The two females of the Archbold Expedition agree closely with the type, except that in one of them the wings are hyaline save for a golden yellow basal spot, which is better defined than in the type.

Evidently a very rare species.

Distribution: North New Guinea.

Synthemis gracilenta LIEFTINCK.

1935. LIEFTINCK, Nova Guinea 17, p. 285 (key ♂♀), 290 - 293, fig. 45 (apps. & genit. ♂, genit. ♀). — ♂♀ N. New Guinea.

Material studied. — N. New Guinea: 1 ♀ (ad.), Araucaria River, 700 m, 22.iii.1939, L. J. TOXOPEUS; 2 ♂, 1 ♀ (ad.), Bernhard Camp B, 100 m, 5 & 10.iv.1939, J. OLTHOF. — Living colours: "Eyes olive-green, lateral thoracic stripe citron-yellow; fine yellow streaks on abdominal rings" (♀ Araucaria River, L. J. T.).

Resembling closely the typical series from the hill-country south of the Cycloop Mts. Our two males differ only in that the yellow spots upon the dorsum of the 8th abdominal segment are a little smaller and rather more crescent-shaped than in the type.

This is probably the commonest species of *Synthemis* in New Guinea, distributed generally in the low country and submontane areas of the north.

Distribution: North New Guinea.

Synthemis primigenia (FÖRSTER).

1903. FÖRSTER, Ann. Mus. Nat. Hung. 1, p. 543 - 546, figs. — ♂ (♀?) Huon Gulf (*Palaeosynthemis*).

1935. LIEFTINCK, Nova Guinea 17, p. 285 (key ♂♀), 285 - 290 (incl. full references), fig. 42 (♂ insect), 43 - 44 (genital structures ♂♀). — ♂♀ N. & N. E. New Guinea.

Material studied. — N. New Guinea: 2 ♂, 1 ♀ (ad.), Bernhard Camp, 50 m, 19.ix, 29.x, and 23.xii.1938, J. OLTHOF.

These examples differ somewhat from the type, described in my previous paper, and also from a series of specimens from the Cycloop Mts. These differences lie within the range of individual variation and hence are of no great importance.

In the two males the mouth-parts are black, or almost so; the yellow fascia in front of frons in obliterated and consists of three spots, the lateral ones being sub-triangular and ill-limited anteriorly, whilst the median spot is indistinct or barely visible. The mesepisternites are throughout metallic-green, lacking any yellow marks. The yellow fascia over the first suture, enclosing the spiracle, is straight, widest dorsally, the ventral portion being a little excavated posteriorly.

The ♀ differs from examples of that sex from the Cycloop Mts in that the yellow frontal fascia is likewise interrupted on each side of the middle, but the three spots thus formed are considerably larger than in the ♂. There are no antehumeral yellow spots.

The anal appendages of the ♂ resemble closely those figured after a specimen of the Cycloop Mts, except that the tips of the superior ones are slightly less outbent. The genitalia of both sexes are exactly identical in individuals of all known localities.

Examples of *S. primigenia* from the southern Bewani Hills, southeast of the Humboldt Bay, which I have received from Mr STÜBER, are intermediate in colour between individuals of the Cycloop Mts and the type from Simbang (Huon Gulf).

A scarce species, but probably widely distributed in North New Guinea. I have received from Mr J. P. K. VAN EECHOUD a single ♀ taken by him near the Batavia rapids in the Mamberamo River, March-April, 1940 (low country).

Distribution: North New Guinea.

Macromia terpsichore FÖRSTER (pl. 38 fig. 127 - 128).

1900. FÖRSTER, Termész. Füzetek, 23, p. 86 - 88 fig. (penis ♂). — ♂ Bongu, Astrolabe Bay.
1907. MARTIN, Cat. Coll. SELYS, 17, Cordul., p. 72.
1914. MARTIN, in WYTSMAN, Gen. Ins. 155, Cordul. p. 25.
1929. LIEFTINCK, Tijdschr. Ent. 72, p. 62 - 63 (key, pars!), 68.

Material studied. — North New Guinea (W. to E.): 5 ♂ 1 ♀ (ad.), Upper course of Korimé River (W. of Lake Sentani), Mameda, 240 m v- vi & xii.1934, & 7.iii.1936; 39 ♂, 11 ♀ (ad.), Hollandia and environs, low country, v, vii, ix, xi-xii.1930, i-ii, iv-vi.1931; 19 ♂, 4 ♀ (ad.), S. slopes of Cycloop Mts, and hill-country southward, 400 - 600 m, ix.1930 and xi-xii.1931; 5 ♂, 1 ♀ (ad.), Tami River valley, East Tami, 600 m, 23-25.x.1935 (1 ♀), Njau Sanke (15 km S. of Bougainville Hills), 400 m, 15-25.xi.1935, and Nonno Hills, 400 m 7-21.ii.1936; 3 ♂, 2 ♀ (ad.), southern Bewani Hills, upper course of Tami River 300-500 m, Ampas distr., Pauwasi R. and Parfia, 8 - 20.vi & 22.ix.1939; all W STÜBER. — 1 ♂ (ad.), Bernhard Camp, 50 m, 24.viii.1938, J. OLTHOF; 6 ♂, 2 ♀ (ad.), Bernhard Camp B, ± 100 m, 5.iii, 5-13.iv; 2 ♂ (ad.), above Bernhard Camp, ± 600 m, 13.iv; 1 ♂, 1 ♀ (ad.), Araucaria Camp, 800 m, 7 & 30.iii.1939 all L. J. TOXOPEUS.

Extralimital material. — 1 ♀ (ad.), New Britain, "Neupommern, Herbertshöh, Blanchebai, Sommer 1900, CARL WAHNES, no. 1890", ex FÖRSTER collection (Michigan Museum, Ann Arbor).

As ♀ allotype I have selected a Hollandia specimen in good condition v.1930, W. STÜBER.

The extensive series of specimens and the ♂ genitalia agree perfectly with the original description that was based on two examples, which are now in the Michigan Museum, Ann Arbor. According to a note kindly sent to me by Mr HOWARD K. GLOYD, these specimens are labelled by FÖRSTER as follows: "In Urwalde bei Bongu bei Konstantinhafan, D. Neuguinea, 10.12.1898" and "In

Urwalde um das Eingeborenen Dorf Bongu bei Konstantinhafen, W. WAHNES 1898".

FÖRSTER's description of the ♂ is very full, but in one point needs elucidation: I find it impossible to come to any conclusion as regards the armature of the dorsum of the terminal abdominal segments, and it is not clear which of the segments 8, 9 or 10 is armed as stated in his description. In our material the 10th segment is only weakly produced dorsally in profile view, as is the case in at least one of FÖRSTER's 'types' of this species.

The tibial keels are yellow and extend along the apical 2/5 of anterior tibiae, and almost along full length of the posterior pair. It may be noted that the small extero-lateral tooth at about the middle of the length of the sup. anal appendages is often obsolete or altogether wanting (pl. 38 fig. 128).

RIS's description of the ♀ of *M. terpsichore* (*eurynome* nob.) applies perfectly to our series of females of true *terpsichore* from northern districts. The valvula vulvae only appears to differ from that of *eurynome* in that the blades are leaf-like, broadly rounded apicad, more deeply cleft and reaching about ⅔ of the length of the 9th sternite.

The single ♀ of Herbertshöh, New Britain, does not differ in any way from examples of the Humboldt Bay country.

Length: ♂ abd. + app. 43.5 - 49.0, hw. 42.5 - 46.5, pt $\frac{1.3 - 1.5}{1.1 - 1.4}$; ♀ 45.0 - 50.0, 46.5 - 50.0, $\frac{1.5}{1.4}$ mm.

M. terpsichore is evidently a common species and is found all over the northern part of the island in low country up to about 800 m above sea-level. Our large series confirmed differences I had previously noted between specimens from North New Guinea and those of the Lorentz River in the Amsterdam Museum, which I have therefore re-named *eurynome*, nom. nov. It is very close to *eurynome*, differing in the shape of the genital hamule, the absence of a triangular boss on the dorsum of segment 10, and, to a less extent, in details of the anal appendages (*vide postea*).

The New Guinean species of *Macromia* form a group of their own, characterized by their large size, minute pterostigma and very small hind wing triangle; also by the sharply acute anal angle of hind wing, and sombre body-colours. *M. terpsichore* is not, as stated by FÖRSTER, allied to *M. septima* MARTIN, but it and allied species are evidently most closely related to *M. westwoodi* SELYS and *cydippe* LAIDLAW, which they greatly resemble in general facies.

Distribution: North New Guinea; New Britain.

Macromia eurynome, nom. nov.

?1909. MARTIN, Bull. Soc. ent. Ital. 60, p. 198. — ♂ Astrolabe Range, S. E. New Guinea (*terpsichore*).

?1911. TILLYARD, Proc. Linn. Soc. N. S. Wales, 36, p. 380 - 381, pl. 10 fig. 11 (pt. ♀). — ♀ Cape York (*viridescens*).

1913. TILLYARD, Ibid. 37, p. 584 (synonymical note).

1913. RIS, Nova Guinea 9 Zool. 3, p. 494 - 495 fig. 13 (wings ♀). — ♀ Lorentz River, S. New Guinea (*terpsichore*).
1915. RIS, Ibid. 13 Zool. 2, p. 84 - 85 fig. 2 - 3 (genit., apps. ♂). — ♂ S. New Guinea (*terpsichore*).
1915. CAMPION, Trans. Zool. Soc. London 20, p. 488. — ♂ S. New Guinea (*terpsichore*).
1929. LIEFTINCK, Tijdschr. Ent. 72, p. 62 - 63 (key), 68 (pars).

Material studied. — 1 ♂ (allotype), S. New Guinea, Kloofbivak (Lorentz River territ.), 17.xi.1912, Mus. Amsterdam.

Both sexes of this species have been described and figured in detail by RIS. The nominotypes (*terpsichore* RIS nec FÖRSTER) are not now available for comparison with true *terpsichore*, but I studied them in the Amsterdam Museum. The ♂ differs very strikingly from *M. terpsichore* in the shape of the genital hamule, which organ is of paramount importance in discriminating species of *Macromia*. In *eurynome* the basal three-fifth of the hamule is roughly twice as broad as in *terpsichore* and strongly convex dorsally in its basal part, while the distal two-fifth is abruptly narrowed and in the form of a fine, slender apical hook slightly overlapping the genital lobe; in *terpsichore* the hamule is extremely slender, and very gradually narrowed from base to apex. The genital lobe in *eurynome* is about half as wide basally as it is in *terpsichore*.

The dorsum of the 10th abdominal segment is produced into a high triangular tubercle, the apex of which is blunt; in *terpsichore* the upper margin of this segment is only slightly obtuse-angulate in profile view, never produced (pl. 38 fig. 128). As appears from RIS's sketches of the anal appendages of the ♂, these organs are not essentially different from those of *terpsichore*, but what is characteristic about them in *eurynome* is the greater length of the inferior appendage, and the straighter line of the dorsal margin of the superiors when viewed laterally.

I have not seen the unique ♀ of *Macromia* from Cape York, described by TILLYARD s.n. *viridescens*. As far as I know this is the only example of the genus ever reported from Australia. Maybe *viridescens* is the same species as *eurynome*, and in that case the former name has priority; but in the absence of a ♂ the status of this species remains uncertain.

Distribution: South New Guinea; ? Cape York.

Macromia melpomene RIS.

1913. RIS, Nova Guinea 9 Zool. 3, p. 496 - 497 fig. 14 (apps. ♂), 15 (genit. ♂), 16 - 17 (wings ♂♀). — ♂♀ S. New Guinea.
1915. RIS, Ibid. 13 Zool. 2, p. 85. — ♂♀ S. New Guinea.
1929. LIEFTINCK, Tijdschr. Ent. 72, p. 63 (key), 68 - 69.

Material studied. — North New Guinea: 2 ♂ (ad.), S. Cycloop Mts, 900 m, 25 -26.vi; 1 ♂ (ad.), Hollandia, 6.vii.1938; 1 ♂, Rattan Camp, 1150 m, 10.ii; 8 ♂ (ad.), Araucaria Camp and River, 800 m, 4, 10-13.iii, 30-31.iii, 2.iv.1939, L. J. TOXOPEUS. Living colours: "Lateral thoracic stripe narrow, citron-yellow. Abdomen with small yellow spot beneath upper ridge of auricles; a fine, trans-

verse basal yellow line roundabout segm. 3, and latero-ventral margin of 3 also bordered with yellow; large citron-yellow baso-dorsal patch on segm. 6." (♂ Araucaria Camp, 4.iii.1939). Notes on habits: "Sits on stones in mid-stream" (♂ Rattan Camp, 10.ii.1939). — Additional material of North New Guinea: 16 ♂, 9 ♀ (ad.), Hollandia and surrounding hill-country, 4 - 600 m, xi-xii.1931 and iv-vi.1932; 10 ♂, 5 ♀ (ad.), Cycloop Mts, 700 - 1100 m, x.1932, 1-7.ix.1933, ix.1934, and 600 m, ix.1935; all W. STÜBER.

Both sexes agree in every detail with the types in the Amsterdam Museum. RIS has given excellent drawings of the ♂ appendages and genitalia. As in *M. terpsichore* the minute extero-lateral tooth of the superior pair of appendages is sometimes indistinct and, occasionally, entirely absent. Armature of fore and hind tibiae as in *terpsichore*. Specimens from the Cycloop Mts and the mountain-forest camps of the Archbold Expedition average larger in size and have paler pterostigmata than individuals of the lowlands, where *melpomene* is decidedly less frequently found than *terpsichore*. In spite of some overlapping in the range of variation found in the specimens studied, *melpomene* is distinctly a more robust and larger insect than *terpsichore* and *eurynome*.

Length: ♂ abd. + app. 49.0 - 52.5, hw. 44.0 - 49.0, pt. 1.3 - 1.4; ♀ 47.5 - 53.0, 49.0 - 53.0, 1.3 - 1.4 mm.

This species is easily distinguished from *terpsichore* by the absence of a yellow clypeal fascia, by the absence of yellow antehumeral bands, by the pointed process on the dorsum of segm. 10, and by the different genitalia.

The peculiar habit of resting on stones in the stream is quite unique among species of this genus.

Distribution: North and South New Guinea, sea-level up to 1150 m alt.

Fam. GOMPHIDAE.

Ictinogomphus australis australis (SELYS) (pl. 41 fig. 157 & 162).

1873. SELYS, Bull. Acad. Belg. (2) 35, p. 768 - 770. — ♂♀ Queensland (*Ictinus australis*).
1901. MARTIN, Mem. Soc. Zool. France, p. 233. — Queensland (*Ictinus australis*).
1917. TILLYARD, Biol. of Dragonflies, p. 88 fig. 36A (larva), p. 260 fig. 117 (wings) (*Ictinus australis*).
1926. TILLYARD, Ins. Austral. & New Zealand, Sydney, p. 83 pl. 5 fig. 2 (phot. ♂ insect). (*Ictinus australis*).
1933. LIEFTINCK, Rev. Suisse Zool. 40, p. 434. — ♂♀ N. Australia (N.T.) (*Ictinus australis*).
1939. FRASER, Proc. R. Ent. Soc. London (B) 8, p. 21 (*Indictinogomphus australis*).

Material studied. — N. Australia: 1 ♂ (ad.), labelled: "Cairns 1.05" (green label, TILLYARD's hand), "*Ictinus australis* Selys/Queensland" (red, MARTIN's hand), ex coll. R. J. TILLYARD, in the Paris Museum. 1 ♂ (ad.), N. Queensland, Redlynch, 9.xii.1938, R. G. WIND; 2 ♀ (ad.), Northern Territory, Marrakai (near Pt. Darwin), 16 & 21.v.1931, ED. HANDSCHIN. In the author's collection.

This species has not been discussed since the original description was published in 1873 by DE SELYS LONGCHAMPS. To this description the following notes on the neuration and colours may be added.

M a l e. — The vertical black stripe over the middle of the labrum does not quite reach the black apical border in our two specimens. In the Queensland male the antehumeral yellow fascia is complete and only slightly constricted above the middle of its length (pl. 41 fig. 162), whereas in the Redlynch specimen the band is shortly interrupted dorsally, forming a isolated dorsal green spot.

Occipital plate green, finely bordered with black; posterior margin slightly convex in fronto-dorsal view.

The yellow rings on the abdominal segments 3 - 6 in both of our two males occupy a little less than the basal half of these segments, and the lateral portions of the basal rings of 7 and 8 are distinctly convex when viewed laterally; segment 9 bears a large baso-lateral and a much smaller apical lateral spot, whilst 10 only bears a baso-lateral yellow spot.

Wings hyaline, bases with minute ferruginous spots in *c-sc* and in *cu*. Triangle of fore and hind wings with two transverse cross-nerves (Redlynch) or with only a single cross-vein in both pairs of wings (Queensland); *ti* two-celled; anal loop consisting of 3 - 5 cells. Pterostigma black.

Anal appendages black, shaped similarly to *a. lieftincki* (pl. 41 fig. 159 - 160). Penile organ also similar to the Papuan subspecies.

F e m a l e (N. T.). — Resembling the ♂ in most respects, but differing slightly as follows: — Median vertical streak on labrum either very narrow or obliterated and reduced to a mere blackish line that is disconnected from the basal and apical black stripes. Postclypeus with the two black impressions, one on each side of the middle, vestigial. Occipital border black, with two low (but distinct) triangular tubercles in frontal view (pl. 41 fig. 157).

Antehumeral yellow bands complete, of even width, extreme dorsal end slightly clubbed in both females.

Wing-bases slightly tinged yellowish and with the extreme basal areas spotted with ferruginous, as in the male. *t* in fore wing three-celled, in hind wing with one or two cross-nerves; *ti* free or with a single cross-nerve. Anal loop made up of 4 cells. Pterostigma black.

Abdomen marked with bright ochre as in the male. In one female the apical side-spot of segment 9 is wanting.

Length: ♂ abd. + app. 48.0, hw. 36.0 - 39.0, pt. fw. 5.2; ♀ 46.0 - 47.0, 36.8-38.2, 5.4 - 5.7 mm.

D i s t r i b u t i o n: North Australia (N. T. and Q.).

Ictinogomphus australis lieftincki (SCHMIDT) (pl. 41 fig. 158 - 161).

1909. VAN DER WEELE, Nova Guinea 5. Zool. 3, p. 386. — ♂♀ New Guinea (no descr.) (*Ictinus australis*).

1933. LIEFTINCK, Revue Suisse Zool. 40, p. 434. — New Guinea; Halmahera (sine nomen).

1934. SCHMIDT, Arch. Hydrob. Suppl.-Bd. 13, p. 359 (key), 362 - 363, fig. 57e (occiput ♀), 61e (abd. ♂), 65 (thor. ♂). — ♂♀ N. New Guinea (*Ictinus*).

Material studied. — Moluccas: 2 ♀ (ad., crushed), N. Halmahera, Tobelo, v.1930 & vi-vii.1931, M. J. VAN DIEJEN. — New Guinea (North, W. to E.): 1 ♂ (ad.), Mac Cluer Gulf, Bintoeni Bay ('neck' of the Vogelkop), Soengai Jakati, 17-21.v.1941, E. LUNDQUIST (Negumy Expedition). 1 ♂, 1 ♀, northcoast, between Modderlust & Kalawai, 18.v.1910, and Jakari, P. N. VAN KAMPEN, in the Leiden Museum. 2 ♂, 1 ♀, near Lake Sentani, 17.iv-4.vii. 1903, New Guinea Exped., in the Leiden Museum. 5 ♂, Lake Sentani, Kojaboe and Nettar, 24-30.vi.1938, L. J. TOXOPEUS & J. OLTHOF; 5 ♂, 5 ♀, S. Cycloop Mts, 400 m, 28.vi.1938, J. OLTHOF; 10 ♂, 32 ♀, Hollandia, 17.vi.-28.vii.1938 and 16-21.iv.1939, L. J. TOXOPEUS & J. OLTHOF. 15 ♂, 30 ♀, Hollandia, v. & 27.viii-4.ix.1930, iv.vi.1931; 1 ♂, Second hill-range, 40 km S. of Hollandia, 300 m, iii.1932; 3 ♂, Kressi valley, road to S.-slope of Cycloop Mts., 400 m, 28.ix.1933 and 9.vii (Mameda), 26.viii.1934; 3 ♂, E. Cycloop Mts., 700 m, vi.1935; 1 ♂, 15 km S. of Bougainville Mts., Njau Sanké (E. of Humboldt Bay), 15-25.xi. 1935; 2 ♂, S. Bewani Hills, Ampas distr., Ampas, 150 m, 16.x.1938; all W. STÜBER leg. 12 ♂, 5 ♀, Bernhard Camp, 50 m, and Bernhard Cp B, 100 m, 20.vii, 1, 8, 23.viii, 24-29.ix, 1-5.x.1938, and 5-13.iv.1939, L. J. TOXOPEUS & J. OLTHOF; 1 exuvia, Bernhard Camp, 50 m, 7.ii.1939, with collector's note: "In a boat (*prahoe*), also commonly found attached to *Saccharum* and reed-stems" (L. J. T.) — 1 ♂ Astrolabe Bay, Stephansort, BIRÓ 1897 (printed label), in the Michigan Museum, Ann Arbor.

Structurally very similar to *I. australis*, from the mainland of Australia. When the two forms are compared they are found to be quite closely related, but the armature of the occipital plate and the greater development of the dark areas of the head, thorax and abdomen of *lieftincki* may serve to its easy recognition.

The more evident diagnostic features of *lieftincki* have been given by SCHMIDT in his key to some species of *Intinogomphus* (l.c.p. 359). The following description is largely comparative with that of the preceding (or nominate) form of *australis*, described in detail by DE SELYS, and stresses solely those characters showing sufficient difference to be noted.

Male (Hollandia, topotypical). — Labium green, median lobe with narrow black border. Mandibles with a large green basal patch. Labrum black with two oval, or slightly triangular, green spots, one on either side of the middle; vertical diameter of each of these spots as wide as or even a little narrower than the black apical border is wide. Anteclypeus green, the sulcus dull brownish anteriorly; a large, oval green spot on each side of the postclypeus. Transverse green dorsal fascia in front of frons moderately broad, slightly indented by black mesially, this band variable in width but usually a little wider than the triangular black basal stripe. Vertex and occipital plate black, the latter

with green twin-spot upon middle and a similar spot behind it on occiput. Occipital border straight, or very slightly convex.

Synthorax brownish-black, marked with green as shown in pl. 41 fig. 161; humeral fascia usually not interrupted, but occasionally narrower and broken up into two unequal portions. Mesepimeral and lateral bands rather straight, slightly variable in width, the dorsal ends of first and second lateral bands sometimes less distinctly hooked than in fig. 161.

Legs black, coxae, trochanters and all femora more or less brown, the posterior femora fading to black apically.

Wings hyaline, bases coloured similarly to *a. australis*, but occasionally without any trace of basal spots. A milky white spot in the basal cells of the anal triangle. Triangle of fore wing three-celled, that of hinder wing with 1 (occasionally 2) cross-nerves; *ti* two-celled; anal loop consisting of 4 cells. Discoidal field of fore wing with two rows of cells up to the origin of *Mspl.* Anal triangle made up of 5, rarely 6, cells. Pterostigma brown to almost black.

Abdomen coloured black and orange-yellow as is shown in SCHMIDT's fig. 61e (*loc. cit.* p. 360); however, the dorso-lateral spots of segm. 8 and 9 usually are somewhat larger, 10 also bearing a tiny hook-like lateral spot in the majority of our specimens (see pl. 41 fig. 159). (It may be noted that the orange dorso-lateral spots on the 7th abdominal segment are often fused dorsally so as to form a broad basal ring of that colour).

Anal appendages black, shaped as in pl. 41 fig. 159 - 160.

The penile organ of *I. australis lieftincki* (and of the nominate subspecies as well) approaches in its shape most closely that of the *rapax*-group of the genus. The first segment is thick and strongly curved, rather club-shaped; second segment about one-fourth shorter than first, shaped much as in *rapax*, but apically strongly flattened and narrowed in profile view; glans penis about half as long as second joint, lacking a ventral spine, ridged ventrally on both sides, strongly fissured horizontally, and provided with two short, tiny spines springing from the lower lip of the fissure.

[Already many years ago the taxonomists first noticed and described the small but remarkably constant disparities in the penis-build of the *Gomphidae*; these differences were being used successfully to differentiate between the various species of a genus, when other characteristics failed. In my opinion, however, one goes too far when attributing generic value in all cases to such differences, as is being done nowadays by certain authors who do not seem to realize that they themselves found no occasion to recognize new genera under circumstances where differences even more apparent and just as conspicuous were present, e.g. in the structure of the no less important anal appendages.

FRASER (l.c. 1939) has recently established the new generic name *Indictinogomphus* for SELYS's group of *Ictinus ferox* RAMBUR; but as follows from the above notes, the distinction between *Ictinogomphus* (*Ictinus* olim) and his new genus is much less clearly drawn than one would assume from FRASER's paper; and I can see no valid reason to depart from the course previously followed by HAGEN and DE SELYS LONGCHAMPS of considering all known species of the genus *Ictinogomphus* as an approximately con-

nected series of forms of a single genus; the necessity seems at least evident for considering *I. ferox* (RAMB.) and *I. rapax* (RAMB.) to be merely the terminal poles of such a series, not as the types of valid and distinct genera].

Female (Hollandia). — Differing from the ♂ only as follows:

Ground-colour of the thorax generally paler, buckthorn-brown or bister-coloured. Green bands more slender, antehumeral stripes a little longer and narrower. Occipital plate with the transverse dorsal green spot larger, the ridge shaped as shown in pl. 41 fig. 158.

Wing-membrane stained with dirty yellow in old individuals, especially the distal portion (similar to old males).

Size very variable. ♂ abd. + app. 42.8 - 50.0, hw. 34.6 - 41.0, pt. 4.5 - 5.5; ♀ 44.2 - 50.5, 37.0 - 45.2, 5.0 - 6.5 mm.

Variation. — One ♀ from Bernhard Camp B has the antehumeral pale bands very fine and obliterated and the humeral band wanting, save for a single dorsal point; it is an exceptionally large specimen (abd. 50.0, hw. 45.2, pt. 6.5 mm), with its abdominal markings also much reduced, and at a casual glance would, for these reasons, be considered to represent a distinct species. Comparison, however, of males from the same locality with examples of that sex from the Humboldt Bay country, and with lightly coloured females from the northcoast, discloses the identity of the specimen with other individuals of *lieftincki*. A less amount of recession of the pale body-marks and intensification of the dark ground-pattern, shared by superior size, is to be found in certain males from the Bewani Hills and Lake Sentani, where the body-colour is deep black whilst the glaucous green thoracic and abdominal bands are comparatively narrow and stand out conspicuously.

These extremes, on casual examination, appear different, but a more detailed study of the entire series shows very little which could be utilized as characters for specific or further subspecific division.

From our entire series of New Guinea specimens it is evident that individually we may find marked size and colour fluctuation and that regional variation appears to be but slight, the size of the northern 'continental' individuals being surprisingly little uniform.

