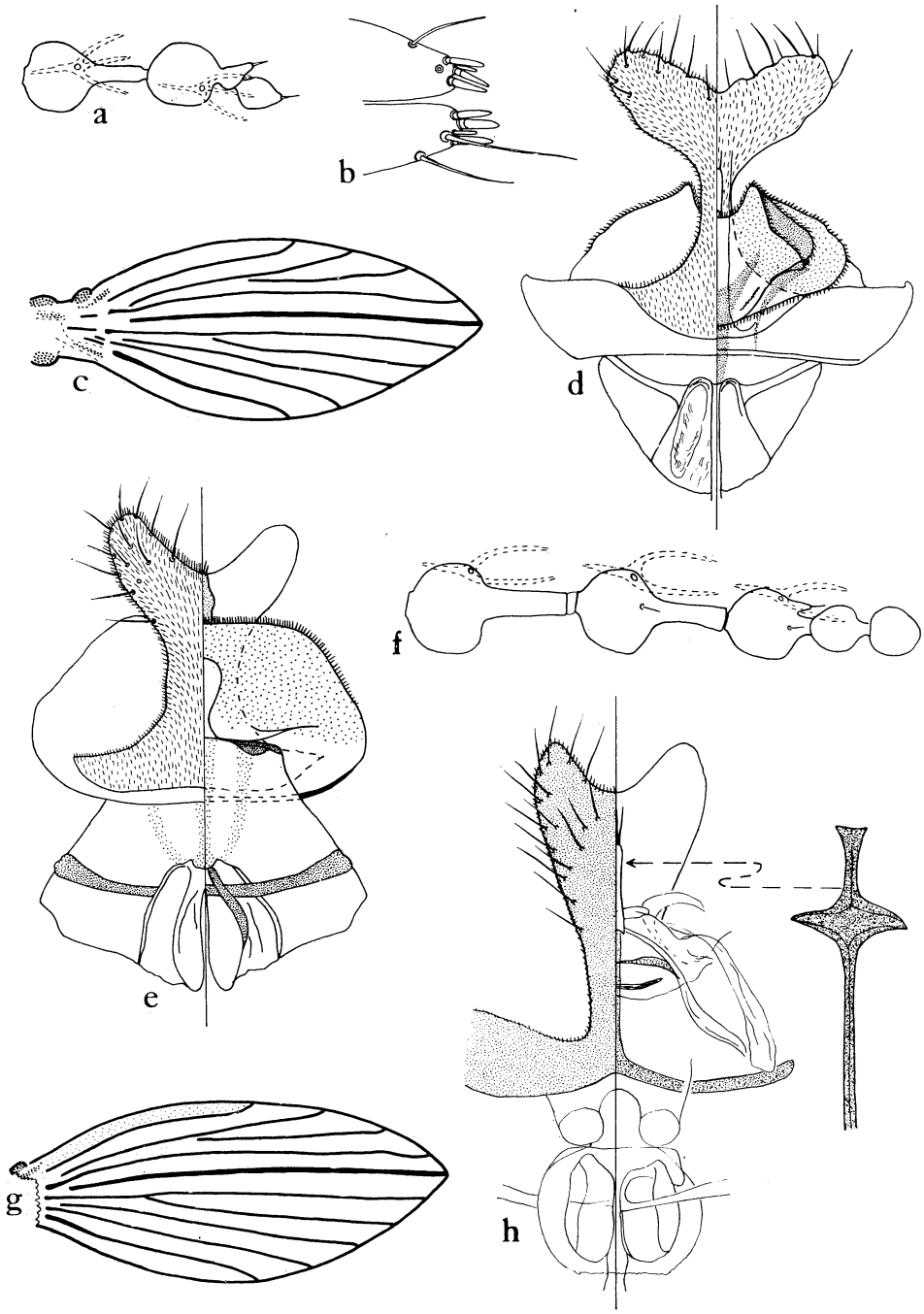

Fig. 28. a–d. *Psychoda aderces*, ♀. a, antenna tip; b, labella tips; c, wing; d, genitalia. e, *P. paraderces*, ♀ genitalia. f–h. *P. helotes*, ♀. f, antenna tip; g, wing; h, genitalia.

