MINISTERIE VAN ONDERWIJS, KUNSTEN EN WETENSCHAPPEN

ZOOLOGISCHE MEDEDELINGEN

UITGEGEVEN DOOR HET

RIJKSMUSEUM VAN NATUURLIJKE HISTORIE TE LEIDEN

DEEL XXXIII, No. 25 25 Juli 1955

FURTHER INQUIRIES INTO THE OLD WORLD SPECIES OF MACROMIA RAMBUR (ODONATA)

by

M. A. LIEFTINCK

(Rijksmuseum van Natuurlijke Historie, Leiden)

I. Descriptions and records of Northeast Asiatic species, with notes on the immature stages

Remarkably little is known of the species of *Macromia* occurring in the northern part and far eastern countries of continental Asia. In the following list I have enumerated chronologically all species at present known from the vast territory extending north of the Himalayas, Indo-China and the intermediate countries:

1. *M. amphigena* Selys 1871 (Bull. Acad. Belg. (2) 31: 537-538). — ♂ ♀ Japan.

2. *M. fraenata* Martin 1907 (Cat. Coll. Selys, 17, Cordul.: 71-72). — ♂ Korea.

3. *M.* spec. indet. Bartenef 1914 (Horae Soc. Ent. Ross. 41: 21-23, fig. 12). — ♂ ♀ N. Manchukuo (Station Imjanpo, East China railroad).

4. *M. clio* Ris 1916 (Supplem. Entom. 5: 67-68, pl. 3, fig. 1). — ♀ Formosa.

5. *M. urania* Ris 1916 (Supplem. Entom. 5: 68-70, fig. 42-43, pl. 3, fig. 2-3). — ♂ ♀ Tonkin. Further range: Hainan & E. China (Fukien).

6. *M. sibirica* Djakonov 1926 (Revue Russe d'Entom. 20: 228-231, fig. 3). — ♂ S.W. Sibiria, Novonikolaevsk, long. 83° E, lat. 55° N.

7. *M. icterica* Lieftinck 1929 (Tijdschr. Ent. 72: 64, 84-86, fig. 11-12). — ♂ S.E. China, Kwang Tung.

8. *M. cantonensis* Tinkham 1936 (Lingnan Sci. Journ. 15: 457-459). — ♂ ♀ S.E. China, Kwang Tung.

9. *M. daimoji* Okumura 1949 (Matsumushi, 3: 120-121, fig. 1 A-C). — ♂ ♀ Japan. (Syn.: *M. tokyoensis* Asahina 1949, ♂ ♀ Japan).

10. *M.* spec. indet. Popova 1953 (Keys to the Fauna U.S.S.R. Zool. Inst. Acad. Sci. U.S.S.R., no. 50, Leningrad: 168-171, fig. 105-106, larva & larval structures; in Russian). Larva only, E. Manchukuo (Primorski distr., Sintucha River, Chanka Lake).

Of these species, *M. urania, icterica, cantonensis,* and *daimoji* are all insects of small size, which differ in a number of important characters from the others listed above; these, therefore, will not concern us here any longer. The remaining species are probably all members of the group *amphigena* Selys, which contains insects of moderate or large size and strong build, and whose members appear to find their nearest relatives in such species like the European *M. splendens* (Pictet) and the Indo-Malayan group of *moorei* Selys.

The species discussed by Bartenef (no. 3) was provisionally referred to *amphigena,* but as he knew this species only from the description as given by Martin in his monograph, Bartenef expressed much doubt as to its identity. As a matter of fact, according to Bartenef's description, it differs so much from genuine *amphigena,* being also a good deal smaller in size (♂ abd. 40, hw. 37 mm) that it might well belong to a distinct and still unnamed species.

Of *M. clio* unfortunately only the female is known, but according to Ris it should also come closest to *amphigena.*

Next in sequence comes *M. sibirica,* which is doubtless also a near ally of *amphigena*; it differs, however, in the presence of two pairs of yellow spots on the frons, a peculiar character also manifest in the Korean species *fraenata* Martin.

Lastly, we must consider the larva of an unidentified *Macromia* (no. 10), reported by Popova from a locality in Manchukuo. This is discussed under the heading "Immature stages".

Macromia amphigena Selys

1871. Selys, Bull. Acad. Belg. (2) 31: 537-538. — ♂ ♀ Japan.
1883. Selys, Ann. Soc. ent. Belg. 27: 110. — Japan, note (*Epophthalmia*).
1890. Cabot, Mem. Mus. Comp. Zoöl. Harvard College, 17: 22. — Supposed larva, Japan.
1907. Martin, Cat. Coll. Selys, fasc. 17, Cordulines: 65, 83. — ♂ ♀ Japan.
?1907. Martin, ibid.: 71-72, fig. 82 (wings ♂, Korea), fig. 86 (apps. ♂, Korea), pl. 3, fig. 15 (insect ♂, Korea). — ♂ Korea (*fraenata*).
1922. Okumura, Deutsch. Ent. Zeitschr.: 112. — Honshiu; Kiushiu.
1929. Lieftinck, Tijdschr. Ent. 72: 64-65 (key ♂ ♀), 86-89 (?pars), fig. 13 (genit. ♂, Korea, type *fraenata*). — ♂ ♀ Japan; ♂ Korea.
1929. Hirayama, Fauna Musashinensis, 1: 16, fig. 24 (photo ♂ insect, Japan).
1936. Fraser, Trans. R. Ent. Soc. London, 85: 153-154 (notes), fig. 4 (larval structures). — Japan.

1938. Asahina, Tenthredo, *2*: 155. — ♂ and larva, Hokkaido.
1939. Asahina, Kontyû, 13: 146. — Doubtfully from O-sima I. (S. Japan).

Of this species, well-known to entomologists in Japan, I have now examined 7 males and 1 female, from various localities in Japan, including two males from the southern extremity of Kiushiu (Shimabara Peninsula, Unzen, 700 m, 6 and 30 July, 1934, E. Suenson). These individuals all agree with the existing descriptions, the measurements in our series of males varying from 48.0-55.0 mm for the abdomen (incl. apps.), and 44.5-47.5 mm for the hind wing.

I am still a little doubtful about the identity of Martin's *fraenata,* from Korea. The plesiotype (neotype) of this species is a male in the Brussels Museum, of which a re-description and drawings of its genitalia were published in my 1929 paper. This example differs from typical *amphigena* in details of colouring and in having a longer abdomen, the presence of a roundish yellow spot upon each of the flattened portions of the frons being especially a noteworthy feature of *fraenata.* It is approximately of the same size as *amphigena,* abd. + app. 49.0, hind wing 43.0 mm. Seeing how slight the differences between the adult members of this genus often are, it is probably best to consider *fraenata* specifically distinct from *amphigena,* and to await further material from Korea before deciding upon its status.

Macromia hamifera, sp. n. (figs. 1-4)

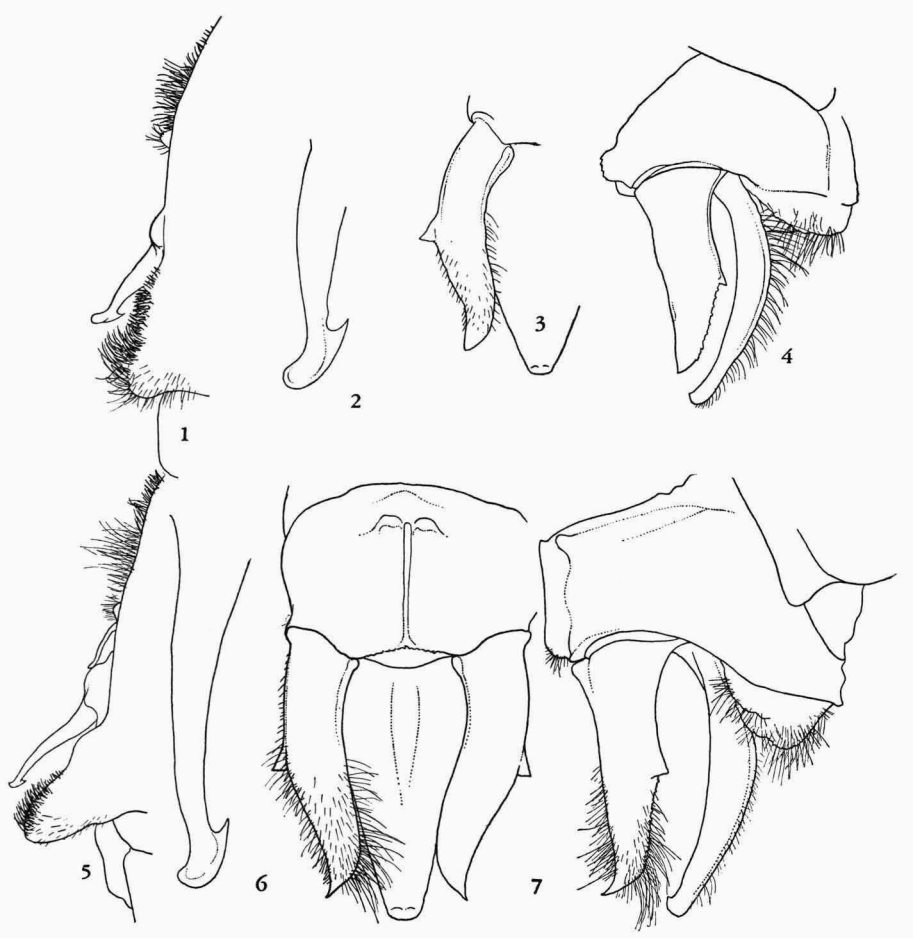
Material. — E. China: 1 ♂ (ad.), Fukien province, Kuatun, Chung-an Hsien, 2300 m, 22-25. viii. 1943, Tsing-chao Maa. Holotype in the Leiden Museum.