The position of the two females in our collection from Halmahera (Moluccas) is somewhat uncertain. They agree in most respects with Papuan *lieftincki*, but differ slightly in the structure of the occipital border, which, in both specimens, is still more rounded off posteriorly, showing an evenly convex curve instead of being undulated in dorsal aspect. The pale humeral thoracic bands, though narrow and slightly constricted above the middle, are shaped similarly to *lieftincki*, but the humeral streaks are comparatively longer, straight and linear. Other differences are quite unapparent. These Halmahera individuals do not at all tally with specimens in our collection of *I. c. celebensis* (SCHMIDT) or *I. c. velox* (SCHMIDT), both of which are from Celebes. The Moluccan insect possibly represents a distinct subspecies of *I. australis*, but I feel that it is not

advisable to give it a name, leaving this for some future worker who has material of the male sex.

The present records of *I. australis* considerably extend the known range of this interesting species, — which still remains the sole representative of the family *Gomphidae* known to inhabit the Papuan Subregion —, carrying it westward to the Moluccan island of Halmahera, eastward to the Astrolabe Bay on New Guinea. With the nominate subspecies in North Australia it thus is seen to cover in its distribution a large part of the Austro-malayan region.

Although no *Ictinogomphus* has yet been found in the tropical rain forests and lake districts south of the central mountain range, nor in the dry zones of southern New Guinea, it is highly probable that *australis* occurs there; and the two races *lieftincki* and *australis* might intergrade in the area where is found the transition from true forest to the surrounding grass and bush savanna condition.

Distribution: Lowlands of West and North New Guinea; ? Halmahera I.

Fam. AESHNIDAE.

Agyrtacantha dirupta (KARSCH).

1937. LIEFTINCK, Nova Guinea, N.S. 1, p. 59 - 62 (descr., full references), fig. 39a (thorax ♂). — ♂♀ Halmahera; ♂ Kei Is.; ♂ Tanimbar Is.; ♂♀ New Guinea; ♂♀ New Britain.

Material studied. — W. New Guinea: 1 ♀, Jef Kasim (opposite S.-point of Salawati Id.), 13.vi.1938, L. J. TOXOPEUS. — N. New Guinea: 12 ♂, 47 ♀ (mostly discoloured, and many teneral), Bernhard Camp B, 5-13.iv. 1939; 1 ♀, Bernhard Camp, 50 m, 26.vii.1938; 1 ♀, above Bernhard Camp, ca 600 m, 13.iv.1939; 3 ♀, Araucaria Camp, 800 m, 13 & 20.iii, and 1.iv.1939; all L. J. TOXOPEUS & J. OLTHOF.

Extremely common all over New Guinea and adjacent islands.

Distribution: The Moluccan islands Batjan, Halmahera, Soela and Ceram; Tanimbar Id (Timorlaoet); Kei Is. (terr. typ.); Aroe Is.; New Guinea (universal); New Ireland; N. Australia; Shortland Id (Solomon Is).

Agyrtacantha microstigma (SELYS).

1937. LIEFTINCK, Nova Guinea, N.S. 1, p. 59, 62 - 63 (descr., full references), fig 37 (♂ insect), 39b (thorax ♂). — ♂♀ N.W. and N. New Guinea; ♀ Aroe Is.

Material studied. — N. New Guinea: 4 ♂, 8 ♀ (mostly adult), Bernhard Camp B, ca 100 m, 5-13.iv.1939, J. OLTHOF; 4 ♀ (ad.), Araucaria Camp, 800 m, 10, 20 & 25.iii.1939. L. J. TOXOPEUS & J. OLTHOF. Females from Araucaria Camp with collector's notes: "Pale marks on thorax and abdomen bright grass-green", "Flies very swiftly in the late afternoon, in open places of the forest", „At lamp during heavy rain, 8 p.m. (L.J.T.).

Probably a widespread species in New Guinea, but less abundant than *dirupta,* with which it frequently occurs together.

Distribution: The "Moluccas" and Ternate; Aroe Is.; New Guinea (universal).

Agyrtacantha othello, sp. n. (pl. 38 fig. 129 - 131).

Material studied. — North New Guinea: 1 ♀ (semiad.), Bernhard Camp, Idenburg River, 50 m, 13.iv.1939, L. J. TOXOPEUS, with collector's note: "Markings and spots light greenish yellow; last abdominal segments ringed with light and dark brown." The specimen is the holotype.

This conspicuous new species, of which no males are yet available for study, differs so strikingly from the three other species of the genus, that I do not hesitate to describe it as new.

Female (semiad.). — Resembles *Plattycantha* in details of coloration, but is a true *Agyrtacantha* in all other respects.

Mouth-parts chestnut-coloured, but the median lobe and the tips of the lateral lobes of labium black. Labrum brown, its distal half obscured, almost black. Clypeus, the vertical portion of frons and the base of the horizontal surface, brown. Frons a little longer and more projecting than in *dirupta,* distinctly obtuse-angulate in frontal view, but not definitely produced and devoid of a longitudinal ridge; "T-spot" black, shaped as shown in pl. 38 fig. 129.

Thorax brown, light marks obscured but yet well discernible, faded to brownish-yellow (pl. 38 fig. 130). Legs reddish-brown (lighter than in *dirupta*); apices of all femora broadly ringed with black, tibiae also blackish apicad; tarsi dark brown. Posterior femora short (7.3 mm long), barely reaching the apex of first abdominal segment.

Wings perfectly hyaline, with a large, very conspicuous, basal patch of a Mummy brown to Prout's brown colour; this basal spot in the fore wing is not sharply defined, extending as far out from the base as the distal angle of *t,* but in the costal and anal spaces of the wing the colour is paler en fades away at level of Ax_{6-7} in *c-sc-cu,* to beyond *Arc,* and in the anal field to the origin of Cu_2. In the hinder wing the basal patch occupies nearly the whole basal third of the wing, ceasing at about 6 cells proximal to the nodus in the costal part of the wing as far as M_4, and in the anal part from a point 1 - 2 cells before level of nodus in a slightly curved line to the posterior border of the wing, at some 4 - 5 cells proximal to the point where Cu_2 enters the wing margin. Pterostigma pale ochreous, covering 2 - 3 underlying cells. Neuration similar to other species of the genus. Fork of *Rs* almost symmetrical, and distinctly more proximal than in *dirupta*; 4 rows of cells between the branches where most widely separated. Two rows of cells between distal course of M_3-M_4, but also some undivided cells in both pairs of wings. Four rows of cells between *Rs-Rspl* and M_3-*Mspl* where most widely separated. Cross-veins in *cu, ht* and *t* more

numerous than in *dirupta* and allies (*cu* $\frac{6}{5}$, *ht* $\frac{6}{5}$, *t* 6-celled); *m* entire; anal loop made up of 18 cells in both hind wings. Membranula pure white.

Abdomen (deformed by pressure) dark chestnut brown, markings indistinct; pale spot on either side of 2nd segment not prolonged caudad as in *dirupta*, but confined to the lower portion of the basal half of segment, more or less V-shaped, the branches of the V pointed dorsad.

Ventral process of tenth segment shaped as for genus, broader than in *dirupta*. with the three prongs definitely more swollen basally and the lateral prongs longer than in that species (pl. 38 fig. 131). Anal appendages exactly similar in shape to *dirupta* and approximately equal in length.

Length: abd. 55.7 + 11.0, hw. 55.5, pt. $\frac{3.4}{3.1}$ mm.

Male unknown.

The name for this remarkable new species is an allusion to the Libellulid *Camacinia othello* TILLYARD, the male of which has somewhat similarly coloured wings.

Plattycantha spec. nov. (indet.) (pl. 41 fig. 166).

Material studied. — North Central New Guinea: 3 ♀ (ad.), Sigi Camp, 1350, 1500 and 1550 m, 17, 19 and 23.ii.1939; 1 ♀ (ad.), Lower Mist Camp, 1500 m, 28.i.1939; 1 ♀ (juvenile, in alcohol), Lower Mist Camp, 22.i.1939; all L. J. TOXOPEUS. One ♀ with collector's note: "Oviposits against wet aerial roots above mountain stream", and the alcoholic specimen with "At light, a.m."

Female. — These examples all belong to the same species, but in none of them (except the alcohol specimen) the colours of the thorax are well-developed. These thoracic bands are of a fine apple-green tint and intermediate in shape between those of *cornuta* and *acuta*: the band on the metepimeron is surrounded by brown (as in *acuta*), whereas the mesinfraepisternite is pale-coloured (as in *cornuta*).

Frons in front very similar to *cornuta*, but with the T-spot narrower. Wings strongly tinged with brown all over the membrane in old individuals, with strong basal saffroning and a patch of yellow in the region of *Nod* in young adults. No cross-veins in *m*. Pterostigma very small.

Ventral process of segm. 10 (pl. 41 fig. 166). Anal appendages broken off.

Length: abd. 56.5 - 57.5, hw. 57.0 - 59.0, pt. $\frac{2.0}{1.7}$ mm.

This species, of which unfortunately no males have been found, may be distinguished from the three named species of *Plattycantha*, by the slightly different shape of the thoracic bands, the ventral process of the 10th abdominal segment and the small size of the pterostigma.

Without a male specimen it would be most unwise to name these females as a new species.

Plattycantha spec. nov. (indet.).

Material studied. — West Central New Guinea: 1 ♀ (semiad.), Wissel Lakes group, Lake Paniai (eastern shore), Enarotali, 1742 m, 1.x.1939, H. BOSCHMA (Le Roux Expedition).

Female. — This individual likewise resembles the three named species of *Plattycantha* in the most important features, but it differs in its large size, minute pterostigma and dark rusty brown patches to the wing-bases and approaches "*P. spec. indet.* (nov.)" [1] from E. New Guinea rather closely in these respects.

Head with the front strongly produced (damaged). Thoracic markings very distinct, rather similar to *P. cornuta*, but with the metepimeral band narrower, shaped as in *acuta*.

Wings subhyaline; bases strongly tinted with yellow and with diffuse dark rusty-brown spots in *c-sc* almost as far as Ax_1, and in *m-cu* at extreme base. No cross-veins in *m*. A cloudy yellow patch between *Nod* and *pt* in both fore and hinder wing. Pterostigma vestigial.

Ventral process of segm. 10 very similar in shape to *P. acuta*, only the two prongs are a little longer and more evenly pointed. Anal appendages (both intact) rather short, 9.0 mm long.

Abdomen (shrivelled) —, hw. 62.0, pt. $\frac{1.8}{1.4}$ mm.

It is extremely unfortunate that no males of this beautiful species have come to our knowledge as it would probably prove easily separable from other species of the genus. Nevertheless, on the differences in the female only, I do not feel justified in naming a new species.

With the two unnamed forms described in this paper, I have listed no less than 6 species of *Plattycantha* from New Guinea, but of only 3 of these both sexes are known.

Gynacantha rosenbergi BRAUER.

1867. BRAUER, Verh. Zool.-bot. Ges. Wien, 17, p. 290, 295 - 297. — ♂ New Guinea.
1878. SELYS, Mitt. Zool. Mus. Dresden, 3, p. 295. — "Menado, Celebes (error), Jobi (Meyer)" (*Rosenbergii*).
1899. KRÜGER, Stett. ent. Zeitg. 59, p. 278, 280 (key), 282 (measurem.).
1900. FÖRSTER, Termész. Füzetek, 23, p. 101 - 103, fig. E-G (penis). — ♂♀ Bongu, Astrolabe Bay.
1908. MARTIN, Bull. Soc. Ent. Ital. 60, p. 200. — S.E. New Guinea, Astrolabe Range (*Rosenbergii*).
1909. VAN DER WEELE, Nova Guinea 5, Zool. 3, p. 386. — ♀ N. New Guinea.
1909. MARTIN, Cat. Coll. SELYS, Aeschn. 20, p. 191 - 192, fig. 196 (apps. ♂). — ♂♀ "Japon (error); Singapore (error), Célèbes (error) Papouasie; Queensland".
1913. RIS, Abh. Senckenb. naturf. Ges. 34, p. 524 - 525. — ♀ Aroe I.; and loc. diff.
1915. RIS, Nova Guinea 13, Zool. 2, p. 106 (key), 107 - 108, fig. 29 (apps. ♂). — ♂♀ Kaimana, S.W. New Guinea.

[1] *Nova Guinea*, N.S. 1, 1937, p. 72 - 73. — ♀ E. New Guinea.

Material studied. — N. New Guinea: 3 ♂, 1 ♀ (ad.), Bernhard Camp B, ca 100 m, 5-10.iv.1939, J. OLTHOF; 1 ♀ (ad.), Araucaria Camp, 800 m, 31.iii.1939, L. J. TOXOPEUS. One example with collector's note: "On the wing in late afternoon" (♀ Araucaria Camp).

This is a very common species, distributed over the whole of the Papuan subregion and also found outside our faunal limits. It has often been confounded in the past with other species of the genus and all records, except those enumerated below, are unjustified and need confirmation.

In the Buitenzorg Museum are examples from many localities in New Guinea; also from Boeroe, the Tanimbar and Aroe Islands, and from North Australia.

TILLYARD has published a description and sketches of the larva of *G. rosenbergi* and he has also commented upon the habits and distribution of this species. [1])

Distribution: The Moluccan islands Boeroe and Ceram; Tanimbar (Timorlaoet) Is.; Aroe Is.; New Guinea (universal); Banks Id (Torres Strait); N. Australia; New Britain; New Hebrides. (Erroneously reported from Japan, Singapore, and Celebes (MARTIN), and the Loo Choo Is. (OGUMA, CAMPION).

Oreaeschna dictatrix LIEFTINCK.

1937. LIEFTINCK, Nova Guinea, N.S. 1, p. 75 - 81, fig. 46 (♂ insect), 47 (♂ apps., ♀ genit.). — ♂♀ Cycloop Mts, N. New Guinea.

Material studied. — West Central New Guinea: 1 ♂ (ad.), Wissel Lakes group, Lake Paniai, 1742 m, 10.xi.1939, H. BOSCHMA (Le Roux Expedition).

Male (ad.). — Colours much faded, except those in front of the head.

Exactly identical with the two males from the Cycloop Mts., but of slightly smaller size.

Length: abd. + app. 51.0 hw. 47.8, pt. 3.0 mm.

A very scarce insect, probably widely spread in New Guinea, but only at high altitudes.

Distribution: W. and N. New Guinea (1000 - 1750 m alt.).

Genus **Anax** LEACH.

The genus *Anax* is represented in the Papuan subregion by not less than 7 species, only 5 of which, however, can be characterized adequately, since of the two remaining species I am only acquainted with the females; to avoid confusion I have left these latter two species entirely unmentioned, and this is better also because they are not represented in the collection brought back by the Archbold Expedition.

In examining *A. gibbosulus*, a species which is thus far known to occur with certainty only in the western and southern parts of New Guinea, I came across two other species from the neighbouring region of the Moluccas and

[1]) *J. Linn. Soc. London, Zool.*, 33, p. 71 - 72, 75, pls. & figs.

Celebes whose exact determination has caused a good deal of difficulty also in the past, and that occasioned some confusion. I believed it to be well to subject also these two species to a critical survey in this examination, and although it is true that neither *fumosus* nor *panybeus* have penetrated into New Guinea, yet of both these species topotypical specimens are present in our collection, so that it seems to me to be perfectly justifiable to deal with them also in this paper. Furthermore it was necessary, for various reasons, to characterize anew the as yet insufficiently known *A. guttatus,* despite the fact that it is a very common species in the western part of the Indo-Australian archipelago: of this species topotypical material is also present in sufficient quantities for comparative study.

It has become apparent that the structure of the accessory genitalia of the male on the one hand provides so little certainty in distinguishing between the species, and on the other hand these organs are so difficult to study that after but a short while I had to discontinue the examination of them. From the tables of the measurements of the *Anax* species it will be evident that, if one has at one's disposal considerable series of each species, practically all characters that can generally be taken to be of diagnostic value in separating the species, also vary more or less within each species, and that in such measure that the extremes overlap. The averages, however, provide a good insight into the value of any particular character as they do into the variability of each species. It is not at all to be excluded that certain species hybridize: this, it seems to me, is clearly demonstrated in the island of Celebes where there are to be found types intermediary between *A. panybeus* and *A. fumosus celebense* on the one hand, and between *panybeus* and *gibbosulus* on the other hand. In some cases it was indeed difficult to decide what appellation one had to assign to a certain specimen. The other species are variable, it is true, but they seem to be very constant structurally.

The identification tables given below are not 'keys' properly speaking, since the differences cannot readily be summarized in a few words: they are rather descriptive surveys. It seemed to me to be superfluous to give complete descriptions also under the heading of each species separately; moreover, the most important characteristics are satisfactorily indicated in the outline sketches of morphological details. As regards the appendices anales, I have followed KENNEDY in not drawing these in the illustrations in their naturally slanting positions, but either purely horizontally or else purely in profile (see pls. 39 and 40).

For the general table of measurements (see page 576), I have selected for each of the species or subspecies dealth with one — or occasionally two — characteristical specimens in perfect state of preservation (in most instances the type), and of these I have carefully determined the measurements. This table clearly indicates the proportionate length between the abdomen and the hind wing, as also those between the abdominal segments mutually, and the degree to which the third segment is constricted.

Measurements of *Anax* spp. from the Malay Archipelago.

Name	Locality	Abd. + app.	Hind wing	Pt. fore w.	Abdomen							
					Length					Width		
					Seg. 3	Seg. 4	Seg. 5	Seg. 6	Seg. 7	Constriction seg. 3	End seg. 3	Seg. 8-9
A. guttatus	W. Java	63.2	53.4	5.1	8.6	7.8	7.9	7.0	5.5	2 3	3.1	4.2
A. f. fumosus	Ternate (type)	61.0	55.5	4.0	8.3	7.2	7.3	7.1	5.4	2.8	3.2	4.3
A. f. celebense	Celebes (Paloe, type)	65.0	52.0	4.7	9.8	8.2	8.0	7.7	5.3	2.0	3.1	4.4
A. selysi	N.E. New Guinea (Huon Gulf, paratype)	59.4	52.5	3.5	7.6	6.7	7.2	6.8	5.8	2.2	2.8	4.3
A. panybeus	N. Celebes (Tondano)	68.7	51.7	4.2	11.9	8.5	8.4	7.4	5.2	1.8	2.7	4.5
A. gibbosulus	N. Australia	71.6	53.5	4 5	11.2	8.8	8.8	7.9	5.8	1.9	2.7	4 6
A. gibbosulus	Soemba	70.5	55.2	5.0	11.5	9.0	9.0	8.0	5.9	1.8	2.8	4.8
A. pugnax	C. New Guinea (Arauc.-Camp, type)	75.0	56 3	4.9	11.5	10.0	9.7	8.8	5.5	2.0	3.0	5.0
A. maclachlani	N. New Guinea (Hollandia)	79.5	55.5	4.0	14 4	11.2	11.0	9.5	5.5	1.9	3.0	5.2

For the detailed tables of measurements (see under the species) I have selected a number of the best preserved specimens of each species or subspecies (wherever possible about ten of each sex), the abdominal measurements of which I have indicated in sequence. The maximum and minimum size of each part of the body measured is printed in italics, whilst of each species the average has been determined. From these tables it is very evident that there can be no possible correlation between the measurements of the various body parts. It is useful to keep this in mind when comparing the various species and when measuring the various parts of any particular single individual, so that not too much value be assigned to the outcome of the relations between these various measurements.

Key to the males of *Anax*.

1. Dorsal surface of frons *wihout T-shaped black spot*; green, changing to blue at the crest with a broad triangle of black surrounding the vertex, pointed anterad and prolonged laterad for a very short distance as a narrow black line along eye-margin; no distinct black stripe along anterior edge (pl. 40 fig. 145). Labrum and face green, anterior $^1/_4$ - $^1/_5$ of *labrum bordered with brown or black*. Anterior surface of frons green as are also the thorax, abd.-segm. 1, membrane between 1 - 2, and lower half of the sides of 2. *Entire dorsum of 2* and prejugal marks on 3 *sky-blue*, except narrow, transverse, $\}$-shaped black lines along base and jugal suture of 2 which are neither connected with each other on the median line nor with the dark intersegmental ring; blue colour on dorsum of prejugal division of 3 passes to silvery-white laterally; postjugal part of 3 carrying on either side two roundish blue-green spots; segm. 4 - 7 each with one pair of prejugal supra-carinal blue-green spots; on 8 the prejugal spots are wanting and replaced by small anterior postjugal spots of the same colour; on 9 only the posterior postjugal spot is present; *10 unmarked*. Infra-carinal area of 3 light blue; inter- and infra-carinal areas of 4 - 8 chestnut-coloured (pl. 41 fig. 151). *A black latero-ventral triangular spot at the base of the meso- and metepimeron* of thorax. An oblique, cloudy yellow band across and before middle of hind wing with ill-defined edges, extending from outer angle of *t* to level of *Nod* or slightly before or beyond that level. Membranula Seal-brown, its basal $^1/_6$ - $^1/_8$ abruptly turning pure white. At least the costal part of *first elongate cell adjacent the membranula ferruginous*. Abdomen short, moderately constricted on middle of 3, gradually expanded from end of 3 to end of 9. Dorsum of 10 finely transversely striate, with low, irregular, scarred, basal tubercle on either side of a distinct mid-dorsal longitudinal keel, which extends over almost proximal half of segment. Sup. anal app. in dorsal view (horizontal position) with the basal one-fourth narrow, parallel-sided, the median portion rather abruptly expanded and the apical portion again somewhat narrowed; exterior border at first slightly convex, beyond

the middle slightly concave; median keel strong, slightly oblique and curved towards the inside of the appendage beyond middle. Apex subtruncate with a distinct exterior tooth. Greatest width into length 1: 4.55 (pl. 40 fig. 142). Species of moderate size: abd. + app. 61.0 - 64.9, hw. 50.5 - 55.0 mm. ..... **guttatus**

1'. Dorsal surface of frons with a *distinct T-shaped black mark* of variable shape and size. *Dorsum of abd.-segm. 2* partly blue or green, with a blackish more or less *five-pointed mark* resembling two birds with wings outstretched, the one behind with its head over the rump of the bird leading, the tips of the four "wings" usually extending down to middle of side, the tail of the posterior bird forming *a mid-dorsal line or band* connecting with the black intersegmental ring 2 - 3. Base of hind wing hyaline or at most with a diffuse yellowish spot. 2

2. Abdomen (incl. app.) measuring 70 - 84 mm. 7

2'. Abdomen (incl. app.) not or only very rarely exceeding 70 mm in length, usually considerably shorter. Basal area of fore and hind wing hyaline, hind wing *without ferruginous patch at extreme base*, occasionally with small, diffuse, basal spot of yellow. 3

3. Membranula entirely greyish-black. Labrum yellow, broadly bordered with black (almost its distal half black). Black basal line on dorsal surface of frons narrow, forming a small median triangle which is prolonged forwards as a fine black line right up to crest, where it spreads out on either side so as to form a very slender, crescent-shaped, transverse stripe at crest of frons: thus the head mark is *a sharply defined very slender T-spot* (pl. 40 fig. 146).

Lateral lobes of labium tipped with black. Thorax unicolorous yellow (possibly light green in life ?), save for a short, elongate, latero-ventral black streak at the base of the meso- and metepimeron of thorax. Colours of abdomen much faded, but markings fairly well discernible, shaped as shown in pl. 41 fig. 153 [1]). Prejugal spots on seg. 4 - 7 extremely small, but distinct, those on 8 slightly larger; no anterior postjugal spots; posterior postjugal spots present on 3 - 10, those on 6 - 8 elongate, placed in the long axis of the body, occupying on 7 and 8 almost half the length of segment, those on 10 small and slightly diffuse. Inter-carinal areas dark brown, infra-carinal areas more reddish brown. Basal area of wings, as far as *Arc* and proximal side of *t*, hyaline, remainder of wings *strongly and deeply flavescent with golden reflections*, apices only slightly paler, *not smoky*. [2]) Pterostigma short, 3.5 - 3.8 mm long. Abdomen short, only slightly constricted on middle of 3, then gradually and but slightly expanded towards end of 7 and from there almost parallel-sided up to the end of 9. Dorsum of 10 very finely transversely striate; median carina indicated only by a number of equally fine longitudinal striae. Sup. anal app. of very characteristic shape: narrow basally, almost stalked, but soon greatly expanded, with strongly convex inner and outer borders (widest about half-way its length), thence diminishing in width towards the tips which taper gradually to a strong point, the *intero-apical angle poorly developed* even in horizontal aspect; dorsal keel strongly developed and very high; greatest

[1]) Only one specimen, one of FÖRSTER's series, is now before me.
[2]) See pl. 1 fig. 3 of MARTIN's monograph.

width into length 1 : 3.3. Inf. app. longer than in any other regional species, viewed laterally only slightly less than half as long as the superior pair (pl. 40 fig. 143). Species of small size: abd. + app. 58.0 - 61.0, hw. 52.0 - 54.0:15.5 mm. **selysi**

3'. Membranula greyish-black, tipped with white on its inner anterior angle. Black basal line on dorsal surface of frons thick, band-like, broadly connected in front with a rather toadstool-shaped spot at crest of frons so as to form a *conspicuous heavy T-spot* of variable size and shape. Apex of sup. anal app. subtruncate with *well-developed (rounded) intero-apical angle* and pointed tips. 4

4. No distinct black latero-ventral streaks at the base of the meso- and metepimeron of thorax. Sup. anal app. in horizontal dorsal view narrow basally, then rather abruptly widened from before to slightly after the middle of its length, and finally, after a slight concavity, again noticeably narrowed towards apex; outer border of sup. app. at first slightly convex, then almost straight or even distinctly concave, hence the apical third slightly outbent in dorsal view (textfig. 2 and pl. 40 fig. 144). Wings cloudy orange-yellow all over the membrane except the bases which are clear; apical portion smoky. Abdomen short, segm. 3 moderately to slightly constricted. 5

4'. Black latero-ventral streaks at base of meso- and metepimeron of thorax distinct. Sup. anal app. in horizontal dorsal view broader and flatter, more gradually widened from base to about half-way its length, the apical portion wider and less suddenly narrowed towards apex; outer border of sup. app. evenly and convexly curved from extreme base to as far as the base of the apical tooth, hence apical third not outbent in dorsal view. Wings hyaline, or with the apical part smoky, posterior pair always with a fairly distinct oblique, cloudy yellow band across and before middle with ill-defined edges, extending from bifurcation of $Cu_2 + A_1$ and outer angle of *t* to level of *Nod* or slightly beyond it. Abdomen longer and more slender, constriction of segm. 3 more distinct. 6

5. Sup. anal app. short and narrow (greatest width into length 1: 4.1 - 4.2), shaped much as in *guttatus;* inner shelf-like expansion less abruptly marked off from the apical part and perfectly rounded when viewed obliquely from the inside; mid-dorsal keel slightly undulated, generally more rounded, not at all pinched after the middle of its length; intero-apical angle more evenly rounded (textfig. 2). Labrum with the anterior border blackish or brown, or with only the lateral edges obscured. Abdomen short, segm. 3 only slightly constricted on middle (width 2.4 - 2.8 mm), very gradually and but slightly widened posteriorly, widest at apex of segm. 8. Wings longer than in *f. celebense,* strongly tinged with yellowish-brown, except basally. Abdominal segm. 4 - 8 with no visible supra-carinal anterior postjugal spots; intercarinal areas of 3 - 8 coloured conspicuously light brown. Black T-shaped mark on top of frons heavy (pl. 40 fig. 147), but apparently somewhat variable (transverse portion slightly diffuse in examples from Boeroe).

