

Coniopterygidae from the Snow Mountains, New Guinea (Neuroptera)

By BO TJEDER

Zoological Institute, S-223 62 Lund

This report covers the collection of Coniopterygids made by Dr. L. J. Toxopeus, entomologist of the Netherland Indian-American Expedition to New Guinea in 1938—1939, an Archbold Expedition, also known as the Indisch-Amerikanische Expeditie.

The area chosen for the work of this expedition was the north slope of the Snow Mountains, until then practically unknown biologically. The expedition worked in the central part of this unknown area, between Mt. Wilhelmina and the Idenburg River, about 3.5° — 4.15° S and 138.8° — 139.15° E (cf. map, fig. 1). The available Coniopterygids were collected at high altitudes: 1,800, 2,100, 2,800 and 3,300 meters, being among the highest altitudes at which representatives of this family ever have been captured. A single species was previously known from New Guinea, *Coniopteryx biroi* Enderlein, 1906 (from Lemien near Berlinhafen at the north coast).

The collection comprises six species, all hitherto unknown and all belonging to the genus *Heteroconis* Enderlein. The ecological descriptions of the localities in which these species were found have been summarized from papers by Toxopeus (1940) and Archbold, Rand and Brass (1942). The map sketch on which these localities are indicated (fig. 1) is copied from a figure in the latter paper.

Gen. *Heteroconis* Enderlein, 1905

Enderlein, 1905, Zool. Anz. 29: 226. — Id. 1906, Zool. Jahrb. 32: 227. — Id. 1929, Arch. f. klassif. u. phylog. Entom. 1: 114. — Meinander, 1969, Notulae Entom. 59: 51.

Type species: *H. ornata* Enderlein, 1905 (Australia).

The ♂ of the type species has an interantennal horn, described by Meinander in his monographic revision of the genus (1969). This structure is present also in most of the other known species as well as in the available males from New Guinea. It is a remarkable structure, placed below the somewhat projecting margin of the vertex (or fused vertex and frons) and is movable vertically (cf. figs. 3—4 and 13—14). Its function is uncertain but it is perhaps a prehensile organ, used together with the basal antennal segments to hold the female during copulation.

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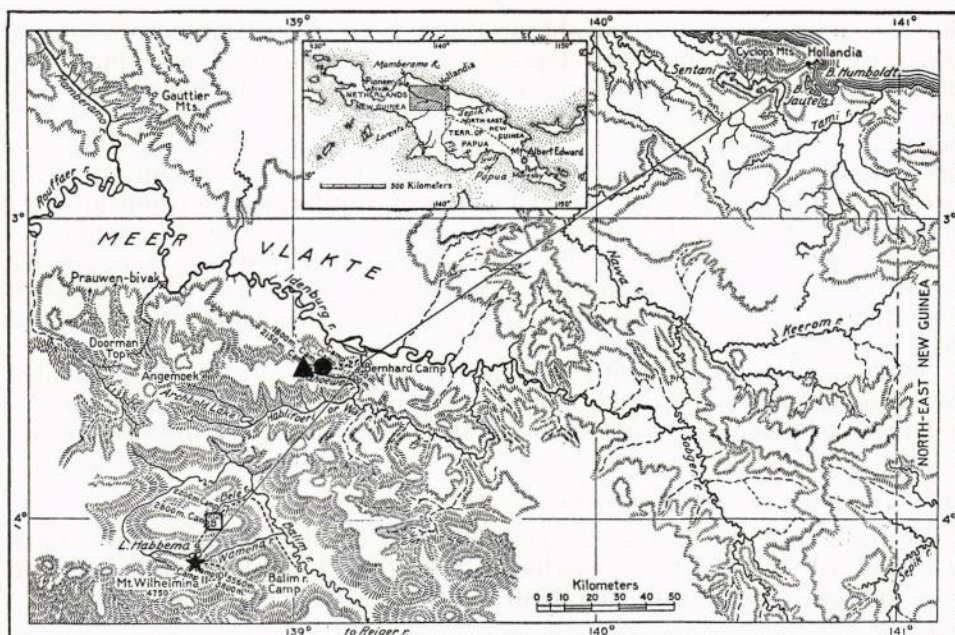


Fig. 1. Area visited by the expedition, showing situation of collecting stations for Coniopterygids. — Symbols: ● = *Heteroconis flavicornuta* n. sp.; ▲ = *H. toxopei* n. sp., *H. iriana* n. sp. and *H. jumipennis* n. sp.; □ = *H. candida* n. sp.; ★ = *H. (D.) amoena* n. sp.

Another interesting sort of structures is present in all the specimens from New Guinea, also in the females, being rounded organs, larger than the bases of the macrosetae, placed in one or two rows on the upper parts of the toruli and in small lateral groups on the vertex. These organs are perhaps wax-glands but they are larger than the ordinary wax-glands, present on the abdomen. In the following descriptions they are dealt with as "glands".

Four of the available species are represented by male specimens. In these the terminal abdominal structures are dominated by a pair of large gonocoxites (fig. 9, gx) and a large penis (p). The gonocoxites are fused ventrally; they carry styles (st) and a long hypocausta (hca). At the base of the hypocausta there is a central shield-like structure, in the following species descriptions called parma (pma). In three of the available species the parma is a solid plate (fig. 10), in one species (fig. 43) divided into a pair of plates which are fused with each other membranously, and also fused apically with a triangular structure, appearing as the partly detached tip of the parma of the mentioned three species. In one of these latter species there is a central tooth-like structure, situated in the membrane close above the parma (fig. 9, ads), perhaps being a fragment completely detached from the parma. The gonarcus (gs) is a transverse structure above the mentioned structures, in one species with teeth and other processes (fig. 17). The penis is a tubular central organ, projecting with its apex above the parma between the styli. By means of a pair of movable lateral apical structures (aps) it is

fused membranously and movably to the styli. A pair of large central wing-like projections present. The ectoprocts (epr) are quite weak and small. The 9th sternite is also weak and covers the basal parts of the gonocoxites and the hypovalva. — The pattern of the gonocoxites, with styli and hypocausta, resembles strikingly the pattern in *Raphidia* but in that genus the gonocoxites are external, in *Heteroconis* invaginated into the apical segments. For the present it is impossible to state whether this similarity is an indication of true phylogenetic affinity between the two genera, or only is a matter of convergence in development. The parma may be supposed to represent the fused parameres. In *Raphidia* the parameres are either paired or unpaired (fused) and in some species even fused with the hypovalva (cf. Aspöck et Aspöck, 1971: 21).

The genital structures of the available females (two species) are dominated by large, fused gonapophyses laterales which proceed into the abdomen as a large sclerotized structure enclosing the bursa. A slender duct is present.

Geographical distribution

Australia and the Bismarck Archipelago (according to Meinander, 1969, who has revided the three species described by Enderlein, and described five additional species, all from Australia).

Key to the species of *Heteroconis* from New Guinea

- | | |
|---|-------------------------------|
| 1. Antennae with some flagellar segments pale | 2 |
| – Antennae with all flagellar segments dark | 4 |
| 2. Tip segment of antennae pale | 1. <i>flavicornuta</i> n. sp. |
| – Tip segment of antennae dark | 3 |
| 3. Flagellar segments 1, 2 brown, 8 and 10 pale | 3. <i>iriana</i> n. sp. |
| – Flagellar segments 1, 2, 6, 8 and 10 pale | 5. <i>candida</i> n. sp. |
| 4. Wings acute; forewings falcate | 6. <i>amoena</i> n. sp. |
| – Wings rounded apically | 5 |
| 5. Scape and pedicel dark brown | 4. <i>fumipennis</i> n. sp. |
| – Scape and pedicel yellow | 2. <i>toxopei</i> n. sp. |

1. *Heteroconis flavicornuta* n. sp. (Figs. 2–11)

Type locality: about 15 km W of Bernhard Camp, between Sahoeweri and Idenburg Rivers, Snow Mountains, New Guinea. — Type: a male in the collections of the Rijksmuseum van Natuurlijke Historie, Leiden.

Description

Available material: a single male.

Holotype ♂.

Size: length of body about 2 mm, of forewing 2.9 mm, of hindwing 2.5 mm, of antenna 0.9 mm.

Head, body, legs and pale areas of forewings sparsely covered with white waxy substance, hindwings densely covered.

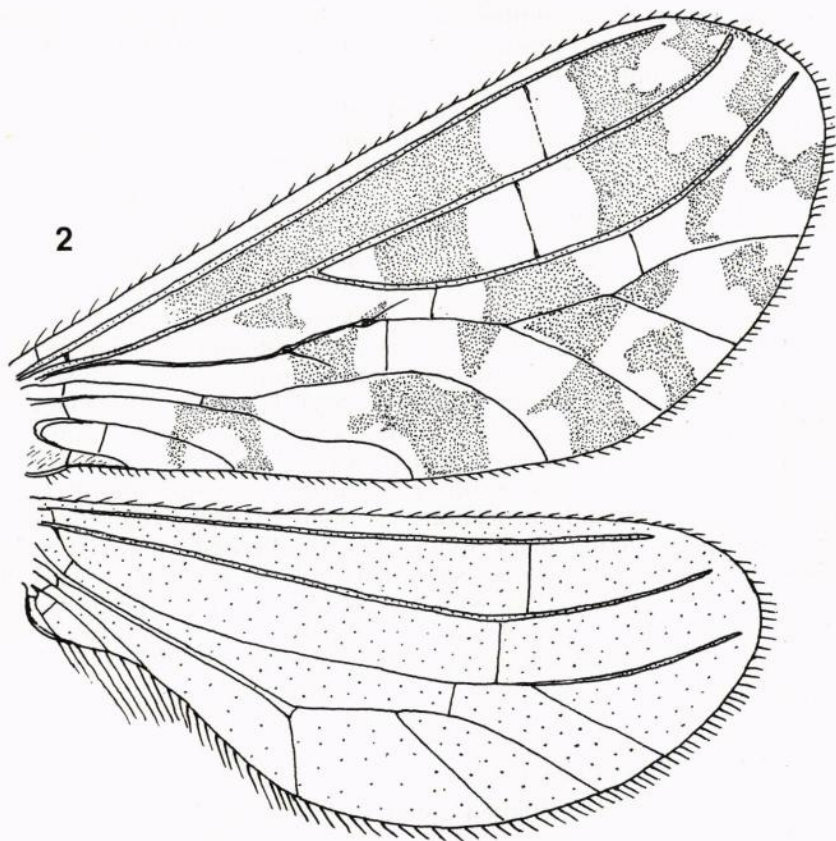


Fig. 2. *Heteroconis flavicornuta* n. sp. (holotype ♂; forewing 2.9 mm).