A large and robust species, allied to *amphigena* Selys.

Male (ad. holotype). — Head rather small, width across the eyes 10.2 mm; face strongly protuberant. Pyramidal processes of frons well separated, not very high, bluntly conical; anterior surface of frons rounded, coarsely and confluently punctate, dorsal surface divided by a deep sulcus into two subtriangular flattened portions, the surfaces of which are striato-punctate and shiny. Labium of very large size, the median lobe and slightly more than the outer half of each of the lateral lobes, bright chrome, the inner half of the latter as well as a stripe along anterior border of the rest of the side-lobes, black. Mandibles black with a circular yellow spot at base. Labrum, anteclypeus and a narrow well-defined stripe along front margin of postclypeus, deep black, the postclypeus otherwise bright yellow. Frons black, anterior surface with low metallic-blue lustre, the upper surface brilliant (though rather dark) metallic-blue. Vertex moderately elevated,

provided with two nipple-shaped tubercles, coloured metallic-blue anteriorly and almost black posteriorly. Occipital triangle and rear of the head glossy black.

Thorax large, strongly built and of robust shape; colour throughout dark metallic-green, slightly intermingled with bronze and blue on the sides,



Figs. 1-4. *Macromia hamifera,* sp. n., holotype Fukien. ♂ genitalia, left lateral view (1), left hamulus, more highly magnified (2), anal appendages, partial dorsal view (3), and right lateral view (4). Figs. 5-7. *M. malleifera,* sp. n., holotype Fukien. ♂ genitalia, left lateral view (5), left hamulus, more highly magnified (6), and anal appendages, dorsal and right lateral view (7).

marked with vivid chrome, as follows: — the ante-alar triangles entirely; a pair of well-defined, parallel-sided, antehumeral bands, rounded on both ends, extending exactly half-way up the dorsum; a vestigial mesin-

fraepisternal spot just below the antehumeral band; a broad, almost parallel-sided band of the same colour on the thoracic sides traversing the spiracle and leaving off just before reaching the dorsal ridge of the pleurae, 1.3 mm broad at its widest point just dorsal to the spiracle; a triangular yellow spot filling out the postero-ventral edge of the metepimeron, this coloured area continued downwards on either side so as to form a pair of strongly converging broad bands on the ventral surface of the metepimera, the enclosed triangular area of the meta- and poststernum remaining deep black.

Legs robust and very long; entirely black, save the tibial keels which are pale yellow. Posterior femur (incl. troch.) 14.0 mm long, reaching back as far as the apex of the genital hamule. Anterior tibia curved, intermediate tibia straight, b o t h provided with a distinct keel on the flexor side which extends along the distal one-half of their length; posterior tibia straight, with its keel extending along the entire length but commencing about 1 mm from base.

Wings long and narrow, narrower than in *amphigena,* with the same open venation of its near relative *malleifera* sp. n., but with still fewer cross-veins and cells in the apical portion. Membrane hyaline. All triangles uncrossed, the costal side of *t* in fore wing a little longer than in *malleifera*; *ti* free. *Arc* at Ax_2. Cross-veins in *ht* $\frac{3.2}{1.1}$; *Cux* $\frac{5.4}{3.3}$. Discoidal field of hind wing with 2 basal cross-veins running directly from M_4 to Cu_1. Anal angle of hind wing shaped much like *amphigena* but slightly less pronounced, with the excavation beyond the membranula not so deep and with the distal side of the anal triangle nearly straight. Anal loop consisting of 8 cells, lacking a central cell. Nodal index $\frac{9.16.16.8}{10.11.11.10}$. Membranula light grey. Pterostigma longer than in *amphigena,* black.

Abdomen markedly longer than in *amphigena,* but otherwise shaped and coloured much as in that species and differing only in the following particulars. On segm. 2 the transverse orange-yellow band is widely interrupted by black on either side above the auricles, the dorsal portion of it being in the form of a large transverse spot, widest on mid-dorsum and occupying its posterior half. On segm. 3 the lowermost division of the yellow mark is of large size, rather crescent-shaped and tapering away posteriorly to a point at the postero-ventral margin; the uppermost portion being considerably larger than it is in *amphigena,* narrowly divided by black in the median line, forming two subtriangular spots of half the segment's length, each of them widely separated from the lateral spot by a distance equal to their own diameter (in *amphigena* much narrower and confluent laterally). Mid-dorsal twin-spots on segm. 4-6 rapidly decreasing in size from before back-

wards, but that on 4 much larger than in *amphigena,* the latero-ventral streaks however smaller. Segm. 7 with complete yellow ring slightly projecting mesially beyond the transverse suture; 8 with narrow transverse basal ring, incomplete laterally; 9-10 entirely black. Dorsal surface of tenth segment moderately raised towards apex so as to form a blunt tubercle; median line weakly and obtusely carinate (fig. 4).

Genitalia of very small size, resembling those of *amphigena* fairly closely, but the distal part of the hamule much slenderer, less abruptly hooked, with the hammer-like apical process at least twice as large and more drawn out, the backwardly directed hook long and acutely pointed (fig. 1).

Anal appendages (figs. 3-4) longer than those of *amphigena,* the superior pair less downcurved in profile view, with the extero-lateral tooth at about half-way their length considerably stouter, the apices longer, more abruptly outcurved and also a little more upturned. Appendix inferior distinctly longer than the superiors and also much longer than its own width at base, length and breadth in the ratio of 3 : 1.7 (*amphigena* 3 : 2.1).

Measurements: abd. + app. 55.7, hw. 46.5, pt.fw. 2.9 mm.

Female unknown.

Among its congeners, this new species approaches *amphigena* most closely in details of colouring, armature of tibiae, and genital organs. The differences between them may prove sufficiently clear from the above description and figures.

Macromia malleifera, sp. n. (figs. 5-7)

Material. — E. China: 1 ♂ (ad.), Fukien province, Kuatun, 2300 m, 6. vii. 1938, J. Klapperich. Holotype in the Leiden Museum.

Very similar to the preceding species, but a slightly more broad-winged insect with a slenderer abdomen.

Male (ad., holotype). — Head similar to *hamifera,* width across the eyes 10.0 mm, the face a little less protuberant. Pyramidal processes of frons with the anterior surface less convex, but the subtriangular flattened parts of the upper division on either side of the sulcus definitely better marked off and even somewhat hollowed out, surface smoother and more shiny, the outer rim almost acute. Labium shaped similarly to *hamifera,* but unicolorous orange-yellow, including the median lobe. Mandibles and labrum wholly black. Anteclypeus brown, postclypeus almost entirely bright chrome, only the anterior border narrowly brown on middle. Frons black, except a small, diffuse, yellowish dot filling out the antero-lateral edge between clypeus and eye-margin; anterior surface with steely blue reflections, the upper surface brilliant metallic-blue. Vertex not differing in shape

and colour from that of *hamifera*. Occipital triangle and rear of the head glossy black.

Thorax shaped and coloured as in *hamifera*, but, when viewed laterally, the metepimeron lacks the triangular yellow spot within the postero-ventral edge of it, the entire under surface of the thorax being of a uniform yellowish-brown tint, lacking the conspicuous bands of *amphigena* and *hamifera*.

Legs long and robust, posterior femur (incl. troch.) 13.8 mm long; keel on anterior tibia extending along distal one-half of its length; no keel on intermediate tibia; keel on posterior tibia similar to *hamifera*.

Wings long and narrow, more drawn out than in *amphigena*, a little more expanded at level of the discoidal triangle than in *hamifera* and differing also from that species in the less open venation. Membrane hyaline. Triangles and subtriangles of fore wing all traversed by a single cross-vein; *t* of hind wing free. *Arc* a little proximal to Ax_2 in all wings. Cross-veins in *ht* $\frac{4\cdot3}{1.1}$; *Cux* $\frac{5\cdot5}{3\cdot3}$. Discoidal field of hind wing with 2 or 3 basal cross-veins running directly from M_4 to Cu_1. Veins M_3-M_4 and Cu_1-Cu_2 more strongly curved towards anal margin than in *amphigena* and *hamifera*. Anal angle of hind wing a little less drawn out though definitely better pronounced and more incurved than in the two species just mentioned, the excavation beyond the membranula much more concave, hence the distal side of the anal triangle (A_3) strongly curved. (In *amphigena* A_3 is only slightly curved, whereas in *hamifera* it is nearly straight). Anal loop consisting of 9 cells lacking a central cell. Nodal index $\frac{12.16.16.12}{13.10.10.14}$. Pterostigma a trifle shorter than in *hamifera*. Membranula grey.