Antenna 0.9 mm; wing length 1.4–1.8 mm, holotype 1.5; wing width 0.6–0.7 mm, allotype 0.5.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3121), Kundasan, North Borneo, 4–XI–58, at light, Maa. Paratypes (USNM, BMNH): ♀, same as holotype; 5 ♀♀, Tenompok, North Borneo, 2–XI–58, Quate.

59. Psychoda helotes Quate, n. sp. Fig. 28f–h.

Female. Body integument brown. Eyes separated by distance equal to 1 facet; eye bridge with 4 rows of facets, rounded on median margin; frons with band of hairs extending posteriorly on midline to upper 1/3 of eye bridge, not joining vertex hairs. Labellum with 2 setae and 4 teeth; palpus slender, extending to about node of antennal segment 6, ratio of segments=4 : 4 : 4 : 6. Antenna 15-segmented; 14 and 15 equal in size, separate; ascoids Y-shaped.

Wing membrane lightly infuscated, with slightly darker infuscation in costal cell, veins strong; forks complete; no spots. Ratio of fore leg=5 : 5 : 1.5 : 3, mid leg=5 : 6.5 : 2 : 3, hind leg=6 : 7 : 2 : 3.5. Subgenital plate long and slender, widening apically from slender stem; genital digit long but not extending beyond margin of plate, dark, with 3 apical setae; elongate cross-like structure on inner face of plate; spermatheca rather small.

Antenna 0.9–1.0 mm, holotype 1.0; wing length 1.5–1.8 mm, holotype 1.8; wing width 0.6–0.7 mm, holotype 0.7.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3122), Tenompok, 50 km E of Jesselton, North Borneo, 2–XI–58, Quate. Paratypes (USNM, BMNH): 5 ♀♀, same.

60. Psychoda makati del Rosario, 1936 : 568.—Satchell, 1953 : 372.—Tokunaga, 1957 : 58. Fig. 29a, b.

Psychoda infurcis Satchell, 1950 : 180.

DISTRIBUTION: Polynesia, Australia, Borneo, Philippines, Taiwan.

NORTH BORNEO: Tenompok, 50 km E of Jesselton, 21–X–58, Quate; Ranau, 2, 3–X–58, vegetation on road cut and sweeping at dusk, Quate; 3 ♀♀.

SARAWAK: Santubong, 50 km N of Kuching, 18 to 30–VI–58, Maa; 33 ♀♀, ♂.

61. Psychoda caudata Quate, n. sp. Fig. 29c–f.

Female. Very small species with light brown integument. Eyes separated by distance equal to about 1–1/2 facets, eye bridge with 4 rows of facets, rounded (sometimes unevenly) on median margin; frons with band of hairs extending posteriorly on midline to near upper eye margin, not joining vertex hairs. Labellum with 2 setae and 4 teeth; palpus extending to internode of antennal segment 6, segment 3 smallest, ratio of segments = 5 : 5 : 4.5 : 6. Antenna 16-segmented; 14 and 15 firmly fused together, 16 separated; ascoids Y-shaped.

Wing membrane clear; forks incomplete (sometimes nearly complete), base of R_3 basad