Sculpture on dorsum of abd.-segm. 10 as described for *guttatus*, the mid-dorsal longitudinal carina short and weakly developed (Ternate). Species of small size: abd. + app. 58.0 - 61.0, hw. 54.0 - 55.5 : 16.2 - 16.5 mm.

f. fumosus

5′. Sup. anal app. generally wider (greatest width into length 1 : 3.7), its basal portion only shortly stalked with straighter inner border, apical part broader and flatter, thus appearing more abruptly truncated; inner shelf-like expansion abruptly marked off from the apical part and strongly obtuse-angulate when viewed obliquely from the inside; mid-dorsal keel more removed laterad on middle and distinctly pinched beyond the middle of its length; intero-apical angle more abruptly rounded, apical spine usually long and fine [1]) (pl. 40 fig. 144). Labrum unicolorous greenish-ochreous. Abdomen comparatively longer, segm. 3 markedly constricted on middle (width 1.7 - 2.3 mm), gradually though strongly widened posteriorly, attaining its maximum width at the apex of segm. 9; 10 parallel-sided, distinctly narrower than preceding segment. Wings (*postea*) coloured similarly to *f. fumosus*. Black T-shaped mark on top of frons very heavy, but transverse portion not so broad and also narrower.

Lateral lobes of labium, labrum and anterior surface of head grass-green in perfectly preserved examples. Thorax wholly green, the axillaries at the wing-bases spotted with sky-blue dorsally. Abd.-segm. 1, membrane between 1 - 2 and lower half of sides of 2 olive-green; dorsum of 2, the blackish-brown winged mark excepted, sky-blue; blue colour on prejugal division of 3 passes to green or ochreous laterally and posteriorly; postjugal part of 3 carrying on either side two small, roundish, blue-green to orange-green dots; *seg. 4 - 7 each with* one pair of prejugal and *two pairs of roundish, postjugal supra-carinal greenish-orange spots* [2]), the posterior postjugal spots on 6 and 7 largest (but smaller than in *guttatus*), those on 8 and 9 diminishing in size; on 8 and 9 the prejugal and anterior postjugal spots wanting; 10 unmarked, but often with a diffuse brownish stripe, widening on either side to form rudimentary spots, along posterior border. Infra-carinal area of 3, inter- and infra-carinal areas of 4 - 8 reddish-brown, the supra-carinal spots on proximal segments occasionally more or less confluent ventrally with the pale colour of inter-carinal areas (pl. 41 fig. 152). Basal area of wings, including *t* and *al* (but not al_1) usually *hyaline*; h.w. with area distal to distal side of *t*, $Cu_2 + A_1$ and A_1 to about as far as mid-way between M_4-*Mspl* stained with orange-yellow, distal edges of this spot very indistinct and shading insensibly to smoky-grey towards apices and about posterior border of wing (cell-centres!); often both pairs of wings stained with grey-ochreous all over the membrane, only the bases remaining more or less hyaline. *Pterostigma 3.8 - 4.7 mm long.* Abdomen short and robust, moderately to rather strongly constricted on middle of 3, gradually but conspicuously expanded from end of 3 towards end of 9, the apical segments decidedly more flattened than in *guttatus*. Sculpture on dorsum of 10 as described

[1]) The tips of the sup. app. in the majority of specimens, including the type from Paloe, are definitely more abruptly and acutely pointed than in the figured ♂ from Pipikoro. Also the length, the width and the shape of the inferior appendage is subject to individual variation.

[2]) The anterior postjugal spots and occasionally also the prejugal spots, are usually indistinct or wholly obscured.

for *guttatus* (mid-dorsal longitudinal carina occasionally less developed!). Species of moderate size: abd. + app. 60.1 - 66.8, hw. 51.0 - 54.0 : 15.6 - 17.0 mm.

f. celebense

6. Sup. anal app. shaped much as in *gibbosulus,* but more slender and a little narrower (greatest width into length 1 : 3.7 - 3.8), and also larger than in *f. celebense;* inner shelf-like expansion obtuse-angulate when viewed obliquely from the inside, less abruptly marked off from the apical part than in *f. celebense,* but decidedly more so than in *f. fumosus;* intero-apical angle almost rectangulate, the angle itself rounded; apical spine long and fine (pl. 39 fig. 136). Labrum unicolorous green. Black T-spot on top of frons variable, but usually less heavy than in *fumosus,* longitudinal portion more constricted, transverse bar smaller and finer. Head and thorax coloured similarly to *fumosus* in perfectly preserved examples, except for the presence of basal dark streaks on the epimera.

Abdomen, ground-colour darker and with pale markings less distinct than in *f. celebense*; blue colour on prejugal division of 3 passes to silvery-white laterally and posteriorly; postjugal part of 3 carrying on either side one small anterior and a much larger, roundish, posterior orange spot; 4 - 7 each with extremely small, transverse prejugal and 4 - 6 with two pairs of roundish, postjugal supracarinal spots, the anterior postjugal spots only small [1]), the posterior pair increasingly enlarged from 3 to 6, their diameter on 6 being about one-fifth of the length of segment; posterior postjugal spots diminishing gradually in size on segm. 7 - 9, on which there are no other pale spots; 10 unmarked. Inter- and infra-carinal areas darker than in *f. celebense,* this colour not confluent with the supra-carinal spots. Sculpture on dorsum of segm. 10 as described for *guttatus*: usually a well-developed longitudinal carina over its basal half. Wings comparatively narrow. *Pterostigma 4.0 - 4.9 mm long.* Abdomen slender but rather short, gradually expanded from end of 3 towards end of 8, apical segments again very slightly narrowed. Species of moderate size: abd. + app. 66.2 - 70.4, hw. 51.3 - 54.8 : 15.0 - 15.5 mm. ..... **panybeus**

7. Sup. anal app. *without distinct tooth- or spine-like projection* on the outer side of the apex; inner border slightly concave before as well as beyond the middle of its length, outer border also slightly concave from base to apex; *ventro-basal tubercle distinct,* rounded; dorsal longitudinal ridge low, distinctly twice curved or S-shaped, running at first much nearer the inner than the outer border; *greatest width into length* 1 : 4.55 (pl. 39 fig. 137).

Labrum chrome-yellow, distal border (¼ - ⅓) sharply defined black. Face and frons green, black T-spot on top of frons clearly indicated, variable in shape, but usually of slender form (pl. 38 fig. 132). Thorax green with distinct, pruinosed black latero-ventral patches at the base of the meso- and metepimeron. Wings long and narrow, hyaline, or strongly tinged with brownish- or greyish-orange all over the membrane in very old individuals. No yellow discal patch on fore wing. An oblique, cloudy orange band across and before middle of hind wing with ill-defined edges, extending from outer angle of *t* to somewhat beyond level of *Nod;* extreme bases usually also slightly yellowish. *Membranula* either *entirely smoky-black,* or with the slightest trace of a whitish basal spot on its inner anterior angle.

[1]) The anterior postjugal spots are usually obliterated or obscured so much as to become invisible.

Pterostigma short and narrow, 4.0 - 5.0 mm long. Abdomen (pl. 41 fig. 155) very long and slender, slightly spindle-shaped, strongly constricted on middle of 3, from thence on widening out gradually but considerably as far as the middle or apex of segm. 8, the apical segments again slightly narrowed. Segm. *10 wider than long* and *wider at base than at apex*; dorsum finely transversely striate, with a short, mid-dorsal keel that extends approximately over the basal one-sixth or less of its length and which, distally, merges into a number of very fine longitudinal striae. Supplementary longitudinal carina of segm. 4 only short, from ¼ - ⅓ as long as the segment itself.

Colour black, segm. 1, membrane between 1 - 2 and lower one-third to one-fourth of the sides of 2, green; dorsum and sides of 2 otherwise sky-blue, except the winged marking on dorsum, which is black; prejugal marks on 3 blue-green; 3 - 7 without anterior postjugal pale spot; 4 - 7 each with one pair of extremely small, transverse, greenish prejugal basal spots and with one pair of oval, posterior postjugal spots, which are largest on 6 and 7, though occupying hardly more than the distal one-sixth and one-fourth, respectively, of the length of these segments; 8 and 9 each with one pair of posterior postjugal spots; 10 unmarked. Inter- and infra-carinal areas dark brown. Species of large size: abd. + app. 70.0 - 84.0, hw. 52.3 - 59.0 : 15.0 - 16.5 mm. ..... **maclachlani.**

7'. Sup. anal app. *with a distinct spine-like projection* on the outer side of the apex; inner border almost straight or even a little convex before the middle of its length; dorsal ridge neither twice curved nor S-shaped, dividing the appendage longitudinally into two approximately equal portions. ... 8

8. Sup. anal app. reddish-brown, broad, *greatest width into length 1 : 3.3,* narrow at extreme base, thence suddenly and considerably widened towards middle with a strongly developed obtuse-angulate shelf-like median interior projection; distal portion rather abruptly narrowed with the intero-apical angle broadly and almost rectangularly rounded; *outer border distinctly convex in dorsal view;* dorsal ridge darkly pigmented and strongly pinched beyond half-way its length, stopping short a little before the extero-lateral spine; *ventro-basal tubercle distinct, rounded* (pl. 39 fig. 135).

Mouth-parts bright ochreous, tipped with black; labrum greenish-ochreous, its distal border (⅓) sharply defined black; clypeus and anterior surface of frons bright green, horizontal surface of frons light greenish-blue in perfectly preserved examples; black T-spot on top of frons clearly indicated, but *vertical portion of the T usually short and narrow,* connected posteriorly with a conspicuous black basal triangle in front of the vertex (pl. 38 fig. 133). Thorax bright green with distinct, through small, pruinosed black, latero-ventral patches at the base of the meso- and metepimeron; axillaries at the wing-bases sky-blue. Wings narrower; *costa yellow* or pale brownish from base as far as *pt*; membrane hyaline, but often with a rudimentary, diffuse, yellow basal streak in *cu* of both fore and hinder wing. *A large,* oblique, fairly well-delimited, bright saffron or *orange yellow band across* (and slightly before) *middle of hind wing,* extending normally from outer angle of *t* and 1 - 2 cells distal to the fork of $Cu_2 + A_1$ to as far as midway between *Nod* and *pt* and the convex terminal bend of *Rspl,* the outer edges of this discal patch less sharply defined. *Fore wing* either also with a diffuse, *discal patch of yellow* (Australia, New Guinea, Banda), or uncoloured (Ambon, Halmahera, Soemba). *Membranula* Seal-brown to smoky-black, its *basal* $^1/_5$ - $^1/_6$ *abruptly turning pure white.* Pterostigma dirty yellow dorsally. Abdomen

(pl. 41 fig. 154) very long and slender, strongly pinched on middle of 3, from thence on widening out gradually but considerably to reach its maximum width on middle or near apex of segm. 9. *Segm. 10 as long as it is wide* and not noticeably narrowed apically; dorsum finely transversely striate with *a distinct, strong, mid-dorsal keel* that extends almost over the basal half of segment. Supplementary longitudinal carina of segm. 4 well-developed, about ⅓ as long as the segment itself. Basal segments coloured similarly to *maclachlani* but more brightly so; spots on segm. 3 - 9 considerably larger in typical specimens and coloured bright green; no anterior postjugal pale marks [1]). Segm. 10 unmarked. Inter- and infra-carinal areas of 4 - 8 brown. Species of large size: abd. + app. 70.0 - 74.7, hw. 52.3 - 56.0 : 15.4 - 16.5 mm. ..... **gibbosulus.**

8'. Sup. anal app. blackish-brown or black, longer and more slender, *greatest width into length 1:4.6;* narrow basally, thence very gradually widening towards middle, with the shelf-like median interior projection narrower, less strongly downbent and but slightly angular; distal portion evenly narrowed with the intero-apical angle much less prominent and obtusely rounded; *outer border distinctly concave in dorsal view;* dorsal ridge lower than in *gibbosulus,* not or only feebly pinched beyond half-way its length, slightly and evenly curved from base towards apex, ending in the extero-apical spine; *no distinct ventro-basal tubercle,* but instead of it a small tooth-like projection followed by a row of irregular, minute teeth (pl. 39 fig. 138).

Head and thorax coloured similarly to *gibbosulus*; *T-spot on top of frons heavier,* sometimes resembling that of *fumosus* rather closely, the longitudinal portion always thicker and more gradually merging into the black basal triangle in front of the vertex (pl. 38 fig. 134). Wings comparatively broader; *costa black*; membrane hyaline or tinged with greyish-yellow from distal side of *t* outwards all over the membrane in very old individuals; *bases entirely hyaline.* No definite yellow discal band on hind wing, but either entirely hyaline or the discoidal field between *t* and *Nod* bearing a small roundish patch of pale yellow with ill-defined edges in the majority of specimens. *Membranula* brownish-black with the *slightest trace of a whitish basal point* or line on its inner anterior angle. Pterostigma dark brown dorsally. Abdomen (pl. 41 fig. 156) shaped much as in *gibbosulus,* but segm. 3 less strongly pinched and not so slender as in that species, widening out gradually and considerably to rearward, reaching its maximum width on middle or near apex of segm. 9. *Segm.* 10 *distinctly wider than long* and slightly diminishing in width apically; dorsum finely transversely striate, with a short and weak mid-dorsal keel that extends over the basal fourth of segment. Supplementary longitudinal carina of segm. 4 variable: either obliterated and barely indicated, or better beveloped, but never exceeding ¼ of the length of segment. Markings on abdominal segments apparently similar to *gibbosulus* (discoloured in almost all males); dorsum and sides of 1 and of membrane between 1 - 2, green; dorsum of 2 and prejugal division of 3 blue in perfectly preserved specimens; spots on 3 - 9 similar in arrangement to typical *gibbosulus* though decidedly smaller (intermediate between *maclachlani* and *gibbosulus*), and orangish or green instead of blue (discoloured!); no anterior postjugal pale spots. Segm. 10 unmarked. Inter- and infra-carinal areas dark brown. Species of lage size: abd. + app. 72.2 - 76.4, hw. 55.6 - 58.0 : 16.2 - 17.1 mm. ..... **pugnax.**

[1]) For a description of Australian *gibbosulus* see also TILLYARD's notes (loc. cit. *postea,* 1916).

Key to the females

1′. Anal apps. generally not over 4.5 mm long. Length of abdomen not exceeding 59.5 mm, usually shorter. 2

1. Anal apps. 4.4 - 5.8 mm long. Length of abdomen 59.0 - 68.2 mm. 6

2. Dorsal surface of frons with narrow black basal line produced on middle so as to form a small, obtuse-angulate or finely pointed triangle of black in front of the vesicle of the vertex; anterior frontal ridge either uncoloured or, when finely edged with black, this line disconnected from the black triangle along base. Labrum bordered with black. No distinct cloudy yellow band across middle of posterior wing, but extreme base with a small ferruginous or burnt-sienna spot in the first elongate cell adjacent the membranula, this spot usually also invading basal cell in *cu*. Membranula as in male.

Abdomen short, segm. 3 not or scarcely pinched on middle but evenly narrowed towards apex, from thence on the abdomen widens out slightly and gradually to rearward, reaching its maximum width at the end of 9.

No distinct five-pointed dark mark on dorsum of abd.-segm. 2, but instead of this only the anterior border and transverse carina finely bordered with brown, the latter connected more or less distinctly with the brown intersegmental ring 2 - 3 by a narrow, diffuse, brownish, x-shaped mid-dorsal band; dorsum green, conspicuously marked with blue: one pair of prejugal and one, slightly smaller, pair of postjugal transverse, oval, sky-blue patches. Markings on segm. 3 - 9 of abdomen coloured as in the male, but all spots considerably enlarged: on 3 the dark median band narrower, the anterior postjugal spot very large and broadly confluent over the carina with the prejugal blue colour as well as with the posterior postjugal spot along latero-ventral border; on 4 - 8 the latter are isolated, but the two anterior pairs of spots extend on to the inter-carinal areas of each segment and on 4 and 5 usually coalesce. Appendages short and narrow, shaped as shown in pl. 40 fig. 150. Species of moderate size: abd. + app. 54.5 - 59.0 + 3.5 - 4.1, hw. 53.3 - 55.9 mm. ..... **guttatus**

2′. Dorsal surface of frons with a T-shaped black spot of variable shape. Posterior wing without small ferruginous or burnt-sienna spot adjacent the membranula. Dorsum of abd.-segm. 2 with a more or less five-pointed dark mark, which is broadly connected with the dark intersegmental ring 2 - 3. 3

3. Distal ⅓ to ¼ of labrum sharply defined black. Black T-spot on top of frons as in the male: extremely slender, the longitudinal portion long and thread-like, connected posteriorly with a fine black triangle in front of the vesicle of the vertex. Wing-bases to as far distal as *Arc* or proximal side of *t* hyaline, remainder of wings throughout rich orange-yellow with golden reflections. Pterostigma as in male. Membranula entirely greyish-black. Abdomen thick, very robust, 3rd segment diminishing in width to-

wards apex, but not constricted. Anal appendages lanceolate, shaped as shown in pl. 40 fig. 148, but distinctly twisted and downcurved beyond the middle of each (not shown in figure). Labium as in male; face bright ochreous; frons greenish-yellow. Thorax entirely green. Abdomen mainly black, markings indistinct (discoloured), but apparently spotted with green as in male, sides of basal segments more distinctly green. ..... **selysi**

3'. Labrum either unicolorous greenish-yellow to ochreous, or with the anterior margin diffusely bordered with brown. Black T-spot on top of frons not so slender, the stem short. Wing-bases usually hyaline, sometimes as far out as *Nod*; distal portion of wings and posterior border smoky grey or with indefinite dirty yellowish patches; no definite yellow band across middle of hind wing. Membranula greyish-black, tipped with white on its inner anterior angle. 4

4. Labrum with ill-defined brown stripe along distal margin. Abdomen robust, 3rd segment not or only very slightly constricted on middle. No visible anterior postjugal spots on segments 4 - 7. Anal appendages shaped much as in *guttatus,* but narrower basally, with apex more pointed; very short and narrow (3.7 mm), lanceolate, flat and not twisted, pointed apicad (Boeroe) [1]). ..... **f. fumosus**

4'. Labrum unicolorous. Abdomen more slender, 3rd segment distinctly constricted on middle. Anal appendages not as before, 4.0 - 4.9 mm long. ... 5

5. No visible anterior postjugal spots on segments 4 - 7, that on 3 rather large, tapering posteriorly, narrowly confluent along latero-ventral border with the (transverse) posterior postjugal spots [2]), those on 4 - 7 small, transverse; posterior postjugal spots roundish, largest on 6 and 7. Inter-carinal areas brown. Constriction of segm. 3 2.8 mm, width at apex 3.1 mm. Anal appendages 4.9 mm long, slightly wider than in *f. celebense,* slightly outcurved apically, with rounded tips. Colours faded, but probably identical to *f. celebense.* Wings with the basal third hyaline, then insensibly passing to greyish-yellow, this colour gradually deepening towards the apices, which are smoky grey [3]). ..... **panybeus**

5'. Segments 4 - 5 (occasionally 4 - 7) with distinct, though small, anterior postjugal pale spots, those on 3 as in the former species but still larger, those on 4 - 7 as in *panybeus;* posterior postjugal spots as in that species. Inter-carinal areas reddish-brown, those of segm. 4 - 8 with an additional oval greenish spot. Constriction of segm. 3 (allotype Paloe) 2.6 mm, width at apex 3.0 mm [4]). Anal appendages (pl. 40 fig. 149) 4.0 - 4.3 mm long, not outcurved, tips shortly pointed (also slightly variable!). Coloration: face, frons and the entire thorax apple-green without brown spots at the base of the meso- and metepimeron; dorsal oval spots of segm. 2 blue, sides

[1]) No topotypical material available.
[2]) Very similar to KENNEDY's fig. 4 - 5 of the ♀ of *A. piraticus* (*loc. cit.*).
[3]) Only a single female, the allotype, examined.
[4]) A variable character.

of this segment green; remaining segments spotted with orange-green. Wings coloured similarly to *panybeus*. ..... **f. celebense**

6. Membranula brownish-black, with a conspicuous, sharply defined, triangular white spot on its inner anterior angle. Pterostigma comparatively long (5.0 - 5.8 mm). Costal vein at least narrowly striped with yellow. Extreme bases of fore and hinder wings with a diffuse yellow spot; a large, oblique, fairly well-delimited, bright saffron- or orange-yellow band across (and slightly before) middle of hind wing, extending normally from outer angle of *t* and 1 - 2 cells distal to the fork of $Cu_2 + A_1$, to as far as midway between *Nod* and *pt* and the convex terminal bend of *Rspl*, the outer edges of this discal patch less sharply defined [1]); a similar, though smaller and somewhat diffuse, light yellow band across middle of fore wing; distal third of wings smoky grey in old individuals. Abdomen long and slender, widest at apex of segm. 9; segm. 3 distinctly constricted on middle. Anal appendage long and broad, leaf-like, 5.4 - 5.8 mm long, greatest width into length 1:3.0, outer border convex, apex subacute (pl. 39 fig. 139).

Face, frons, thorax and first two segments of abdomen bright green. Black T-spot on top of frons distinct, variable in shape. Dorsum of 2nd abd.-segm. with one pair of elongate-oval prejugal and one, slightly shorter, pair of postjugal sky-blue spots; prejugal patch of segm. 3 very large, porcelain-blue basally; prejugal and posterior postjugal blue-green spots also conspicuous; all spots confluent along ventro-lateral border. Segm. 4 - 9 each with conspicuous, roundish, posterior postjugal green or orange-green spots, which are largest on segm. 6 and 7, but still very conspicuous on 8 and 9; prejugal pale spots present on 4 - 7, almost of equal size on 4, from thence on diminishing in size, more transverse, that on 7 small; anterior postjugal spots distinct on 4 - 6, but much smaller and rather rectangular in shape; segm. 10 unmarked. ..... **gibbosulus**

6'. Membranula either entirely smoky black or with narrow whitish point or line on its inner anterior angle. Pterostigma shorter. Anal appendages not so broad. 7

7. Anal appendages blackish-brown, slenderly lanceolate, 4.7 - 5.7 mm long, greatest width into length 1:4.1, with the inner border strongly convex, the outer border very slightly so or almost perfectly straight, distal portion tapering, tips narrow, but apices rounded (pl. 39 fig. 141). Wings either entirely hyaline or with a smoky-grey tint from *t* outwards, growing darker towards posterior border and apices; rarely with a small, diffuse patch of palest greyish-yellow in the discoidal field of hinder wing. Costal vein blackish-brown or black. Pterostigma dark brown, 4.5 - 5.2 mm long. Membranula unicolorous smoky black. Abdomen comparatively shorter and more robust, segm. 3 less constricted on middle.

[1]) In the single ♀ from Soemba, the wings are entirely hyaline save only for the bases, which bear very small yellow spots.

Body-colouring apparently similar in principle to *gibbosulus* in perfectly preserved examples, but faded in most specimens. Abd.-segm. 4 - 9 very dark, almost black, with the light spots only small and usually obscured so much as to become obsolete; prejugal spots vestigial or absent; posterior postjugal spots apparently absent from segm. 4 and 9, but from 5 onwards slightly increasing in size, though usually less distinct than in the male. Inter-carinal areas obscurely brown. Body-size intermediate between *gibbosulus* and *maclachlani*. ..... **pugnax**

7'. Anal appendages dark reddish-brown, regularly lanceolate, 4.4 - 5.4 mm long, greatest width into length 1 : 3.3, or still longer, with inner and outer borders convex, distal portion gradually narrowed, apices broadly rounded (pl. 39 fig. 140). Wings usually with a small yellow spot at extreme base and with a conspicuous, bright saffron- or orange-yellow band straight across (and slightly before) middle, extending from middle or end of *t* and 2 - 3 cells distal to the fork of $Cu_2 + A_1$ to as far as 2 - 4 cells distal to *Nod* (hind wing) or *Nod* (fore wing) and the apex of Cu_1 (hind wing), the outer edges of this discal patch rather diffuse, and the fore wing patch paler than that of hind wing; apical part of wings usually smoky-yellow in old individuals. Costal vein brown, always striped with yellow interiorly. Pterostigma yellow-brown, 3.9 - 5.0 mm long. Membranula either unicolorous smoky black or with a whitish seam or point on its inner anterior angle. Abdomen comparatively longer and more slender, segm. 3 more definitely constricted on middle.

Body-markings as in the previous species, but light posterior postjugal spots more distinct, more definitely placed in the long axis of the segments, slightly larger and well visible on segm. 3 - 9, largest in size on 6 and 7. Inter-carinal areas reddish-brown. ..... **maclachlani**

Anax guttatus (BURMEISTER) (pl. 40 fig. 142, 145, 150, pl. 41 fig. 151).

Principal references:

1839. BURMEISTER, Handb. Ent. Névropt. 2, p. 840, no. 14. — ♂♀ Java (*Aeschna guttata*).
1842. RAMBUR, Hist. Nat. Ins. Névropt., p. 188. — ♂ Java, coll. SERVILLE (*magnus*).
1866. BRAUER, Novara Exped. Zool. 1, Neuropt. p. 62 (key, *magnus* + *guttata*) — Java, Amboina.
1867. HAGEN, Verh. Zool.-bot. Ges. Wien, 17, p. 40 (descr. ♂ Java), 40 - 41 (descr. ♂♀ India).
1898. CALVERT, Trans. Amer. Ent. Soc. 25, p. 54 - 55 (BURMEISTER's types). — Java.
1900. RIS, Archiv f. Naturgesch. 1, p. 191 - 192 (key ♂, with *maclachlani* & *gibbosulus*). — ♂ Seychelles.
1908. MARTIN, Cat. Coll. SELYS, Aeschn. 18, p. 23 (pars), fig. 17 (apps. ♂).
?1908. MARTIN, Bull. Soc. Ent. Ital. 60, p. 200. — S.E. New Guinea (Astrolabe Range).
1913. RIS, Abh. Senckenb. Naturf. Ges. 34, p. 527. — ♂ Aroe Is.
1921. LAIDLAW, Rec. Ind. Mus. 22, p. 83 - 84, — ♂ Calcutta (*guttatus* Ser. B).

[1]) In the ♀♀ from Soemba and Flores the pale spots on abd.-segm. 4 - 9 are considerably smaller in size, and there are no visible anterior postjugal spots.

Material studied. — North New Guinea: 1 ♀ (ad.), Hollandia, vii.1930, W. STÜBER. — Aroe Is.: 1 ♂ (semiad.), Dobo, acq. vii.1932, Mrs M. E. WALSH ded.

Extralimital material. — New Britain: 1 ♂, 1 ♀ (ex alcohol), "Neu-Pommern, N.-Küste, Hanamhafen (Mündung Geysir Fluss), No. 438 der Hamburg Südsee-Expedition, 27.xi.1908, Dr. G. Duncker leg.", in Mus. Hamburg. — 1 ♂ (ad.), N. Australia: N. Queensland (Cape York Peninsula), Thursday Island, 18.i.1939, R. G. WIND. — Banda Is.: 3 ♂, 2 ♀ (ad.-semiad.), Groot Banda, Laoetang Estate, 8.iv.1937, F. K. A. CLARINGBOULD. — Celebes: 1 ♂ (ad.), northcoast, 18 km off shore opposite Kabila Mts, Gorontalo distr., 24.xi.1937, J. J. VAN DER STARRE; 1 ♀ (ad.), Central Celebes, Loewoe Prov., Bolokan, 1600 m, 2.xi.1940, L. L. A. MAURENBRECHER; 1 ♂, 2 ♀ (ad.), same province, Masamba, 22-25.xi & 25.xii.1940, same collector; 1 ♂ (ad.), southwestcoast, Pare Pare, 15.xi.1939, J. J. VAN DER STARRE; 2 ♂, 1 ♀ (ad.), southcoast, Makassar, 13.iv.1940, 5.i and 13.v.1941, L. COOMANS DE RUITER.