Abdomen as long as in *hamifera* but yet somewhat more slender; much less compactly built than in *amphigena* and with the terminal segments less expanded. Colour black, the sides of segm. 2 and 3 with low metallic-blue shine. On segm. 2 the orange band in front of the transverse suture is uninterrupted laterally above the auricles, extending on to the base of the segment, but on mid-dorsum it is restricted to the posterior half of the space between base and transverse suture. On segm. 3 the lowermost division of the yellow ante-sutural mark is band-like, approximately parallel-sided, and connected with the transverse uppermost portion under a right angle, the median "ring" much narrower than in *hamifera*, somewhat similar in size to the same marking in *amphigena* but hardly noticeably indented by black in the median line. Dorso-lateral spots on segm. 4-6 also shorter than in *hamifera*, resembling those of *amphigena* more closely in shape and size, those on 5 and 6 indented by black anteriorly. Segm. 7 with

complete orange ring similar to the preceding species; 8 with a pair of small, closely approximated, triangular basal spots restricted to the dorsum; 9 and 10 entirely black. Ventral surface of abdominal tergites 4-8 each with a pair of orange basal spots, which are all of them a little larger in size than those of *hamifera*. Dorsal surface of tenth segment strongly raised and longitudinally carinate, forming a robust mid-dorsal prominency and a pair of blunt tubercles on either side of it (fig. 7).

Genitalia larger and more prominent than in *hamifera*, the hamulus longer and slenderer, with the apex of the hammer-shaped end-hook shorter, the lobus posterior much more projecting and tongue-shaped (figs. 5-6).

Anal appendages similar to *hamifera*, but the superiors tapering apically to an upturned point and provided interiorly with long black hairs; appendix inferior only little narrower, more parallel-sided, than in *hamifera* (fig. 7).

Measurements: abd. + app. 58.0, hw. 51.0, pt. fw. 2.7 mm.

Female unknown.

Though very similar to *hamifera* in outward appearance, this new species differs from it chiefly in the presence of an incomplete keel on the mesotibia (which is also absent in *amphigena*). It is further distinguished from both by the unicolorous labium, the more prominent genital lobe, and in details of the anal appendages and venation.

Immature stages

Turning our attention to the immature stages of palaearctic *Macromia*, we must admit that our knowledge is still very poor.

The larva of the oldest described and best known species, *M. splendens* (Pictet), from southern France and the Iberian Peninsula, was described and figured only recently by Grassé (1930). A short account of the supposed larva of *M. amphigena*, taken near Kanagawa (Japan), is to be found in Cabot's well-known monograph, published as early as 1890, but this description was based on an immature specimen in poor condition. Cabot's work has apparently been overlooked by Fraser, otherwise this author would have mentioned it in the publication (loc. cit. 1936) in which he gave outline sketches of the external morphology of a cast skin which he found associated with an emerging male of *amphigena* near Kyoto (Japan). Unfortunately, neither description nor measurements were given by Fraser, but judging from his figures, this exuvia has but few features in common with those of the other large-sized forms of the *amphigena* cluster discussed by Popova and the present writer (p. 259 ff.). Thus, for example, the characteristic rounded tubercles along the hind margin of the occipital lobes are not shown in Fraser's sketch of the supposed *amphigena* skin; it is also dif-

ficult to explain why the armature of the labium, as figured by Fraser, should be so different not only from that of the larvae just mentioned, but also from that of Cabot's Japanese specimen of *amphigena*.

Lastly, mention should be made of the *Macromia* reported from Manchukuo by Miss Popova, who supplied a very detailed description accompanied by excellent drawings of a larva collected in the Chanka Lake district. This insect exhibits a remarkably close similarity to one of the two Chinese larvae in our collection (both from Fukien), described in the following pages. In general appearance it also resembles that of the European *splendens;* but, although we may safely assume Popova's insect to be a member of the same group, nothing further can be said about its affinity since the adult has not yet been discovered.

The drawings and descriptions that follow of the two larval forms collected in Fukien, were prepared almost thirty years ago (1928) and have nothing to do with those of the two new species of *Macromia* described from the same region in the previous pages. Their identity must remain doubtful until an opportunity arises of breeding out the adults, but it is fair to assume that one (or both) belong to either of the two described species, *hamifera* or *malleifera*.

Summarizing the known facts, it is thus evident that we are still far from correctly associating a number of these larval types with their imagines. In attempting to arrive at a more satisfactory understanding regarding the mutual relationship of these East Asiatic species, future students should endeavour to publish a re-description of the larva of *amphigena* and to grasp at every opportunity of rearing those of the allied species.

Macromia spec. indet. A (figs. 8 and 10-11).

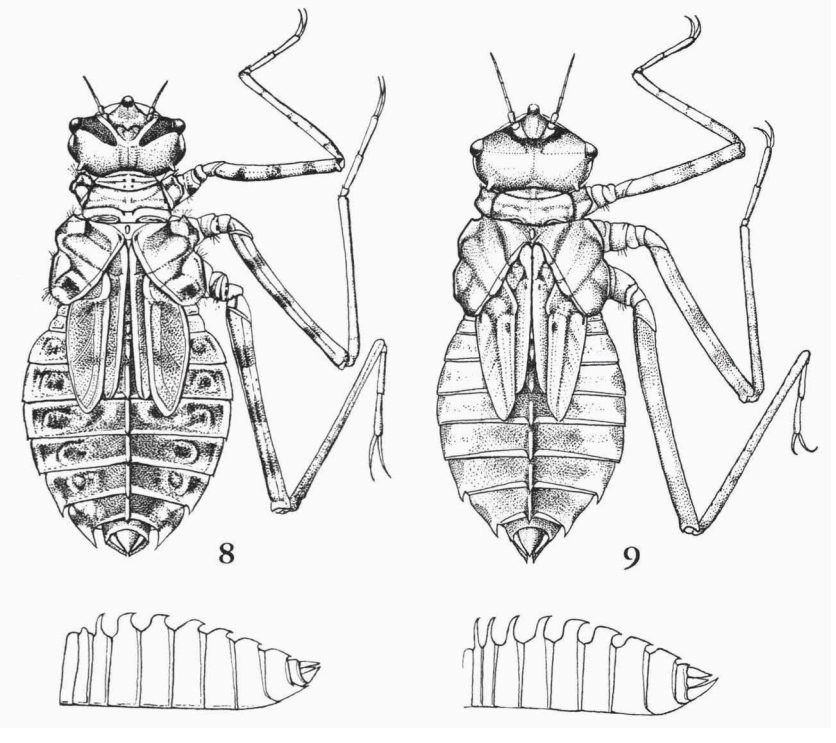
Material. — 1 larva ult. (ex alcohol), E. China, Fukien province, G. Siemssen (ex Mus. Hamburg).

Principal features.

Measurements. — Total length 26.3; greatest width of the head 6.4; length of head 4.0; posterior femur 12.0; length of abdomen 14.5; greatest width of abdomen 12.0; highest point of body (across mesothorax) 6.0 mm.

Antennae short, first two segments thickened, sub-equal in length, segm. 2 almost circular; segm. 3-7 slender, elongate and tapering, approximately equal in length to one another. Frontal horn protuberant, strongly upcurved, apex swollen and knob-like. Eyes very prominent, projecting beyond level of epicranium. Tubercles on postero-lateral angles of head very distinct, nipple-shaped, directed obliquely sidewards and backwards. Labium of huge size, extending back to posterior surface of mesocoxae, the mentum

constricted in its proximal fourth, flaring distally. Apical border of mentum almost straight, projecting only slightly in the median line, its free margin finely crenulate and furnished with short setae; long mental setae 5, followed by 3 shorter ones on each side. Lateral setae 5 on each side. Lateral lobes with 5 deep irregularly V-shaped indentations and with 6 large projections, the latter strongly convex laterally with very finely crenulate margins, each ending in a strong tooth; first and last projection divided, the



Figs. 8-9. *Macromia* spec. indet. Ultimate larval instars of two different species, A (8) and B (9), both from Fukien, with outline sketches of the abdomen, left lateral view.

apical one very deeply so, and all projections carrying a varying number of rather long strong bristles (figs. 10-11).

Lateral propleural processes well developed, tubercular, carrying long soft pencil-hairs. Antero-lateral edges of mesopleurae strongly angulate. Thorax very robust, much higher than the abdomen, highest point just before the base of the anterior wings. Mesosternum armed with two robust, backwardly directed, curved and pointed thorn-like tubercles, followed posteriorly by a similar, though somewhat shorter and thicker, tooth

situated on the middle of the metasternum just posterior to the labial mask.

Legs very long and spidery, all femora slightly curved though not flattened.

Abdomen ovate, roof-shaped, very flat, but dorsal spines strongly laterally compressed. Lateral spines present on segm. 8 and 9, both strong and acute. Dorsal hooks present on segm. 2-9 and shaped as shown in fig. 8 (that on segm. 2 broken off). Tenth segment and appendix dorsalis without indication of a dorsal keel.

Colour-pattern as shown in fig. 8; colour brown and yellowish-brown; eyes, and a conspicuous dot on the metapleurae, almost black. Femora banded on dorsal surface.