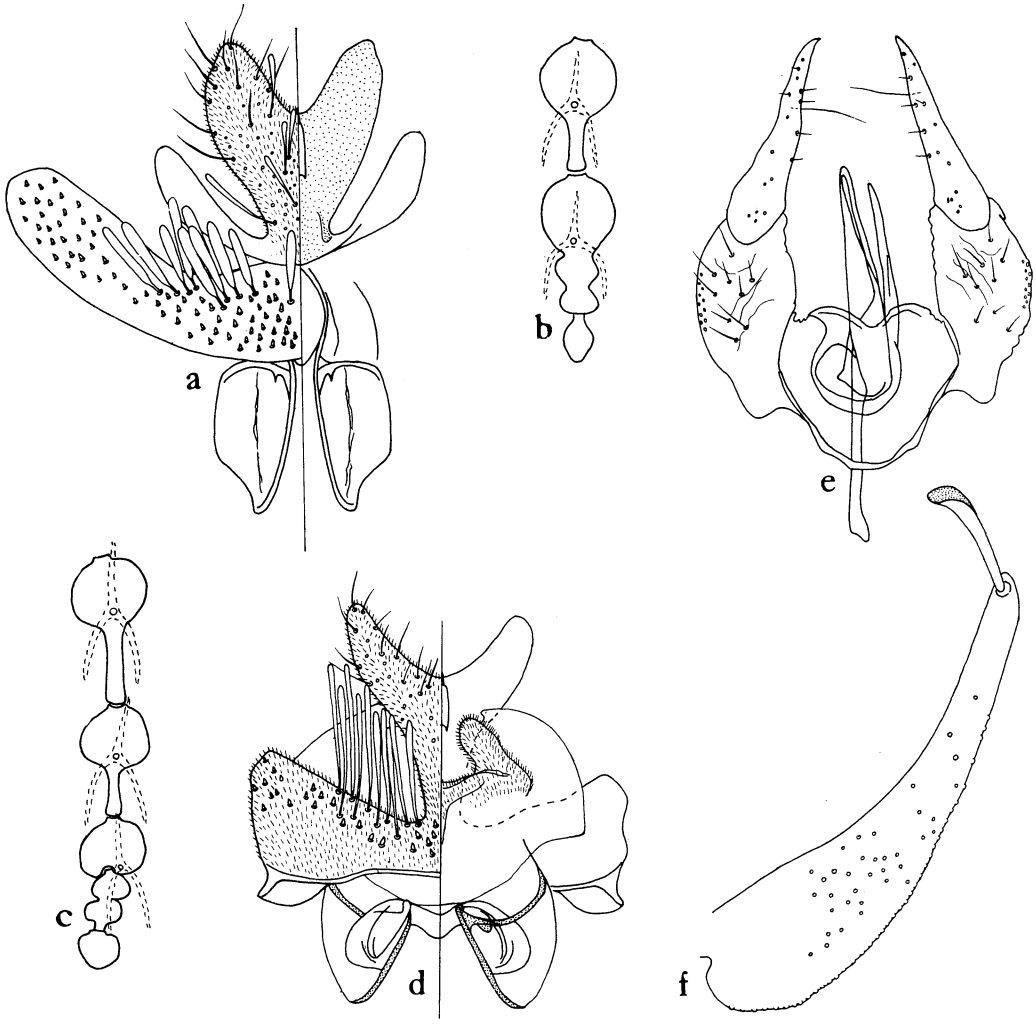

Fig. 29. a, b. *Psychoda makati*, ♀. a, genitalia; b, antenna tip. c–f. *Psychoda caudata*. c, antenna tip; d, ♀ genitalia; e, ♂ genitalia, ventral; f, ♂ surstyle.

of R_1 apex; no spots. Ratio of fore leg=4 : 4 : 1.5 : 3, mid leg=4 : 5 : 2 : 3, hind leg=4 : 6 : 2 : 3. Subgenital plate Y- or fishtail-shaped with base broad and bearing irregular row of long, spatulate hairs on distal margin.

Antenna 0.8 mm; wing length 1.3 mm; wing width 0.5 mm.

Male. Similar to ♀; eyes separated by 1–1/2 facets; interocular suture sometimes present; antennal ascoids 4-branched; radial fork complete or almost so; lateral shaft of aedeagus long, slender and a little sinuous, sometimes twisted over and at or nearly at right angle to main shaft giving different impression than figured.

Wing length 1.3–1.45 mm, allotype 1.3; wing width 0.5 mm.

DISTRIBUTION: Borneo.

Holotype ♀, allotype ♂ (BISHOP 3123), Gomantong Caves, 30 km S of Sandakan, North Borneo, 22 to 26–XI–58, in cave, Maa and Quate. Paratypes (USNM, CAS, BMNH): 9 ♀♀, 5 ♂♂, same data.