Besides the material from the eastern part of the Malay Archipelago, enumerated above, numerous specimens of *A. guttatus* are available for study in our collection from the islands of Sumatra, Bangka, Billiton, Krakatau (Strait Soenda), Java, Karimoendjawa, Kangean (and Paliat Islet), Borneo and Bali.

Miss CYNTHIA LONGFIELD tells me (*in litt.*) that she has collected two males of *guttatus* on the island of Kisar (Kisser), off the N.E. point of Timor, 17.xii.1929.

[In a recent paper KENNEDY (*Ann. Ent. Soc. Amer.* 27, 1934, p. 351) voices the opinion that of *Anax guttatus* "no detailed description has ever been published", and "until this is done we will not be positive just which of several species is the true *guttatus* Burm." While at first one might be inclined to contradict KENNEDY's statement, it should be admitted that some confusion has arisen around this species, and there is little doubt in my mind but that KENNEDY was misled by the striking dissimilarity in shape between MENGER's sketches of the anal appendages of *guttatus* on p. 23 of MARTIN's monograph and his own figure of these organs drawn from a specimen taken near Coorg, South India. Discounting MARTIN's judgment as being so often at fault in a species sence, KENNEDY was led to write: "Martin's figures (fig. 17, p. 23 *loc. cit.*) are probably of another species, as they show a keel on segment 10 and the curves of the tips of the superior appendages are different. Which is *guttatus*, if either is?" — In my opinion the solution is that MARTIN's illustration is of true *guttatus* and KENNEDY's sketches are probably of another species or subspecies, and not vice versa as supposed by KENNEDY!

LAIDLAW (*loc. cit.* p. 82 - 86) has split up a number of 'forms' of *"guttatus"* from the Indian Empire into three series, A, B and C. Of these, the series A was thought by LAIDLAW and FRASER to be undoubtedly the true *guttatus* of BURMEISTER; series B, according to FRASER (*J. Bombay N.H. Soc.* 28, 1921, p. 115), "is most probably a local race of the same insect", whilst LAIDLAW

(*Proc. U.S. Nat Mus.* 62, 1923, p. 13 footnote) expressed the view that the single specimen from Calcutta which constituted "series B" would be either a form of *fumosus,* or possibly a hybrid *guttatus* and *fumosus.* Lastly, series C, from Sikkim and the Darjeeling district, was thought by RIS and LAIDLAW to be a form of *fumosus,* but later FRASER correctly classified it as a new species, *A. nigrolineatus* (*J. Darjeeling Nat. Hist. Soc.* 10, 1935, p. 23 - 25).

Although I have unfortunately neither seen examples of LAIDLAW's series A nor yet of B, I have carefully read the existing descriptions and compared them with topotypical specimens of *guttatus,* with the following results.

Series A. — **Anax indicus,** sp. n.

The principal features of the ♂ have been given by LAIDLAW (*loc. cit.* 1921, p. 83 - 84), whilst a drawing of the ♂ abdomen accompanies the description (l.c. Text-fig. 2). Notes on the coloration of the insect at the time of capture, its habits, food and larva, have been supplied by FRASER and DOVER (*Rec. Ind. Mus.* 24, 1922, p. 308 - 309).

Type-locality: Barkuda Island, Chilka Lake (Orissa, N.E. peninsular India).

The chief characters of the ♂ are: Frons without T-mark. Labrum pale, very narrowly and diffusely edged with brown. Thorax leaf-green.

Wings coloured much as in typical *guttatus.* Basal cell adjacent to membranula possibly hyaline (not mentioned in original description).

Abdomen with segm. 1 and anterior triangular area on dorsum of 2 green; lateral region and posterior part of dorsum of 2 and prejugal dorsal spots of 3, blue; two pairs of post-jugal spots on 3 yellow or orange; prejugal sides of 3 shining white; remainder of abdomen purplish-black dorsally with all pale markings bright orange to yellow. Seg. 4 - 8 each with a pair of prejugal spots bluish-yellow or orange, almost obsolete on 8; and two pairs of rounded post-jugal orange spots, which on 7 - 8 coalesce to form a continuous orange band. Segm. 9 - 10 each with a pair of large orange-yellow spots, triangular with the apex directed forward on 9, rounded on 10 (sometimes 10 entirely yellow save for a narrow basal reddish-brown annule prolonged mid-dorsally to apical border).

Anal appendages not described (similar to *guttatus,* according to LAIDLAW).

Length ♂ abd. + app. 51 + 6, hw. 50 mm [1]).

Most probably not a subspecies of *A. guttatus,* and easily distinguished from that species by its much smaller size and differently shaped and coloured abdominal markings.

Although FRASER in 1921 still regarded "Series A" as a local race of *guttatus* (*antea*), he rejects this idea in the 'Fauna of British India' volume and does not mention this form any longer. I am unable to agree with him in this respect as from the description it is quite evident that the two species were mixed,

[1]) In a later publication by FRASER and DOVER (*loc. cit.*), the length of the abdomen (incl. apps) is said to vary from 55 - 58 mm, that of the hinder wing from 50 - 51 mm.

Measurements of *Anax guttatus* BURM. from Java.

Locality ♂	Abd. + app.	Hind wing	Pt. fore wing	Abdomen			Locality ♀	Abd. — app.	Apps.	Hind wing	Pt. fore wing
				Length seg. 3	Constriction segm. 3	Greatest width seg. 8-9					
Java	**64.9**	**55.0**	4.5	**8.9**	2.4	4.3	Java	**59.0**	**4.1**	55.0	5.3
id.	64.0	54.5	**5.0**	8.7	2.4	4.3	id.	59.0	3.7	55.4	**4.9**
id.	64.0	54.0	5.0	8.6	2.3	4.2	id.	58.0	3.8	54.0	5.1
id.	63.4	53.4	4.8	8.7	2.3	4,3	id.	57.2	3.6	54.8	5.0
id.	63.2	53.4	5.1	8.5	2.4	4.2	id.	56.2	3.6	**55.9**	5.0
id.	63.2	52.7	4.7	8.2	2.1	**4.4**	id.	56.2	3.6	54.7	5.1
id.	62.8	54.4	5.0	8.7	2.3	4.1	id.	56.0	**3.5**	54.5	5.0
id.	62.7	53.1	4.3	8.1	**2.6**	4.2	id.	55.4	3.7	**53.3**	5.0
id.	62.0	**50.5**	5.0	8.1	2.1	4.3	id.	55.0	3.6	54.8	**5.4**
id.	**61.0**	52.0	**4.2**	**8.0**	**2.1**	**4.0**	id.	**54.5**	3.6	54.1	5.0
Average	63.1	53.0	4.7	8.4	2.3	4.2	Average	56.6	3.6	54.2	5.1

the description itself being of a composite character, as in shown by the notes on the colour variations, the anal appendages, and the measurements.

The description given on pages 141 - 142 of the ♀ of *'guttatus'* also suggests two different forms as FRASER remarks on the anal appendages that they are: "as long as segment 9, rather broadly and uniformly lanceolate, dark brown (differing in breadth and length when a series is examined)" [1]).

The distribution of typical *indicus* probably extends beyond the north-eastern provinces of India as FRASER, in his 'Survey of the Odonate fauna of Western India' writes: "The form most commonly seen is one bearing bright orange markings on the abdomen. This is the form found so commonly in Bombay. I have, however, seen specimens of this and others with blue and greenish blue markings to the abdomen all occurring on the same tank at Fraserpet, Coorg, so am of opinion that they represent mere varieties". (*Rec. Ind. Mus.* 26, 1924, p. 464). From these interesting observations it would appear that *guttatus* and *indicus* in some parts of India fly together in one locality. Later, the same author claims that: "Specimens from wet areas show considerable restriction of the light-coloured markings of the abdomen, whilst those from dryer zones, such as the East Coast of the Peninsula, show a corresponding increase in these markings" (*loc. cit.* 1936, p. 142).

Series B. — **Anax guttatus** BURM.

From the description the single male of this series appears to be quite typical. The measurements also are the same as in Javan examples of *guttatus* (abd. 56 + 6, hw. 54 mm).

Type-locality: Calcutta (Bengal)].

It will be seen from the undermentioned facts that topotypical *A. guttatus* has been characterized by several authors.

BURMEISTER in the original description of the Javan type explicitly states that the frons is unicolorous ("fronte unicolore"), with which clearly the absence of a well-marked T-spot is meant.

RAMBUR in his good description of *A. magnus* (= *guttatus* BURM.), also from Java, says: "Ressemblant extrêmement au *Gibbosulus,* mais en différent surtout par la partie postérieure du front, bordeé seulement par une ligne noire, formant un angle avancé dans son milieu".

HAGEN, discussing a Javanese male identified with *guttatus* by BURMEISTER himself, commented on this: "Dies Männchen ist ohne Zweifel *A. magnus* Ramb. Die Stirn ist nicht einfarbig, wie BURMEISTER angibt, sondern das Stück ist

[1]) An excellent description of the ♀ of *guttatus* from Insein (Burma) was published by FRASER under the name of *A. goliathus* (*J. Bombay N.H. Soc.* 28, 1922, p. 900). The measurements of this specimen are: abd. + app. 56, hw. 53 mm. The bases of the hind wings are enfumed in the subcostal space and anal triangle, as in *guttatus* from Java, and the anal appendages are described as: "very short, spathulate, rounded at the tips, shaped very much like those of *Aeshna petalura*", which applies also to typical *guttatus*. Later (1936), *A. goliathus* was correctly placed as a synonym of *guttatus* by FRASER himself, but in the original description it was distinguished from the supposed *guttatus* from India by the distinctive character of its anal appendages.

jung, und die schwarze Farbe des dreieckigen Fleckes vor den Nebenaugen hat nicht ihre volle Schwärze erreicht".

RAMBUR in his description of *A. magnus* further mentions the rufous spot close near the base of the hinder wings: "base des ailes inférieures marqueé contre la membranule d'une tache rousse", and the additional pale spot on the abdominal segments: "..... mais la tache antérieure des segments est double".

BRAUER's remark: "Hinterflügel ..... neben der Membranula g a l l e n b r a u n" may of course merely have been taken from RAMBUR's description, but possibly was mentioned on the basis of more extensive material. It is clearly evident, however, that HAGEN, when carefully describing a ♂ of *guttatus* from 'Trankebar' in the Copenhagen Museum, also considered the presence of a brown basal spot to be an important feature of *guttatus* as the writes: "Basis der Hinterflügel neben der Membranula mit rostfarbigem Fleck", and we can safely conclude that HAGEN had before him correctly referred material of *guttatus* from India [1].

Summarizing, we would consider that, with the rich material of topotypical *guttatus* before us, there need be no confusion with it; and it will be seen from the above quotations that although RAMBUR, BRAUER and HAGEN have failed to give accurate illustrations, it is beyond question that our Malaysian examples of *guttatus* are the same as those of these earlier writers.

D i s t r i b u t i o n. — Outside of continental East Asia, Formosa etc., *guttatus* has been reported as occurring throughout the Malay Archipelago to the Pacific as far east as the Tuamotu Islands (KIMMINS, *Ann. Mag. Nat. Hist.* (10) 18, 1936, p. 74), and southwards to North Australia.

Recently, ASAHINA (*Tenthredo*, 3, 1940, p. 2) has reported *guttatus* from the Marianne and Caroline Islands, — whence KENNEDY described *piraticus* [2]—, and placed the latter as a synonym of *guttatus*. I am not at all convinced of the correctness of ASAHINA's identification as *piraticus* is certainly a distinct species, differing from *guttatus* in a number of characters.

Typical *guttatus* has its headquarters in Malaysia where it is the commonest species of the genus, and as the type was described from Java I have in comparisons, descriptions and sketches used Javanese material as typical.

A. guttatus is evidently a scarce species in New Guinea where it is replaced by *maclachlani*, which is quite common in low country.

The single ♀ of *guttatus* that we have in our collection from New Guinea differs in no way from Javan topotypes, the male from the Aroe Islands being also closely similar to typical *guttatus*.

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[1]) FRASER's drawing of the ♂ anal appendages in the 'Fauna of British India' (vol. III, 1936, p. 137) is like MARTIN's of the true *guttatus* and agrees equally well with those given by RIS (*l.c.* 1900, pl. 9 fig. 10), NEEDHAM & GYGER (*Philipp. J. Sci.* 63, 1937, pl. 2 fig. 25 - 26), and the present author (pl. 40 fig. 142).

[2]) *Ann. Ent. Soc. America*, 27, 1934, p. 346 - 356, figs. — ♂♀ Guam.

Anax selysi FÖRSTER (pl. 40 fig. 143, 146 & 148, pl. 41 fig. 153).

1900. FÖRSTER, Termész. Füzetek, 23, p. 88 - 91, fig. 1 - 4 (apps. ♂♀ & genit. ♂). — ♂♀ N.E. New Guinea (*Selysii*).

1908. MARTIN, Cat. Coll. SELYS, Aeschn., 18, p. 25, 26 - 27, fig. 20 (apps. ♂), pl. 1 fig. 3 (♂ insect). — ♂ N.E. New Guinea.

1934. KENNEDY, Ann. Ent. Soc. Amer. 27, p. 356 (notes), fig. 20 (apps. ♀ allotype), 27 - 28 (apps. ♂ type). — ♂♀ types, N.E. New Guinea.

Material studied. — N. Central New Guinea: 2 ♀ (ad.), Baliem River & Camp, 1600 m, 10.xii.1938, L. J. TOXOPEUS & J. OLTHOF. — N.E. New Guinea: 2 ♂ (ad.), labelled: "*Anax selysi* F., Sattelberg, N. Guin. ♂ Gegagalu" (purple label in SELYS's hand), in the Brussels Museum. — 1 ♂ (ad.), of the type series, labelled by FÖRSTER [1]) (penis removed and fixed on cardboard), in the Michigan Museum, Ann Arbor.

FÖRSTER's description of the pale dorsal marks of the abdomen of the male is inadequate as he used for it a discoloured specimen in which the colours were much faded.

Both sexes of *A. selysi* are easily distinguished from the other small-sized species of the genus by the peculiar shape of the T-spot on top of frons, and

Measurements of *Anax selysi* FÖRSTER from New Guinea.

Locality ♂	Abd. + app.	Hind wing	Pt. fore wing	Abdomen: Length seg. 3	Abdomen: Constriction seg. 3	Abdomen: Greatest width seg. 8 – 9	Locality ♀	Abd. — app.	Apps.	Hind wing	Pt. fore wing
Huon Gulf, Sattelberg (Brussels Mus.) . .	61.0	54.0	3.8	—	—	—	Baliem Valley	56.2	4 5	55.3	4.2
							id.	56.0	4.5	55.3	4.2
id. Michigan Mus.)	59.4	52.5	3.5	7.6	2.2	4.3					
id. (Brussels Mus.)	58.0	52.0	3.7	-	—	—					
Average	59.5	52.8	3.7	7.6	2.2	4.3	Average . .	56.1	4.5	55.3	4.2

the unicolorous membranula; also by the golden yellow wings. The male further differs from *guttatus, fumosus* and *panybeus* in the great length of the inferior appendage; lastly, the characteristic shape of the anal appendages, which in the ♀ are unique in being twisted and curved, may serve to its easy recognition.

The coloured drawing of ♂ *selysi* in MARTIN's monograph is a combination of the two males from Sattelberg, in the Brussels Museum; the depth of the yellow hind wing patch in this figure is rather exaggerated.

The two females from the Baliem Valley are quite typical.

KENNEDY (*loc. cit.*) has given useful outline-sketches of the appendages of both sexes, drawn from the types [1]); these sketches do not quite agree with

[1]). Mrs HOWARD K. GLOYD kindly informs me that: "*Anax selysi* Förster was apparently described from 3 ♂, 1 ♀ of which we have here 2 ♂, 1 ♀. The ♂ sent to you must be the 3rd ♂ of the type series. All have same data: Gegagalu (Sattelberg), Simbang, D. Neuguinea, W. Wahnes, 1 - 5. 1899".

our drawings fig. 143 in pl. 40, as the former were made before KENNEDY realized the necessity of drawing the superior appendages of the ♂ as if they were held by the insect in a perfectly horizontal (quite unnatural) position.

Distribution: Central N. and N.E. New Guinea.

Anax fumosus fumosus HAGEN. (textfig. 2 and pl. 40 fig. 147).

1867. HAGEN, Verh. zool.-bot. Ges. Wien, 17, p. 43 - 44. — ♂ Ternate (*fumosus*).
1900. KARSCH, Abh. Senckenb. Naturf. Ges. 25, p. 213, notes. — ♂ Ternate (*gibbosulus* aberr. *fumosus*).
?1908. MARTIN, Cat. Coll. SELYS, Aeschn. 18, p. 24. — "Célèbes, Batjan, Mariannes" (pars! sub *guttatus* Race *panybeus*).
1923. LAIDLAW, Proc. U. S. Nat. Mus. 62, p. 13 (pars? Ternate, non vidi).
1926. LIEFTINCK, Treubia 7 Suppl. p. 277 - 279 (descr. ♂♀), 319. — ♂♀ Boeroe (*fumosus*).
1930. LIEFTINCK, Treubia 7 Suppl. p. 315 - 316 (♀ Boeroe), 328 - 329 (larva descr., key), fig. 7 (larval labium). — ♀ (♂ larva) Boeroe (*fumosus*).

Extralimital. Material studied. — 1 ♂ (ad.), Ternate I., labelled: "*Anax fumosus* Hagen" (unknown hand), ex Mus. Leiden in Mus. Amsterdam. — 1 ♂, 4 ♀ (ad.), Boeroe I., Leksoela, ii.1921, and Nal'besi (Lake Rana), 21, 28.v & 15.i.1921, L. J. TOXOPEUS. — Lectotype: Ternate (Mus. Amsterdam).

A robust, short-bodied species of moderate size with heavily tinted wings and broadened end-segments of abdomen. In the Leiden Museum is a fine series of males, all from Ternate, bearing the same label as the one in the Zoological Museum at Amsterdam, which I have no doubt is HAGEN's type. These individuals were confronted by me in 1938 and I found them well agreeing. The Boeroe specimens of which I gave a detailed description in 1926, are also strikingly similar to the typical series and I am now sure that they are all true *fumosus*. The shape of the black T-spot on top of frons,

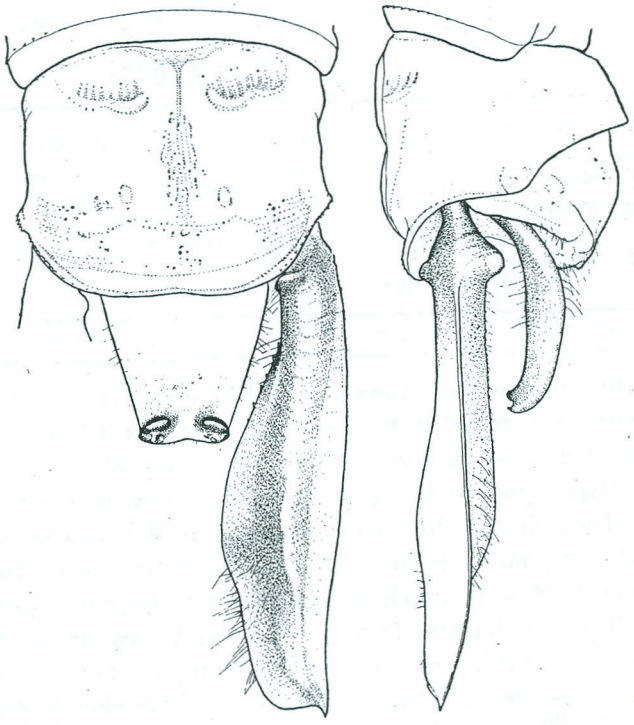


Fig. 2. *Anax fumosus fumosus* HAGEN. Type Ternate. ♂ Anal appendages, horizontal dorsal and right lateral view.

very heavy in the type (pl. 40 fig. 147), is somewhat variable individually as it is in *f. celebense* and the allied species *panybeus*. The anal appendages are here figured for the first time (tixtfig. 2).

Measurements of *Anax fumosus fumosus* HAGEN, from the Moluccas.

Locality ♂	Abd. + app.	Hind wing	Pt. fore wing	Abdomen: Length seg. 3	Abdomen: Constriction seg. 3	Abdomen: Greatest width seg. 8—9	Locality ♀	Abd. — app.	Apps.	Hind wing	Pt. fore wing
Ternate (type, ex alcohol) .	61.0	55.5	4.0	8,8	—	4.3	Boeroe . . .	56,0	3.7	57,0	4.3
Boeroe	57.2	54	4	8	2.4	4.8					

The Ambonese specimens of *gibbosulus*, from the Negumy Expedition, are distinguished at a glance from the present series of *fumosus*.

Distribution: The Moluccan islands Ternate, Boeroe and ? Batjan.

Anax fumosus celebense, subsp. n. (pl. 40 fig. 144 & 149, pl. 41 fig. 152).

1915. RIS, Nova Guinea, 13 Zool. 2, p. 112 - 113. — ♂ N.W. Celebes (Paloe) (*fumosus*).

Extralimital. Material studied. — Celebes: 1 ♀ (ad.), N. Celebes, Minahasa, Tomohon, Lake Lahendong, 700 m, 14.vii.1940, L. COOMANS DE RUITER; 2 ♂ (ad.), Mid Central Celebes, Pipikoro (Peana), 900 m, 12.iii.1941, "forest-path at dusk", P. M. FELIX; 1 ♀ (ad.), Paloe distr., Koelawi, 550 m, 15.i.1941, "at dusk in resthouse", P. M. FELIX; 1 ♂ (ad.) Paloe distr., S. Koelawi, Kalamanta, 1000 m, 10.x.1940, "sunshine", P. M. FELIX; 2 ♂, Paloe, near Tanah Mateh, 200 m, vii.1937, J. P. A. KALIS; 3 ♂ (ad.), Central Celebes, Loewoe distr., Todjamboe (Palopo), 800 m, 12-17.vii.1936, L. J. TOXOPEUS; 2 ♂, 1 ♀ (ad.), Todjamboe, 800 - 1000 m, 30.iv. & 10.v.1941, H. & E. VONK; 2 ♀ (ad.), same distr., Masamba, S. Bone-Bone and S. Masamba, 25.v.1940 & 2.v.1941, L. L. A. MAURENBRECHER; 1 ♀ (ad.), same distr., Bolokan, 1600 m, 2.xi.1940, L. L. A. MAURENBRECHER; 1 ♀ (ad.), S.W. Celebes, Pare Pare distr., Polewali, 21.viii.1940, J. J. VAN DER STARRE; 1 ♀ (ad.), S. Gowa distr., Malakadji, 800 m, 24.ix.1941, L. COOMANS DE RUITER. — Holotype ♂: Paloe distr., S. Koelawi, Kalamanta, 1000 m, 10.x.1940, P. M. FELIX; allotype ♀: Paloe distr., Koelawi, 550 m, 15.i.1941, P. M. FELIX.

The correct identification of this short-bodied *Anax* from the submontane districts of Celebes presented considerable difficulty inasmuch as in colour, size, proportions and genital characters it is a variable insect. Examples from the Paloe district and Todjamboe are quite homogeneous and have as most distinctive external features their rusty colours and well-pronounced blue and green body-marks; others however (from Pipikoro and one from Paloe) differ somewhat in being generally more slenderly built and in showing a pronounced yellow

Measurements of *Anax fumosus celebense*, ssp. n. from Celebes.

Locality ♂	Abd. + app.	Hind wing	Pt. fore wing	Abdomen			Locality ♀	Abd. — app.	Apps.	Hind wing	Pt. fore wing
				Length seg. 3	Constriction segm. 3	Greatest width seg. 8-9					
Todjamboe (C.C.)	**66.8**	53 5	4.1	10.0	1 7	**4.8**	Todjamboe (C.C.)	**59 5**	4.1	53.0	4.2
id.	66.1	**51.0**	4.5	**11.4**	2.0	4.6	Masamba (C.C.)	59.2	4.1	53.8	**4.9**
Paloe (N.W.C.) (type)	65.0	52.0	**4.7**	9.8	2.0	4.4	id.	58.0	4.0	**55.0**	4.7
Pipikoro (C.C.)	64.5	53.3	4.1	9.5	2.0	4.7	Bolokan (C.C.)	57.2	**4.3**	53.7	4.5
id.	64.0	**54.0**	**3.7**	9.3	**2.3**	**4 2**	Malakadji (S.C.)	57.0	4.0	51.0	4.0
Todjamboe (C.C.)	63.5	51.3	4.2	10.0	**1.7**	4.7	Polewali (S.W.C.)	54.5	4.0	51.5	4.5
id.	63.4	53.0	4.5	10.3	1.9	4.8	Paloe (N.W.C.)	**53.3**	**4.0**	**51.4**	**3.9**
Paloe (N.W.C.)	60.8	53.0	4.0	**8.5**	2.1	4.6					
Todjamboe (C.C.)	60.5	51.5	4.7	9.7	1.7	4.7					
Paloe (N.W.C.)	**60.1**	51.8	3.8	9.5	2.1	4.6					
Average	63.5	52,4	4.2	9.8	1.9	4.6	Average	56.9	4.0	52.7	4.4

hind wing patch, thus approaching northern individuals of *panybeus* rather closely and combining secondary characters of the two species. But although there is a marked difference in size and colour between the extremes of *celebense,* fresh specimens of it and *panybeus* are separable at sight and show quite clearly that two allied species exist in Celebes; and I cannot yet appreciate that the differences are geographical, *i.e.,* subspecific, for the real affinities of *celebense* are with *fumosus* (see key on p. 580 - 581). More fresh material of typical *fumosus* from Moluccan islands is necessary to definitely solve the racial problems that have arisen. Unfortunately, neither of *panybeus* nor of the formenkreis *fumosus* the ranges have yet been defined in any degree of detail.

Distribution: Celebes.

Anax panybeus HAGEN (pl. 39 fig. 136).

Principal references:

1867. HAGEN, Verh. Zool.-bot. Ges. Wien, 17, p. 42 - 43. — ♂ N. Celebes ("Panybee" *recte* Panybi) (*panybeus*).

1867. BRAUER, Ibid. 17, p. 290, notes. — Celebes (*gibbosulus*).

1908. MARTIN, Cat. Coll. SELYS, Aeschn. 18, p. 24, 25. — "Célèbes, Batjan, Mariannes" (pars! sub *guttatus* Race *panybeus*).

1934. KENNEDY, Ann. Ent. Soc. Amer. 27, p. 346 - 349 (comp. notes *panybeus* with *piraticus*), 352 (descr. notes type *panybeus*); fig. 9 - 10 (♂ apps. type). — ♂ Type, Celebes (*panybeus*).

Extralimital. Material studied. — Celebes: 14 ♂, 1 ♀ (ad.), N. Celebes, Tondano near Manado, vii.1933 & vi.1935, C. VAN BRAEKEL; 1 ♂ (ad.), Airmadidi near Tondano, "forest-pool", 1.xii.1940, L. COOMANS DE RUITER; 1 ♂ (ad.), Central Celebes, Loewoe distr., Todjamboe (Palopo), 800 m, 5.v.1941, E. VONK; 1 ♂ (ad.), S. Celebes, Loka (Djeneponto), 1000 m, 30.viii.1941, L. COOMANS DE RUITER. — Allotype ♀: N. Celebes, Tondano, vii.1933, C. VAN BRAEKEL.