This larva in almost all respects resembles so closely the one from Manchukuo, described and figured by Miss Popova (loc. cit.), that it evidently belongs to a species very nearly related to it. The only major differences between them which I am able to make out are the existence of an additional mental seta (8 + 1 in the Manchukuo example, 7 + 1 in the Fukien larva) as well as an additional lateral seta (6 + 1 and 5 + 0, respectively). Otherwise the labium is practically identical in the two insects. A noteworthy feature of both seems to be the presence of three thorn-like projections, placed in a triangle, on the underside of the thorax (figured by Popova, loc. cit., fig. 106).

Although the identity of these two larvae remains unknown, the Fukien specimen might well belong to one of the two new species, described earlier in this paper.

Macromia spec. indet. B (figs. 9 and 12-13).

Material. — 1 larva ult. (ex alcohol), E. China, Fukien province, G. Siemssen (ex Mus. Hamburg).

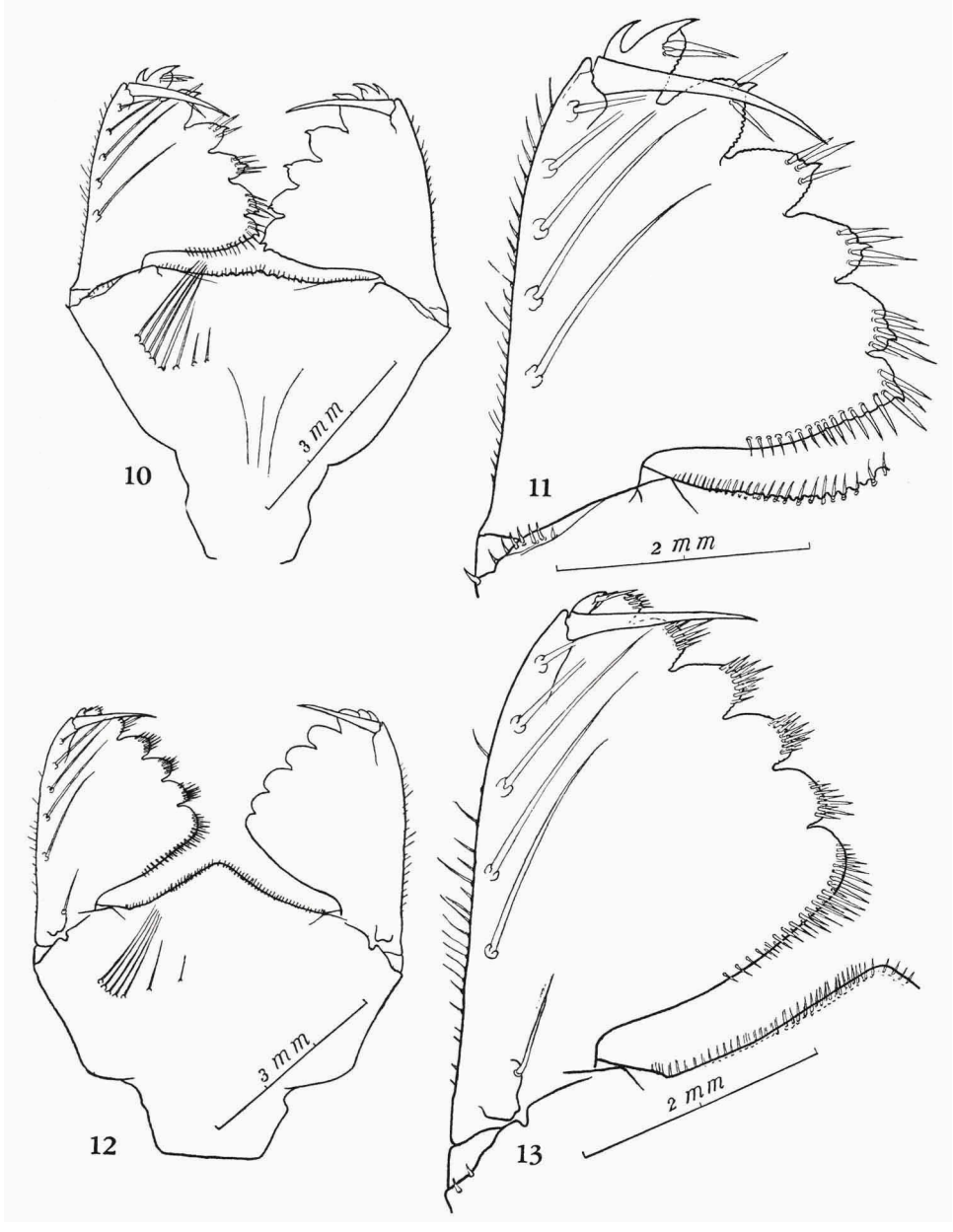
Principal features.

Measurements. — Total length 26.0; greatest width over the eyes 7.3; length of head 4.5; posterior femur 12.6; length of abdomen 15.6; greatest width of abdomen 11.0; highest point of body (across mesothorax) 7.4 mm.

Generally very similar to the preceding species, but body higher and abdomen more prolonged and pointed apically (probably on account of the more advanced stage of development of the imaginal tissue within the skin, as evidenced by the more swollen wing-sheaths!).

Differs from the preceding species in the following respects.

Frontal horn a trifle longer and more abruptly narrowed apicad. Genal area less developed, sides straighter and more gently sloping towards the eyes when viewed dorsally, the eyes situated more distad. Postoccipital area less convex.



Figs. 10-13. *Macromia* spec. indet., full grown larvae of two different species from Fukien. Interior view of labium, spec. A (10) and B (12), with left lateral lobes of same, more highly magnified, spec. A (11) and B (13).

Labium of huge size, extending back almost as far as the base of abdomen, the mentum more abruptly constricted in its proximal fourth. Apical portion of mentum triangular, strongly projecting on middle, its free margin entire, devoid of crenulate teeth, but furnished with short setae; long mental setae 5, followed by 2 very short and more widely distant ones. Lateral setae 5 + 1 shorter basal one on each side. Lateral lobes with 5 rather deep V-shaped indentations and with 6 large projections, the latter simply rounded, their margin entire, lacking teeth; last projection deeply divided, and all projections provided with a varying number of bristles, these bristles slenderer, shorter and more numerous than in the preceding species (figs. 12-13).

Thorax and legs not appreciably different from the first described species.

Abdomen with lateral spines on segm. 8 and 9, these a little shorter than in the foregoing species. Dorsal hooks present on segm. 2-9 but shaped differently, considerably longer and more erect, as shown in fig. 9. Tenth segment and appendix dorsalis as in the other species.

Colour-pattern almost completely disappeared, as shown in the figure; colour yellowish-brown.

This larva superficially resembles that of the previously described species, but differs considerably from it in the structure of the labium and in the absence of teeth on the thoracic sternum. Like the foregoing specimen, the identification of this larva is not possible.

II. New species and larval forms from the Indo-Australian Region

Macromia arachnomima Lieftinck (fig. 14)

1953. Lieftinck, Treubia, *22*: 395-406, figs. 4-7 (♂ imago & larva). — ♂ S. Borneo.
1954. Lieftinck, Handlist, ibid. *22*, Suppl.: 116.

Additional material. — S. Borneo: 1 ♀ (juv., bred from larva), Sampit distr., ca 50 m, Pemantang, 150 km inland, 26.vii.1953, forest brook, M. A. Lieftinck. The specimen is the allotype, transformed at Bogor (Java), 4.xi.1953, and deposited in the Leiden Museum.

Female (allotype, bred from larva). — Head, thorax and legs coloured exactly as described for the male, the metallic-blue shine on top of frons slightly less intensive.

Both fore and hind wings with a conspicuous brownish-black (almost black) basal patch extending from the base outwards to slightly beyond Ax_1 in *c* and *sc* of fore wing, and, similarly, as far as Ax_2 in hind wing, where the spot also occupies *m* about half-way up to the arculus and *cu*