Head yellowish brown. Mandibles yellowish brown, not darkened apically. Maxillary and labial palpi dark brown with somewhat paler under surface of apical segment. Antennae 18-segmented, bicoloured (fig. 5). Scape, pedicel and flagellar segments 1, 2, 8, 10, 12 and 16 (tip segment) pale yellow; flagellar segments 3, 6 and 9 dark brown with pale distal portion, and segments 4, 5, 7, 11, 13, 14 and 15 wholly dark brown. Scape about two and a half times as long as wide. Pedicel short, not fully one and a half times as long as its width at apex. Flagellar segments of subequal length but apical segment longer and wider than the others. Interantennal horn slender, pale yellow, shaped as shown in figs. 3 and 4. Along its under surface there is a narrow, haired furrow. Toruli with a row of 6 and vertex on each side with a group of 6 "glands". Along the face there is a broad, weak area as shown in fig. 3. Face with very sparse, pale hairiness. Labrum narrow with almost straight margin.

Dorsum and sides of thorax yellowish brown but mesoscutum with a pair of large, oblong dark brown spots and mesoscutellum with hyaline anterior part (fig. 6). Hairs on thorax few, extremely short, pale, on mesonotum

directed forwards and distributed as shown in the figure. Legs pale with extreme tip of femurs and apical segment of tarsi slightly darkened. Claws pale. Hairs on legs short, pale.

Wings (fig. 2) with rounded apex. Membrane of forewing pale brown with white areas as in the figure. Membrane of hindwings whitish with a slight greyish tinge. Venation brown, closely like that of *H. dahli* Enderlein (cf. figure by Meinander, 1969) but crossvein between M and Cu_1 in forewing beyond the outer medial seta (in *dahli* before the seta).

Abdomen pale with blackish genital structures (except the hypovalva). Sternite 9 with a pair of rounded, projecting protuberances before apex (figs. 7 and 8). Gonarcus blackish with projecting, acute tip in lateral view (figs. 8 and 9), rather transverse with central, rounded incision in dorsal and caudal view (fig. 10) and with dark hairs. Gonocoxites blackish, rather narrow, shaped as shown in figs. 9 and 10. Styli blackish, with black hairs and with projections from the inner surface as shown in the mentioned figures. Hypocauda pale yellow, slender, wavy in lateral view, and with simple, very acute apex (figs. 9 and 10). Parma obovate, slightly convex, without teeth or marginal projections, sparsely haired (figs. 9 and 10). A central, additional acute black tooth present, situated on the membrane close above the apex of the parma, shaped as indicated in fig. 9. Penis large, tubular, very wide proximally, with acute tip and with large wing-like projections as shown in figs. 9 and 11. A pair of narrow, curved black appendages, movably attached to the penis behind the scale-like projections.

Female unknown.

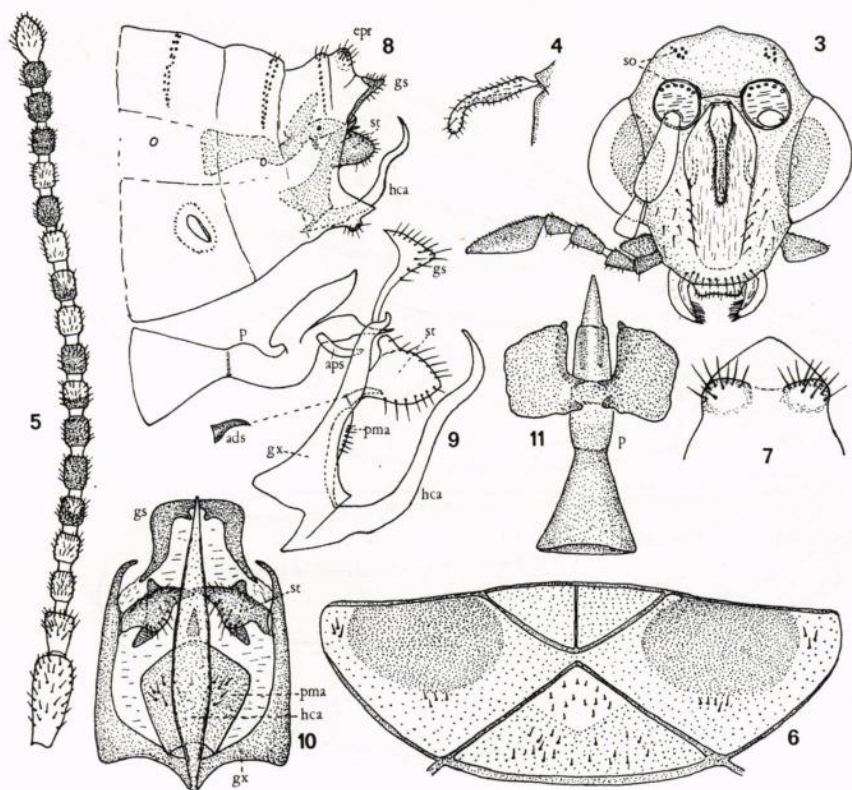
Geographical distribution

New Guinea. Mist Camp, situated about 15 km W of the Bernhard Camp, between Sahoeweri and Idenburg Rivers in the Snow Mountains, central New Guinea; altitude 1,800 m. Holotype ♂, 9.i.1939, leg. L. J. Toxopeus, in coll. Rijksmuseum van Natuurlijke Historie, Leiden. (Cf. map, fig. 1, ●).

Ecological distribution

The camp was situated in mist-saturated beech-forest with thick ground moss, and mixed rain-forest with a dense layer of subsidiary trees and sparse woody undergrowth under conditions of dense shade. Common canopy trees *Phyllocladus* and *Calophyllum congestifolium*; in the sub-canopy predominated two species of Cunniaceae, *Metrosideros Pullei parviflora* and *Tetractomia Lauterbachiana*. The undergrowth included climbing *Cyathea biformis* and narrow-leaved *Freycinetia laterifolia* and *erythrospatha*, the tree-ferns *Cyathea perpelvigera* and *melanoclada*; in the ground-moss a pale pink *Medinilla* and a sprinkling of herbs and ferns as *Argostemma* sp., *Burmanna longifolia*, *Lindsaya marginata* and *Grammitis Knutsfordiana*. In the sparse woody undergrowth chiefly *Rapanea* sp., *Drimys* ssp. and *Medinilla* spp., accompanied by *Palmeria Fengeriana*, *Nepenthes* sp., and the fern *Sticherus venosus*.

Every day during January, 1939, mist from about dawn to noon and every day rain. Temperature (C.) maximum, mean 18.5°; minimum, mean 13°.



Figs. 3—11. *Heteroconis flavicornuta* n. sp. (holotype ♂). — 3. Head, frontal. — 4. Inter-antennal horn, lateral. — 5. Antenna. — 6. Prescutum, mesoscutum and mesoscutellum, dorsal. — 7. Apex of sternite 9, ventral. — 8. Apex of abdomen, lateral. — 9. Gonarcus, gonocoxites with appendages, and penis, lateral (central, tooth-like structure, hidden by the gonocoxites and styles, drawn separately). — 10. Gonarcus and gonocoxites with appendages, ventro-caudal (central, tooth-like structure hidden by the hypocauda, drawn dotted). — 11. Penis, dorsal.

Abbreviations: *ads*=additional central tooth-like structure; *aps*=pair of movable apical appendages of penis; *epr*=ectoprocts; *gs*=gonarcus; *hca*=hypocauda; *p*=penis; *pma*=parma; *so*=gland-like structures on vertex and toruli; *st.*=styli.

2. *Heteroconis toxopei* n. sp. (Figs. 12—18)

Type locality: about 20 km W of Bernhard Camp, between Sahoweri and Idenburg Rivers, Snow Mountains, New Guinea. — Type: a male in the collections of the Rijksmuseum van Natuurlijke Historie, Leiden.

Description

Available material: a single male.

Holotype ♂.

Size: length of body about 2 mm, of forewing 2.5 mm, of hindwing 2.1 mm, of antenna 1.15 mm.