Male. — The single authentic specimen of *panybeus* thus far known is the type ♂ in the Museum of Comparative Zoology, Cambridge (Mass.). It has not been examined by KENNEDY, but Professor F. M. CARPENTER has made some valuable drawings of its anal appendages which KENNEDY published in his account of the new species *A. piraticus* KENN., from Guam, with which it was compared (l.c. *supra*). KENNEDY's figure 9 was not — as in *piraticus* and in our sketch on pl. 39 —, drawn as if held in a horizontal position (which is not the natural one but is necessary for comparisons), but, as stated by KENNEDY, appears to have been made as a true dorsal view; at the same time his fig. 10 was a lateral view, but with the inner edges of the appendage hanging slightly below the level of the outer edges of the same appendage, also a natural position. This is enough to account for the slight difference between KENNEDY's and my figures (pl. 39 fig. 136), which otherwise are practically alike. CARPENTER's figures of *panybeus* show no keel on the dorsal midline of segm. 10 and its absence in the type is explicitly stated (l.c. p. 349, 352); this, however, is a variable character, as 11 out of 14 males from Tondano show a fine distinct

Measurements of *Anax panybeus* HAGEN, from Celebes.

Locality ♂	Abd. + app.	Hind wing	Pt. fore wing	Abdomen			Locality ♀	Abd. — app.	Apps.	Hind wing	Pt. fore wing
				Length seg. 3	Constriction seg. 3	Greatest width seg. 8-9					
Tondano (N.C.)	**70.4**	**54.8**	**4.9**	10.7	1.7	**4.6**	Tondano (N.C.)	58 0	4 9	53.2	4.5
id. [1]	70.0	52.4	4.7	11.3	1.8	4.4					
Loka (S.C.)	69.5	53.2	4.3	11.3	1.8	4.6					
Tondano (N.C.)	69.1	53.7	4.7	11.4	1.7	4.5					
id.	69.0	53.4	4.5	11.4	1.5	4.5					
id.	68.9	**51.3**	4.4	11.1	**1.9**	4.5					
id.	68.7	51.7	4.2	**11.9**	1.8	4.5					
Todjamboe (C.C.) [2]	67.4	51.7	**4.0**	11.0	1.8	4.4					
Tondano (N.C.)	67.0	52.7	4.3	**10.0**	1.8	4.4					
id.	67.0	52.6	4.6	10.7	1.7	4.5					
id.	66.3	51.9	4.2	10.7	**1.4**	**4.3**					
id.	**66.2**	53.2	4.7	10.4	1.8	4.4					
Average	68.3	52.7	4.4	11.0	1.7	4.5					

[1] Airmadidi, near Tondano; apps. figured (pl. 39 fig. 136).
[2] Intermediate between *panybeus* and *f. celebense*.

keel, whereas in 3 others such a keel is feebly developed or all but invisible. The 9th abdominal segment of *panybeus* is spotted with yellow (or green) in the better preserved specimens; these spots are absent in others and in the type as stated by KENNEDY. In all respects, except colours, our specimens are perfectly typical, agreeing in every detail with HAGEN's description of the type, the colours of which had obviously faded.

The only f e m a l e (and allotype) of *panybeus* thus far known is a specimen from Tondano. Although practically indistinguishable from *f. celebense* in other respects, it is at once distinguished from that species by the much longer and differently shaped anal appendages. For measurements see table.

A. panybeus is closely related to *gibbosulus* and is possibly a subspecies of it. HAGEN did not know *gibbosulus* at the time of describing *panybeus* and even says of it: "bis nach Vergleich der Type möchte ich vorläufig meine Art [*panybeus*] für *A. gibbosulus* halten" (l.c. p. 43). The two species are held apart chiefly on account of small but apparently constant differences in the shape and size of the anal appendages of both sexes, the colour of the labrum, the size of the body, and in details of coloration. On the other hand, *A. panybeus* is linked up with *fumosus celebense* by a few slightly aberrant individuals of the latter, captured at Todjamboe in central Celebes, which I have found are intermediate; four males and one female are true *celebense*, but one ♂ I have been unable to identify satisfactorily at it shows the characters of both species, approaching *panybeus* most closely.

The type of *panybeus* has been collected by VON ROSENBERG at the same time as numerous other dragonflies from North Celebes, labelled "Ayer Pann", "Gorontalo", "Limbotto", "Panybie" etc. / "Rosenberg", — without particular indication of locality or date. All of these are preserved in the collection of the Leiden Museum and most of them are still in a perfect state of preservation. I have not, however, found any further specimen of *panybeus* in the Leiden Museum.

Panibi (or Panybi) is, or was, a little native village on the shore of Lake Limboto, distr. Gorontalo, Minahasa, North Celebes. C. B. H. VON ROSENBERG [1]) stayed at Limboto from Aug. 28th till Sept. 6th, 1863, and at Panibi from Sept. 7th — 15th, and says of the lake: "Van gekorven dieren treft men op het meer en in den omtrek eene groote hoeveelheid van Libellulae (glazenmakers) minstens een veertigtal soorten, aan". (l.c. p. 68).

D i s t r i b u t i o n: Celebes (parts).

Anax gibbosulus RAMBUR (pl. 38 fig. 133, pl. 39 fig. 135 & 139, pl. 41 fig. 154). Principal references:

1842. RAMBUR, Hist. Nat. Ins. Névropt. p. 187-188. — ♂ "Nouvelle Hollande".
1866. BRAUER, Novara Exped. Zool. 1. Neuropt. p. 62 (key). — ♂ "Neuholland".
1867. BRAUER, Verh. Zool.-bot. Ges. Wien, 17, p. 41 (notes, non vidi!).
1898. KRÜGER, Stett. entom. Zeitg. 59, p. 271-274 (pars, Soemba Id. only ?).

[1]) "Reistogten in de afdeeling Gorontalo", Amsterdam, Fr. MULLER, 1865, viii + 134 pp.

Measurements of *Anax gibbosulus* RAMB., from various localities.

Locality ♂	Abd. + app.	Hind wing	Pt. fore wing	Abdomen			Locality ♀	Abd. − app.	Apps.	Hind wing	Pt. fore wing
				Length seg. 3	Constriction seg. 3	Greatest width seg. 8-9					
Banda	**74.7**	**56.0**	**5.5**	**12.9**	—	5.1	Soemba	**63.7**	5.5	**58.8**	**5.8**
Ambon	72.7	54.7	**4.2**	11.6	1.9	4.8	S. New Guinea (Digoel)	62.7	5.4	57.0	5.1
S.W. New Guinea (Kaimana)	72.2	55.4	5.2	11.2	**2.0**	**5.2**	id. id.	61.4	5.7	55.7	5.3
N. Australia (Pr. of Wales Id.)	71.6	53.5	4.5	11.2	1.9	4.6	id. (Merauke)	60.7	**5.8**	**55.2**	**5.0**
Ambon	70.5	54.0	4.5	11.6	**1.6**	**4.4**	id. (Etna Bay)	**60.5**	**5.4**	55.3	5.4
Soemba	70.5	55.2	5.0	11.5	1.8	4.8					
id.	70.0	54.0	5.0	11.7	1.8	4.7					
N. Halmahera	**70.0**	**52.3**	4.3	**10.9**	—	—					
Average	71.5	54.4	4.8	11.6	1.8	4.8	Average	61 8	5.5	56.4	5.3

1900. RIS, Archiv f. Naturgesch. 1, p. 191 - 192 (key ♂), Taf. 10 fig. 20 (♂ apps., Kei Is.). — ♂ Kei Is.
1908. MARTIN, Cat. Coll. SELYS, Aeschn. 18, p. 24 - 25, fig. 1 (wings ♂ N. Australia), 18 (apps. ♂, N. Australia). — Kei Is.; N. Australia.
1913. RIS, Abh. Senckenb. Naturf. Ges. 34, p. 526 - 527. — ♂♀ Aroe Is.; ♂ Ceram.
1915. RIS, Nova Guinea, 13, Zool. 2, p. 84 (New Guinea), 113 (Ceram). — ♂ S. New Guinea; ♂ Ceram (no descr.).
1916. TILLYARD, J. Linn. Soc. London, Zool. 33, p. 66 - 67 (descr. ♂♀). — ♂♀ Pt. Darwin; ♀ Queensland.
1932. FRASER, Mém. Mus. Roy. Hist. Nat. Belg. hors ser. 4, 3, p. 14 - 15 (pars!). — W. New Guinea.
1933. LIEFTINCK, Rev. Suisse Zool. 40, p. 435 - 438 (descr., key with *maclachlani*). — ♂ N. Australia (N.T.); "Soemba; Flores; Celebes (error!); Ceram; Kei; Aroe; S. New Guinea; N. Australia.
1936. LIEFTINCK, Rev. Suisse Zool. 43, p. 151, note. — ♀ Flores; ♂♀ Soemba.

Material studied. — South New Guinea (W. to E.): 1 ♂ (ad.), Bombarai Peninsula, Kowiai distr., Kaimana (southcoast), 5.vi.1941, E. LUNDQUIST (Negumy Expedition). 1 ♀ (ad.), Etna Bay (southcoast), 20.viii.1939, H. BOSCHMA (Le Roux Expedition). 1 ♂ (ad., segm. 4- 5 of abdomen lacking), New Guinea Expedition 1904/05, Merauke, labelled by R. MARTIN: "*Anax guttatus* forme *Panybeus* (manquent 2 segm. de l'abdomen)", in the Leiden Museum. 1 ♀ (ad.), Merauke, 30.iii.1939, R. G. WIND. 2 ♀ (ad.), Digoel River, ix. 1909, DUMAS ("*A. guttatus* Burm. ♀", det. F. C. FRASER 1926). [1])

Extralimital material. — N. Australia (N. Queensland): 1 ♂ (ad.), Prince of Wales Id, 14.ii.1939, R. G. WIND. 1 ♂ (juv.), labelled: "Palmerston, N. Austr." (purple label, SELYS's hand), "*A. gibbosulus*? R. ♂ Molluques" [white (erroneous) label, SELYS's hand], in the Brussels Museum. — Kei Is.: 1 ♂ (ad.), "Toleal (recte Toeal), I. Key" (yellow label, SELYS's hand), *Anax gibbosulus* Rb." (pencil, unknown hand), in the Brussels Museum. — Banda Is.: 1 ♂ (semiad.) Groot Banda, Laoetang Estate, 29.iv.1937, "at house, 6 a.m.", F. K. A. CLARINGBOULD. — Ambon: 2 ♂ (ad.), Ambon, Goenoeng Soja, 19.iv.1941, E. LUNDQUIST (Negumy Expedition). — 1 ♂ (ad.) N. Halmahera, Tobelo, vi-vii.1931, M. J. VAN DIEJEN. — Lesser Sunda Islands: Soemba I.: 1 ♀, W. Soemba, 23.xi 1932, L. P. KRIJGER (Mus. Amsterdam); 2 ♂, 1 ♀ (ad.), N. W. Soemba, distr. Laora (Waikelo-Karoni), 100 m, iv.1925; 1 ♀ (ad.), S. E. Soemba, lake E. of Kananggar, 700 m, 13 - 23.v.1925, K. W. DAMMERMAN. 2 ♀ (ad.), W. Flores I., crater-lake Wai Sano, 650 m, xi.1929, J. K. DE JONG. 1 ♀, Timor I., Nikiniki, vi.1935, C. BÜHLER & MEYER (Mus. Basle).

Typical individuals of this handsome insect which I have examined from N. Australia [2]), S. New Guinea, the Banda group and Kei Islands are well

[1]) In 1938 I examined in the Brussels Museum a specimen from the Anggi Lakes, C.W. New Guinea, which I identified with *gibbosulus*, confirming FRASER's determination (l.c. 1932).

[2]) Cf. TILLYARD's significant diagnosis (l.c. 1916); one of the ♀ described by him from Port Darwin should be considered the allotype of *gibbosulus*.

Measurements of *Anax maclachlani* FÖRSTER, from New Guinea.

Locality ♂	Abd. + app.	Hind wing	Pt. fore wing	Abdomen			Locality ♀	Abd. — app.	Apps.	Hind wing	Pt. fore wing
				Length seg. 3	Constriction seg. 3	Greatest width seg. 8-9					
N. New Guinea	**84.0**	58.0	4.4	**14.7**	1.9	4.8	N. New Guinea	**68.2**	**5.4**	58.8	4.8
id.	83.5	56.5	4.3	14.4	1.9	**5.0**	id.	67.2	4.9	**60.0**	4.2
E. New Guinea [1])	83.0	**59.0**	—	—	—	—	id.	66.6	5.0	57.6	**5.0**
N. New Guinea	81.0	55.0	4.0	14.0	1.9	4.7	id.	66.4	4.8	57.0	4.8
id.	78.0	54.8	**5.0**	13.4	1.7	4.4	id.	65.5	4.8	59.3	5.0
id.	75.5	57.0	4.7	13.4	1.9	4.5	id.	64.8	4.9	57.4	4.1
id.	75.5	53.5	**4.0**	13.2	1.7	4.6	id.	63.0	5.0	54.5	4.3
id.	75.2	**52.3**	4.1	13.2	**2.0**	**4.4**	id.	62.5	4.4	56.3	4.6
id.	72.3	56.3	4.2	12.3	1.8	4.8	id.	59.5	4.9	**53.4**	4.0
id.	**69.8**	58.0	4.5	**11.0**	**1.7**	4.5	id.	**59.5**	**4.4**	54.3	**3.9**
Average	77.8	56.0	4.3	13.3	1 8	4.6	Average	64.3	4.8	56.8	4.5

[1]) Milne Bay (Brussels Mus.).

characterized by the conspicuously spotted abdomen. In most examples from Aroe, the Lesser Sunda islands and the Moluccas, these light spots are considerably reduced in size, but structurally I can find no differences between these dark-coloured populations and typical *gibbosulus* from Australia and continental New Guinea.

The wing-photograph and drawing of the ♂ anal appendages in MARTIN's monograph (l.c. 1908), were made after the ♂ from Palmerston, in the Brussels Museum.

Our series of *A. panybeus* from N. Celebes presenting a very uniform appearance, differing constantly from *gibbosulus* in details of the anal appendages of the ♂, I believe that the two species should be held apart. Nevertheless, as stated elsewhere (*antea*), it is not unlikely that hybridization occurs in the eastern parts of Celebes and in the northern Moluccas, where the ranges of the two species overlap. At all events there is no reliable evidence for the occurrence of *gibbosulus* in Celebes.

Distribution: N. Australia (terr. typ.) and Prince of Wales Id.; New Guina (southcoast, universal); Aroe Is.; Kei Is.; Banda Is.; the Lesser Sunda islands Soemba, ? Flores and Timor; the Moluccan islands Ambon, Ceram and N. Halmahera.

[A distinct race or subspecies of *gibbosulus*, which I cannot refer to any previously described form occurs in Malaysia (e.g. Sumatra, Java, Bali and Borneo, probably also in other Sondaic islands). It resembles *gibbosulus* and *panybeus* very closely, but differs from the former in its more sombre colours and smaller size, and from the latter in details of venation and anal appendages. I refrain from giving it a name here as I am not yet definite of its being a distinct species or a subspecies of either of the two above mentioned species. It has been recorded in several publications dealing with Malaysian *Anax* [1]), and descriptions of both sexes have already been published by RIS (*loc. cit.* 1927, p. 34 - 35). Possibly the two females from Flores (*antea*) also belong to it.]

Anax maclachlani FÖRSTER (pl. 38 fig. 132, pl. 39 fig. 137 & 140, pl. 41 fig. 155).

1898. FÖRSTER, Természs. Füzetek, 21, p. 290 - 292, pl. 13 fig. 1 (♂ insect), 2 (apps. ♂). — N.E. New Guinea.
1900. RIS, Archiv f. Naturgesch. 1, p. 191 - 192 (key; descr.), 202 - 203 (note larva), pl. 9, fig. 12 (apps. ♂). — ♂♀ New Britain.
1908. MARTIN, Cat. Coll. SELYS, Aeschn. 18, p. 25 - 26, fig. 19 (apps. ♂). — ♂ N. Guinea.
1933. LIEFTINCK, Rev. Suisse Zool. 40, p. 437 (diagn.), 438 (key, with *gibbosulus*). — ♂ N. New Guinea.
1934. KENNEDY, Ann. Ent. Soc. Amer. 27, p. 353, 356 (type ♂, notes), fig. 29 - 30 (apps. ♂, type). — ♂ type, notes.

[1]) See KRÜGER, *Stett. ent. Zeitg.* 59, 1898, p. 271 - 274, Sumatra (*gibbosulus*). RIS, *Zool. Meded. Leiden*, 10, 1927, p. 34 - 35, Java, Sumatra (*fumosus*). SCHMIDT, *Arch. Hybrob. Suppl.* 13, 1934, p. 354, C. Java (*guttatus*). LIEFTINCK, *Treubia*, 14, 1934, p. 448 - 449, Java (*gibbosulus* subsp.); *Miscell. Zool. Sum.* (Medan), 92 - 93, 1935, p. 23, Sumatra (*gibbosulus* subsp.). NEEDHAM & GYGER, *Philipp. J. Sci.* 63, 1937, p. 43 pl. 2 fig. 21 - 22, Luzon (*gibbosulus*).

Measurements of *Anax pugnax*, sp. n., from New Guinea.

Locality ♂	Abd. + app.	Hind wing	Pt. fore wing	Abdomen			Locality ♀	Abd. — app.	Apps.	Hind wing	Pt. fore wing
				Length seg. 3	Constriction seg. 3	Greatest width seg. 8-9					
Wissel Lakes	**76.4**	**58.0**	4.7	11.1	2.0	**5.2**	Araucaria Cp. [2]	**66.5**	5.5	**59.1**	5.0
Araucaria Cp.	75.7	57.7	5.0	**11.6**	2.1	5.0	id.	66.1	5 6	57.6	4.5
Wissel Lakes	75.0	57.4	4.5	**11.0**	**2.5**	5.2	Wissel Lakes	65.0	**5 7**	57.0	**5.2**
Araucaria Cp. [1]	75.0	56.3	4.9	11.5	2.0	5.0	id.	63.0	5.7	56.0	4.7
id.	74.7	56.2	5.0	11.4	2.1	**4.6**	Baliem Cp.	62.2	5.0	56.0	4.8
Wissel Lakes	74.5	**55.6**	**4.2**	11.3	2.2	5.0	Araucaria Cp.	62.0	5.3	56.4	4.7
id.	73.0	55.8	5.0	11.1	2.0	5.0	Baliem Cp.	62.0	5.0	55.0	4.5
id.	72.9	56.7	4.9	11.4	2.2	5.0	id.	61.6	4.9	53.0	4 8
id.	72.5	56.5	**5.2**	11.4	**2.0**	4.8	Araucaria Cp.	61.5	5.0	56.6	4.8
id.	**72.2**	56.4	5.0	11.5	2.4	5.1	id.	60.8	5.2	55.3	4.5
							Baliem Cp.	60.8	4.9	54.6	4.9
							Araucaria Cp.	60.0	5.3	57.0	4.5
							Baliem Cp.	60.0	5.0	56.0	4.8
							Araucaria Cp. [3]	60.0	4.7	**52.0**	4.5
							Baliem Cp.	**59.0**	**4.7**	53.7	**4.5**
Average	74.2	56.6	4.8	11.3	2.1	5.0	Average	62.0	5.2	55 7	4 7

[1] **Holotype.**
[2] **Allotype.**
[3] **Ovipositing.**

Material studied. — North New Guinea (W. to E.): 1 ♂, 1 ♀ (ad.), W. Vogelkop (Berau), Aja Maroe, xi.1937, J. M. VAN RAVENSWAAY CLAASEN. — 1 ♂, Mamberamo River Valley, Pionierbivak, xi.1920, W. C. VAN HEURN. — 4 ♂ (ad.), Kressi Rd, 400 m (Kressi valley, W. of Lake Sentani), 10.vii.1934; 1 ♀ (ad.), Cycloop Mts, 1000 m, 8.viii. 1935; 36 ♂, 13 ♀ (ad.), Hollandia & environs, v, vii-ix.1930 & 22.ii.1933; 1 ♂, 1 ♀ (ad.), 15 km S. of Bougainville Range, Nonno (Japoe) Hills, 400 m, Komfé, xi.1935 and Nonno River, 400 m, 12.ii.1936; 1 ♂ (ad.), S. Bewani Hills, Ampas distr., Kali Bau, 22.iii.1938; 1 ♂, 1 ♀ (ad.), same region, near Keerom River, 30.x.1938 and 5.vi.1939; all W. STÜBER. — 1 ♂ (ad.), Hollandia, 11.vii.1938, J. OLTHOF. — East New Guinea: 1 ♂ (ad.), "Bongu, Astrolabebai, Sommer 1898, W. Wahnes", and "*Anax Maclachlani* Foerster" (both labels in FÖRSTER's hand); 2 ♂ (ad.), "Huongolf, Simbang, Carl Wahnes leg. Sommer 1900", and "*Anax Mac Lachlani* Foerster" (both in FÖRSTER's hand, one with notes on coloration by WAHNES); all in the Michigan Museum, Ann Arbor [1]). — 1 ♂ (ad.), labelled: "*Anax Mac Lachlani* * Milne Bai. Foerster. N. Guinée par Mr. Foerster" (red label, SELYS's hand), "*Anax Maclachlani* FÖRST." (MARTIN's hand), in the Brussels Museum. — Allotype ♀: Hollandia, v. 1930, W. STÜBER.

This long-bodied *Anax* is a common and easily recognized species which needs no further elucidation. Many specimens were captured by STÜBER near Hollandia, at dusk. As RIS's ♀ from New Britain is a worn and discoloured specimen, I have selected as allotype a Hollandia specimen of that sex. Both sexes vary much in size.

Apparently confined to low country and replaced by *A. pugnax* at higher altitudes.

Distribution: North New Guinea (universal); New Britain.

Anax pugnax, sp. n. (pl. 38 fig. 134, pl. 39 fig. 138 & 141, pl. 41 fig. 156).

Material studied. — Central New Guinea (W. to E.): 3 ♂ (1 juv.), 1 ♀ (ad., ovipositing), Wissel Lakes group, Enarotali (E.-point of Lake Paniai), 1742 m, 29.ix, 1.x and 10-18.xi.1939; 1 ♀ (ad.), Lake Paniai, 25.viii.1939; 6 ♂, 1 ♀ (ad.), Araboe Bivouac, 10 miles N.E. of Lake Paniai, 1800 m, 4.x-1.xi.1939, all H. BOSCHMA (Le Roux Expedition) — 2 ♂, 11 ♀ (ad.), Araucaria Camp and River, 800 m, 3, 15, 21 and 24.iii.1939; 12 ♀ (ad.), Baliem Valley, 1600 m, 16-25.xi and 7.xii.1938, L. J. TOXOPEUS; 1 ♀ (Baliem, 25.xi.1938) with collector's note: "Abdomen segm. 2 with large pair of *Myosotis*-blue spots, ventrally sharply delimited olive-green; segm. 3 with pair of blue points, thence fading to light green; ventral side growing whitish. Frons brownish-olive; eyes with pale side-margin. Ovipositing in small pool." — Holotype ♂ and allotype ♀: Araucaria Camp, 800 m, 21 and 24.iii.1939, L. J. TOXOPEUS.

[1]) Mrs HOWARD K. GLOYD kindly informs me that the type ♂ in the Michigan Museum (Ann Arbor) is labelled: "Constantinhafen, Kaiser Wilhelmsland, Wahnes leg. 1894".

A very distinct species, evidently closely allied to *maclachlani*, but both sexes are easily recognized by the shape of their anal appendages, the shorter abdomen, and by the entirely or almost hyaline wing-membrane.

A. pugnax was obtained in numbers from the surroundings of Lake Paniai and the lake itself, where it has its permanent residence; many larvae were also collected from the lake, apparently without special purpose. Females were also common at Araucaria Camp and in the Baliem Valley, but almost all of them were taken whilst ovipositing. Males evidently very scarce or difficult to capture, especially at Baliem Camp.

Apparently widely distributed and rather common in suitable places, though only at higher altitudes (800 - 1800 m).

A solitary example of *pugnax* (?) was once noticed by Dr TOXOPEUS over a tributary of the Bèlè River, at Iebèlè Camp, 2250 m above sea-level. Stray specimens of a huge *Anax* (presumably also *pugnax* ?) were observed occasionally along the shore of Lake Habbema (3225 m), also by TOXOPEUS, but unfortunately no single individual could be taken at these high altitudes.

Distribution: Central New Guinea (mountains).

ALPHABETICAL INDEX (excl. synonyms).

ERRATA

On page 526 line 6 from below read: wing-margin instead of wing-marging.
— — 533 line 9 from above read: Mouth-parts instead of Mounth-parts.
— — 533 line 3 from below read: occupying instead of occuppying.
— — 560 line 17 from below read: 1000 instead of 100.
— — 567 line 13 from below read: *Ictinogomphus* instead of *Intinogomphus*.
— — 575 line 6 from below read: dealt instead of dealth.

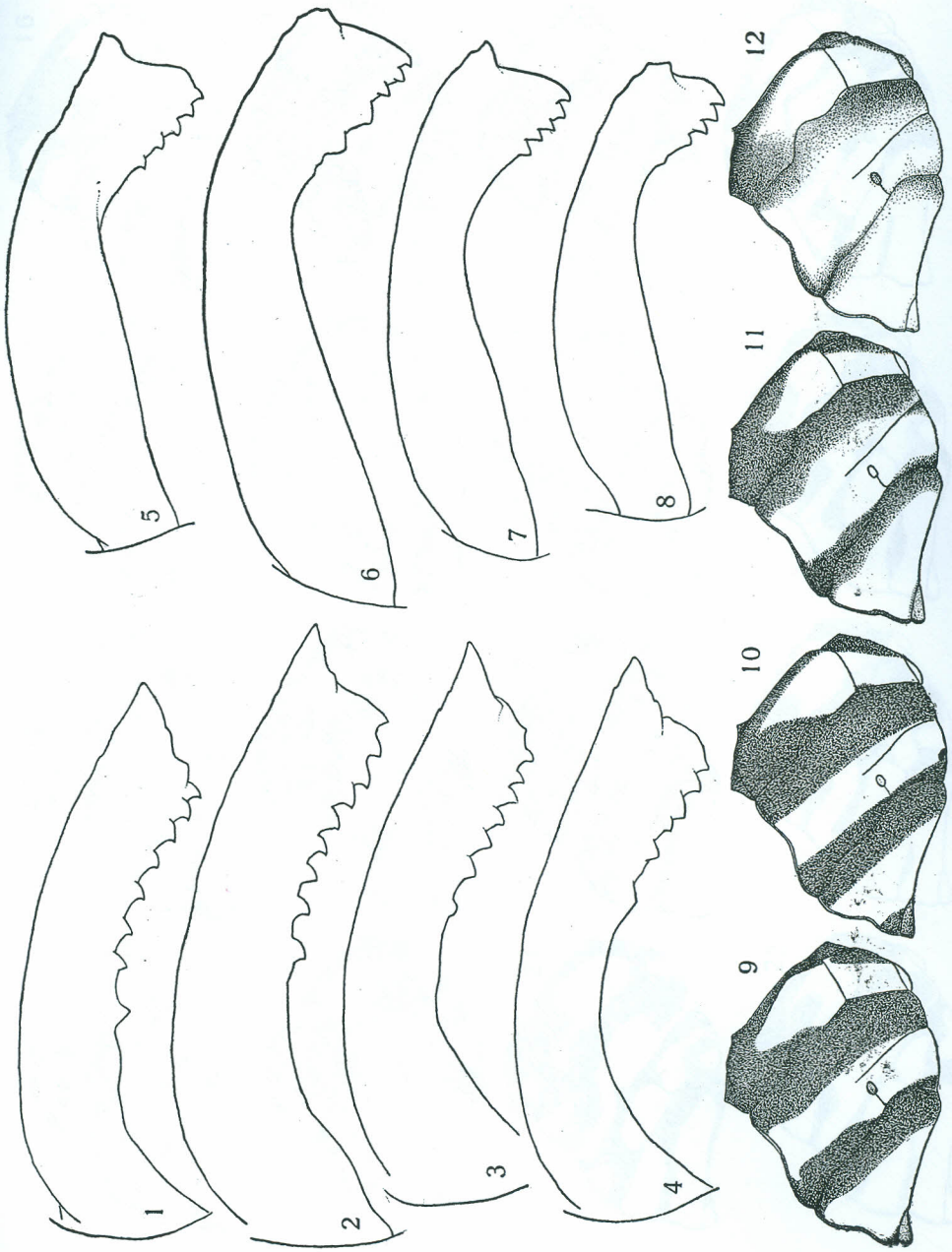


Fig. 1 - 8. Left superior anal appendages of ♂ *Tetrathemis*. 1. *T. irregularis hyalina* K., S. W. Java; 2. W. Flores; 3. W. Borneo; 4. E. Borneo. — 5. *T. i. irregularis* BRAUER, Philippines (Basilan I.). — 6. *T. i. leptoptera* (SELYS), S. W. Celebes. — 7. *T. i. papuensis*, subsp. n., N. New Guinea (Hollandia). — 8. *T. i. dives* RIS, S. New Guinea (paratype). — Fig. 9 - 12. Colour-patterns of synthorax, right side view. — 9. *T. i. irregularis* BRAUER, ♂, Philippines (Basilan I.). — 10. *T. i. leptoptera* (SELYS), ♂, S. W. Celebes. — 11. *T. i. papuensis*, subsp. n., ♂, N. New Guinea (Hollandia). — 12. *T. i. cladophila* TILL., ♀ Aroe Is. (Dobo).