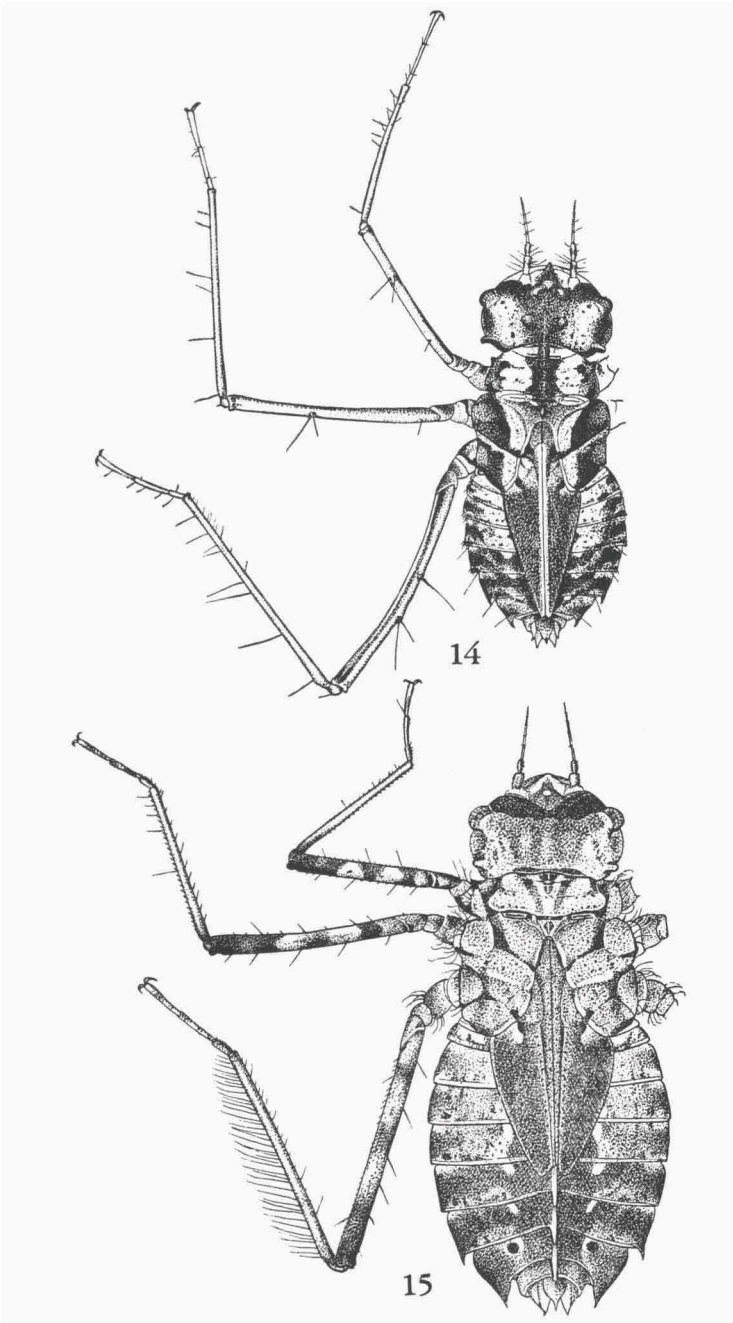


Fig. 14. *Macromia arachnomima* Lieftinck. Ultimate larval instar (live specimen) of ♂ holotype from S. Borneo (after Lieftinck). — Fig. 15. *Macromia cincta* Rambur. Ultimate larval instar (live specimen) of ♂ from S. Borneo.

almost as far as Cux_2. Beyond that level the blackish basal spots are surrounded in both pairs of wings by a saffron-yellow areola up to the arculus, ill-limited distally. Membrane otherwise palely saffronated all over, but fore wings moreover adorned with a diffuse yellow stripe bordering the costal margin as far distad as the pterostigma and with a cloudy brown patch filling out most of the apices from the nodus outwards, almost as far as the tip. Shape of triangles and course of main longitudinal wing-veins as in the male, but neuration much closer than in the opposite sex. 16 antenodals and 6-8 postnodals on fore wing, 11 antenodals and 9-10 postnodals on hind wing. Cross-veins in *ht* $\frac{4.4}{2.2}$; *Cux* $\frac{7.6}{5.4}$. *Arc* at Ax_2 in all wings. Discoidal field of fore wing with two cell-rows up to the level of the 14th antenodal, then widening out with three and more cells between; the same in hind wing with two cell-rows up to the level of the M_{1-3} fork. Hindwing with three cells between the membranula and anal loop, with two cell-rows between loop and posterior border of wing, and with four cells at a maximum between Cu_2 and the border. Cu_1 and Cu_2 strongly curved, entering the wing-margin almost under a right angle. Anal loop consisting of 12-14 cells including two central cells. Membranula greyish-white. Pterostigma long and narrow.

Abdomen short and slender, with cylindrical segments; basal and terminal segments only slightly expanded. Colour black, lacking metallic green or blue reflections. Markings yellow, as follows: 1 with a pair of minute dorsal spots near its base. Segm. 2 with complete, broad, oblique ring occupying the basal half of the dorsal surface but curving forwards laterally towards the base of segment where it is narrowed, meeting its fellow from the opposite side on the ventral surface; dorsally, this yellow mark is broadly indented by black on either side of the middle along base, while posteriorly it is finely excised in the median line; there is, besides, a small yellow spot on each side on the ventral surface of the tergite, close to its posterior margin. Segm. 3-6 each with a small triangular mid-dorsal yellow spot situated just in front of the transverse suture and finely indented anteriorly by black in the median line, the spots on 3 and 4 sub-equal in size but those on 5 and 6 barely visible. Dorsum of segm. 7 with large, subquadrangular, basal yellow spot immediately in front of the transverse suture, occupying the basal two-fifths of the dorsum. Remaining segments unmarked save 8, which carries a diffuse yellowish latero-ventral spot near its base.

Valvula vulvae fully two-thirds as long as the 9th sternite, completely divided into two conspicuous, closely approximated, broadly oval, divergent lobes whose apices are obtuse-angulate, the ventral surface of each being markedly concave. Ninth sternite longitudinally carinate in its basal half.

Anal appendages very small, shorter than 10th segment, conical, abruptly and acutely pointed.

Measurements: abd. + app. 42.0, hw. 42.0, pt. fw. 2.8, pt. hw. 2.5 mm.

On July 26, 1953, I found several *Macromia* larvae on the bottom and among roots of trees of a muddy forest-brook at Pemantang, near Sampit, in southern Borneo. Many of these larvae were brought back alive to the laboratory in Bogor (Java) and several specimens were reared. Of the two full-grown larvae of *M. arachnomima* Lieft., the first adult male emerged on September 2nd; it was killed several days later when the colours were mature. This example was described, along with its larva, in my 1953 paper. The second full-grown larva of the same species transformed on November 4th and yielded a female (the allotype), which is described above for the first time.

By the end of February I left Java for Europe, and since the remaining larvae of *arachnomima* were then still immature, they were preserved in alcohol, no further adults of *arachnomima* being known. As stated previously, the larva of this species is so uttely unlike any other known species of *Macromia,* that I have thought it convenient to copy its existing portrait for comparison with other Oriental species (fig. 14).

Macromia cincta Rambur (figs. 15-18)

1953. Lieftinck, Treubia, 22: 402 (ethological notes on larva, S. Borneo).
1954. Lieftinck, Handlist, Ibid. 22, Suppl.: 116-117.

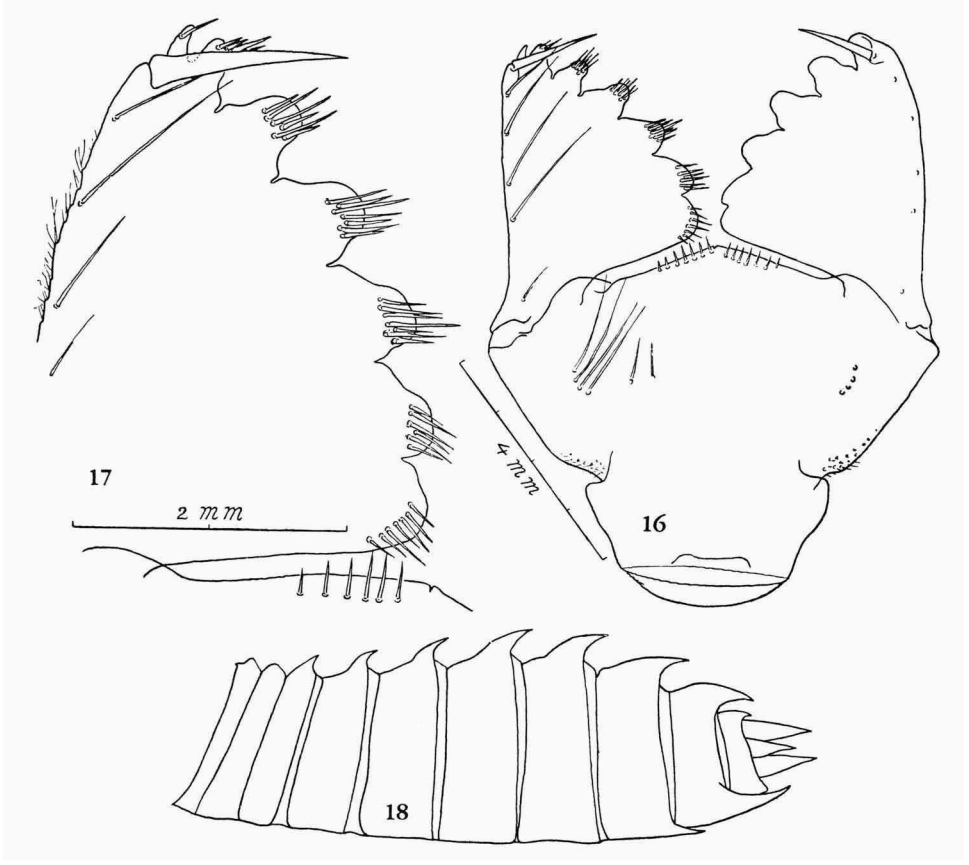
Material. — S. Borneo: 2 larvae (ult.), Sampit distr., ca 50 m, Pemantang, 150 km inland, 26.vii.1953, forest brook, M. A. Lieftinck. Both are males, bred in the laboratory and transformed at Boger (Java), 10.x and 2.xi.1933; in the Leiden Museum.

The rearing of these two larvae enables me to give the following description and figures of the immature stage of this species, which has long remained unknown.

