

EXPLORATION HYDROBIOLOGIQUE  
DU BASSIN DU LAC BANGWEOLO  
ET DU LUAPULA

HYDROBIOLOGICAL SURVEY OF  
THE LAKE BANGWEULU  
LUAPULA RIVER BASIN

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## ODONATES ANISOPTÈRES      ODONATA ANISOPTERA

par      by

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## INTRODUCTION

The present paper deals with the Odonata Anisoptera of "Hydrobiological Survey of the Lake Bangweulu-Luapula River Basin" directed by Professor Dr J.J. SYMOENS, Lubumbashi (Elisabethville). The area covered is situated in the southeastern part of Katanga (Democratic Republic of the Congo) and the northeastern part of Zambia (see map, p. 7). As far as the Odonata are concerned, the partial results of this survey, dealing with the Zygoptera, have been published already by Dr Elliot C.G. PINHEY, Curator at the National Museums of Rhodesia, Bulawayo (PINHEY, 1967b). A third part, in which the immature stages of the regional Odonata will be discussed, is in course of preparation.

Cammaeids!

This paper is based on a large and interesting collection of Anisoptera made during 1960-1963 by Professor Dr J.J. SYMOENS, and again in 1966-1967 by F. MALAISSE: this material includes more than 1700 specimens pertaining to 81 species: 11 *Gomphidae*, 5 *Aeshnidae* and 65 *Libellulidae*. For a limited part it is also based on much smaller collections made recently for the Leiden and Oslo Museums by Messrs. G.M.L. BERGERS (Korogwe) in Tanzania and J. KIELLAND (Oslo) in Zambia. However, only those species are incorporated which are of special interest in this context and represented also in Professor SYMOENS' collection. The inclusion of synonymic notes and comments on misidentified species from other sources will, I hope, enhance the quality of this article.

The collection made by J.J. SYMOENS and F. MALAISSE contains six new species which are described and figured:

*Phyllogomphus symoensi* LIEFTINCK n. sp.

*Lokia gamblesi* LIEFTINCK n. sp.

*Aethiothemis discrepans* LIEFTINCK n. sp.

*Diplacodes deminuta* LIEFTINCK n. sp.

*Trithemis aequalis* LIEFTINCK n. sp.

*Trithemis aconita* LIEFTINCK n. sp.

Besides these, one new libellulid is characterized after Zambian material from PINHEY's collection:

*Lokia ellioti* LIEFTINCK n. sp.

Notes are included on a number of types and redescriptions and figures are given of the types of *Trithemis donaldsoni* (CALVERT) and *T. ellenbeckii* FOERSTER.

The following new synonymies could be established:

*Cinitogomphus* PINHEY (1964) = *Ictinogomphus* COWLEY (1934)

*Lokia berenice* FRASER (1953) = *Lokia erythromelas* (RIS, 1909)

*Aethiothemis aequatorialis* (FRASER, 1954) = *Orthetrum hintzi* SCHMIDT (1951)

*Monardithemis leonensis* AGUESSE (1968) = *Sleuthemis diplacoides* FRASER (1951)