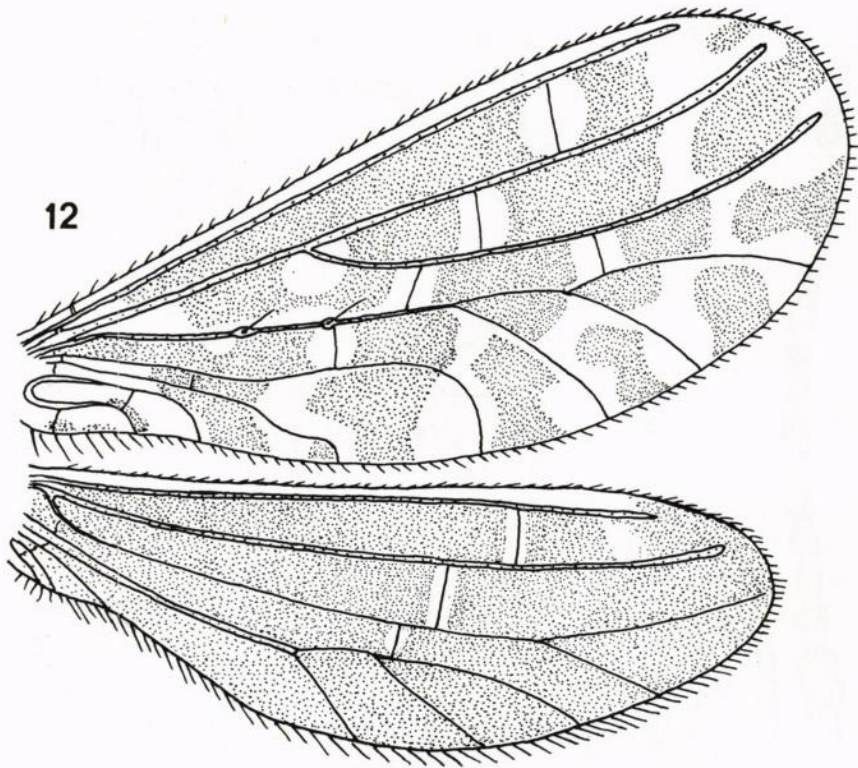


Fig. 12. *Heteroconis toxopei* n. sp. (holotype ♂; forewing 2.5 mm).

Head yellowish brown, rather elongate with transverse vertex in frontal view (fig. 14). Face with central weak area. Labrum with emarginated margin. Interantennal horn yellow with pale setae, narrow apically, somewhat bent distally (fig. 13) and with a narrow furrow along the ventral surface as shown in fig. 14. Mandibles blackish distally. Palpi brown. Antennae 18-segmented; scape and pedicel yellow; all flagellar segments dark brown; hairs short and pale. Scape about two and a half times as long as wide at apex. Pedicellum about one and a half times as long as wide. Flagellar segments subequal, slightly elongate. Toruli with a row of 4 "glands". Lateral groups of 3 similar organs present on vertex near its hindmargin, not visible in frontal view. Hairiness of head sparse, short and pale.

Thorax blackish brown. Legs ochraceous but tips of tibiae and tarsi slightly darker. Hairs very short, pale.

Wings with rounded apex (fig. 12). Membrane of forewing brown with white areas as shown in the figure. Hindwings also brown, with white costal area and narrow white areas along the crossveins and with an oblique white spot between Sc and R near apex. Venation of both wings brownish. Crossvein-similar part of Sc and crossvein between R and Rs gradate and widely separated. Cu_1 of forewing meets the hindmargin in a very steep curve.

Abdomen when treated with KOH pale with dark yellowish brown to blackish brown genital structures (fig. 15). Sternite 9 with straight hind-margin, without projections. Gonarcus blackish, large and complex, hairless (figs. 16 and 17, gs). Its central portion concave; its dorsal margin projecting, tooth-like in lateral view, transverse in caudal view. A pair of strong black, hooky teeth proceeds from the lower margin and is directed upwards. The central part of the margin between these teeth proceeds triangularly downwards-inwards. A pair of entoprocessus (ent) present, flattened and situated alongside the mentioned triangular process. Gonocoxites brownish, rather narrow, shaped as shown in figs. 16 and 17. Styli dark brown with pale, almost spine-like hairs and with a large plate-like extension from the anterior surface as shown in the mentioned figures. Hypocauda brown, rather slender, wavy in lateral view, with long acute tip, directed forwards, and with an anteapical long tooth on the anterior surface. Beyond midway there is a pair of small lateral teeth, situated a little asymmetrically, the left tooth a little beyond the right tooth. Parma brown, a little concave, broader than long, with acute tip. Penis (cf. figs. 16 and 18) tubular with very wide blackish proximal part, yellowish central part and short acute and unpigmented apex. Apical appendages dark brown, very broad at base in lateral view.

Female unknown.

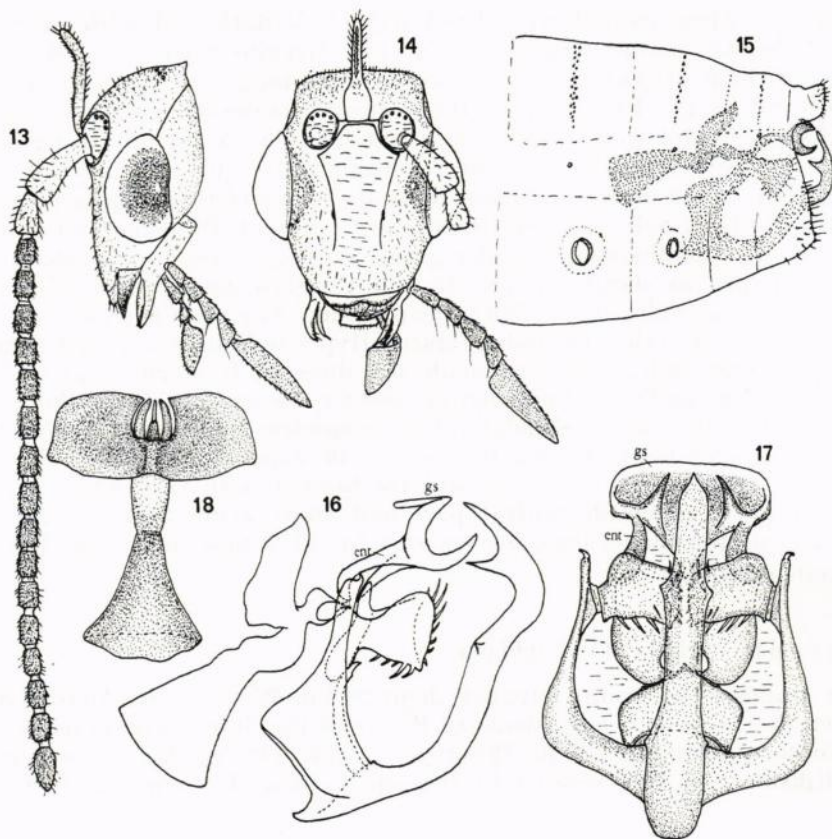
Geographical distribution

New Guinea. Top Camp, situated about 20 km W of the Bernhard Camp, between the Sahoweri and Idenburg Rivers in the Snow Mountains, central New Guinea; altitude 2,100 m. Holotype ♂, 24.i.1939, leg. L. J. Toxopeus, in coll. Rijksmuseum van Natuurlijke Historie, Leiden. (Cf. map, fig. 1, ▲).

Ecological distribution

The Top Camp was occupied 20th January to 10 February 1939, by Toxopeus 20th—25th January. The camp was situated about 5 km W of the Mist Camp on a range on the exposed point of a very narrow triangular bluff which rose almost sheer for 100 meters on the crest of the ridge. The beech-forests there were much like those of the Mist Camp (see above under *H. flavicornuta* n. sp.) but differing in the identity of their major dominants and in the relative abundance of forms and to some extent in the floristic composition of their lower layers and epiphyte flora. *Weinmannia* persisted as a minor dominant but the *Nothofagus* was replaced by two other species of the genus, both in full flower and bearing fruit in early February. Two species of *Xanthomyrtus* figured prominently in the subcanopy tree layer on the upper parts of the peak. A slender, subscandent bamboo formed a dense underwood. The subalpine coniferous *Libocedrus* was conspicuous about the edge of the bluff and an ericoid *Rhododendron*, also a subalpine element, was found in an isolated, abnormally low station in the shrubberies of the bluff. Rain-forest trees, such as *Syzygium*, *Sloanea* and *Evodea*, occurred as high as 2,200 meters in the beech-forests of the peak.

Squally nights, and days of mist, rain, little sun and strong winds were the rule. Temperature (C.) maximum, mean 23°; minimum, mean 12°.



Figs. 13—18. *Heteroconis toxopei* n. sp. (holotype ♂). — 13. Head, lateral. — 14. Head, frontal. — 15. Apex of abdomen, lateral. — 16. Gonarcus, gonocoxites with appendages, and penis, lateral. — 17. Gonarcus and gonocoxites with appendages, ventro-caudal. — 18. Penis, dorsal.

Abbreviations: *ent*=entoprocessus; *gs*=gonarcus.

3. *Heteroconis iriana* n. sp. (Figs. 19—32)

Type locality: about 20 km W of Bernhard Camp, between Sahoeweri and Idenburg Rivers, Snow Mountains, New Guinea. — Type: a male in the collections of the Rijksmuseum van Natuurlijke Historie, Leiden.

Description

Available material: two males.

Holotype ♂.

Size: length of body about 2.5 mm, of forewing 3 mm, of hindwing 2.7 mm, of antenna 1.4 mm.

Head, body, legs and pale areas of forewings sparsely covered with white waxy substance.