Surface smooth, basal antennal joints, propleural processes, the coxae posteriorly, and the lateral margins of all abdominal segments, with numerous rather long hair tufts or scale-like hairs; head and thorax otherwise finely granulate on account of numerous microscopical warts, distributed in patches or stripes and forming a distinct colour-pattern. Posterior tibia with long hair-fringe.

Body shaped as shown in fig. 15. Frons moderately protuberant in dorsal view, obtuse-angulate mesially, forming a short, blunt, slightly upcurved median tubercle which carries a number of closely set, club-shaped and scale-like setae followed on each side by few, thick long hairs;

upper surface of frons smooth. Occipital lobes convex, each carrying a distinct nipple-shaped tubercle. Vertex with a pair of low median tubercles on either side of the middle line. Antenna very long, 4.45 mm, the two basal segments swollen, length of separate joints 0.75, 0.6, 0.7, 0.55, 0.55, 0.65, 0.65 mm. Eyes strongly protuberant and much projecting beyond level of epicranium in profile view.



Figs. 16-18. *Macromia cincta* Rambur, ♂ exuvia from S. Borneo. Interior view of labium (16), with left lateral lobe of same, more highly magnified (17), and left lateral view of abdomen (18).

Labium of large size, mentum extending back as far as anterior border of metacoxae. Apical portion of mentum slightly projecting, obtuse-angulate on middle, its free margin almost entire but furnished with 6-7 strong short setae. Lateral setae 4 + 1 short basal seta on either side. Lateral lobes with 5 deep indentations and with 6 large projections, the latter

bluntly rounded, their margin entire; last projection deeply divided and all projections provided with 6-7 strong short bristles (figs. 16-17).

Lateral pro- and mesopleural processes well developed, triangular, carrying long soft pencil-hairs. Antero-lateral edges of mesopleurae obtuse-angulate. Thorax robust, much higher than the abdomen, highest point at the base of the anterior wings. Wing-cases reaching as far as the end of 6th abdominal segment.

Legs very long and spidery; all femora flattened, very slightly curved, but less expanded than in such species like *moorei fumata* Krüger (fig. 23). Tarsal claws as in that species, posterior pair about half as long as the third tarsal segment.

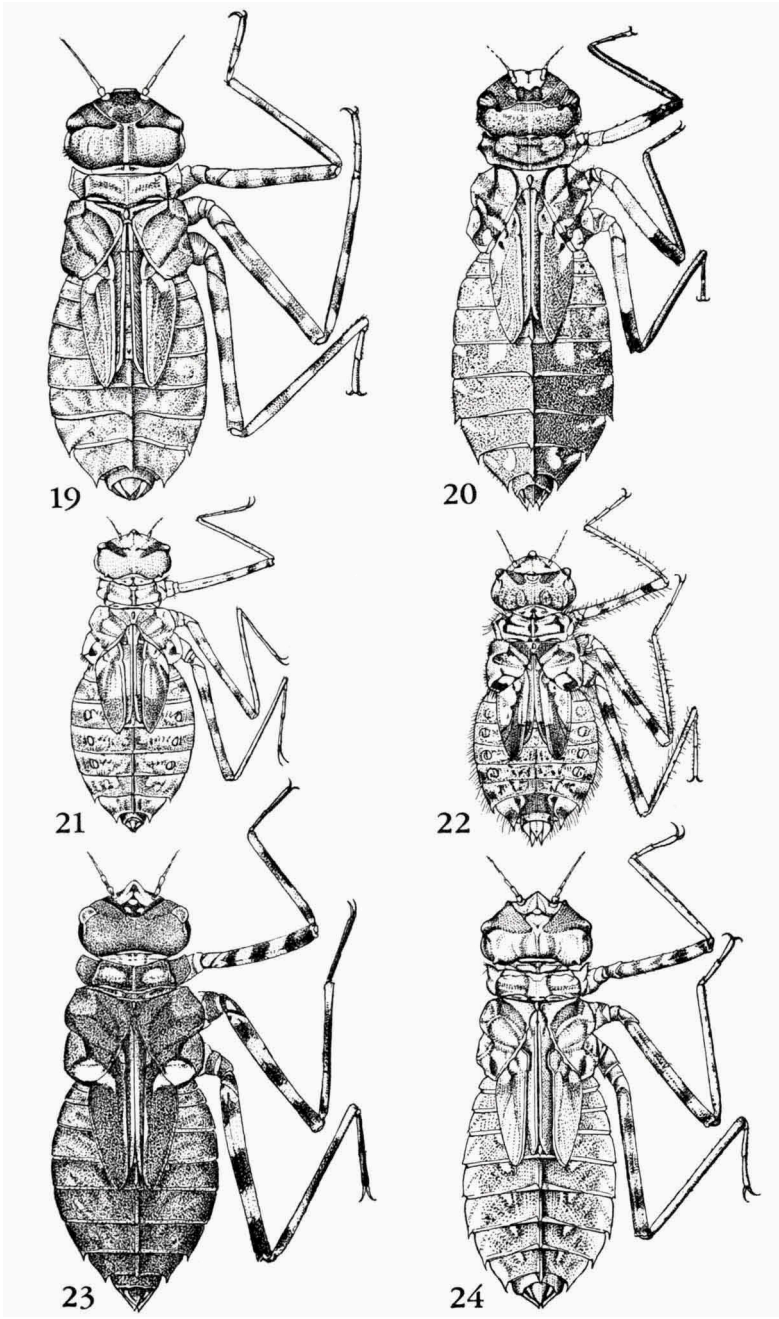
Abdomen shaped similarly to that of *westwoodii,* ovate, roof-shaped, the apical segments and anal pyramid distinctly less strongly pointed than in *moorei fumata*; flat, but less depressed than in that species. Lateral spines on segm. 8 and 9, rather strong, that on 9 much the largest. Dorsal hooks present on segm. 3-10, shaped as shown in fig. 18. Appendix dorsalis distinctly carinate; anal pyramid about 2½ times as long as segm. 10, the lateral appendages a little shorter than the others.

Colour-pattern as shown in fig. 15; ground-colour grey-brown variegated with dark brown; epicranial area, wing-sheaths, apices of femora and posterior abdominal segments, blackish-brown.

Measurements (live specimen, fig. 15). — Total length of body 23.5, greatest width of head 6.5; length of head 3.5; height of head 5.7; length of labium 8.3; legs 19.0, 24.0, and 30.0, respectively; posterior femur and tibia both 11.0; length of abdomen 14.8; greatest width of abdomen at end of 5th segment 10.0; highest point of body (across mesothorax) 6.7 mm.

Macromia cincta Rambur has been for many years the only common Malaysian species whose larva was unknown. Among several *Macromia* larvae which I dredged up from the bottom of a forest-brook near Pemantang, in southern Borneo, were two full-grown examples of a large species which I had not encountered earlier. Along with larvae of three other species of *Macromia,* these were safely brought back alive to Bogor (Java) and, in the course of the next months, yielded a male and female *M. cincta.*

As I have shown elsewhere (Lieftinck, 1929: 65, 90-97), *M. cincta* takes rather an isolated position among its congeners from the Old World. As was to be expected, its larva too is quite unlike those of *moorei* Selys (fig. 23) and *westwoodii* Selys (fig. 19), the only two Malaysian species which are about the same size. Descriptions and figures of the finer structures of these were already given in a previous paper on Malaysian *Macromia* (Lieftinck, 1950: 708-714, figs.). The *cincta* larva can be distin-



Figs. 19-24. Full grown larva of *Macromia westwoodii* Selys, from C. Java, spirit specimen (19), *M. cydippe* Laidlaw, from W. Java, live specimen (20), *M. gerstaeckeri* Krüger, from Malaya, spirit specimen (21), *M. erato* Lieftinck, from W. Java, live specimen (22), *M. moorei fumata* Krüger, from S. W. Sumatra, live specimen (23), and *M. terpsichore* Förster, from N. E. New Guinea, spirit specimen (24).

guished from both of them by the presence of well-developed occipital tubercles, and also by the acuteness of the dorsal abdominal spines, while the more conspicuous pubescence of the body is also a noteworthy feature of it. From *M. westwoodii* (fig. 19), in addition, it can be held apart by the more flattened and compactly built body, the presence of a short frontal horn, and by the armature of the labium. Apart from the entirely different 'facies', the most distinctive characters separating the larvae of *cincta* and *moorei fumata* (fig. 23) are found in the labial mask, which for the latter I have described in my previous account (Lieftinck, 1950: 713, figs. 56-58). Lastly, the conspicuous fringe of long and fine pencil-hairs on the outer side of the posterior tibia seems to be an additional, and unique, feature of the *cincta* larva.

For purposes of comparison, illustrations are here added of the principal larval types now known from the Indo-Australian region (figs. 14-15 and 19-24).

Our specimens of *cincta* were found hidden in accumulated trash on the bottom of the more muddy tracts of a small forest-stream, which had a slow current.