62. Psychoda formosana Tokunaga, 1957 : 61. Fig. 30a–c.

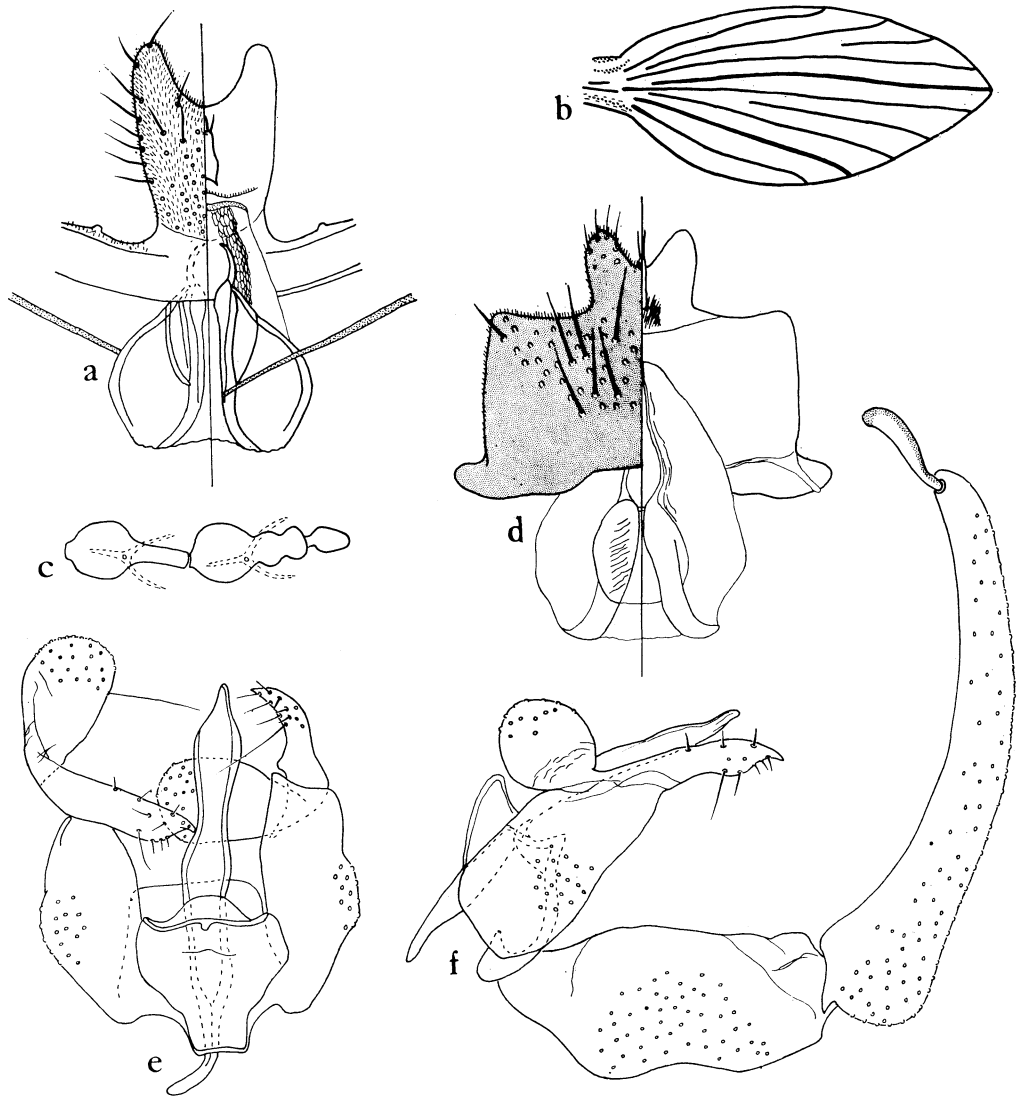

Fig. 30. a–c. *Psychoda formosana*, ♀. a, genitalia; b, wing; c, antenna tip. d–f. *P. malleola*. d, ♀ genitalia; e, ♂ genitalia, left coxite dorsal, right coxite ventral, aedeagus ventral; f, ♂ genitalia, lateral.

DISTRIBUTION: Taiwan, Borneo.

NORTH BORNEO: Bingku, Keningau Dist., 20–I–59, Maa; Ranau, 7–X–58 and 25–I–59, Maa and Quate; 4 ♀♀.