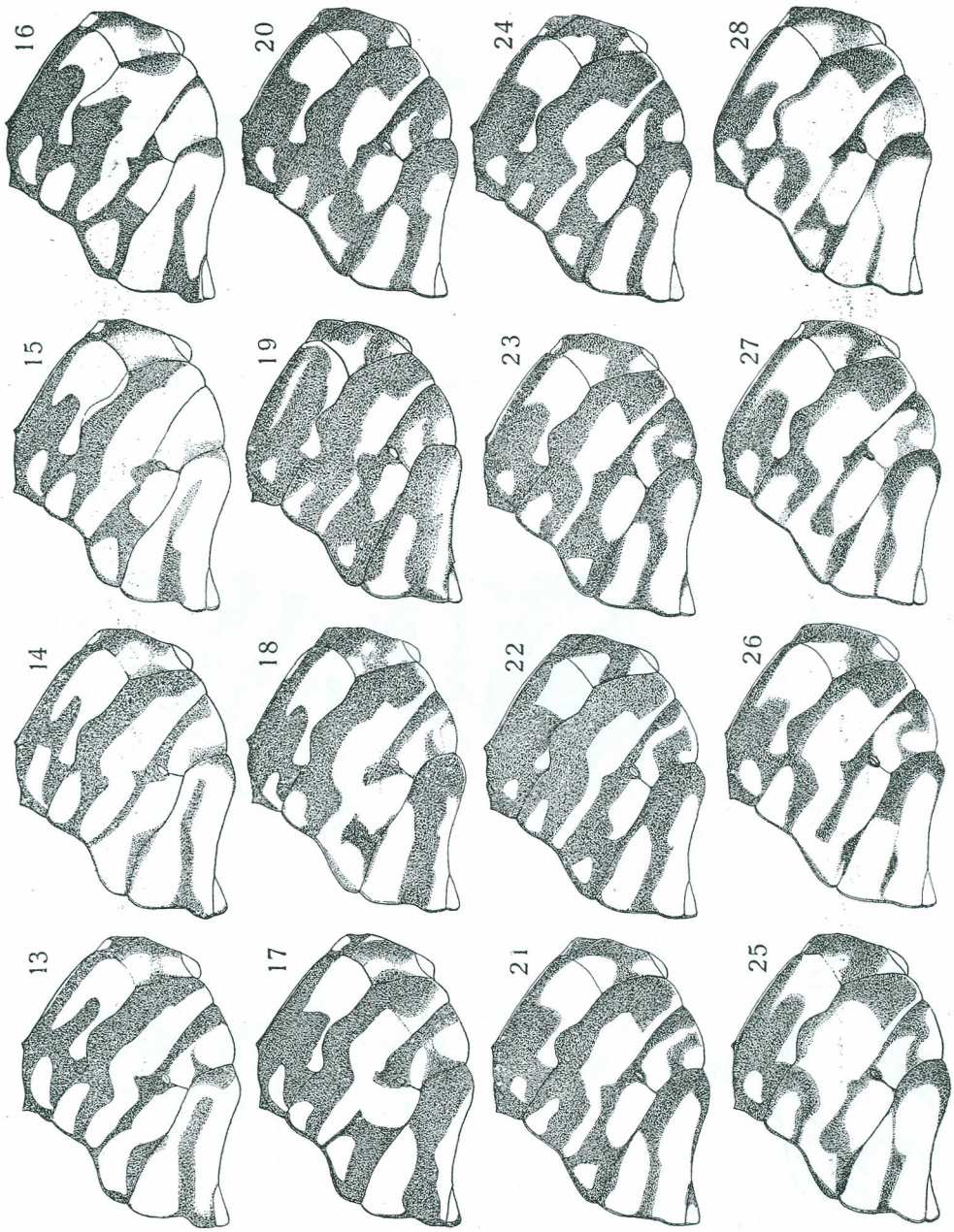


Fig. 13 - 28. Colour-patterns of synthorax, right side view (♂). **13.** *Nesoxenia mysis moluccana*, subsp. n., Boeroe (Wa' Katin); **14.** Kei Is. (Toeal). — **15.** *N. m. interrogata* (SELYS), Schouten Is. (Biak). — **16.** *N. m. mysis* (SELYS), N. New Guinea (Bernhard Cp.). — **17.** *N. m. tarafia*, subsp. n., N. New Guinea (Tarafia). — **18.** *N. m. mutans*, subsp. n., W. New Guinea (Babo). — **19.** *Agrionoptera insignis cynthiae*, subsp. n., Tanimbar Is. — **20.** *A. i. similis* SELYS, Halmahera (Tobelo); **21.** Ceram (Amahai); **22.** E. New Guinea (Bongu); **23.** Aroe Is. (Dobo). — **24.** *A. i. papuensis* SELYS, N. New Guinea (Hollandia). — **25.** *A. i. allogenes* TILL., S. New Guinea (Digoel); **26.** S. New Guinea (Merauke); **27.** Aroe Is. (Dobo); **28.** N. Queensland (Redlynch).

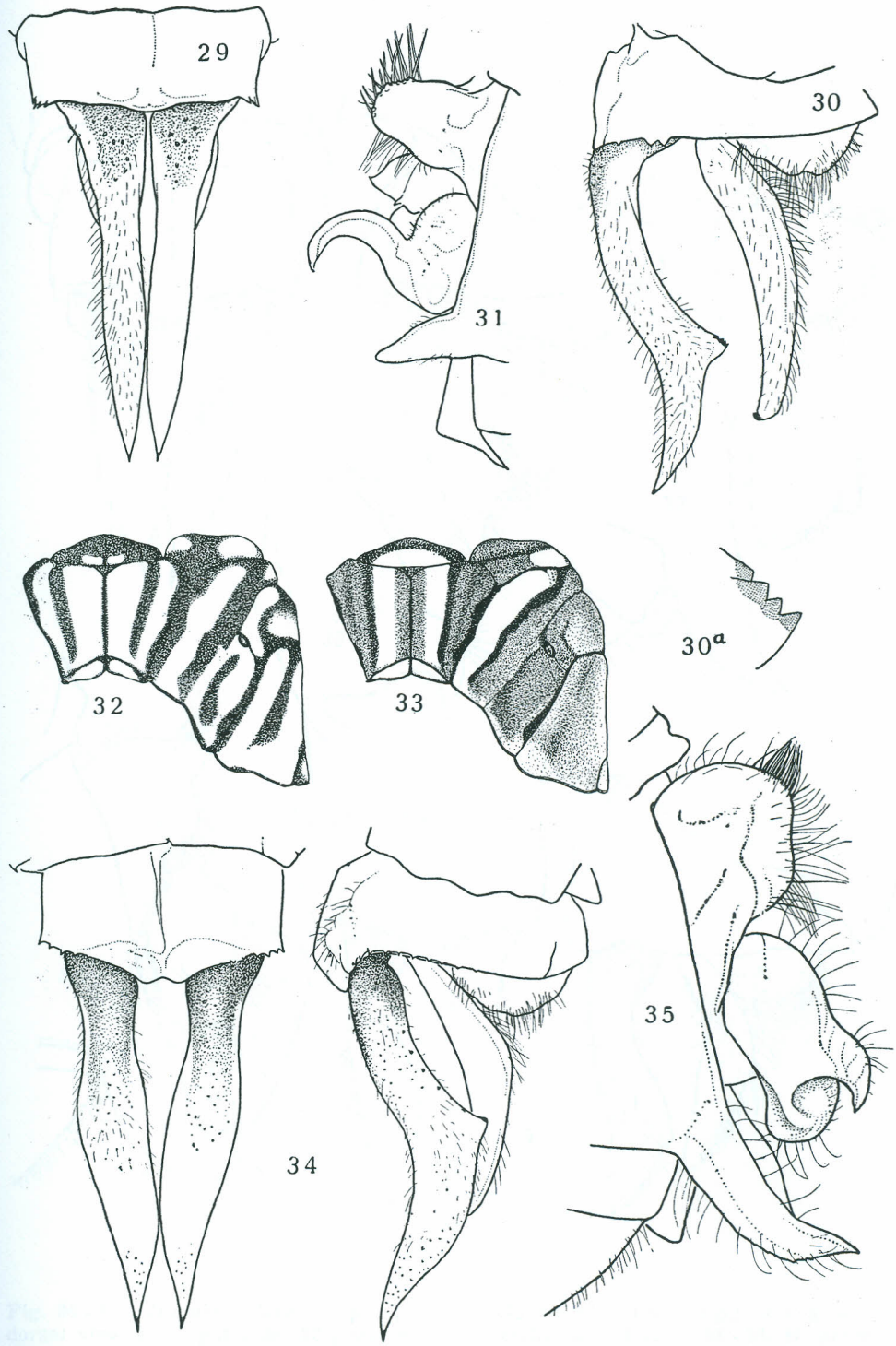


Fig. 29 - 31. *Nannophlebia ampycteria* LIEFT., N. New Guinea (Tarafia), ♂ anal apps., dorsal view (29) and right side (30), genitalia, left side (31), and teeth along lower margin of sup. anal app. (30a). — 32. *Orthetrum s. sabina* (DRURY), ♂, colour-pattern of synthorax, N. New Guinea (Hollandia). — 33. The same of *O. s. viduatum*, subsp. n. ♂, C. New Guinea (Baliem Valley). — 34 - 35. *Huonia thalassophila* FÖRST., N. E. New Guinea (Bongu), ♂ anal apps., dorsal view and right side (34) and genitalia, right side (35).

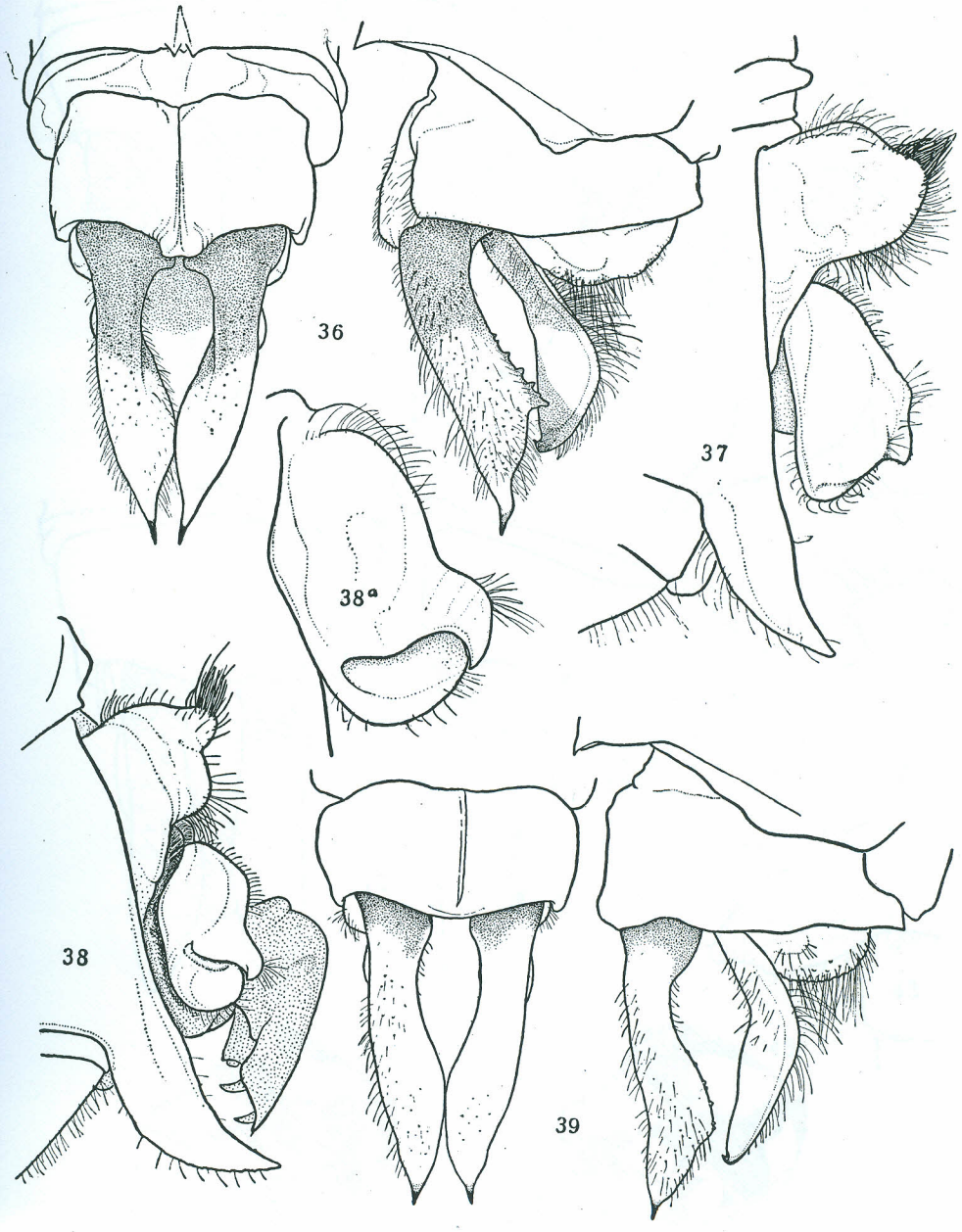


Fig. 36 - 37. *Huonia hylophila*, sp. n., C. New Guinea (Araucaria Cp.), ♂ anal apps., dorsal view and right side (36), and genitalia, right side (37). — 38 - 39. *H. aruana*, sp. n., Aroe Is. (Dobo), genitalia, right side, oblique lateral view (38), right hamule, more highly magnified, full profile view (38a), and anal apps., dorsal view and right side (39).

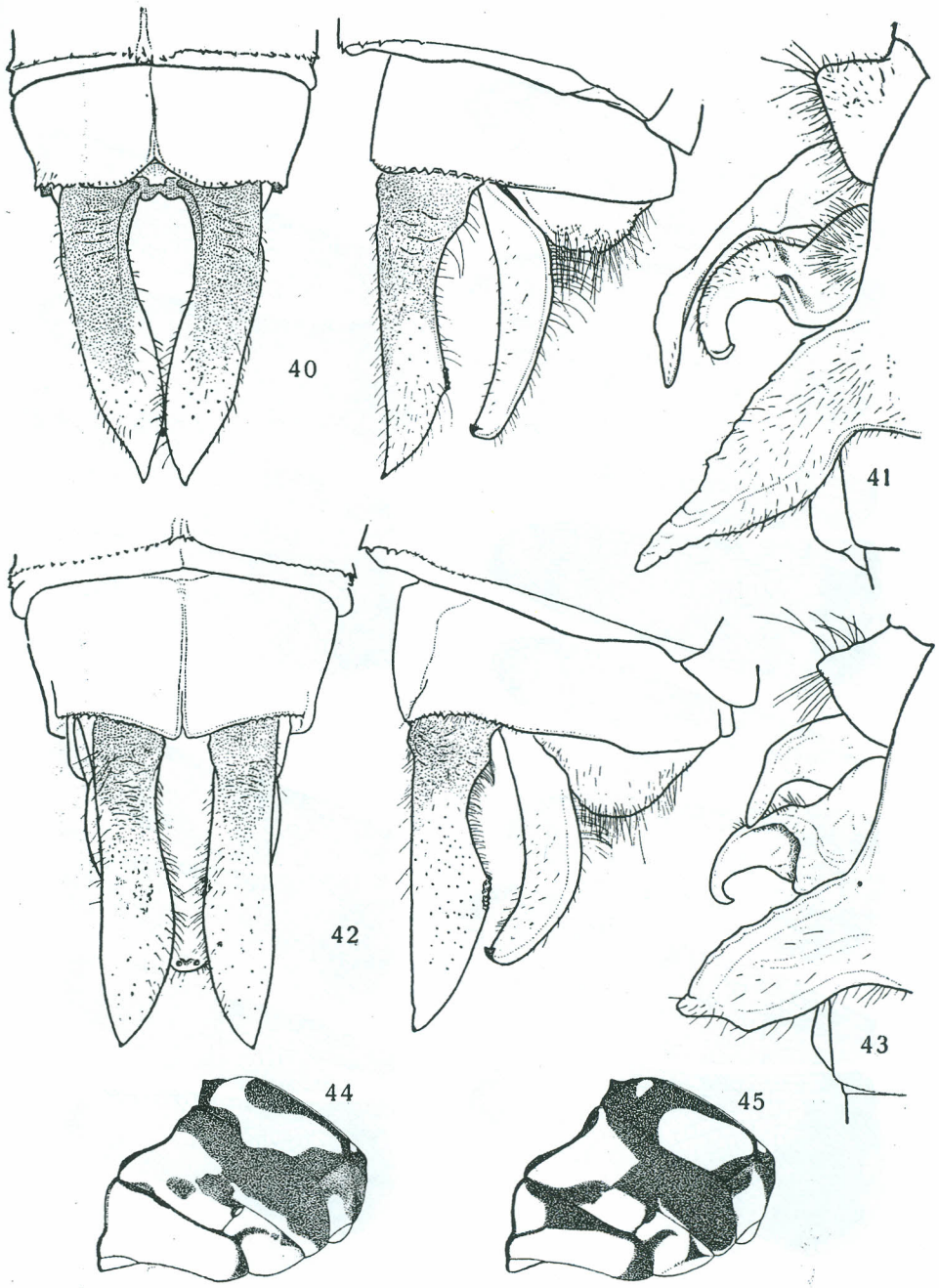


Fig. 40-41. *Lanthanusa richardi*, sp. n., C. New Guinea (Mist Cp.), ♂ anal apps., dorsal view and right side (40), and genitalia, left side (41). — 42 - 43. *L. lamberti*, sp. n., C. New Guinea (Moss Forest Cp.), ♂ anal apps., dorsal view and right side (42), and genitalia, left side (43). — 44 - 45. Colour-pattern of synthorax of ♂ *L. richardi*, sp. n., Mist Cp. (44) and of ♂ *L. lamberti*, sp. n., Moss Forest Cp. (45).

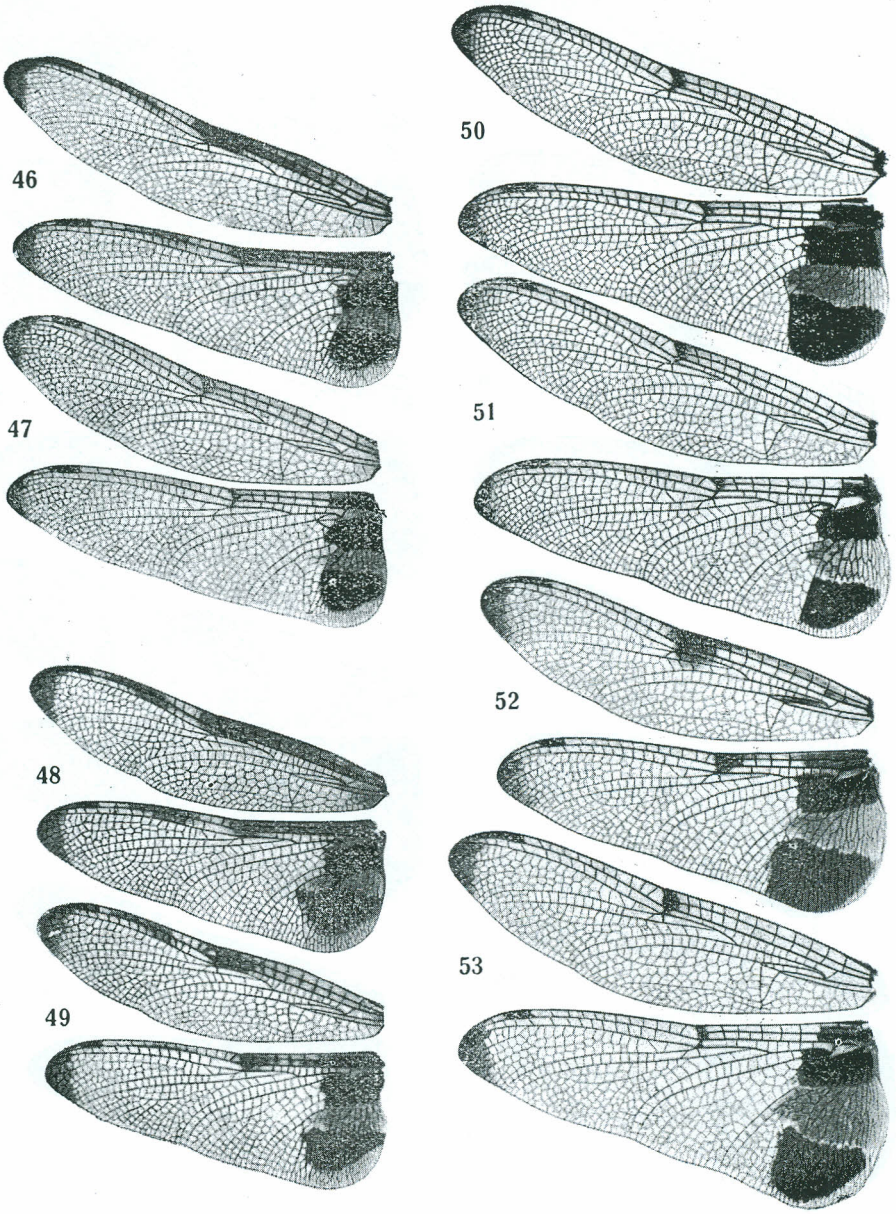


Fig. 46 - 49. Wings of *Rhyothemis phyllis obscura* SELYS, Halmahera (Tobelo); 46. ♂ maximum, 47. ♂ minimum; 48. ♀ maximum, 49. ♀ minimum. — 50 - 53. Wings of *R. p. beatricis*, subsp. n., N. New Guinea (Hollandia); 50. ♂ maximum, 51. ♂ minimum; 52. ♀ maximum, 53. ♀ minimum. All enlarged to scale.

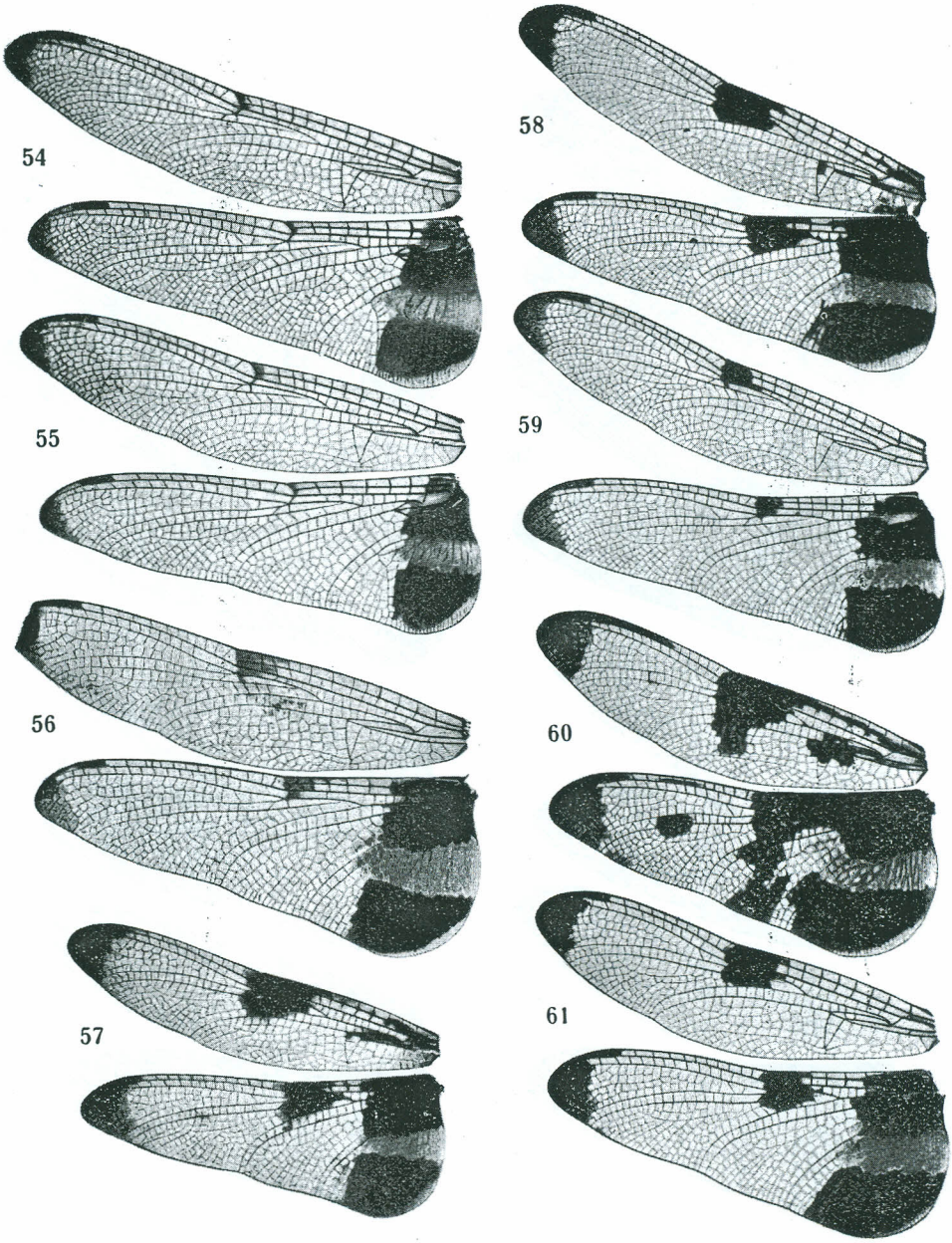


Fig. 54 - 56. Wings of *Rhyothemis phyllis beatricis*, subsp. n., S. New Guinea (Merauke); 54 - 55. ♂; 56. ♀. — 57. Wings of *R. p. chloe* KIRBY, ♀ Aroe Is. (Dobo). — 58 - 61. Wings of *R. p. chloe* KIRBY, N. Queensland (Redlynch); 58. ♂ maximum, 59. ♂ minimum; 60. ♀ maximum, 61. ♀ minimum. All enlarged to scale.