Macromia jucunda, sp. n. (figs. 25-26)

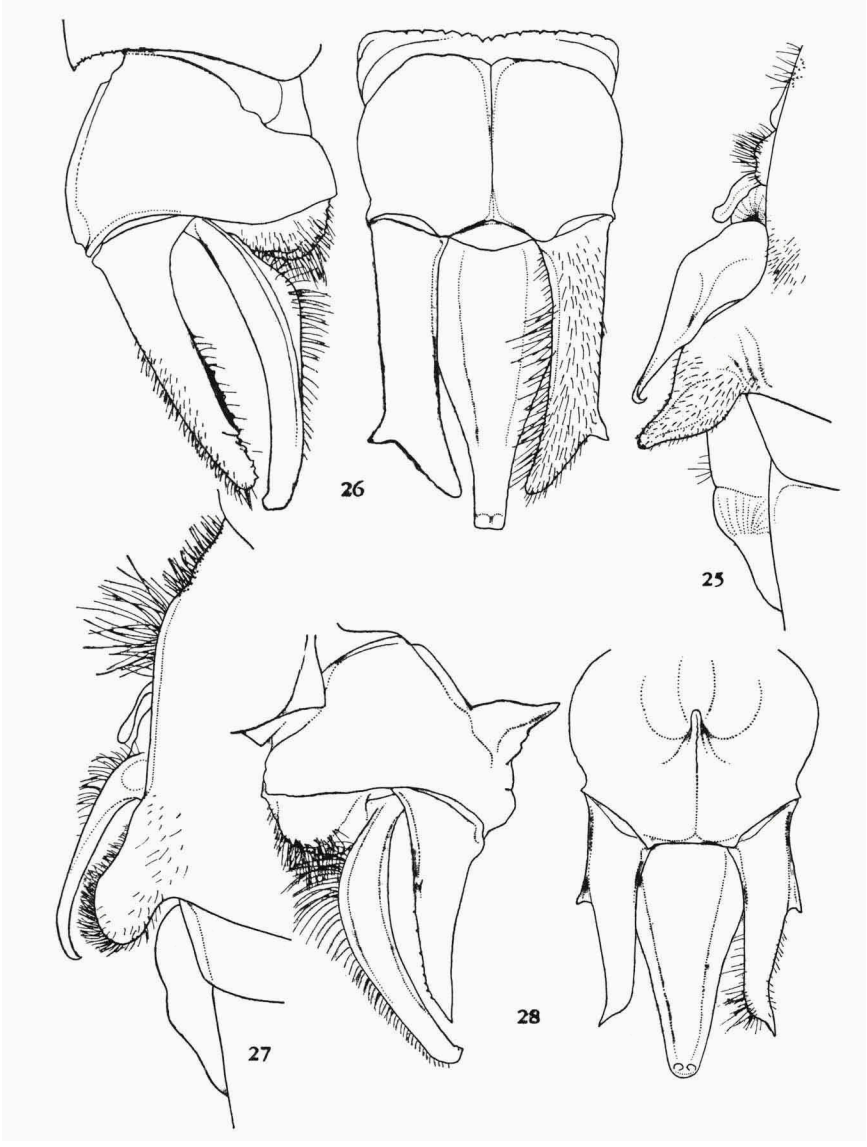
Material. — W. Java: 1 ♂ (ad.), Bogor (Buitenzorg), 240 m, Botanic Garden, 2.ii.1954, M. A. Lieftinck. Holotype in the Leiden Museum.

Nearest *septima* Martin.

Male (holotype). — Labium unicolorous brown. Basal one-third of mandibles dark brown, thence brownish-yellow turning to black apically. Labrum chestnut-coloured with two diffuse blackish-brown dots on each side of the middle along base. Anteclypeus dark brown, the postclypeus also brown but marked on either side against the margin of compound eye with an ill-limited dirty yellowish spot, the transverse impressions on each side of the middle also somewhat yellowish. Frons dark metallic greenish-black anteriorly, blue-black dorsally, marked on either side against the eye-margin with a diffuse yellowish dot, which is slightly larger in size than the one on the postclypeus; pyramidal processes shaped similarly to those of *septima*, their surface moderately shiny, irregularly and transversely wrinkled, their inner surfaces not flattened nor framed. Vertex metallic blue-black, shaped as in *septima*. Occiput and rear of the head shining black.

Synthorax brilliant metallic-green dorsally and at the sides, intermingled with purplish- and blue-green on the posterior part of the mesepimera and metepimeron; dorsum marked with a pair of sharply defined, though narrow and slightly curved, yellow antehumeral bands; these taper to a point up-

wards, extending half-way up the dorsum and are continued downwards on the mesinfraepisternum for about three-quarters of their length. Ante-alar triangles bright chrome-yellow. Thoracic sides with a sharply delimited but



Figs. 25-26. *Macromia jucunda,* sp. n., holotype W. Java. ♂ genitalia, left lateral view (25), and anal appendages, right lateral and dorsal view (26). — Figs. 27-28. *M. celaeno,* sp. n., holotype E. New Guinea. ♂ genitalia, left lateral view (27), and anal appendages, left lateral and dorsal view.

rather narrow yellow band across the spiracle; this band straight and almost parallel-sided, widest (0.6 mm) at level of the spiracle. Venter, including the under surfaces of the posterior pair of coxae, light brown, as is also a diffuse stripe bordering the latero-ventral margin of the metepimeron; this marginal stripe encroaches on upon the underside so as to meet the narrow cream-coloured Y-shaped band separating the metepimera from the post-sternum, the under surface of the former being blackish-brown, forming two narrowly ovate spots, pointed rearwards and slightly converging towards the basal suture.

Legs long and slender, black; coxae blackish-brown anteriorly, somewhat lighter posteriorly; anterior pair of trochanters yellow-brown on the inside.

Posterior femur 8.3 mm long. Tibial keels palest yellow, occupying slightly more than the distal one-third of anterior pair, absent on intermediate pair, and extending along full length of posterior pair, though not quite reaching the base of the tibia.

Wings almost hyaline, the anal area of posterior pair faintly saffronated and extreme bases of same marked with rusty-brown spots in *c*, *sc* and *m*. Costa with a fine interior yellow line extending from base to the nodus. Pterostigma small, about four times as long as it is deep, black in colour. Membranula unicolorous grey, extending half-way between the cross-vein in the anal triangle and the apex of the latter. Anal angle of posterior wing very similar to that of the allied species, shaped exactly like that of *septima*. Neuration open. Nodal index $\frac{5.12.12.5}{8.\ 9.\ 9.\ 8}$; *ht* $\frac{3.2}{1.1}$; *Cux* $\frac{4.4}{3.3}$. Only one large basal cell between anal triangle and anal loop. Anal loop consisting of 5 cells, without central cell.

Abdomen slender; basal and terminal segments much expanded in dorso-ventral but less so in lateral dimension, the apical segments widest at the end of segm. 8. Colour deep black, only the sides of segm. 3 with faintiest metallic-green lustre. Segm. 2-5 and 7-8 marked with yellow, as follows: 2 with a pair of sub-oval, yellow spots, one on each side, occupying most of the sides including the auricles, only the ventral margin of the segment being broadly bordered with black; above that level the segment is black, but upon the middle of the dorsum is a third large roundish spot which extends backwards a little beyond the transverse suture. Segm. 3 has a large crescent-shaped basal spot on the sides and a yellow line along ventral margin extending as far as the transverse suture; moreover, there is a pair of much smaller, roundish, mid-dorsal spots placed near together just in front of the transverse suture; 4 and 5 each have only a pair of median

spots similar, though still smaller, than those on 3. Segm. 6 entirely black; 7 and 8 each carry a small diamond-shaped mid-dorsal yellow spot situated very near the base of the segment, that on 8 being only a trifle larger than that on the preceding segment; 8 moreover has a conspicuous latero-ventral spot on either side near its base, extending backwards for less than half the segment's length. Segm. 9-10 and anal appendages entirely black. Tenth segment evenly and but slightly convex above, finely longitudinally carinate, lacking a dorsal tubercle or spine.

Genitalia black; basal portion of genital hamule very broad and plate-shaped in ventro-lateral view, its apical one-fourth abruptly narrowed, extremely slender and needle-like, its apex strongly recurved. Genital lobe tongue-shaped, its apex almost pointed (fig. 25).

Anal appendages shaped as shown in fig. 26; superior pair not very hairy, a little shorter than the appendix inferior.

Measurements: abd. + app. 41.0, hw. 32.8, pt. fw. 2.0 mm.

Female unknown.

Runs out in my key (Lieftinck, 1950: 683 ff.) to near *septima* Martin and *corycia* Laidlaw, but differs from both in having vestiges of yellow lateral spots on the frons and postclypeus. From *septima* our new species is further distinguished by the narrower yellow band on the sides of the thorax, the very different shape and size of the hamule and the posterior genital lobe, and also by the reduction of the yellow markings on the dorsum of the 7th and 8th abdominal segments. It differs from *corycia* in the shape of the genital hamule, which in the latter is less expanded basally and, after the strongly angulated ventral projection, suddenly narrowed and down-curved; also, the subapical tooth on the appendix superior of *corycia* is situated more distad, the tip of the main body of the appendage at the same time being more incurved than it is in *jucunda*. Lastly, in *corycia* the basal mid-dorsal yellow spot on the 7th segment is of larger size while the spot on 8 is lacking.