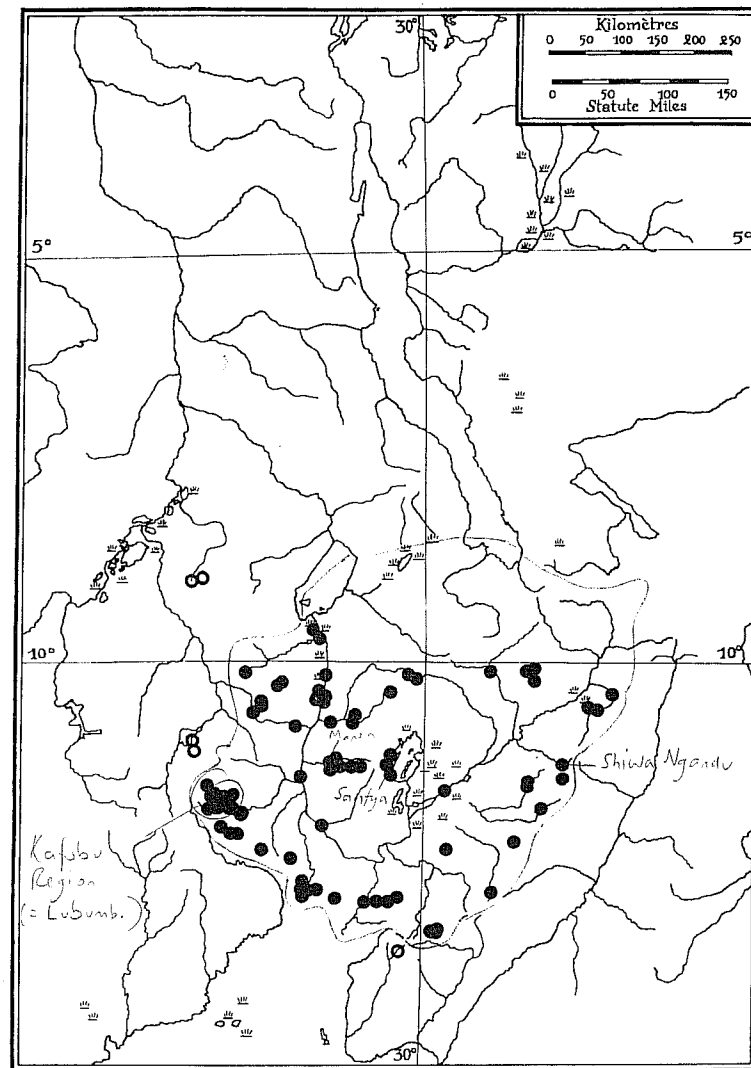
*Trithemis leptosoma* PINHEY (1966) = *Trithemis nuptialis* KARSCH (1894)

In view of certain controversial opinions still occurring with regard to the most satisfactory division of the major systematic units, I have abstained from classifying the genera according to subfamilies. Within the three families here treated I have, therefore, merely followed a sequence starting with the more generalized or "archaic" forms and leading up to the most highly organized genera. Species are arranged in alphabetical order under each genus, hence the sequence does not in any way reflect relationships.

In most cases, bibliographical references have been limited to citations of the original descriptions, which have been given under the heading of each species. Additional references are cited wherever necessary, either following the original reference, or when discussing relevant facts of taxonomic interest in the text.

I am grateful to Professor Dr J.J. SYMOENS for the privilege of studying his collections and to all those who have assisted me in one way or other to make this study as useful as possible. Frequent visits to the British Museum (Nat. Hist.), the Institut royal des Sciences naturelles (Brussels), the Institut des Parcs nationaux du Congo (Brussels), the Muséum national d'Histoire naturelle (Paris), and the Musée royal de l'Afrique Centrale (Tervuren), enabled me to make comparative notes on specimens particularly wanted, and I am greatly indebted to all scientists who during my stay gave freedom of access to the collections under their care. My warm thanks are due to the following colleagues for kindly sending on request a number of types and other valuable material for comparison and study: R. CAMMAERTS and G. DEMOULIN (Brussels), M. GAMBLES (Woodley), Elliot C.G. PINHEY (Bulawayo), Irving J. CANTRALL (Ann Arbor), and Selwyn S. ROBACK (Philadelphia). I wish to express my appreciation to Dr E.C.G. PINHEY, whose "Descriptive catalogue of the Odonata of the African continent" (1962) has been a constant source of information.

Unless indicated otherwise, the types of new species as well as the bulk of the material are in the Musée royal de l'Afrique Centrale (Tervuren). Some duplicate specimens are deposited in the Rijksmuseum van Natuurlijke Historie (Leiden).



Map 1 — Distribution of samples mentioned in the present paper  
(coll. J.J. SYMOENS and F. MALAISSE)

The black circles represent localities in the Bangweulu-Luapula Basin; the white circles represent localities in the neighbouring regions.