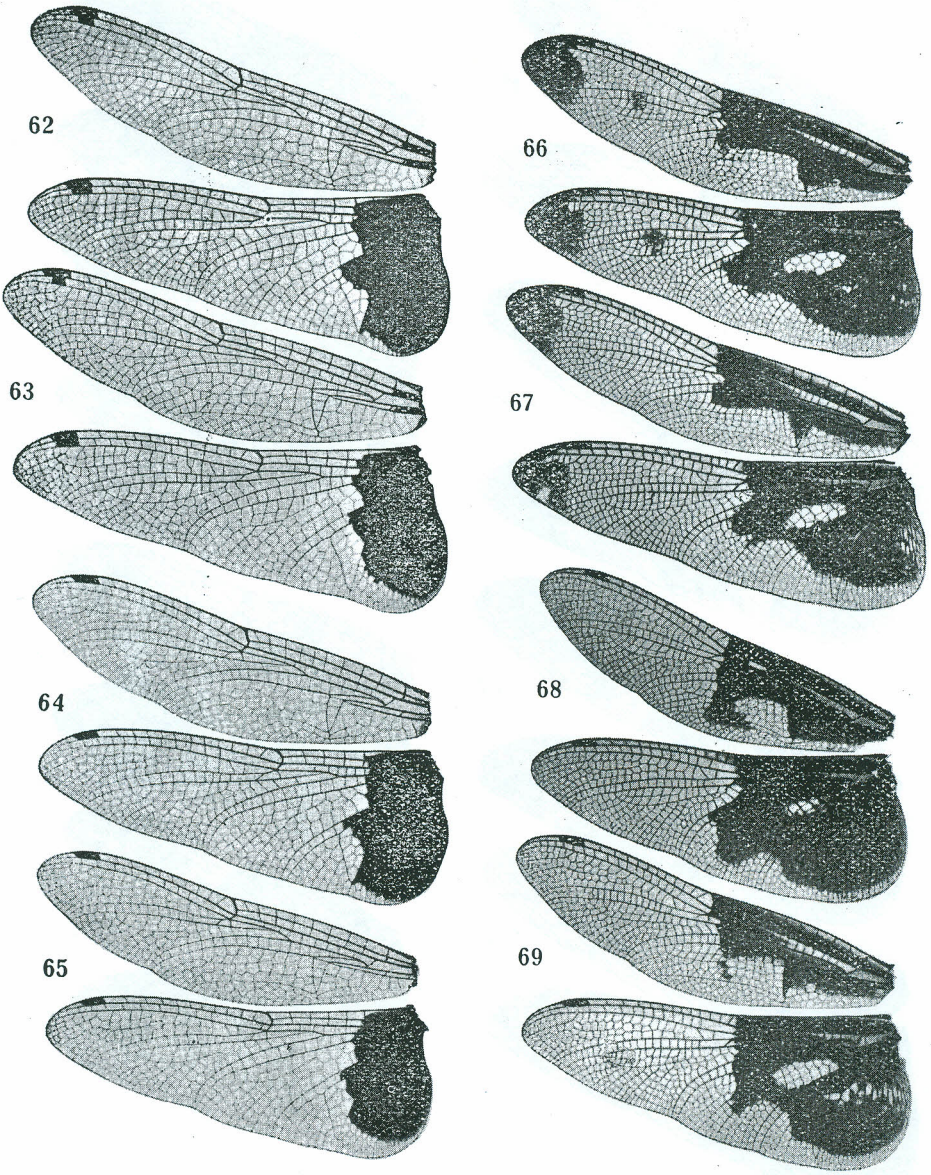


Fig. 62 - 65. Wings of *Rhyothemis hurleyi* TILL., N. New Guinea (Hollandia); 62. ♂ maximum, 63. ♂ minimum; 64. ♀ maximum, 65. ♀ minimum. — 66 - 69. Wings of *R. regia exul* RIS, Kei Is. (Toeal); 66. ♂ maximum, 67. ♂ minimum; 68. ♀ maximum, 69. ♀ minimum. All enlarged to scale.

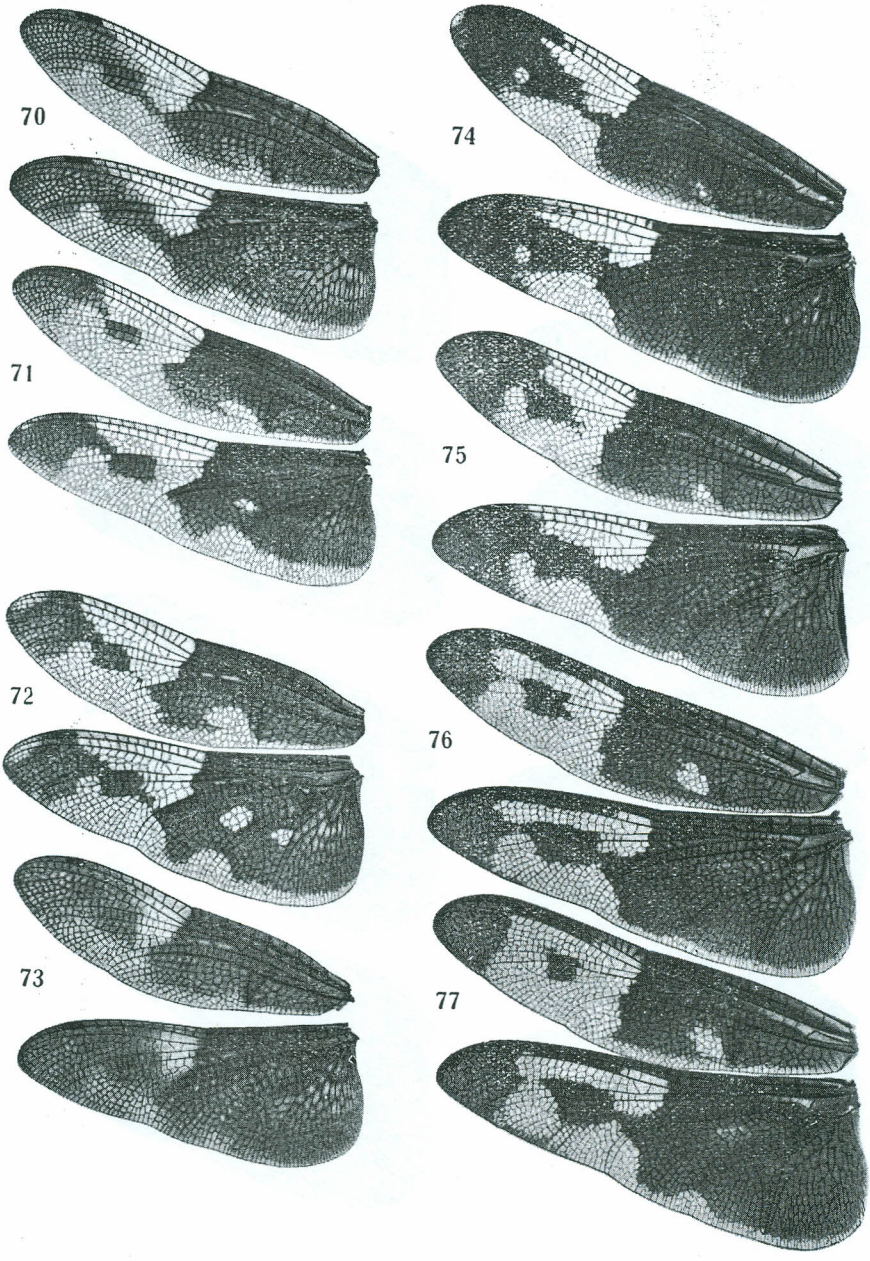


Fig. 70 - 73. Wings of *Rhyothemis princeps irene*, subsp. n., N. New Guinea (Hollandia); 70. ♂ maximum, 71. ♂ minimum; 72. ♀ (common form), 73. ♀ (juvenile, dark extreme). — 74 - 77. Wings of *R. regia juliana*, subsp. n., ♂ N. New Guinea; 74. Lake Sentani; 75. Kressi; 76. Lake Sentani; 77. Berap Lakes. All enlarged to scale.

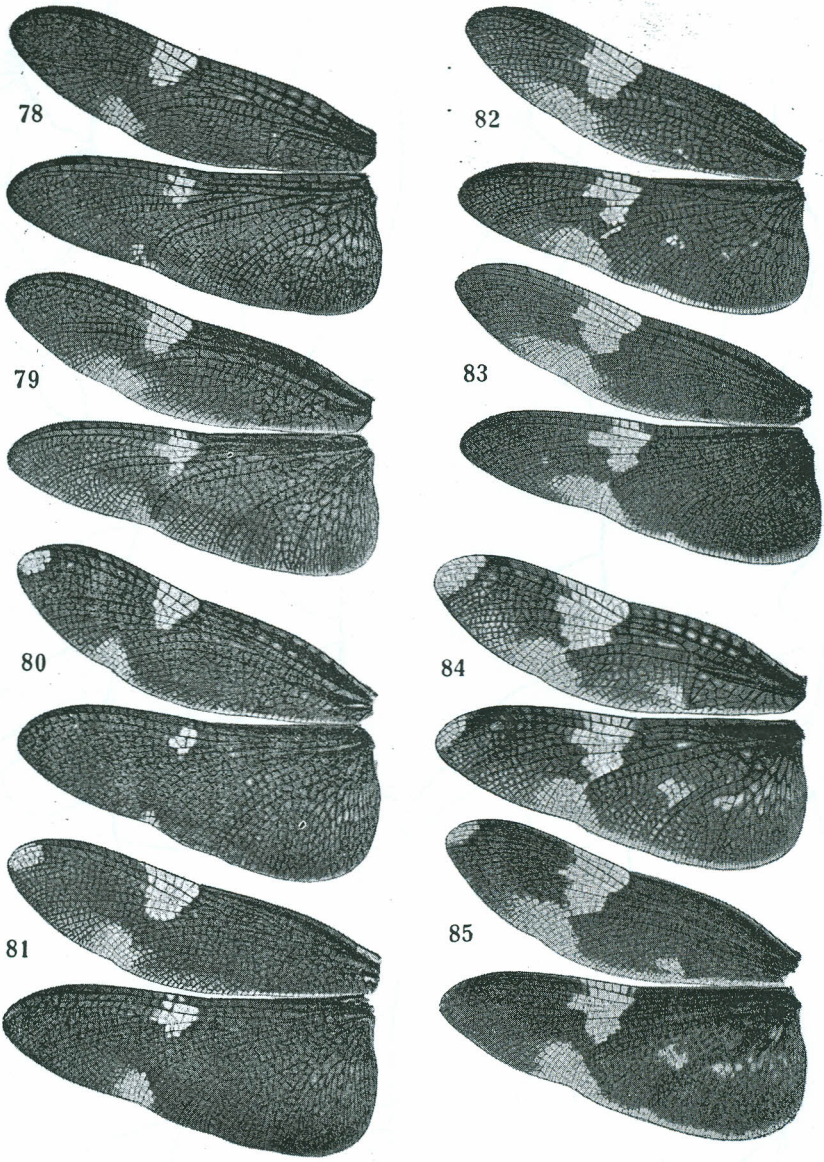


Fig. 78 - 81. Wings of *Rhyothemis princeps princeps* KIRBY, N. Queensland (Redlynch); 78. ♂ maximum, 79. ♂ minimum; 80. ♀ maximum, 81. ♀ minimum. — 82 - 85. Wings of *R. p. princeps* KIRBY, S. New Guinea; 82. ♂ Digoel River, 83. ♂ Merauke; 84 - 85. ♀ Merauke. All enlarged to scale.

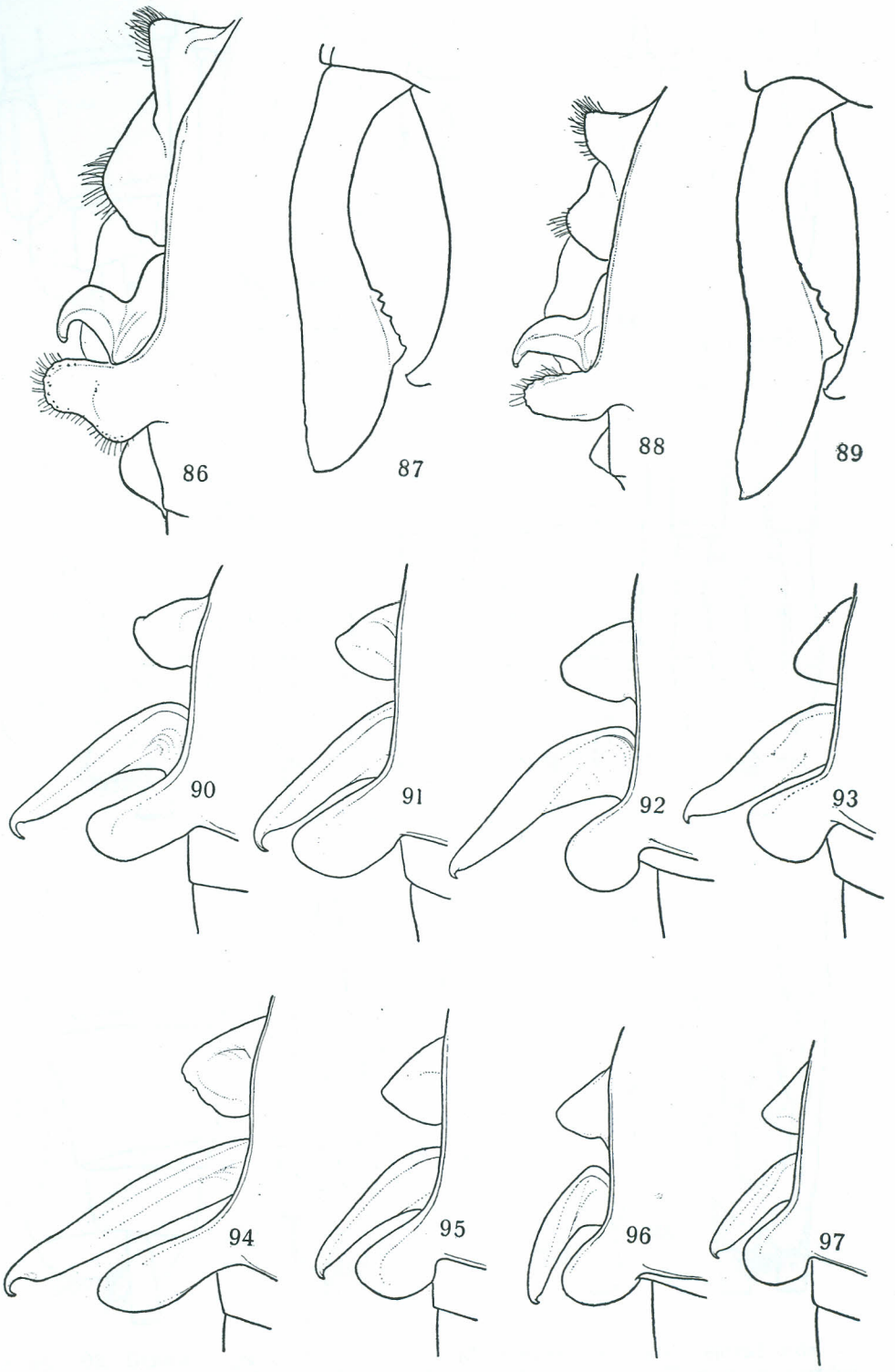


Fig. 86 - 87. *Rhyothemis regia juliana*, subsp. n., N. New Guinea (Berap Lakes), ♂ genitalia, left side view (86), and right sup. anal app., exterior view (87). — 88 - 89. *R. princeps irene*, subsp. n., N. New Guinea (Hollandia), ♂ genitalia, left side view (88), and right sup. anal app., exterior view (89). — 90 - 97. Genitalia of ♂ *Tramea*, left side view. — 90 - 91. *T. propinqua*, sp. n., N. New Guinea (90 Hollandia, 91 Kressi). — 92 - 93. *T. eurybia eurybia* SELYS, N. New Guinea (Hollandia). — 94. *T. rosenbergi* BRAUER, Soela Is. — 95. *T. aquila*, sp. n., N. New Guinea (Pauwasi). — 96. *T. loewi loewi* BRAUER (holotype, Ceram). — 97. *T. l. tillyardi*, subsp. n., N. Queensland (Redlynch).

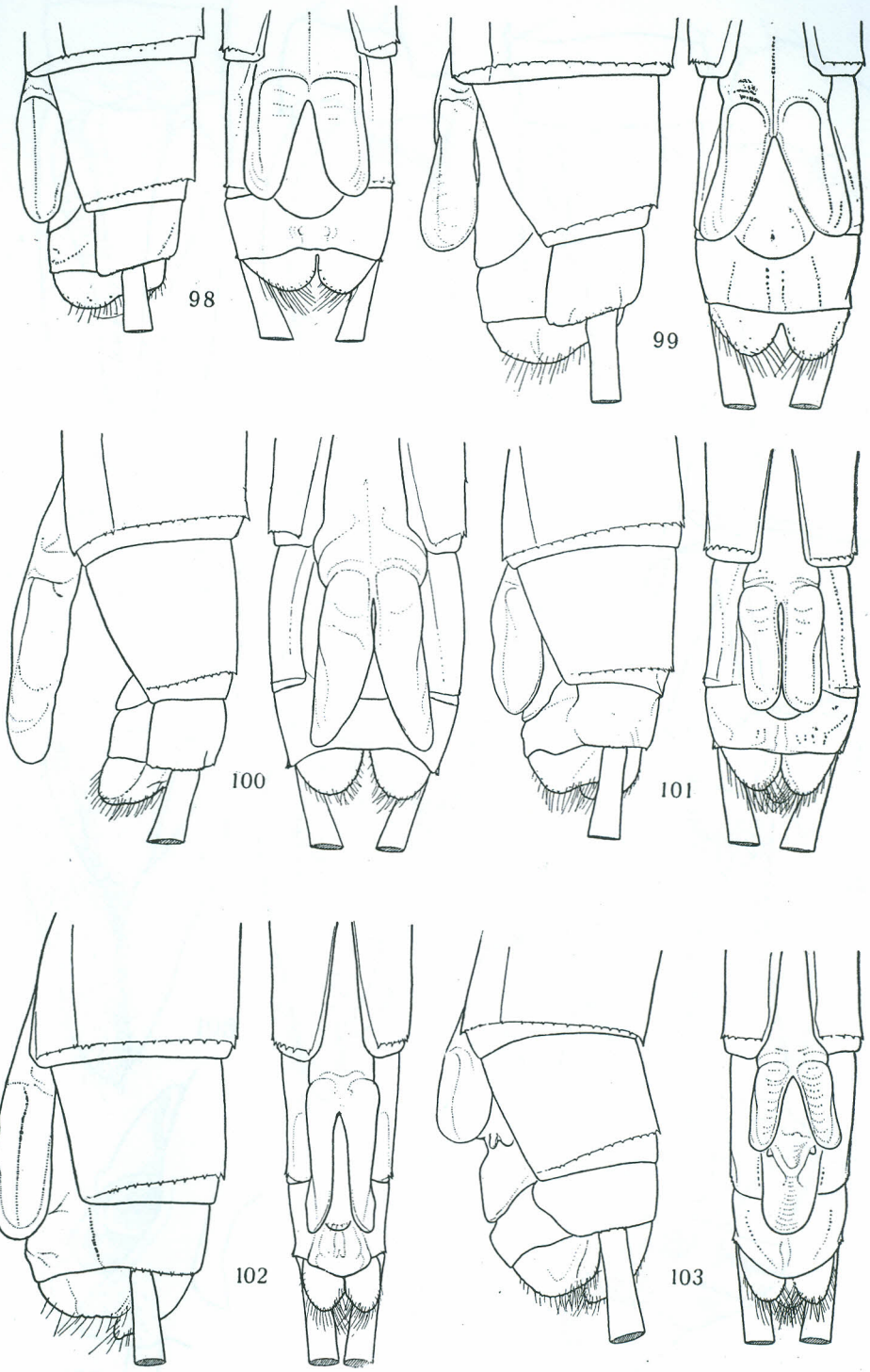


Fig. 98 - 103. Genital organs of ♀ *Tramea*, left profile view and ventral side. — **98.** *T. propinqua*, sp. n., N. New Guinea (Lake Sentani). — **99.** *T. eurybia eurybia* SELYS, N. New Guinea (Kressi). — **100.** *T. rosenbergi* BRAUER, Soela Is. — **101.** *T. aquila*, sp. n., N. New Guinea (Pauwasi). — **102.** *T. eurybia eurybia* SELYS, Komodo Id. — **103.** *T. loewi tillyardi*, subsp. n., N. Australia, N. T. (Shoebridge).

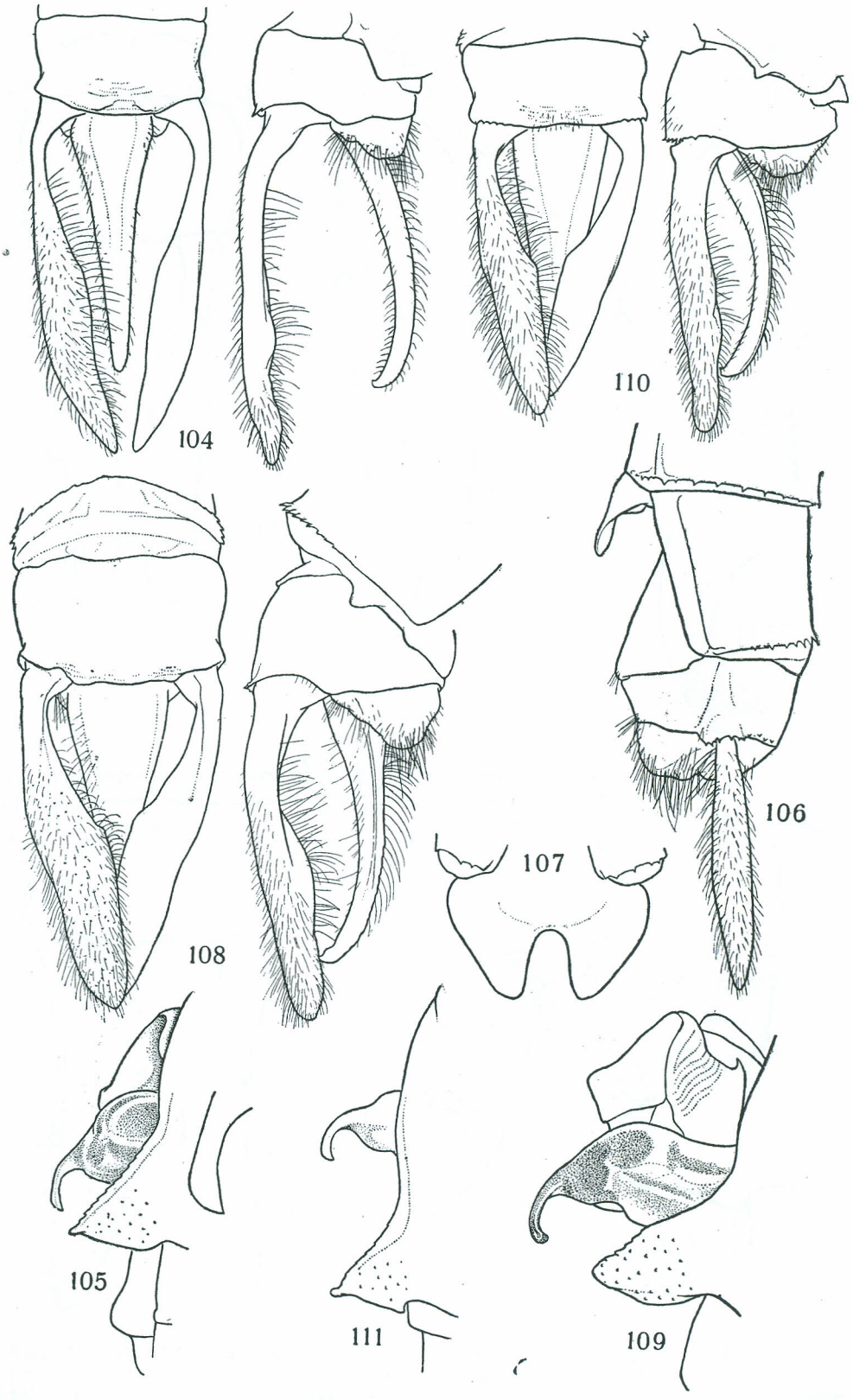


Fig. 104 - 111. Genital organs of *Hemicordulia* from New Guinea. — **104 - 107.** *H. silvarum* Ris (Hollandia); 104. ♂ anal apps., dorsal view and right side; 105. ♂ genitalia, left side; 106. ♀ apex of abdomen, left profile view; 107. ♀ genital valve of same specimen, ventral view. — **108 - 109.** *H. cyclopica*, sp. n. (Cycloop Mts., holotype); 108. ♂ anal apps., dorsal view and right side; 109. ♂ genitalia, left side. — **110 - 111.** *H. hilbrandi*, sp. n. (Wissel Lakes, holotype): 110. ♂ anal apps., dorsal view and

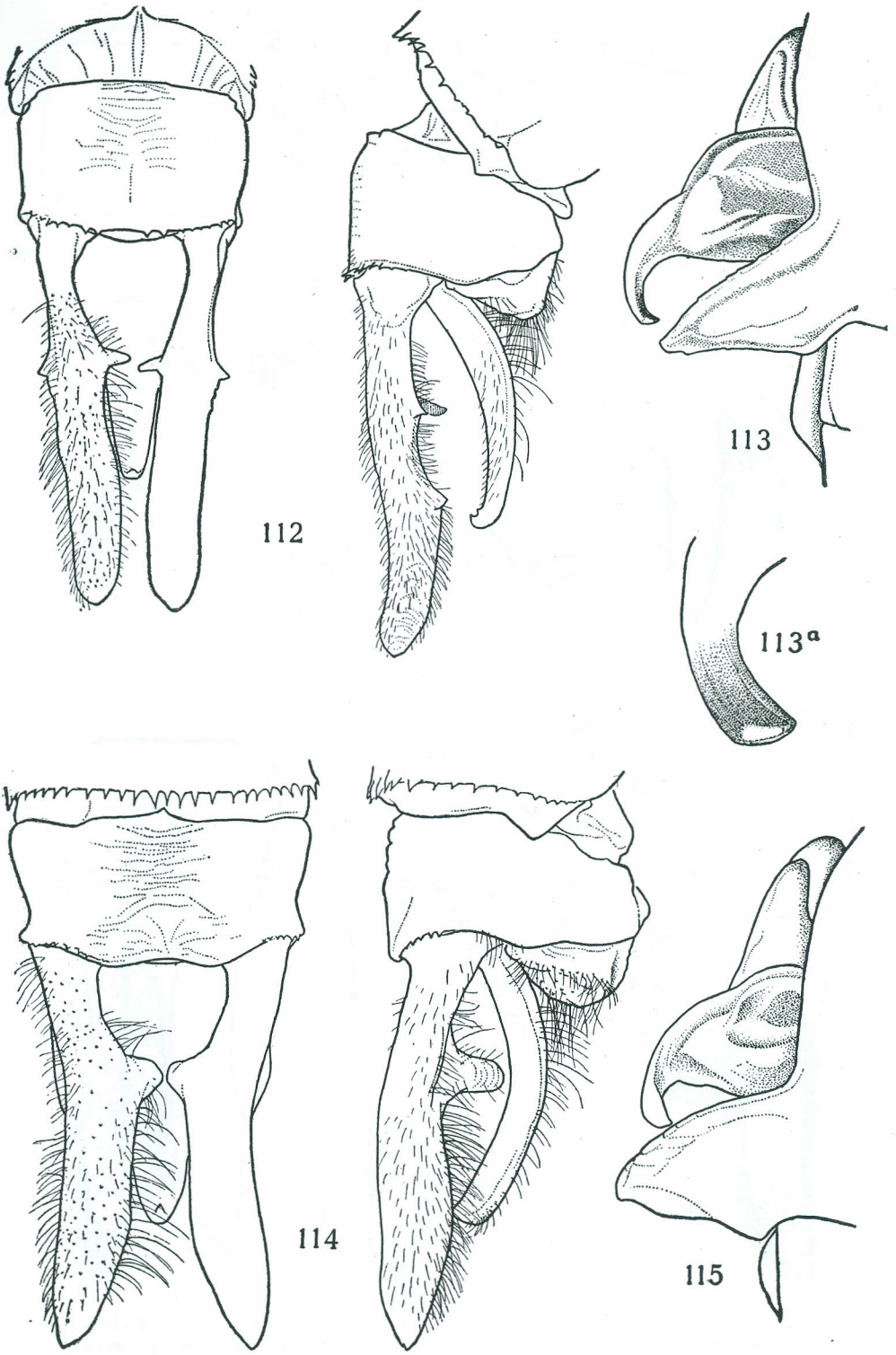


Fig. 112 - 115. ♂ Genital organs of *Hemicordulia* from New Guinea. — 112 - 113. *H. ericetorum*, sp. n., anal apps., dorsal view and right side (112, Baliem Cp.), and genitalia, left profile view (113, Lake Habbema). — 114 - 115. *H. olympica*, sp. n. (Lake Habbema), anal apps., dorsal view and right side (114), and genitalia, left profile view (115).