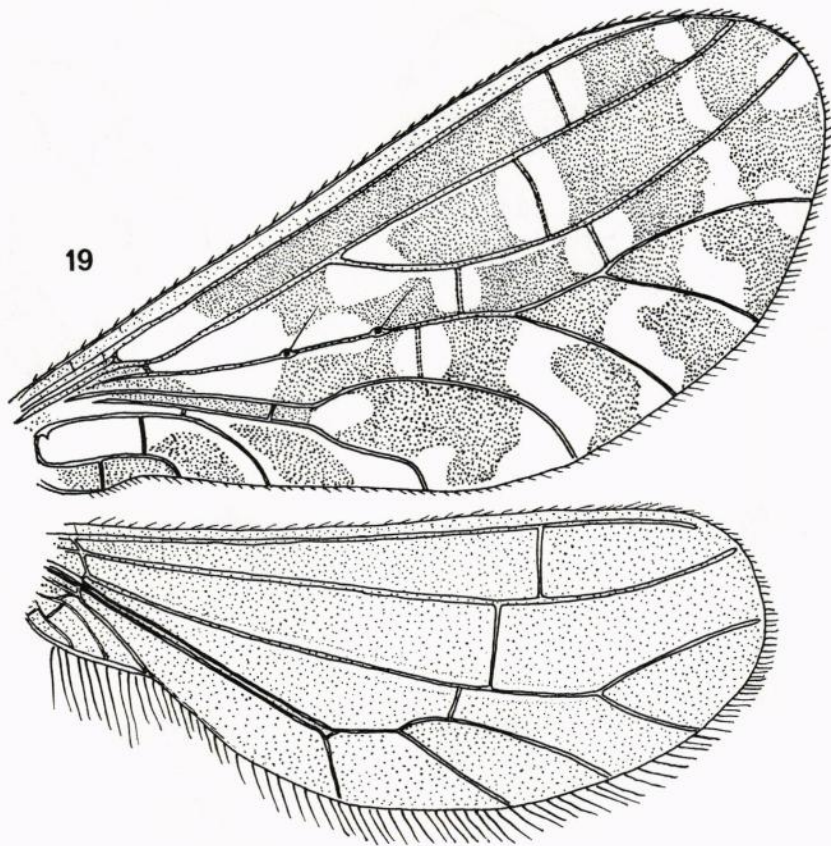
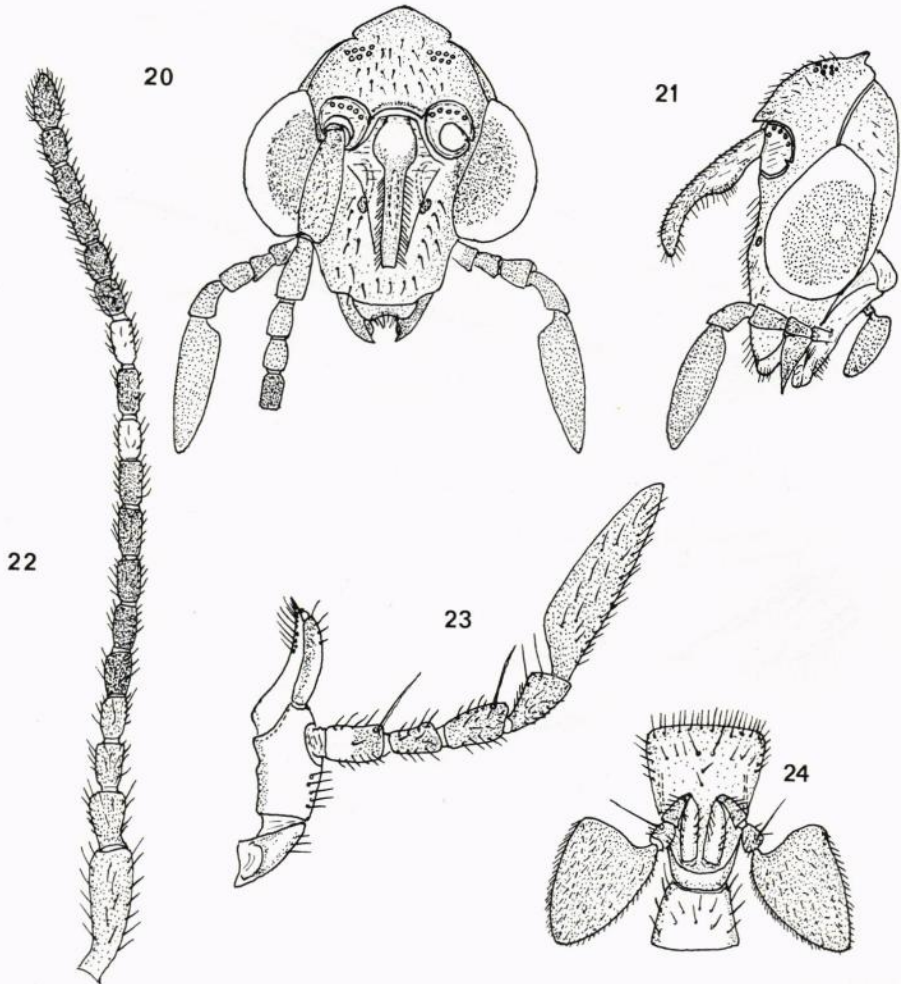


Fig. 19. *Heteroconis iriana* n. sp. (holotype ♂; forewing 3 mm).

Head (figs. 20—21). Vertex and frons dark brown, shining. Face yellowish brown with membranous central area. Labrum with emarginated margin. Interantennal horn dark brown, setose, with transverse apex and a densely setose furrow along the ventral surface. Mandibles brown. Palpi brown but basal part of 1st segment of maxillary palpi pale. Antennae 18-segmented (fig. 22) brownish to brownish black but flagellar segments 8 and 10 yellowish. Scape three times as long as wide. Pedicel less than twice as long as wide. Vertex with lateral groups of seven "glands" and toruli with rows of five similar organs. Head with minute microtrichia and short brownish hairs, especially on the vertex, frons, genae and clypeus. Margin of labrum also with a row of similar hairs.

Thorax blackish brown, shining, with sparse whitish hairiness, indistinct on dorsum. Femurs and tibiae dark brown; 1st segment of tarsi whitish, 2nd—5th segments brown. Hairs on legs whitish.

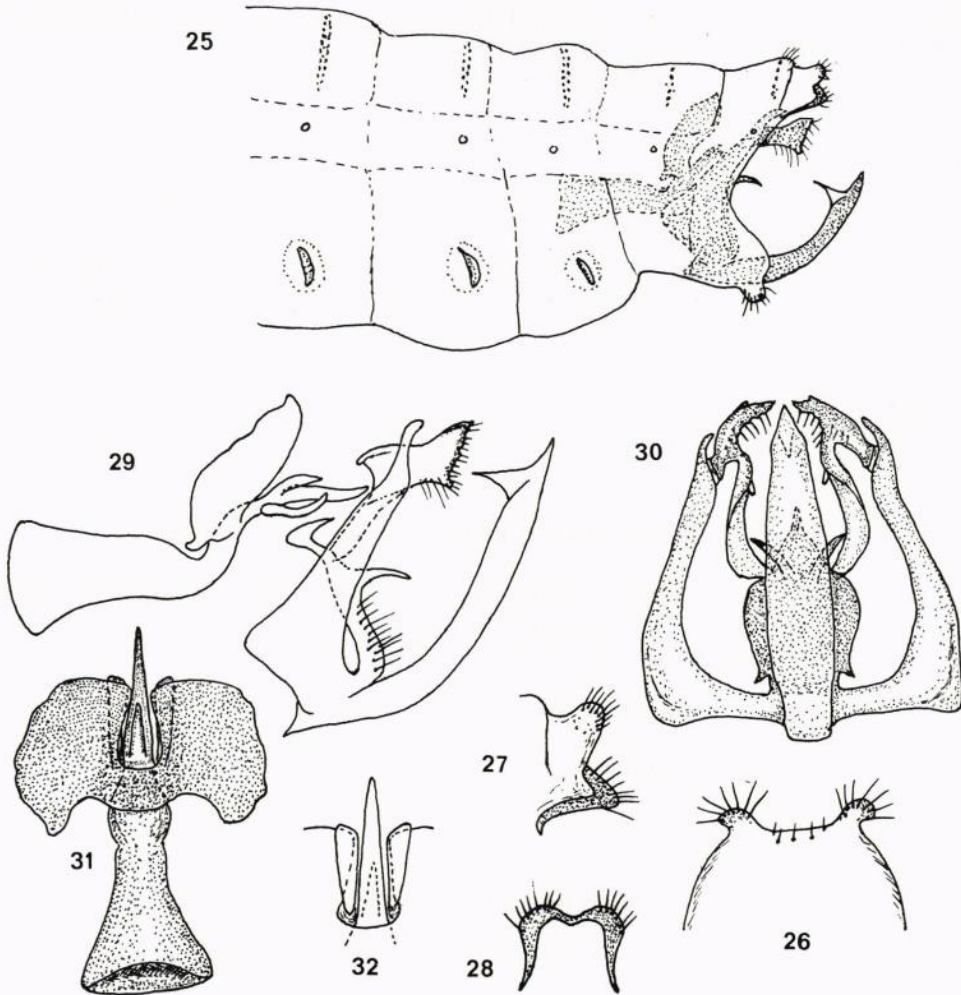
Wings with rounded apex (fig. 19). Membrane of forewing dark brown with white areas as shown in the figure. Venation brown. Hindwings greyish



Figs. 20—24. *Heteroconis iriana* n. sp. (holotype ♂). — 20. Head, frontal. — 21. Head, lateral. — 22. Antenna. — 23. Left maxilla, ventral. — 24. Labium, ventral.

brown with brown venation. Crossvein-similar part of Sc_2 and crossvein between R and R_s in both wings gradate. Crossvein between M and Cu_1 in forewing beyond the outer medial seta.