The recent discovery of this handsome little species is entirely due to an extraordinary coincidence. One early morning, a passer-by picked up the insect casually from the ground, just as it had fluttered down from a tree. It was quite mature and, though benumbed, absolutely undamaged. It was soon recognized as a species new to science. Not once during a more than twenty years' residence at Bogor have I noticed a *Macromia* on the wing in the Botanic Gardens and only on one earlier occasion a Sundanese collector happened to come across two males of the very scarce *M. erato* Lieft., these examples being also captured somewhere in the Garden. The few sand- and mud-bottomed streams existing in this environment are usually

so polluted that I had scarcely expected them to afford a suitable breeding-place to these fastidious insects.

M. jucunda is the eighth species of *Macromia* reported from Java.

Macromia celaeno, sp. n. (figs. 27-28)

Material. — N. E. New Guinea: 1 ♂, 1 ♀ (ad.), Papua, Kwagira River, Peria Creek, 50 m, 2 and 3.ix.1953, G. M. Tate (4th Archbold Expedition). Holotype ♂ and allotype ♀ in the Leiden Museum.

Male (ad., type). — Head large, width across the eyes 9.2 mm; face moderately protuberant; pyramidal processes of frons well separated, nipple-shaped, not divided into flattened or framed parts, the anterior surface of each transversely and rather coarsely, dorsal surface finely and superficially wrinkled; sulcus moderately deep. Labium brownish-yellow, the median lobe dirty ochreous. Labrum very dark brown, almost black, its surface rather shiny. Mandible-bases dark brown. Anteclypeus chestnut-coloured. Postclypeus marked with bright chrome, this colour forming a transverse band along base which fills out nearly all of the side-portions but is more or less interrupted by brown in the median line: the middle portion thus remaining broadly brown, the side portions only so along the inner edges, the transition from one colour into the other gradual and diffuse mesially. Frons and vertex very brilliant metallic-green. Occipital triangle and rear of the head very smooth and shiny, bright purplish-blue.

Thorax brilliant metallic-green. Yellow antehumeral bands distinct, extending two-thirds up the episterna, widest ventrally, very slightly converging and gradually tapering upwards, their apex blunt. Upper portion of mesinfraepisternite also yellow, the ventral division obscurely brown. Yellow lateral stripe traversing the spiracle narrow, its lower and upper parts both slightly undulated, the uppermost portion narrowest and incomplete above, leaving off about 0.6 mm below dorsal margin of metepisternum. Latero-ventral border of metepimeron narrowly yellow, this colour confluent across the latero-ventral carina with the brownish-yellow ventral surface of the thorax; poststernum and ventral portions of metepimera with very slight metallic-blue lustre.

Legs mainly black; coxae and trochanters dull reddish-brown; extreme bases of anterior and middle femora and about the basal two-fifths of posterior femora dark reddish-brown, but the inner surface mainly black. Posterior femur (incl. troch.) 10.8 mm long. Keel on flexor side of anterior tibia extending nearly the distal one-half of its length, but lacking on the middle tibia, that of posterior tibia running along its full length but commencing about 1 mm from its base.

Wings with the group characters of *terpsichore* Förster; rather narrow. Membrane hyaline. Neuration open. Nodal index $\frac{8.15.15.8}{9.\ 9.\ 9.\ 9}$; cross-nerves in *ht* $\frac{2.2}{1.1}$; *Cux* $\frac{5.4}{4.4}$. Discoidal field of posterior wing with 2 cross-veins running directly from M_4 to Cu_1. Shape of anal triangle, membranula and anal angle very similar to the allied Papuan species of this group, the anal angle with the tornus acute-angulate, hooked inwards and bearing a minute tooth, the apex of the enclosed membrane approximately rectangulate. Membranula extending to the transverse cross-vein in the anal triangle, grey in colour. Anal loop consisting of 8 cells, without a central cell. Pterostigma very small, black, inner sides rectangulate, outer angle acute.

Abdomen comparatively long, of the usual slender shape; black in colour, the first four segments with brilliant metallic-green, 5 and 6 with very slight bronzy reflections, the remaining segments dull black. Yellow markings on basal segments small and unapparent, restricted to two vestigial spots upon antero-lateral edge of 2, followed by a line along its ventral border as far as the genital lobe, and a spot on the auricles; 3 with narrow transverse basal line and a similar line along ventral border. Succeeding segments unmarked, except 7 which carries a transverse orange dorsal spot slightly projecting beyond the transverse suture mesially and occupying roughly its basal one-third; seen from aside the lower margin of this spot is convex, the ventral one-third of the tergite remaining black. Ventral surface of segm. 8 with a pair of oval, dull orange spots covering slightly more than the basal one-third of the tergite; 9 and 10 with vestiges of similar, though much smaller, orangish dots. Segm. 10 with its surface rather smooth and shiny, slightly metallic on each side of the crest; dorsum strongly longitudinally carinate, abruptly produced on middle into a robust, laterally compressed, acute prominency, shaped like a shark's tooth.

Strong short bristles along basal half of lower margin of 2nd abdominal tergite light brown in colour. Genital lobe slender, parallel-sided, much longer than broad, apex evenly rounded. Hamulus long and slender, overlapping genital lobe, almost straight on middle when viewed laterally, but apex distinctly upcurved with slightly outbent tip (fig. 27).

Anal appendages black, superiors in principle shaped rather similarly to those of *amymone* Lieft., but more drawn out and lacking the conspicuous interior sub-apical fringe of long hairs of that species; a well-developed extero-lateral tooth at about the middle of their length; tips rather abruptly outcurved, acutely pointed. Appendix inferior much longer than the superiors, shaped as shown in fig. 28.

Female (allotype). — Differs from the male only in being more robustly

built and of somewhat larger size. Lateral thoracic yellow stripe crossing the spiracle slightly broader and approximately of equal width (0.8 mm) throughout. Legs almost wholly black, only the base of the posterior pair of femora brown internally.

Wing-membrane colourless, but anterior half of the bases palely saffronated as far outwards as a little beyond *Ax*1; posterior part of anterior wings also with a distinct orange-yellow cloud filling out the entire apex inwardly about as far as the 3rd postnodal cross-vein. Neuration closer than in the male; nodal index $\frac{9.17.17.7}{9.11.11.10}$; cross-veins in *ht* 4.4; *Cux* 5.5. Anal loop made up of 17 cells.

Abdomen comparatively long but robustly built, compressed, with the segments higher than wide, 3-10 strongly longitudinally carinate. Colour black, 1-6 metallic-green, the first three segments very brilliantly so. Orangish marks alongside segm. 2 larger in size and very irregular in shape, nearly interrupted by the transverse carina, the portion anterior to it transverse and subtriangular in outline, the posterior part attached to it under a right angle; transverse basal line on 3, as well as the stripe along ventral border, somewhat more conspicuous than in the opposite sex. Orange mark on dorsum of segm. 7 of larger size, broadly ovate, a little produced apically and occupying almost the basal half of segment measured along the dorsal crest. Segm. 8 and 9 with orangish latero-ventral marks similar to the male.

Valvula vulvae slightly over one-third as long as the 9th sternite, almost completely divided into two flat, narrowly oval lobes, placed almost in a horizontal plane, the incision V-shaped and the blades themselves rounded off and a little upturned apically; 9th sternite carinate. Anal appendages very small, pointed.

Measurements: ♂ abd. + app. 49.8, hw. 44.4, pt. fw. 1.4, pt. hw. 1.5; ♀ 51.0, 49.3, pt. 1.5 mm.

This new species seems to come nearest to *M. sophrosyne* Lieft., from Waigeu I., which is of about the same size. It can be distinguished from that species by its more open wing-venation and the much smaller size of the baso-dorsal yellow mark on the 7th abdominal segment. Structurally, *celaeno* differs from *sophrosyne* in the genital hamule, which in the latter tapers more rapidly towards the apex, projecting but slightly beyond the lobus posterior; in *sophrosyne*, moreover, this genital lobe is longer, more pointed and distinctly more protuberant. The anal appendages of the two species are very similar, but, whereas in *sophrosyne* the extero-lateral tooth at the superior appendage is only small and situated at the end of the proximal

third, it is better developed and placed further distad in *celaeno,* the appendage of the latter itself being more outcurved in its basal half.

M. celaeno is the eighth representative of *Macromia* reported from New Guinea and the satellite islands. For a recent revision of the Papuasian members of the genus, see Lieftinck (1952).

REFERENCES

GRASSÉ, PIERRE, 1930. La nymphe de *Macromia splendens* Pictet. Ann. Soc. ent. France, vol. 99, pp. 9-14, text-figs. 1-2.

LIEFTINCK, M. A., 1929. A revision of the known Malaysian dragonflies of the genus *Macromia* Rambur, with comparative notes on species from neighbouring countries and descriptions of new species. Tijdschr. Ent., vol. 72, pp. 59-108, 22 figs.

——, 1950. Further studies on Southeast Asiatic species of *Macromia* Rambur, with notes on their ecology, habits and life history, and with descriptions of larvae and two new species. Treubia, vol. 20, pp. 657-716, 61 figs.

——, 1952. On the Papuasian representatives of the genus *Macromia* Rambur, with descriptions of five new species and some larval forms. Treubia, vol. 21, pp. 437-468, 22 figs.