## TAXONOMY AND DISTRIBUTION OF SPECIES

### Family GOMPHIDAE

#### Genus ICTINOGOMPHUS COWLEY

##### *Ictinogomphus ferox* (RAMBUR)

RAMBUR (1842) Hist. Nat. Ins. Névroptères in Suites à Buffon, pp. 172-173 (♂♀ Sénégal).

A widespread species in East and Central Africa, distributed from Natal in the south to Angola and eastwards into Tanzania and Sudan. A strong, swift-flying insect preferring reedy ponded streams and lakes.

Total: 1 ♂.

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 9823d (♂).

##### *Ictinogomphus dundoensis* PINHEY

PINHEY (1961) *Publ. cult. Comp. de Diamantes de Angola*, No. 56, pp. 73-74, fig. 1b, d and g (♀ Angola); Id. (1961) *Occ. Pap. Rhodes-Livingstone Mus.*, No. 14, pp. 45-46 (♀ Angola and N. Rhodesia); Id. (1964) *Publ. cult. Comp. de Diamantes de Angola*, No. 63, pp. 107-109, fig. 8 (♂ Lubumbashi; sub *Cinitogomphus* gen. nov.), syn. n.

The present examples of this interesting species are in complete agreement with PINHEY's description and accompanying drawings of the allotype, taken at Lubumbashi. It is a somewhat smaller insect than the common *I. ferox*, the discoidal triangle of the fore wings is a trifle shorter, and the foliations on the 8th abdominal segment are distinctly narrower than in that species. Apart from the distinctive features mentioned by PINHEY, the males can be easily held apart by the black dorsal mark at the base of the frons, which in *I. ferox* is broad and band-like, whereas *dundoensis* has it produced forward to form a thick triangular spot. However, the two species are of the same robust build and resemble each other closely in details of structure and venation. I am convinced that the characters used to separate these two insects generically, must be regarded as not more than specific in value. Therefore I propose to consider *Cinitogomphus* as a mere synonym of *Ictinogomphus*, rather than accept even a subgeneric name for *dundoensis*.

While examining a great many males (from Tanzania and Zambia) of *I. ferox*, some slight variation was observed in the shape of the discoidal triangle of the fore wings, some having this cell almost as abbreviated as in our series of *dundoensis*.

In our males Ax<sub>1</sub> and Ax<sub>5</sub> or Ax<sub>6</sub> are the strengthened cross-veins in the costal field. The discoidal triangles are 3- or 4-celled in the fore wing, 2-celled in the hind wings. Anal triangle made up of 5 cells. The pterostigma is a little shorter than in *I. ferox*.

Measurements: abd. + app. 50.0-53.0 mm, hind wing 39.0-40.0 mm, pterostigma fore wing 4.6-4.9 mm.

Total: 5 ♂.

LAKE BANGWEULU REGION: Samfya, *Symoens* 9948b (2 ♂).

MIDDLE LUAPULA REGION: Kisongo, *Symoens* 9913 (3 ♂).

Genus **GOMPHIDIA** SELYS**Gomphidia quarrei** (SCHOUTEDEN)

SCHOUTEDEN (1934) *Ann. Mus. Congo belge Tervuren*, Zool., sér. III, sect. II, 3 (fasc. 1), pp. 57-58 (♂ Congo).

Two males, fully coloured and in excellent condition, agree in every detail with the type from Kambaye in the museum at Tervuren. Apparently not rare. Reported from Congo, Uganda, Angola, Victoria Falls and Zambezi (PINHEY, 1962).

Total: 2 ♂.

KAFUBU REGION: Kalota, near Kasokota, *Symoens* 8953a (2 ♂); Kipopo, *Symoens* 8959.

Genus **DIASTATOMMA** BURMEISTER**Diastatomma soror** SCHOUTEDEN

SCHOUTEDEN (1934) *Ann. Mus. Congo belge Tervuren*, (3) 1, p. 59 (♂ Congo).