Abdomen pale with brown to blackish brown genital structures (fig. 25). Sternite 9 with a pair of small, wart-like, haired structures at hindmargin (fig. 26). Gonarcus a black, haired arch without projections; its hindmargin smoothly emarginated in dorso-caudal view (fig. 28), acutely projecting in lateral view (fig. 27). Gonocoxites brown; their side-pieces tapering and ending in a slender, somewhat curved apex as shown in figs. 29 and 30. Styli shaped as shown in the same figures, thus with a long and relatively narrow process, directed downwards and reaching the upper lateral margins



Figs. 25—32. *Heteroconis iriana* n. sp. (holotype ♂). — 25. Apex of abdomen, lateral. — 26. Apex of sternite 9, ventral. — 27. Ectoprocts and gonarcus, lateral. — 28. Gonarcus, dorsal. — 29. Gonocoxites with appendages, and penis, lateral. — 30. Gonocoxites with appendages, ventro-caudal. — 31. Penis, dorsal. — 32. Apex of penis, ventral, showing the movable pair of appendages.

of the parma. Hind margin of their upper part with a row of strong setae. Hypocauda dark brown, ending acutely, smoothly curved in lateral view and with an anteapical straight, pale tooth on the anterior surface. Parma dark brown, rather elongate and ending in a strong tooth, directed backwards; a pair of long and strong teeth present centrally as shown in the figures; a number of hairs present below these teeth. Penis (figs. 29 and 31) blackish brown with long very acute apex and a dorsal tooth before the apex.

Its appendages narrow and curved in lateral view (fig. 29), straight and broadened towards apex in ventral view (fig. 32).

A paratype ♂ agrees well with the holotype.

Female unknown.

Geographical distribution

New Guinea. Top Camp, situated about 20 km W of the Bernhard Camp, between the Sahoeweri and Idenburg Rivers in the Snow Mountains, central New Guinea; altitude 2,100 m. Holotype ♂ and paratype ♂, 22.i.1939, leg. L. J. Toxopeus, in coll. Rijksmuseum van Natuurlijke Historie, Leiden. (Cf. map, fig. 1, ▲).

Ecological distribution

For information about the type locality see above under *H. toxopei* n. sp.

4. *Heteroconis fumipennis* n. sp. (Figs. 33—43)

Type locality: about 20 km W of Bernhard Camp, between Sahoeweri and Idenburg Rivers, Snow Mountains, New Guinea. — Type: a male in the collections of the Rijksmuseum van Natuurlijke Historie, Leiden.

Description

Available material: a single male.

Holotype ♂.

Size: length of body about 2 mm, of forewing 2.8 mm, of hindwing 2.5 mm, of antenna 1.5 mm.

Head brown, shaped as shown in fig. 34. Setae on head very short, pale. Central area of face not distinctly weak, brown as the other parts of the head. Labrum with emarginated margin. Interantennal horn brown with a narrow furrow along the distal ventral surface and with transverse, slightly emarginated tip. Viewed laterally (fig. 35) the horn is bent and its apex is dilated and rather acute; hairiness pale. Mandibles brownish. Palpi brown. Antennae 18-segmented; scape, pedicel and basal segment of flagellum brown, other flagellar segments blackish. Setae short and pale. Scape about two and a half times as long as wide; pedicel about one and a half times as long as wide. Toruli with a row of 7 "glands" and vertex on each side with 5 similar organs.

Thorax blackish brown dorsally, with rather dense, very short, dark hairiness. Mesonotum with a pair of large black spots and hyaline apex of scutellum about as in *H. flavicornuta* n. sp., cf. fig. 6. Metanotum with a pair of similar black spots. Sides of thorax pale, darkened towards coxae. Legs yellowish brown; tip segment of tarsi slightly darker.

Wings with rounded apex (fig. 33). Membrane of forewing brown with rather small white areas, linear in the apical part. Membrane of hindwings brownish grey with very narrow white areas along the crossveins. Venation of both pairs of wings dark brown. Crossvein-similar part of Sc₂ and cross-

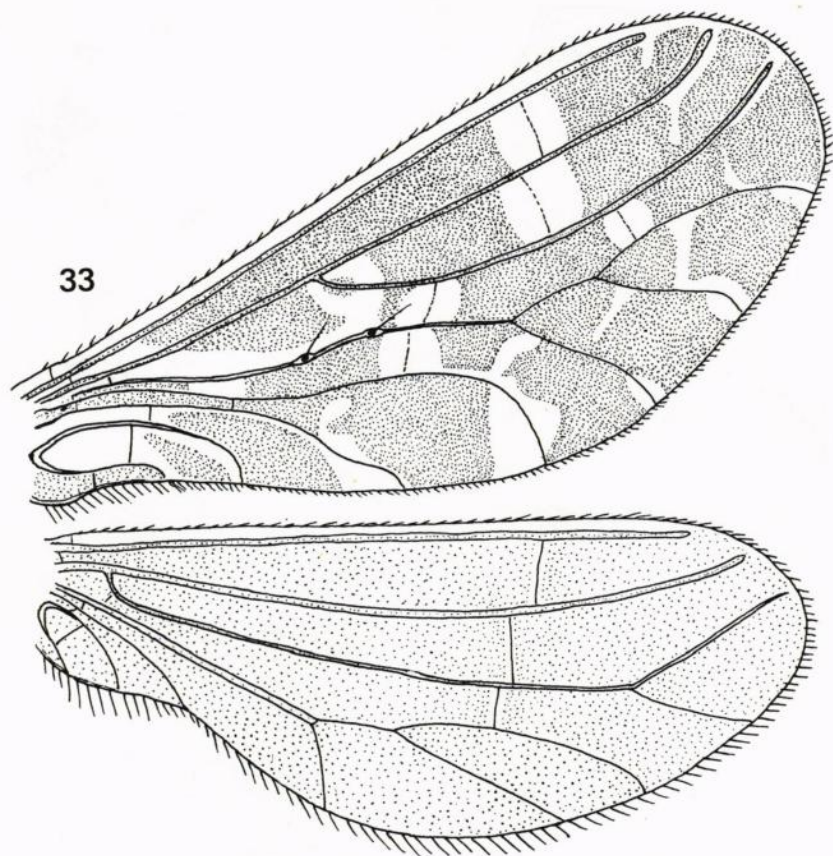
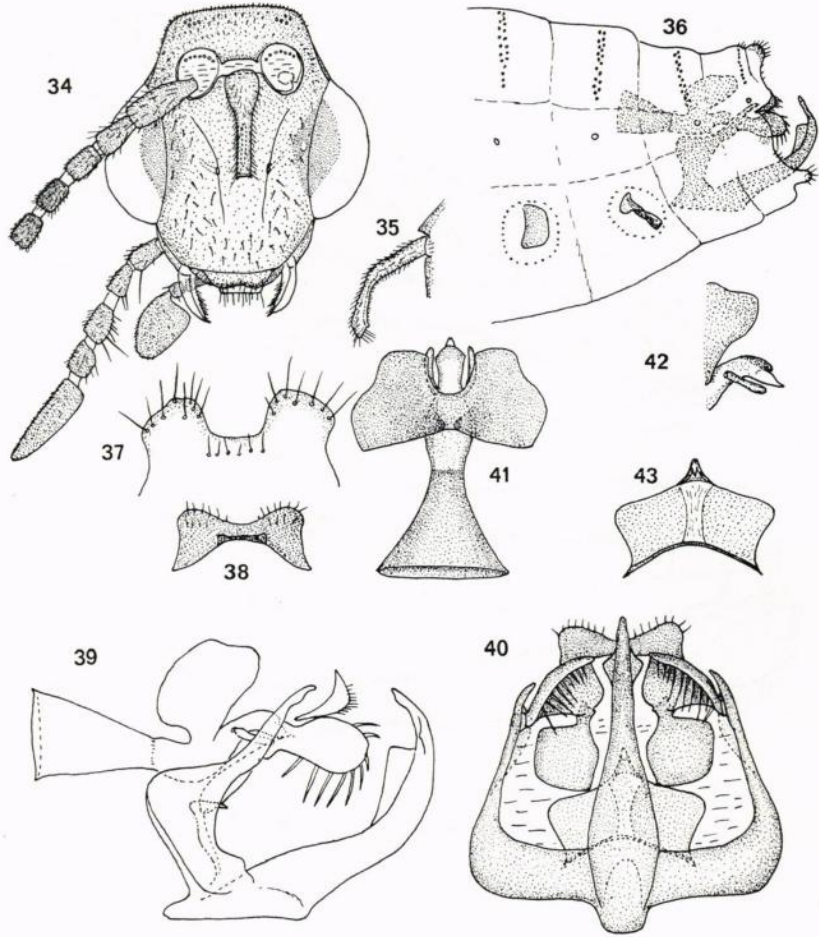


Fig. 33. *Heteroconis fumipennis* n. sp. (holotype ♂; forewing 2.8 mm).

vein between R and Rs gradate. Crossvein between M and Cu₁ in forewing beyond the outer medial seta.