SARAWAK: Santubong, 50 km N of Kuching, 26–VI–58, flying over intertidal zone at dusk, Maa; 2 ♀♀.

Identification of this species was confirmed by comparison with paratypes kindly loaned by Prof. Tokunaga.

63. Psychoda malleola Tokunaga and Komyo, 1954, Phil. Jour. Sci. **83**: 310; Tokunaga, 1958: 374. Fig. 30d–f.

Psychoda Harrisoni Satchell, 1955, Zool. Bot. Africaines, Rev. **51** (3–4): 358. **New Synonymy.**

DISTRIBUTION: Japan, Borneo, Africa.

NORTH BORNEO: Labuan I., 29–XI–58, Quate; Bingku, Keningau Dist., 20–I–59, Maa; Tenompok, 50 km E of Jesselton, 2–XI–58, Quate, and 19–II–59, Maa; Ranau, 1–X–58, stream margin, Quate; 12 km N of Ranau, 8–X–58, at light, Quate; Gomantong Caves, 30 km S of Sandakan, 23–XI–58, Quate; Tawau, 19–XI–59, sweeping at dusk, Quate; 5 ♂♂, 3 ♀♀.

SARAWAK: Santubong, 50 km N of Kuching, 18 to 30–VI–58, intertidal zone at dusk, Maa; 6 ♀♀.

This is a distinctive species with the peculiar lobes on the coxites of the male genitalia and the very small apical lobes of the female subgenital plate. Tokunaga (1958) shows antennal segments 14 and 15 fused. My specimens and a paratype loaned through the coutesy of Prof. Tokunaga have these segments only partly fused.

In spite of some apparent differences of *P. harrisoni* Satchell and its distant occurrence from *malleola* it is regarded as the same species, for it shows the peculiar outgrowths of the male coxite and the quadrate female subgenital plate with small apical lobes and the digit arising near the center. It also shares with *malleola* less distinctive features of the incomplete wing forks and a 16-segmented antenna with segments 14 and 15 partly fused. *P. harrisoni* seems to differ from Oriental *malleola* in having the male basistyle cylindrical rather than inflated basally, the ninth sternite is more slender and the coxite appendages are not as strongly club-shaped. In view of the striking similarities, the differences are not regarded as specific. I have not examined the types of *harrisoni*.

64. Psychoda vanga Quate, n. sp. Fig. 31a–c.

Female. Body integument grayish brown. Eyes separated by distance equal to 1 facet; eye bridge with 4 rows of facets, truncate on median margin; frons with band of hairs extending posteriorly on midline to upper 3/4 of eye bridge, well separated from vertex hairs. Labellum with 2 teeth and 4 spines; palpus extends to internode of antennal segment 6, ratio of segments=4 : 4.5 : 4.5 : 6. Antenna apparently 14-segmented (apex of antenna a little shrivelled and there may be a dimunitive 14th segment beyond 13 which is not visible in type series); ascoids Y-shaped.

Wing membrane lightly infuscated with little darker infuscation in costal cell: forks incomplete, base of R_3 on level of apex of R_1; no spots. Ratio of fore leg=4 : 4 : 1.5 : 3, mid leg=5 : 6 : 2 : 3, hind leg=5 : 7 : 2 : 3. Subgenital plate peculiarly spade-shaped

with excavated apex, almost no ornamentation on inner face of plate other than digit.

Antenna 0.8 mm; wing length 1.5 mm; wing width 0.5 mm.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3124), Tenompok, 50 km E of Jesselton, North Borneo, 2–XI–58, Quate. Paratypes: 2 ♀♀, same, but 1 ♀, 20–X–58.

65. Psychoda alabangensis del Rosario, 1936 : 566 (♂ only).

DISTRIBUTION: Taiwan (?), Philippines, Borneo.

BORNEO. Sarawak: Pangkalan Tebang, Bau Dist., 17–IX–58, Maa; ♂.

Tokunaga (1957) has recorded this species from Taiwan, redescribed the male and described for the first time the female. The male does not seem to agree with that described by del Rosario (*l. c.*).