Our specimens have been compared at Tervuren with the type from Penge, with which they correspond closely. Known from Congo, Zambia and Angola.

Total: 3 ♂.

LAKE BANGWEULU REGION: Samfya, *Symoens* 9077 (2 ♂).

MIDDLE LUAPULA REGION: Namwandwe River, *Symoens* 9910b (♂).

Genus **MICROGOMPHUS** SELYS**Microgomphus** spec. indet.

A freshly emerged specimen whose flattened body and shrivelled terminalia do not permit of specific identification.

Total: 1 ♂.

KAFUBU REGION: 7 km S. of Lukuni, *Symoens* 8922a (♂ juv.).

Genus **LESTINOGOMPHUS** MARTIN**Lestinogomphus angustus** MARTIN

MARTIN (1912) *Ann. Soc. ent. Fr.*, 80 (1911), pp. 484-485 (♂ Afrique orientale anglaise).

A specimen in good condition. In 1966 I have been able to compare this with the allotype of *L. angustus* in the Paris Museum, with which it was found to agree in every respect. The present specimen was confronted afterwards with the same and other species in the British Museum collection. Still more recently, M. R. CAMMAERTS (Brussels), who is preparing a revision of the genus *Lestinogomphus*, has confirmed the identification of Prof. SYMOENS' example.

Total: 1 ♀.

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 9712 (♀ adult).

Genus **PHYLLOGOMPHUS** SELYS**Phyllogomphus symoensi** LIEFTINCK n. sp. — Fig. 1

*Holotype* ♀ (adult). Colours well preserved but body broken. Body stout. Width of head across eyes 10.0 mm. Labium bright greenish yellow, the submentum rather more ferruginous; median and lateral lobes bordered with black all around margins; palpi black with citron yellow exterior stripe. Mandibles black, bases marked with a circular spot of green; genal area obscured, the tubercles green. Labrum thickly bordered with black roundabout so as to enclose a roughly semicircular median patch of bright green, the black apical border about twice as broad as its width along base; a short obscure streak projects lengthwise from the latter into the yellow. Clypeus and anterior portion of frons bright green including the sutures; frons with thick black basal stripe, hardly produced anteriorly in the middle. Vertex and epicranium black as are also the antennae; transverse ridge behind ocelli well pronounced, curving gently back laterally towards the eye-margin, the area behind the raised portion smooth and flat, dull greenish surrounded by black. Occipital plate raised, shaped as in fig. 1a, its colour entirely bright yellow anteriorly as well as posteriorly. Rear of the head otherwise glossy black, strongly contrasting with the yellow occiput; surface at middle behind eyes polished, dark chestnut brown; area surrounding foramen black.

Prothorax wholly black. Synthorax unicoloured dark mahogany with sharply defined bright greenish yellow markings, as follows. Dorsum with pair of broad, oblique 7-shaped mesepisternal bands placed far away from but parallel with the humeral suture, widest and truncated above, tapering gradually below and making full contact with the mesothoracic collar; the collar bands equal in width to the upper bands about half-way up the length of the latter and fused together in the median line, the lower part of the crest also, but more narrowly, green. No trace of a dorsal juxtahumeral mesepisternal spot. Sides with two broad, subparallel green bands of about equal width, one complete mesepimeral and one metepimeral band, the latter rather expanded about midway its length. Ventral surface of thorax brown. Ante-alal triangles and all nota brown, the ridges surrounding them black. Axillaries of wings green.

Legs dark; coxae, trochanters and inner faces of anterior femora green, of intermediate and posterior femora wholly black.