Abdomen when treated with KOH pale with brown to blackish brown genital structures (fig. 36). Sternite 9 with a pair of large, haired projections as shown in figs. 36 and 37. Gonarcus blackish brown with black hairs, broadly emarginated distally (fig. 38). Gonocoxites brown, shaped as shown in figs. 39 and 40. Styli dark brown, widely projecting in lateral view (fig. 39), with long, spine-like hairs along the distal margin, and with a large, plate-like transverse extension from the under border, shaped as indicated in fig. 40. Hypocauda brown, rather slender distally, ending in a narrow apex, curved forwardly. The apex has a pair of triangular, pale tooth-like projections laterally as shown in fig. 40. On the anterior (dorsal) surface there is a very long, somewhat tooth-like ridge with the upper border perpendicular to the stem of the hypocauda (fig. 39). Parma brown, much broader than long, with a weak and pale central longitudinal area and brown hooky tip, directed backwards (fig. 43). Penis as in figs. 39, 41—42.

Female unknown.



Figs. 34—43. *Heteroconis fumipennis* n. sp. (holotype ♂). — 34. Head, frontal. — 35. Interantennal horn, lateral. — 36. Apex of abdomen, lateral. — 37. Apex of sternite 9, ventral. — 38. Gonarcus, ventral. — 39. Gonarcus, gonocoxites with appendages, and penis, lateral. — 40. Gonarcus and gonocoxites with appendages, ventro-caudal. — 41. Penis, dorsal. — 42. Tip of penis, lateral. — 43. Parma, caudal.

Geographical distribution

New Guinea. Top Camp, situated about 20 km W of the Bernhard Camp, between the Sahoeweri and Idenburg Rivers in the Snow Mountains, central New Guinea; altitude 2,100 m. Holotype ♂, 25.i.1939, leg. L. J. Toxopeus, in coll. Rijksmuseum van Natuurlijke Historie, Leiden. (Cf. map, fig. 1, ▲).

Ecological distribution

For information about the type locality see above under *H. toxopei* n. sp.

5. *Heteroconis candida* n. sp. (Figs. 44—49)

Type locality: about 9 km NNE Lake Habbema, New Guinea. — Type: a female in the collections of the Rijksmuseum van Natuurlijke Historie, Leiden.

Description

Available material: a single female.

Holotype ♀.

Size: length of body about 2.2 mm, of forewing 3.1 mm, of hindwing 2.7 mm, of antenna 1.2 mm.

Head, body, legs and pale areas of wings sparsely covered with white waxy substance.

Head yellowish brown. Mandibles with brown apical portion. Maxillary palpi brownish with yellowish apical segment. Labial palpi yellowish brown. Left antenna 18-segmented, bicoloured. Scape, pedicel, segments 1, 2, 6, 8 and 10 of the flagellum yellowish, the other segments pale brown but segment 12 slightly paler. Scape long, about 3 times as long as its width near apex; pedicel about twice as long as wide; 1st flagellar segment a little longer than the others which are of subequal length but tip segment longer than the others (fig. 46). Right antenna incomplete, the apical segments missing. Toruli with a row of 6, vertex on each side with 2 "glands". Across the face just below the toruli there is a pale and weak area, sized and shaped as shown in fig. 45.

Dorsum of thorax uniformly brown, sides pale yellowish brown. Hairs on thorax very short, pale, but mesoscutellum with a few long, pale hairs on hind margin. Legs pale, yellowish, only the 5th segment of the tarsi brown. Claws pale brown. Hairs on legs short, pale.

Wings (fig. 44). Tips rounded. Membrane of forewing pale brown with large white areas. Also the pale brown hindwings with white areas though not to the same extent as in the forewings. Venation very similar to that of *H. dahli* Enderlein, 1906, as figured by Meinander (1969) but the crossvein-similar portion of Sc_2 and the crossvein between R and R_s not so widely separated as in that species, in the left forewing almost in line. Vein Cu_1 of the forewings bent in a steeper curve towards hindmargin, and Cu_2 meets hindmargin steeper and closer to vein 1 A than in *dahli*.

Abdomen pale with pale yellowish brown genital structures. Gonapophyses laterales fused into a single plate, rather acute in lateral view (figs. 47, 48), broad and slightly emarginated in ventral view (fig. 49), densely haired as shown in the figures. Proximal parts of the genital structures formed as a convex shield covering the bursa, shaped as shown in figs. 48—49. A very slender duct runs from the bottom of the bursa in a wide loop and ends behind the shield as shown in the same figures.

Male unknown.

Geographical distribution

New Guinea. Moss Forest Camp, situated in high jungle about 9 km NNE of Lake Habbema, Snow Mountains, central New Guinea; altitude 2,800 m. Holotype ♀, 9.x.—5.xi.1938, leg. L. J. Toxopeus, in coll. Rijksmuseum van Natuurlijke Historie, Leiden. (Cf. map, fig. 1, □).

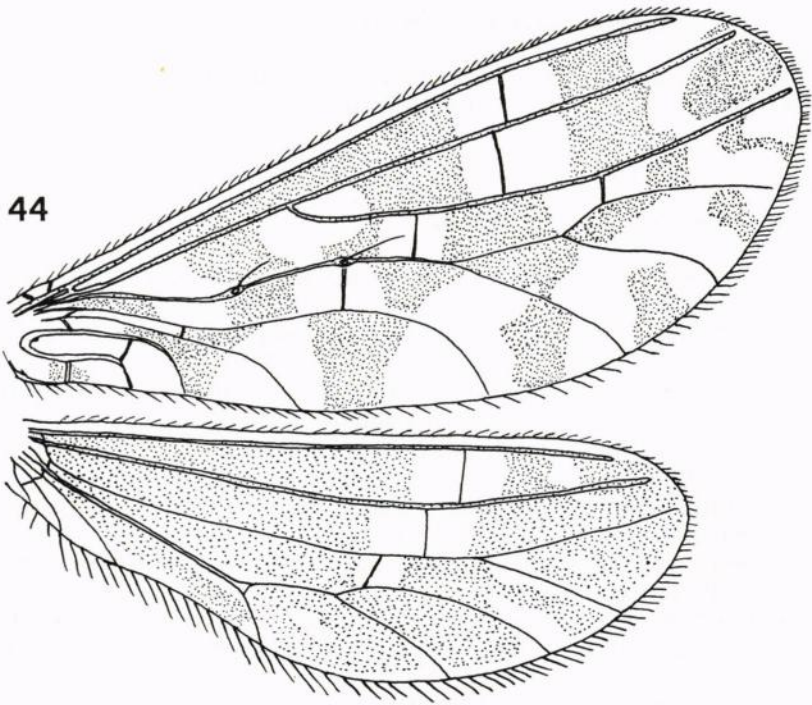


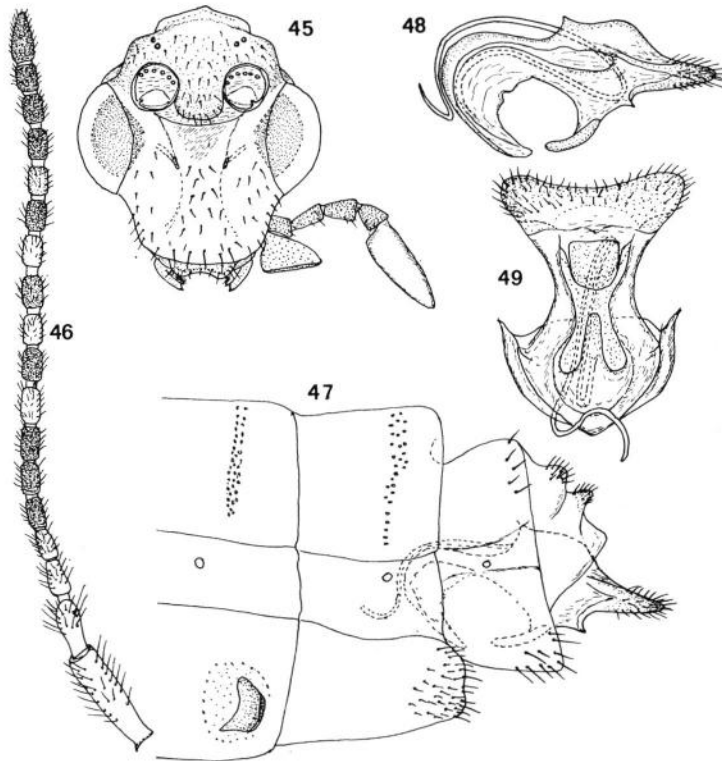
Fig. 44. *Heteroconis candida* n. sp. (holotype ♀; forewing 3.1 mm).

Ecological distribution

The Moss Forest Camp was situated in a heavily forested country in the upper drainage basin of the Bele River. Beech-forests clothed the slopes. Subalpine shrubs occurred on the crests of spurs down to 2,600 m. Alpine grassland plants, such as *Deschampsia Klossii*, species of *Ranunculus*, *Potentilla*, *Trigonotis*, *Epilobium* and *Tetramolopium* were found in great abundance down to camp level (2,800 m) and lower. Two alpine grasses, a buttercup and a *Hydrocotyle* grew on wet rocks in the bed of the Bele River. In the beech-forests at the camp and above a *Nothofagus* was almost sole dominant. Generally, the lower trunks and the crowns of the trees, the undergrowth and the ground were abundantly, often heavily mossed. Thick undergrowth, also of Orchids and ferns. The occupation of the camp from October 8 to November 9, 1938, was during a period of variable weather, with pleasant sunny mornings and showery afternoons, successions of overcast rainy days, and one dry spell without rains for four days and nights.

Temperature (C.) maximum, mean 17.5°; minimum, mean 7°. Relative humidity at sunrise never lower than 87 %/o, at 1:00 p.m. 44—46 %/o.