The single male from Sarawak I have examined seems identical with *alabangensis* from the Philippines. Also, I have females which are the same as Tokunaga identified as *alabangensis* but from a different locality than the male and I'm not certain the two belong to the same species. Until Tokunaga's identification of *alabangensis* and the association of sexes is more firmly established, Tokunaga's identification of *alabangensis* female must be regarded as uncertain.

66. Psychoda ichthycerca Quate, 1959a : 472.

DISTRIBUTION: Micronesia, Borneo.

NORTH BORNEO: Gomantong Caves, 30 km S of Sandakan, 22 to 26–XI–58, Maa and Quate; ♀.

67. Psychoda mediocris Quate, 1959a : 468.

DISTRIBUTION: Micronesia, Borneo.

NORTH BORNEO: Paring Hot Springs, 13 km N of Ranau, 8–X–58, at light, Quate; Gomantong Caves, 30 km S of Sandakan, 22 to 26–XI–58, Maa and Quate; 13 ♀♀.

SARAWAK: Bau Lake area, Bau Dist., 29–VII–58, at light, Maa; 2 ♀♀.

68. Psychoda parsivena Quate, 1959a : 469.

DISTRIBUTION: Micronesia, Borneo.

NORTH BORNEO: Gomantong Caves, 22 to 26–XI–58, Maa and Quate, 13 ♀♀.

69. Psychoda innotabilis Quate, n. sp. Fig. 31d–f.

Female. Body integument grayish brown. Eyes separated by distance equal to 1 facet; eye bridge with 4 rows of facets, rounded on median margin; frons with band of hairs extending posteriorly on midline to upper eye margin and almost joining vertex hairs. Labellum with 2 setae and 4 teeth; palpus extends to internode of antennal segment 6, ratio of segments = 5 : 5 : 5 : 7. Antenna 15-segmented; 14 and 15 subequal, separated; ascoids Y-shaped.

Wing membrane very lightly infuscated; forks incomplete, base of R_3 a little basad of apex of R_1 (with some variation); no spots. Ratio of fore leg = 4 : 4 : 1.5 : 3, mid leg