Wings tinted palely with greyish yellow all over the membrane. Veins all black, only some cross-nerve in subcostal space dark brown. Neuration as for genus. Nodal index  $\frac{13.15.15.11}{13.11.11.13}$ , first and fifth Ax in both fore and hind wings strengthened. Prefurcal cross-veins between sectors of arculus  $\frac{2.2}{1.1}$ . Discoidal field of fore wing commencing with 3 cells for 2-3 cell lengths, then with 2 × 2 cells and thereafter again with 3 and more rows of cells; field of hind wing with 3 and more cell rows. MspI fairly distinct in both pairs of wings, originating at a point slightly proximal to level of nodus. Two rows of cells in anal area of fore wing following one single basal cell. Anal loop of hind wing 4-celled; 3 large anterior cells in a row between base and loop and 3-4 cells between loop and posterior margin. Pterostigma narrow, slightly expanded at middle, surmounting 5-6 cells; colour dark brown. Membranula long, linear, white.

Abdomen robust. Basal segments dark brown, from segm. 3 onwards deep black as far as the end of 7, thereafter again somewhat lighter. Markings sharply defined, bright chrome, especially those of 3-7, the spots of the terminal segments ill-limited. Segm. 1 brown, slightly paler laterally; 2 with fine yellow longitudinal middorsal line slightly expanding towards base, a pair of large irregular yellow lateral patches, and a broad yellow stripe (widest apically) bordering ventral margin of tergite. Segm. 3-6 each with large, squarish, basodorsal chrome yellow spots, the one of 3 finely and incompletely bisected by the black middorsal carina, that of 4 completely so, but those of 5 and 6 complete

and uninterrupted; all these spots extending from base as far as the jugal sutures and tergites 3-7 moreover with broad yellowish stripe along ventral margin. Segm. 7 with almost its basal three-fourths green, the black however extending caudad as a point along the middorsum and the jugal suture also obscured on either side; 8-10 as well as the intersegmental membranes bright ferruginous

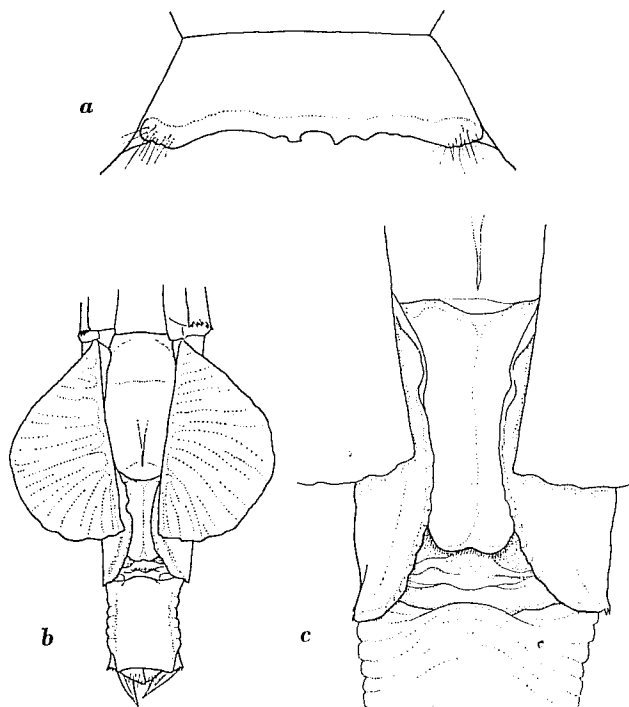


Fig. 1. — *Phyllogomphus symoensi* LIEFTINCK n. sp., ♀ holotype (Lubumbashi, *Symoens* 8026): a, Occipital plate, fronto-dorsal view; b, Apex of abdomen, ventral view; c, Valvula vulvae, more highly enlarged.

but dorsum of 8 and 9 broadly black. Lateral foliations on 8 of moderate size, surpassing but slightly basal half of 9; colour deep black (fig. 1b). Relative lengths of three last abdominal segments 8-10 as 13.75 : 10 : 10, the 9th segment being noticeably longer than in most other species. Lateral ridges of 10th tergite strongly developed. Vulvar lamina broad and exceptionally short, barely reaching posterior margin of 9th tergite, its apex broadly rounded and a little swollen (fig. 1c). Cerci short and strongly ridged, acuminate and directed ventrad; colour ferruginous.