The five species described above are in many respects similar to the type-species of the genus, *Heteroconis ornata* Enderlein, 1905, from Australia (Queensland and N. S. Wales) and may be considered as belonging to *Heteroconis* Enderlein, s. str. The new species described below is, on the other hand,



Figs. 45—49. *Heteroconis candida* n. sp. (holotype ♀). — 45. Head, frontal. — 46. Antenna. — 47. Apex of abdomen, lateral. — 48. Gonapophyses laterales, lateral. — 49. Ditto, ventral.

very different in several respects (small eyes, extremely long scape and falcate wings with peculiar colour pattern). The pattern of the ♀ genital structures (♂ unknown) is agreeing with that of *Heteroconis*. I suggest therefore that it has to be considered as a *Heteroconis* but prefer to establish a new subgenus for the species:

Subgen. **Drepanoconis** n. subgen.

Type species: *Heteroconis (Drepanoconis) amoena* n. sp.

♀. Eyes extremely small on comparison with other species of the genus. Toruli with two rows of "glands". Scape very long, about six times as long as wide. Wings with acute apices; forewing slightly falcate with peculiar colour pattern, dark with numerous small white dots and some larger white areas at apex and along the hindmargin. Fragments of additional crossveins present in the subcostal and radial areas.

♂ unknown.

Geographical distribution

New Guinea (only a single species known, described below).

6. *Heteroconis (Drepanoconis) amoena* n. sp. (Figs. 50—64)

Type locality: vicinity of Lake Habbema, Snow Mountains, New Guinea.
— Type: a female in the collections of the Rijksmuseum van Natuurlijke Historie, Leiden.

Description

Available material: 3 ♀♀ and one specimen lacking the distal part of the abdomen.

Holotype ♀.

Size: length of body about 2.5 mm, of forewing 3.8 mm, of hindwing 3.3 mm, of antenna 1.8 mm.

Head (figs. 51 and 52) dark piceous, shining, with very sparse waxy powdering, covered with microtrichia and with rather dense white hairiness on the face. Dorsal portion of face (part of frons?) prolonged downwards between the toruli. Below this prolongation a transverse membranous area. Vertex with some macrotrichia and with lateral groups of seven "glands". Similar organs also present on the upper part of the toruli, arranged in two parallel rows. Labrum short, with emarginated margin. Eyes very small and flat, their diaphragm somewhat conically prolonged inwardly, broadly black around the small foramen orbitale. Mandibles brownish, shaped as in fig. 54. Maxillae pale. Lacinia somewhat darker apically, with a long apical spine. Galea with darkened outer margin, a short basigalea and the tip portion distinctly separated as a short and acute 3rd segment. Maxillary palpi brownish, their 5th segment very long, shaped as shown in fig. 55. Labium (fig. 56) pale, with a large ligula with transverse distal margin. Palpigers long, pale. Labial palpi brownish, with rather long basal segment, very short 2nd segment and large, axe-like 3rd segment. Antennae (figs. 51 and 53) 18-segmented. Scape extremely long, about six times as long as wide, black with somewhat piceous apex. Pedicel more than twice as long as wide, blackish with piceous apex. Segments of flagellum brownish black, much narrower than pedicel, elongate and subequal.

Thorax dark piceous, almost black dorsally, brownish laterally, very sparsely covered with white waxy powdering. Legs (fig. 60) brown but three proximal segments of the tarsi a little paler. Hind femur slender, curved in dorsal view (fig. 61), other femurs straight. Hind tibia much longer than femur. Claws pale, with small basal tooth.

Wings (figs. 50 and 57). Forewings falcate with acute tip; their outer margin distinctly excised and somewhat wavy. Their membrane dark brown with whitish areas and dots as shown in the photograph, fig. 50. White areas covered with white powder, very densely so on the round dots which appear as convex elevations. Costal area whitish. The pattern is somewhat different in the left and the right wing. In the left wing there is a white transverse stripe along the crossvein between R and Rs which is not the case in the right forewing as shown in the photograph. Longitudinal veins brown. Venation as in fig. 57. Crossveins, except those in the anal area and the one between Cu_1 and Cu_2 , very indistinct, as rows of small dots in the membrane, visible only after treating the wing with KOH. Some additional, incomplete rows of dots are present between Sc and R and a single one between R and

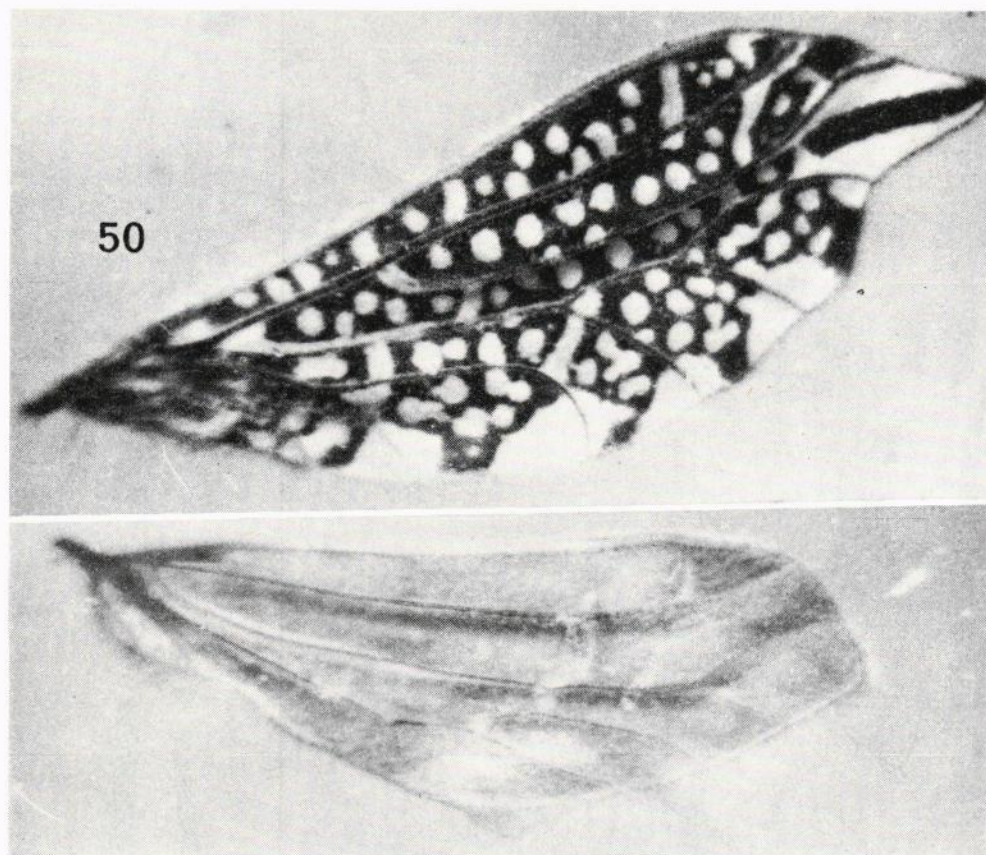
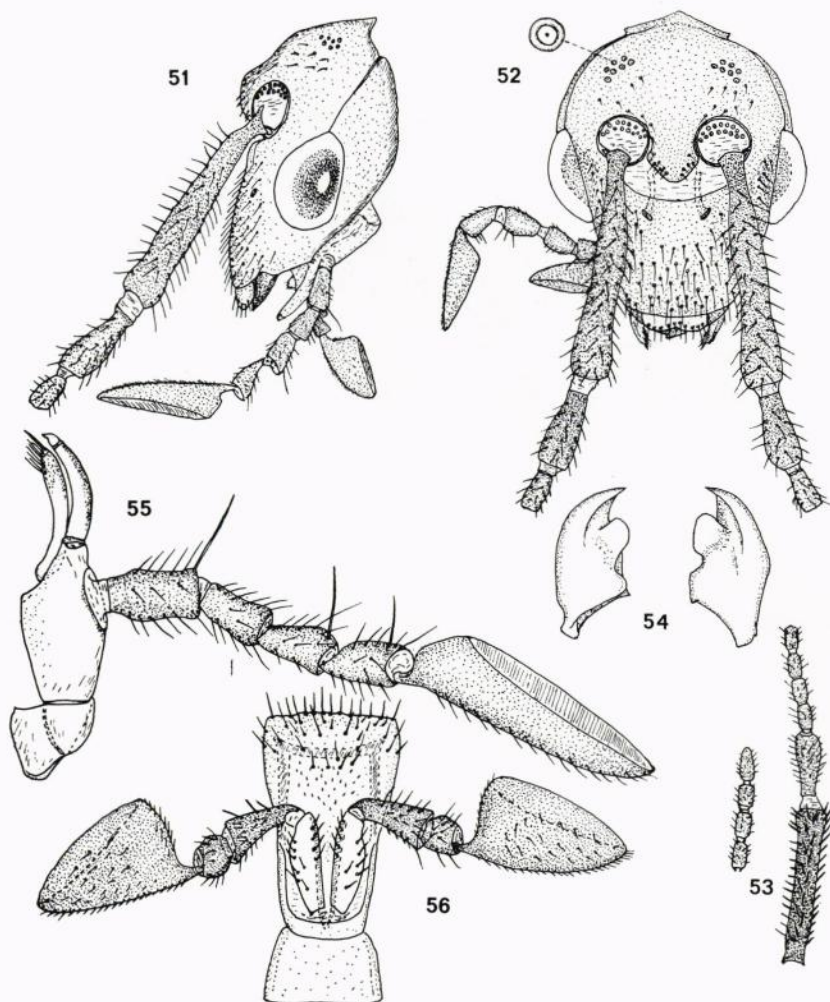


Fig. 50. *Heteroconis (Drepanoconis) amoena* n. sp. (Holotype ♀; forewing 3.8 mm, its anal area folded, cf. fig. 57).