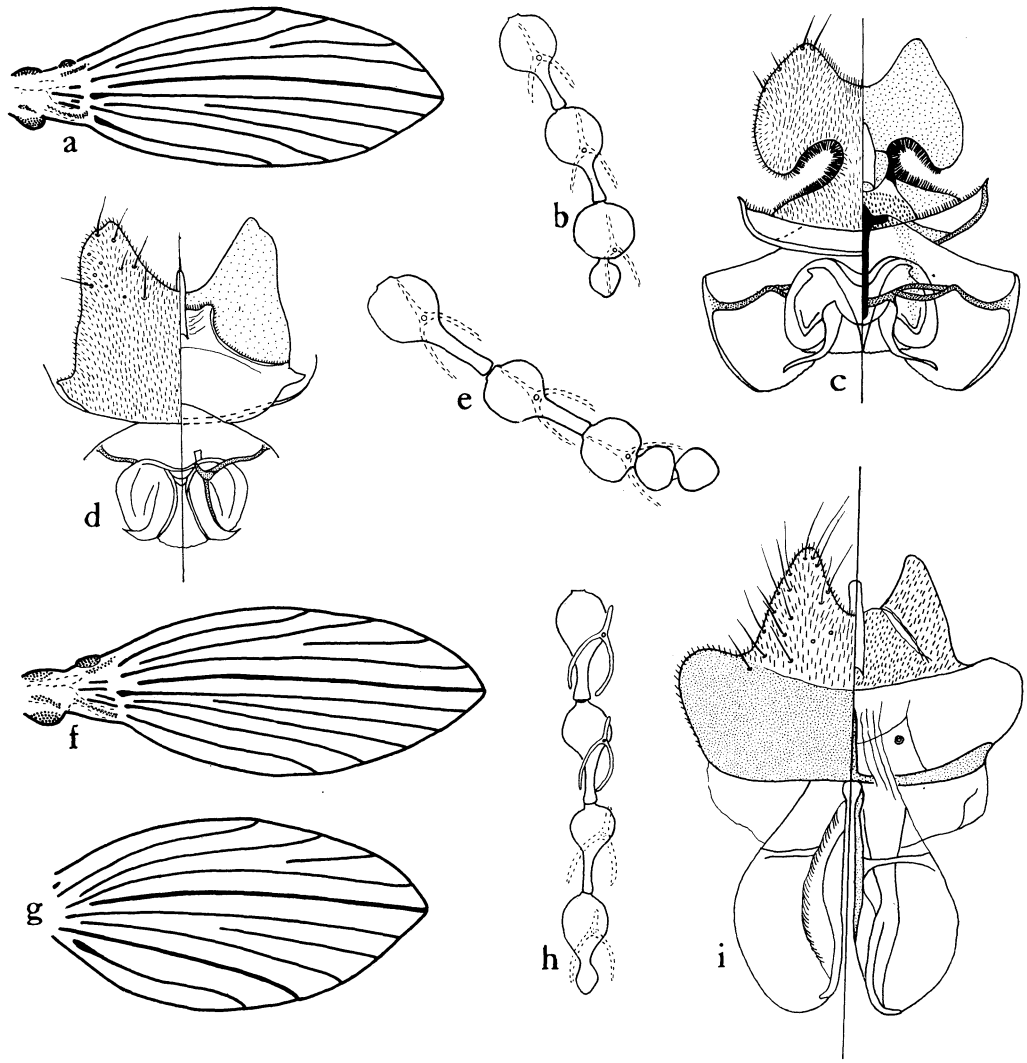

Fig. 31. a–c. *Psychoda vanga*, ♀. a, wing; b, antenna tip; c, genitalia. d–f. *P. innotabilis*, ♀. d, genitalia; e, antenna tip; f, wing. g–i. *P. byblis*, ♀. g, wing; h, antenna tip; i, genitalia.

=5 : 6 : 2 : 3, hind leg=6 : 7 : 2 : 3. Subgenital plate quadrate with deep apical, semicircular concavity, without differentiated base; genital digit extending well beyond apical margin of concavity.

Antenna 0.8 mm; wing length 1.4–1.6 mm, holotype 1.4; wing width 0.5–0.6 mm, holotype 0.5.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3125), Tenompok, 50 km E of Jesselton, North Borneo, 2–XI–58, Quate. Paratypes (USNM, CAS, BMNH): 11 ♀♀, same data and same locality, 17 to 21–X–58, at light, Maa and Quate.

70. Psychoda byblis Quate, n. sp. Fig. 31g–i.

Female. Integument light brown. Eyes separated by distance equal to little less than 1–1/2 facets; eye bridge with 4 rows of facets except innermost row with only 3, median margin obliquely truncate; frons with band of hairs extending posteriorly on midline to upper row of facets and nearly joining vertex hairs; vertex with row of 4 large hairs on either side of midline along posterior eye margin. Labellum with 2 setae and 4 teeth; palpus extending to antennal segment 8, segments 2 and 3 ovoid, shorter and broader than others, ratio of segments=6 : 4 : 5 : 7. Antenna 14-segmented; ascoids Y-shaped.

Wing membrane clear; forks incomplete; no spots at vein tips. Ratio of fore leg= 5 : 5 : 1.5 : 3, mid leg=5 : 7 : 2 : 4, hind leg=6 : 8 : 2 : 4. Subgenital plate sharply bilobed, spermatheca small.

Antenna 0.8–0.9 mm, wing length 1.3–1.5 mm, wing width 0.4–0.6 mm.

Male. Unknown.

DISTRIBUTION: Borneo.

Holotype ♀ (BISHOP 3126), Kundasan, North Borneo, 4–XI–58, at light, Maa. Paratypes (USNM, CAS, BMNH): 2 ♀♀, same data; ♀, Labuan I., North Borneo, 29–XI–58, Maa; 5 ♀♀, Ranau, North Borneo, 12–X–58, 14–XI–58, 25–I–59, Maa and Quate; ♀, Paring Hot Springs, 12 km N of Ranau, 14–XI–58, at light, Maa; ♀, Tawau, North Borneo, 19–XI–58, sweeping at dusk, Maa; ♀, Santubong, 50 km N of Kuching, Sarawak, 26–VI–58, intertidal zone, Maa.

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