Measurements: abdomen (incl. cerci) 51.3 mm, hind wing 43.0 mm, pterostigma hind wing 4.0 mm.

This new species differs from all other described members of the genus which have only two broad green bands at the thoracic sides, by the following combination of characters:

- (1) Whole clypeus and frons anteriorly unicoloured green;
- (2) Vertex behind transverse crest, as well as entire occipital plate, green; armature of the latter as in fig. 1a;
- (3) Three rows of cells in discoidal field of fore wing;
- (4) Dorsum of thorax with pair of complete, regularly opposed 7-shaped marks; no additional isolated pale spots at the sides;
- (5) Broad, basodorsal green annules in front of the transverse suture on segments 3-6 of abdomen, the ring on 4 narrowly interrupted by black medially; basal two-thirds of 7 entirely green;
- (6) Lateral foliations on segment 8 extending caudad to middle of segment 9;
- (7) Segments 9 and 10 subequal in length and shorter than 8; lateral ridge of 10 strongly developed;
- (8) Genital valve very short, not reaching apical border of 9th segment, its apex bluntly rounded and shallowly emarginate (fig. 1c).

I have compared this female with the type series of *P. schoutedeni* FRASER (1957) at Tervuren. Besides the holotype there are three male syntypes, all labelled as from Lualaba, Kabongo, X. 1953, *Ch. Seydel*. In his revision, FRASER (1957) says that the type series originates from Elisabethville but this is obviously an error, the dates (III. 1953) being also wrongly given. This species differs from the present female in having the clypeal parts and fronto-clypeal suture sharply outlined in black, and also by the broader black stripe at the base of the frons. The oblique antehumeral bands are separated from the interrupted mesothoracic collar bands, and there are small humeral and metepisternal green spots. The yellow basal annule of the 7th abdominal segment only occupies 1/5 to 1/4 of the segment's length. The pterostigma of *P. schoutedeni* is not inflated and smaller than in *P. symoensi* n. sp.

Total: 1 ♀, and one exuviae possibly belonging to this species.

KAFUBU REGION: Lubumbashi (Elisabethville), woodland margin, near the University provisional buildings, alt. 1300 m, 28.XII.1960, *Symoens* 8026 (♀ holotype in Musée royal de l'Afrique Centrale, Tervuren.). Exuviae (♂), Lubumbashi (Elisabethville), Lubumbashi River, above the bridge on the Golf Road, among *Hydrocotyle ranunculoides*, alt. 1200 m, 11.XI.1963, *Symoens* 10607c.

#### Genus CRENIGOMPHUS SELYS

##### *Crenigomphus cornutus* PINHEY

PINHEY (1956) *Occ. Pap. nat. Mus. S. Rhod.* (No. 21B), pp. 83-84, fig. 1 (♂♀ Victoria Falls).

This is by no means a common species, previously recorded only from Victoria Falls and the Zambezi River. The genus has recently been revised by FRASER (1960).

Total: 1 ♂.

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 8913d (♂).

Genus **NOTOGOMPHUS** SELYS**Notogomphus praetorius** (SELYS)SELYS (1878) *Bull. Acad. Belg.*, 2<sup>e</sup> sér., 46, p. 447 (106 sep.) (♂♀ Transvaal).

Mainly a South African species but evidently widespread, occurring also northward in Angola, Congo and Zambia.

Total: 1 ♂, 1 ♀.

LAKE BANGWEULU REGION: Lupososhi River, *Symoens* 9048 (♂).KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 10124 (♀).Genus **PARAGOMPHUS** COWLEY**Paragomphus cognatus** (RAMBUR)

RAMBUR (1842) *Hist. Nat. Ins. Névroptères in Suites à Buffon*, p. 167 (♀ patria ignota); CAMMAERTS (1968) *Bull. Ann. Soc. roy. Ent. Belg.*, 104, pp. 43-48, figs. (full references, descr. & distrib.).