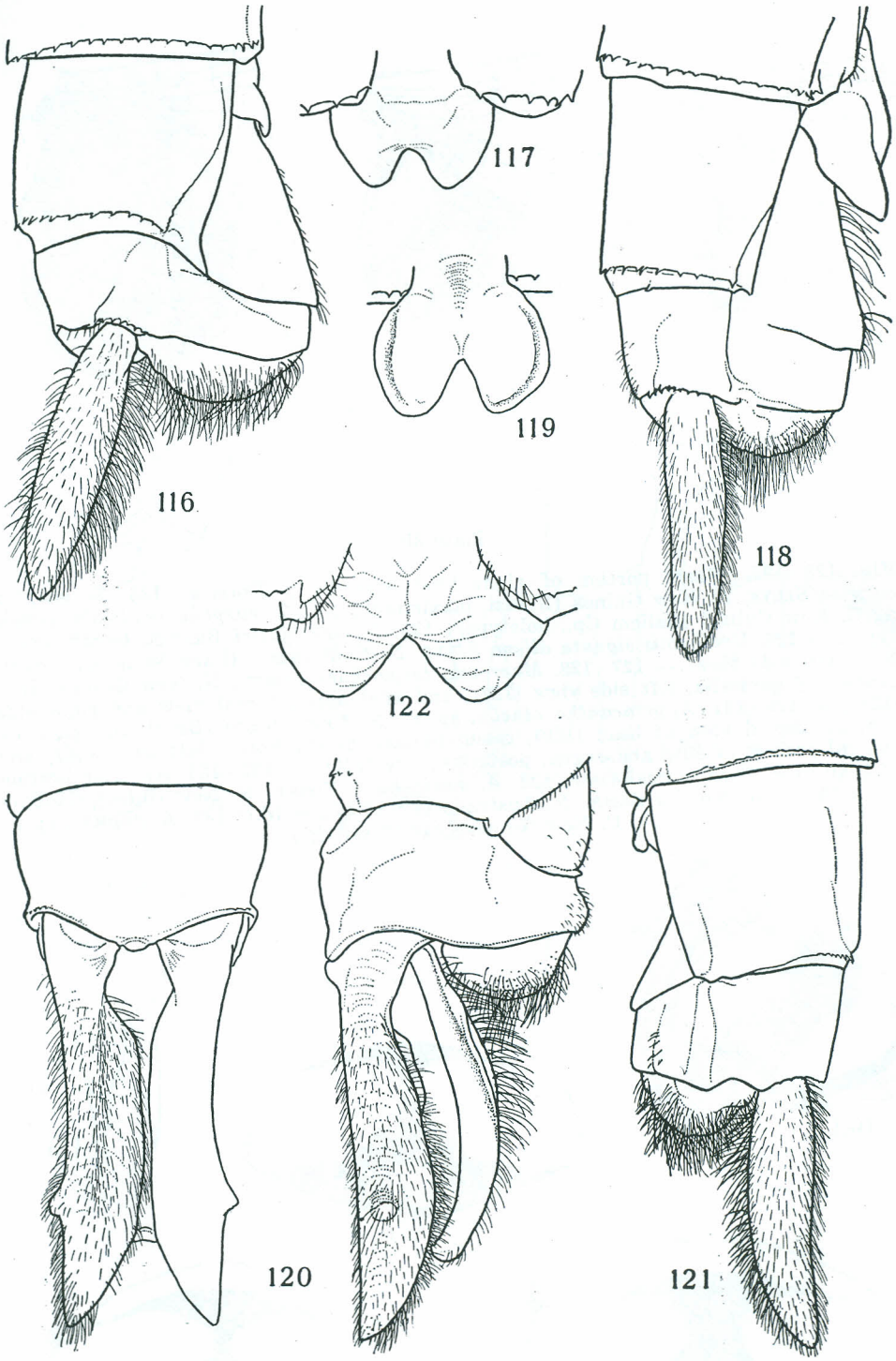
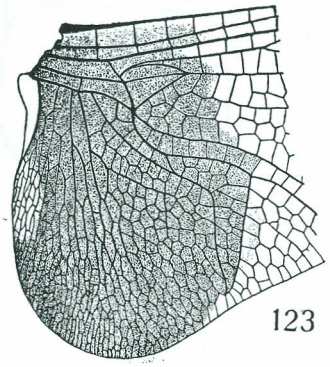


Fig. 116 - 119. ♀ Genital organs of *Hemicordulia* from New Guinea. — 116 - 117. *H. olympica*, sp. n. (Lake Habbema), apex of abdomen, right profile view (116), and genital valve of same specimen, ventral view (117). — 118 - 119. *H. ericetorum*, sp. n. (Baliem Cp.), apex of abdomen, right profile view (118), and genital valve of same specimen, ventral view (119). — 120 - 122. *Procordulia astridae* LIEFT., N. New Guinea (Cycloop Mts.); 120. ♂ anal apps., dorsal view and right side; 121. ♀ apex of abdomen, left profile view; 122. genital valve of same specimen, ventral view.

Plate 38

Fig. 123 - 125. Basal portion of right hind wing of ♂ *Tramea;* **123.** *T. eurybia eurybia* SELYS, N. New Guinea (Kressi, maximum); **124.** *T. eurybia monticola,* subsp. n., C. New Guinea (Baliem Cp., holotype); **125.** *T. loewi loewi* BRAUER, Ceram (holotype). — **126.** *Urothemis signata aliena* SELYS, N. New Guinea (Lake Sentani), ♂ genitalia, left side view. — **127 - 128.** *Macromia terpsichore* FÖRST., N. New Guinea (Hollandia), ♂ genitalia, left side view (127), and anal apps., dorsal view and right side (128). — **129 - 131.** *Agyrtacantha othello,* sp. n., N. New Guinea (Bernhard Cp., holotype ♀), dorsal view of head (129), colour-pattern of synthorax, left side (130), and ventral process of 10th abd.-segm., posterior view (131). — 132 - 134. Anterior portion of head of ♂ *Anax,* dorsal view; **132.** *A. maclachlani* FÖRST., N. New Guinea (Hollandia); **133.** *A. gibbosulus* RAMB., N. Australia (Pr. of Wales Id.); **134.** *A. pugnax,* sp n., C. New Guinea (Araucaria Cp.).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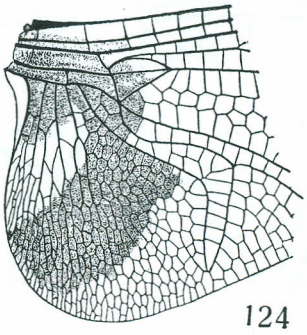
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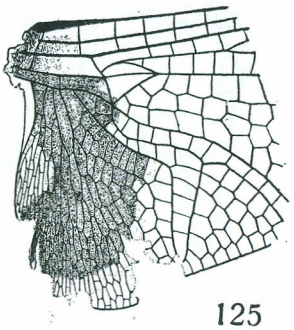
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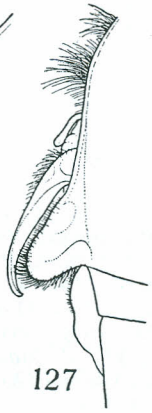
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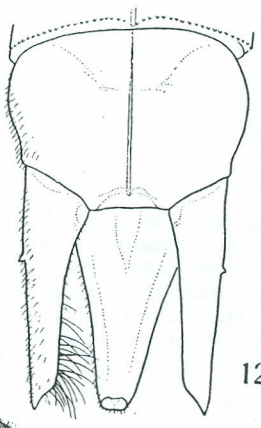
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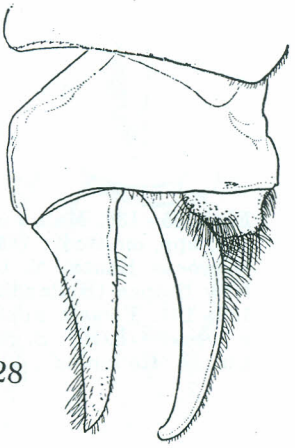

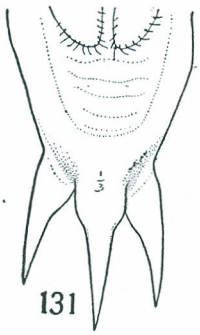
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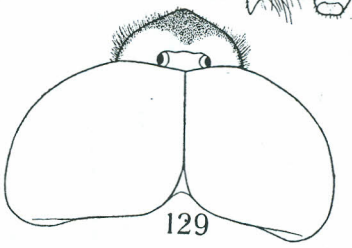
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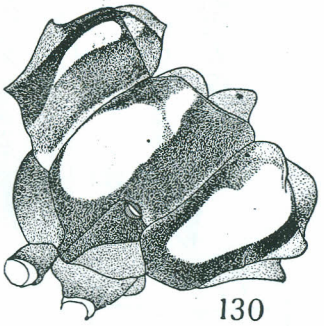
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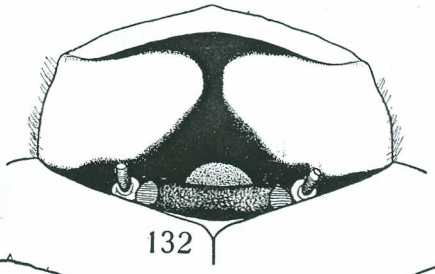
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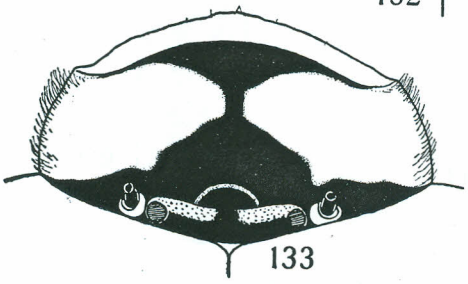
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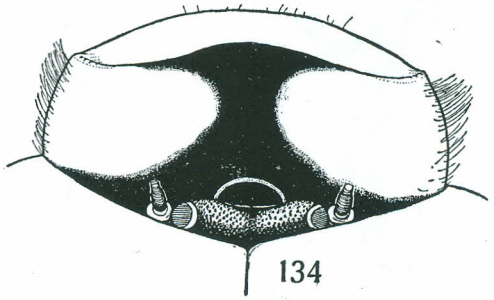
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For explanation see opposite page.

Plate 39

Fig. 135 - 138. Male anal apps. of *Anax*, horizontal dorsal view and full profiles (left sup. app. omitted); **135.** *A. gibbosulus* RAMB., N. Australia (Pr. of Wales Id.); **136.** *A. panybeus* HAGEN, N. Celebes (Airmadidi, Tondano); **137.** *A. maclachlani* FÖRST., N. New Guinea (Hollandia); **138.** *A. pugnax*, sp. n., C. New Guinea (Araucaria Cp.). — 139 - 141. Female anal apps. of *Anax*, horizontal view (left app. omitted); **139.** *A. gibbosulus* RAMB., S. New Guinea (Digoel River); **140.** *A. maclachlani* FÖRST., N. New Guinea (Hollandia); **141.** *A. pugnax*, sp. n., C. New Guinea (Araucaria Cp.). All figures drawn to scale.

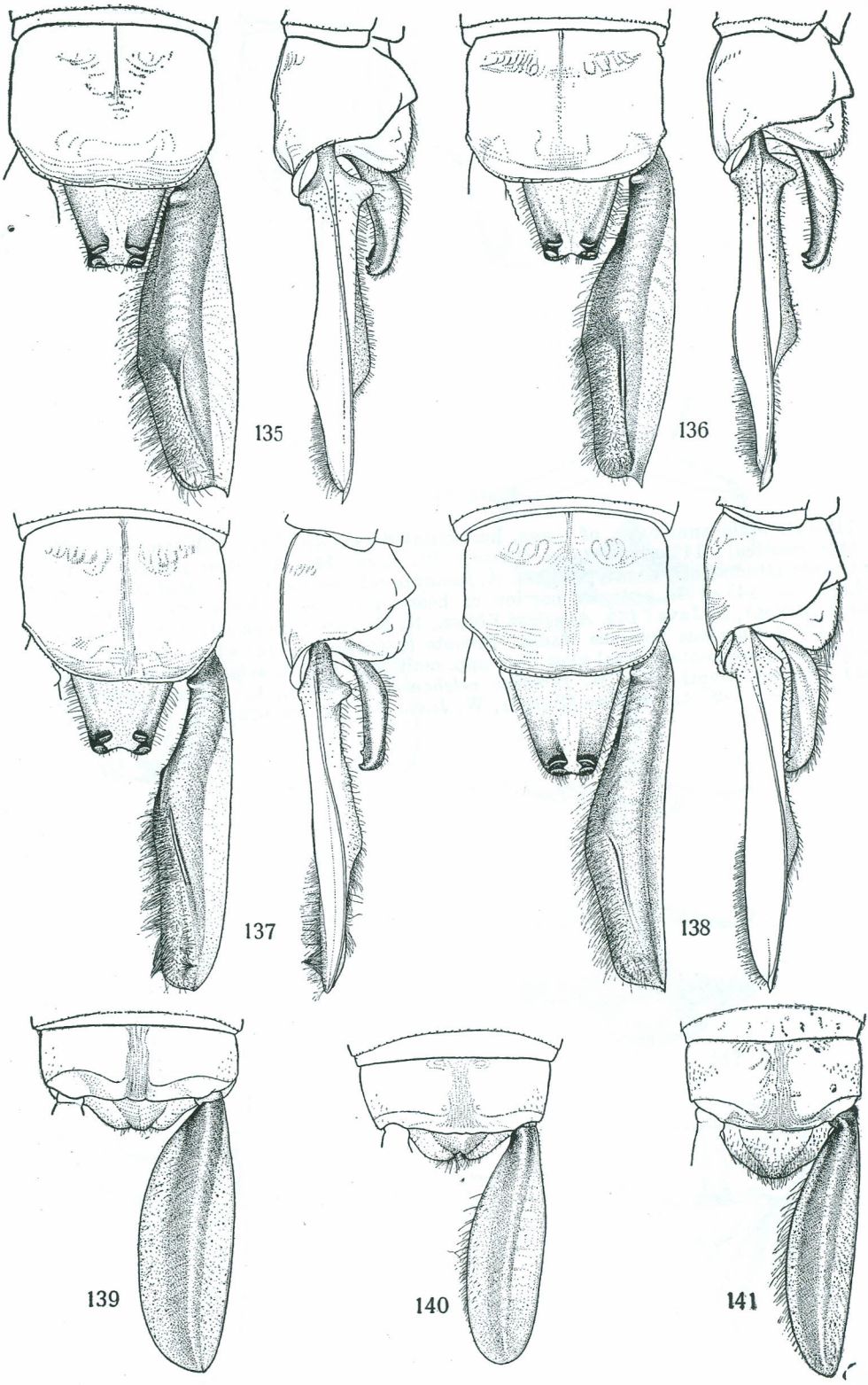

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Plate 40

Fig. 142-144. Male anal apps. of *Anax*, horizontal dorsal view and full profiles (left sup. app. omitted); **142.** *A. guttatus* (BURM.), W. Java; **143.** *A. selysi* FÖRST., N. E. New Guinea (Huon Gulf, paratype); **144.** *A. fumosus celebense* subsp. n., Mid C. Celebes (Pipikoro). — 145 - 147. Anterior portion of head of ♂ *Anax*, dorsal view; **145.** *A. guttatus* (BURM.), S. Java; **146.** *A. selysi* FÖRST., N. E. New Guinea (Huon Gulf, paratype); **147.** *A. fumosus fumosus* HAGEN, Ternate (neotype). — 148 - 150. Female anal apps. of *Anax*, horizontal dorsal view (left app. omitted); **148.** *A. selysi* FÖRST., C. New Guinea (Baliem River); **149.** *A. fumosus celebense*, subsp. n., C. Celebes (Koelawi, allotype); **150.** *A. guttatus* (BURM.), W. Java. All figures drawn to scale.

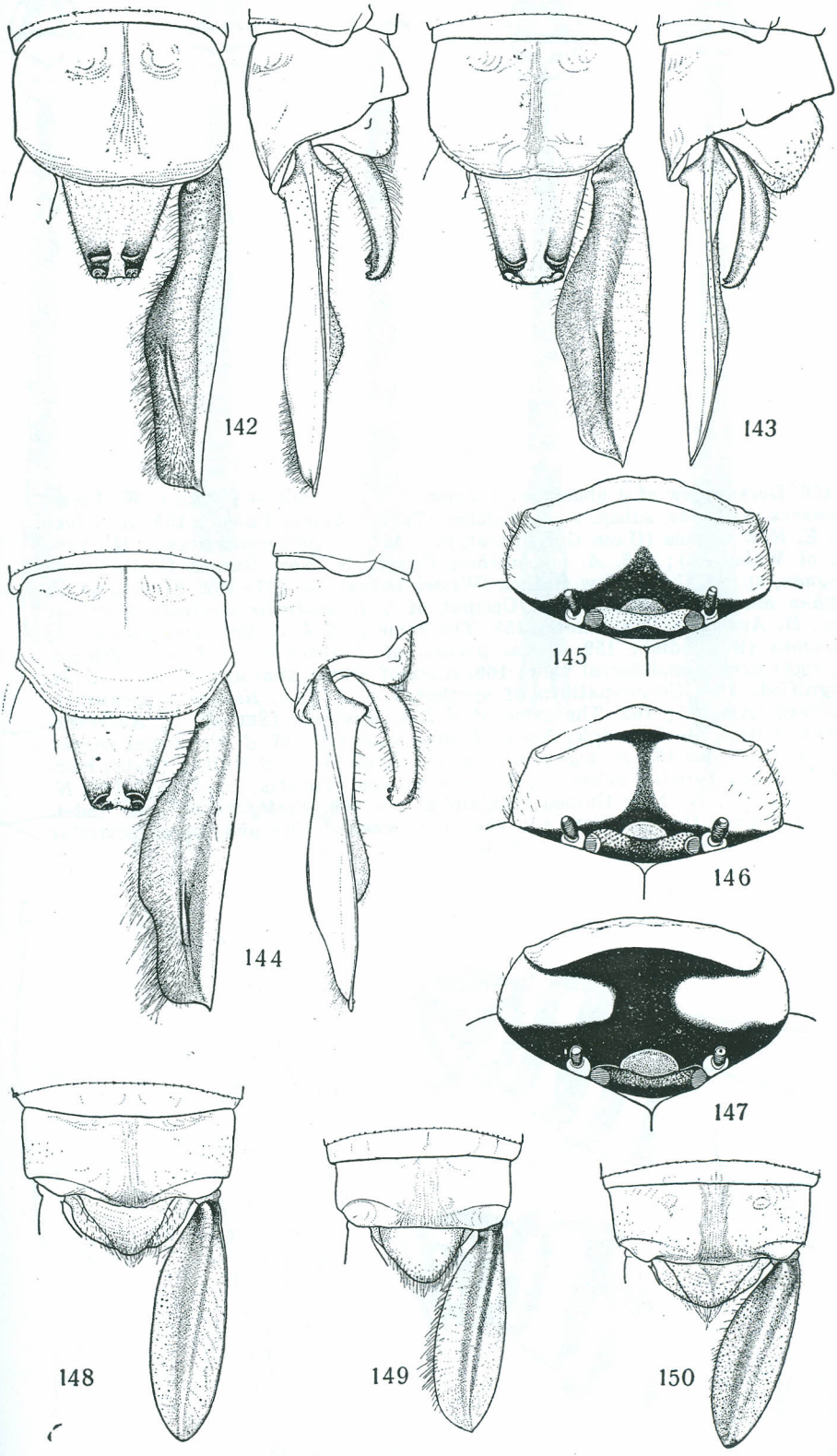

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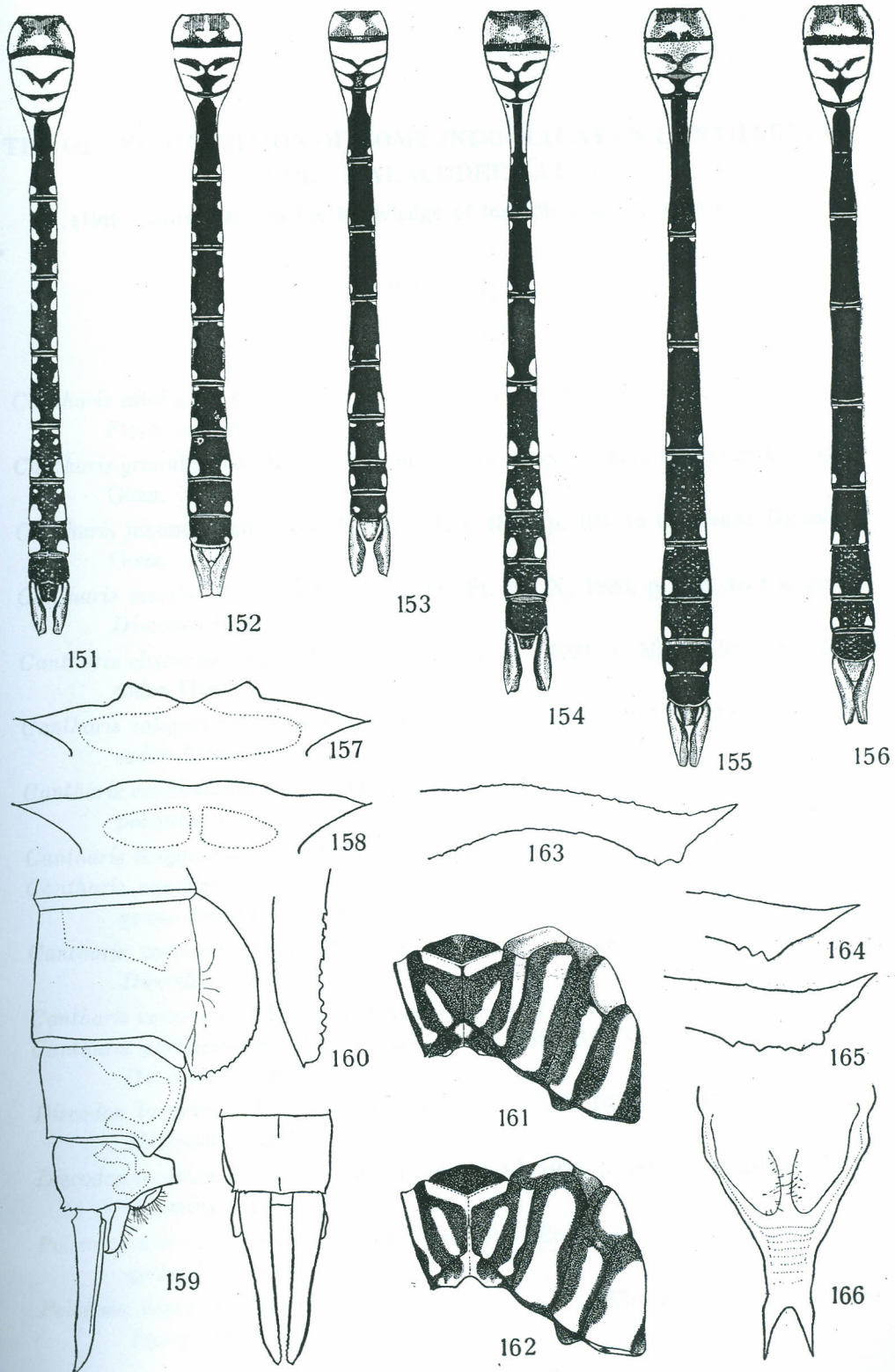
Plate 41

Fig. 151 - 156. Dorsal view of ♂ abdomen of *Anax*; **151.** *A. guttatus* (BURM.), W. Java; **152.** *A. fumosus celebense*, subsp. n., C. Celebes (Tanah Mateh, Paloe); **153.** *A. selysi* FÖRST., N. E. New Guinea (Huon Gulf, paratype); **154.** *A. gibbosulus* RAMB., N. Australia (Pr. of Wales Id.); **155.** *A. maclachlani* FÖRST., N. New Guinea (Hollandia); **156.** *A. pugnax*, sp. n., C. W. New Guinea (Wissel Lakes). — 157 - 162. Structures of *Ictinogomphus australis* (SELYS); **157.** Occiput of ♀ *I. australis australis* (SELYS), dorsal view, N. Australia (Marrakai); **158.** The same of ♀ *I. a. lieftincki* (SCHMIDT), N. New Guinea (Hollandia); **159.** Distal portion of ♂ abdomen of *I. a. lieftincki* (SCHMIDT), right profile and dorsal view; **160.** Apex of ♂ sup. anal app. of same, more highly magnified; **161.** Colour-pattern of synthorax of ♂ *I. a. lieftincki* (SCHMIDT), N. New Guinea (Ampas); **162.** The same of ♂ *I. a. australis* (SELYS), N. Australia (Cairns, Mus. Paris). — 163 - 165. Apex of sup. anal app. of ♂ *Nesoxenia mysis* (SELYS), drawn to scale; **163.** *N. mysis mutans*, subsp. n., W. New Guinea (Babo, holotype); **164** *N. mysis tarafia*, subsp. n., N. New Guinea (Tarafia, holotype); **165.** *N. mysis mysis* (SELYS), N. New Guinea (Hollandia). — **166.** *Plattycantha* spec. indet. (*nov.*), C. New Guinea (Lower Mist Cp.), ventral process of 10th abd.-segm., posterior view.



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