Rs. Marginal fringes rather long between base and vein 2 A. Hindwing acute, not falcate. Membrane greyish brown, pale in the costal area, along Rs, along the crossveins and in the anal area. Marginal fringes long along the hindmargin, very long at the base.

Abdomen of the dried specimen brownish and sparsely powdered with white wax, when treated with KOH pale and translucent but tip of sternite 7 and terminal structures more or less brownish (fig. 62). Plicaturae present on sternites 2—6, on sternite 2 very small, on sternites 5 and 6 the largest. Wax-glands in linear transverse areas laterally on the tergites 2—7 and also surrounding the plicaturae. Hairiness of abdomen very scant and short, except on the apical parts. Ectoprocts fused, weak and pale. Subanale sclerotized and projecting, covering the base of the gonapophyses laterales, which are fused and proceed into the abdomen as shown in fig. 62, forming a large sclerotized structure, covering the bursa (figs. 63 and 64). A thin, pale duct runs in a loop from the bursa and ends proximally to the structure

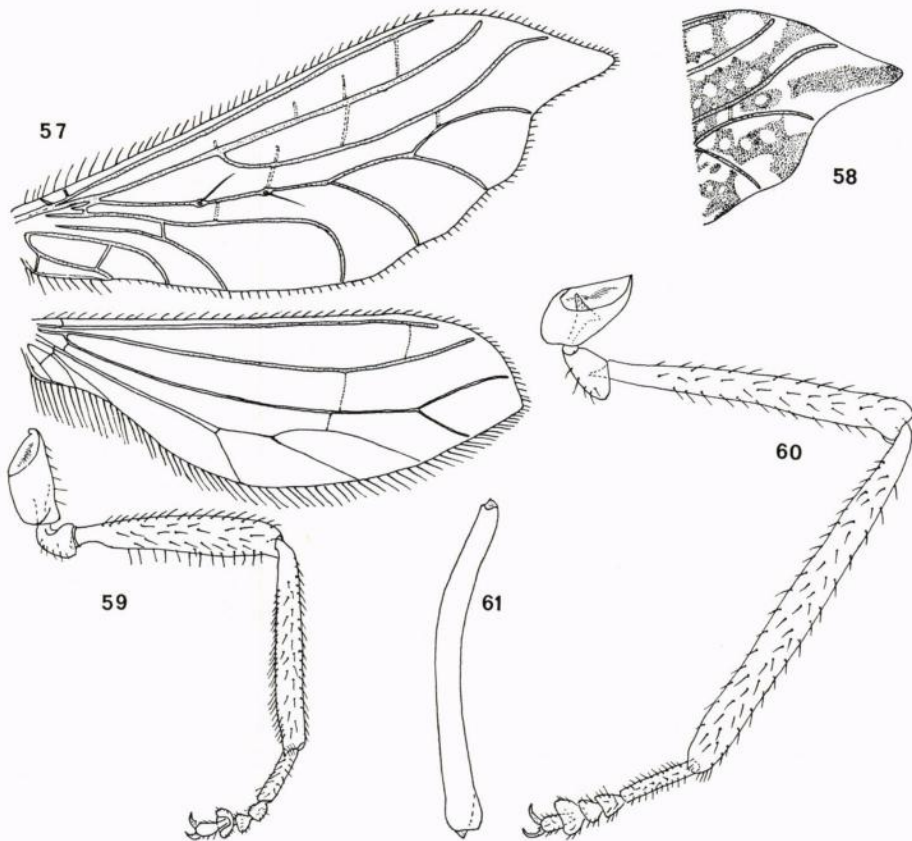


Figs. 51—56. *Heteroconis (Drepanoconis) amoena* n. sp. (holotype ♀). — 51. Head, lateral. — 52. Head frontal (one of the "glands" drawn enlarged). — 53. Apex and base of antenna. — 54. Mandibles, ventral. — 55. Left maxilla, ventral. — 56. Labium, ventral.

as shown in the figures. Distal end of fused gonapophyses flattened, in caudo-ventral view shaped as illustrated in fig. 64.

Two female paratypes and a paratype lacking the distal end of the abdomen agree well with the holotype. I note some small differences in the colour pattern of the forewings, especially in the apical part. The pattern of that portion of the forewing of one of the paratypes is illustrated in fig. 58. The broad, dark central stripe in the apex is present in all the specimens.

♂ unknown.



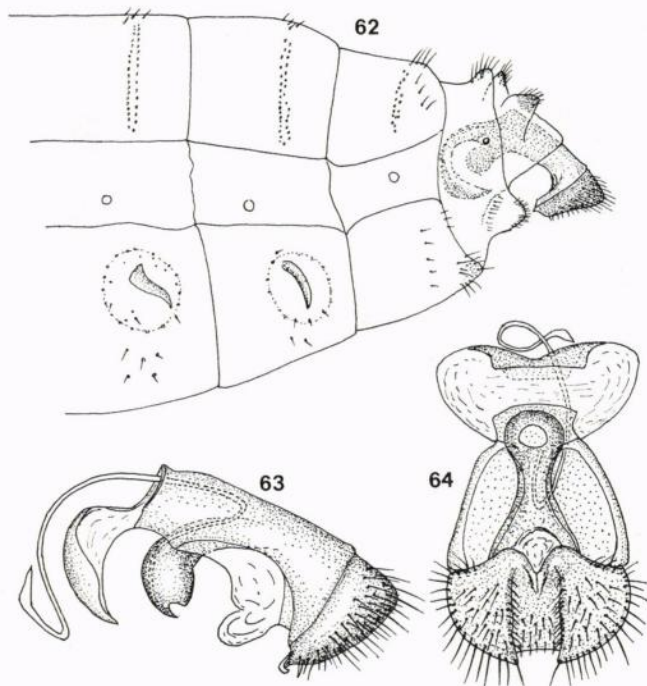
Figs. 57—61. *Heteroconis (Drepanoconis) amoena* n. sp. — 57. Wing venation of holotype ♀. — 58. Apex of right forewing of a paratype ♀. — 59. Foreleg of holotype, frontal. — 60. Hindleg of ditto, caudal. — 61. Hind femur of ditto, dorsal.

Geographical distribution

New Guinea. Vicinity of the Habbema Lake in the Snow Mountains, central part of the island; altitude 3,300 m. Holotype ♀, 6.viii.1938; paratype ♀, 9.viii.1938; paratype ♀, 10.viii.1938; paratype, lacking tip of abdomen, 20.viii.1938, leg. L. J. Toxopeus, in coll. Rijksmuseum van Natuurlijke Historie, Leiden. (Cf. map, fig. 1, ★).

Ecological distribution

The specimens are, in addition to dates, labelled "Habbema Meer. Wilh. Top." (printed) and "3,300 m" (written in hand). The lake (Meer) is at an altitude of 3,225 m, whereas the Wilhelmina Top, about 18 km SW of the lake, rises to an altitude of 4,150 m. Toxopeus (1940) states that the hills surrounding the lake rise "to 3,400 m; most of materials gathered at 3,250 m". At short distance south of the lake there is a timbered hill which rises



Figs. 62—64. *Heteroconis* (*Drepanoconis*) *amoena* n. sp. (holotype ♀). — 62. Apex of abdomen, lateral. — 63. Gonapophyses laterales, lateral. — 64. Ditto, ventral.

to about 3,300 to 3,350 m. The plant formation in this area is subalpine forest which reaches from the beech-forest at 3,100 m on the slopes of the range up to tree limit at 4,050 m on Mt. Wilhelmina. At the lake there are coniferous open forest (*Podocarpus papuanus* and *Libocedrus* sp.), low tree-thickets and *Rhododendron* shrubberies, which all are integral parts of this formation. In this section, however, also alpine grassland alternates with the subalpine forest, with forest-glades, shrubberies, tree-fern stands, etc. The Lake Habbema Camp was situated on reasonably dry ground, sloping to the lake, with an open stand of *Libocedrus*, low ericoid *Rhododendron*, clumps of *Ghania* sp. (Cyperaceae), and a ground cover of dwarf grasses and herbs.

Temperature (C.) July 26—Sept. 3: maximum 11.0—21.0°, mean 18.0°; minimum minus 3°—plus 4.5°, mean 1.1°. During August rains fell on 18 days. Low overcast conditions, mist and cold drizzle usual in the afternoon.

Notes

All the specimens described above have been treated with KOH in order to examine the structures in detail. When so treated the contents of the alimentary canal of all specimens became intensively red. The specimens have accordingly probably fed on some with KOH red-reacting Aphids or

Pseudococcids. Similar reaction has been observed in species of *Helicoconis* Enderlein, a genus of the same subfamily as *Heteroconis* (cf. Tjeder, 1957: 110 and 1960: 317).

When studying the dried holotype ♂ of *Heteroconis toxopei* n. sp. I observed that the plicaturae of the sternites 5 and 6 were open, each carrying a rounded clear globule, apparently a droplet of some liquid clotted in the air. The droplets dissolved rapidly in warm water but the plicaturae remained open, also after treatment in KOH (fig. 15). It seems possible that the exudation may be some repugnant, evil-smelling substance, as has been supposed by Withycombe (1925: 393).

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