This well known species has recently been redefined by CAMMAERTS (1968), who supplied excellent figures of structural details. Ranges from Ethiopia and Central Africa as far south as the Cape, southern populations being generally lighter in colour than those inhabiting the tropical countries. The species has two near allies in Central Africa (see CAMMAERTS, loc. cit.).

Locally common at open parts of rocky streams and rivers, the larvae burrowing in silt and fine sand.

Total: 1 ♂, 1 ♀.

UPPER LUAPULA REGION: Milenje River, *Symoens* 10759d (♂).KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 8906b (♀ juv.).**Paragomphus genei** (SELYS)SELYS (1841) *Rev. Zool.*, août 1841, p. 245 (♀ Sicile).

A very variable and widely distributed stream-dwelling species, occurring throughout Africa and the western Mediterranean islands, with a possible subspecies in Madagascar.

Total: 1 ♂, 1 ♀.

LAKE BANGWEULU REGION: Samfya, *Symoens* 9158b (♀).KAFUBU REGION: Kikwanda, *Symoens* 8003 (♂).Family **AESHNIDAE**Genus **HELIAESCHNA** SELYS**Heliaeschna ? ugandica** MACLACHLANMACLACHLAN (1896) *Ann. Mag. nat. Hist.*, 6th ser., 17 (No. 102), p. 419 (♂♀ Uganda).

This is the commonest species of the genus in tropical Africa. As the specimen is a female with its cerci broken off, I am unable to name it definitively.

Total: 1 ♀.

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 8695 (♀).Genus **GYNACANTHA** RAMBUR**Gynacantha villosa** GRUENBERGGRUENBERG (1902) *Sitzber. Ges. Naturf. Freunde, Berlin*, 9, pp. 233-234 (♂ Langenburg, Nyassa Gebiet).

Widely distributed in tropical Africa.

Total: 1 ♂.

UPPER LUAPULA REGION: Near Pelu, *Symoens* 9404b (♂).Genus **ANAX** LEACH**Anax speratus** HAGENHAGEN (1867) *Verh. zool.-bot. Ges. Wien*, 17, p. 46 (♂ Cap d.g. Hoffnung).

Common in most parts of continental Ethiopian Africa.

Total: 4 ♂.

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 8627 (♂), 8654 (2 ♂), 9859b (♂).**Anax tristis** HAGENHAGEN (1867) *Verh. zool.-bot. Ges. Wien*, 17, p. 35 (♀ Guinea).

Widespread in tropical Africa; also in Madagascar and known even from the remote Maldivé Islands in the Indian Ocean.

Total: 1 ♂.

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 10649 (♂).Genus **HEMIANAX** SELYS**Hemianax ephippiger** (BURMEISTER)BURMEISTER (1839) *Handbuch d. Entomologie*, II. B., 2. Abth., p. 840 (♂ Madras).

A migratory species with a wide distribution, mainly occurring in open country. Nearly all Africa and eastern archipelagoes, southern Europe, West and Central Asia.

Total: 1 ♂.

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 7788 (♂).Family **LIBELLULIDAE**Genus **LOKIA** RIS**Lokia ellioti** LIEFTINCK n. sp.

PINHEY (1966b) *Rev. Zool. Bot. Afr.*, 73 (fasc. 3-4), pp. 304-305, figs. 7a-d, ♂♀ structures (Ikkelenge Distr., Zambia, sub *L. berenice*, nec FRASER).

This is the *Lokia* of which the two sexes were described and figured by PINHEY (1966b) as *L. berenice*, which is, however, a different species (see below). The two males (one immature) from



Zambia, received under this name from Dr PINHEY, correspond with his characterization and illustrations.

*L. ellioti* belongs to the same group as *L. circe* (RIS), *L. gamblesi* LIEFTINCK n. sp., *L. incongruens* (KARSCH), and *L. modesta* (RIS). Both sexes (so far known) of these are distinguished from *L. erythromelas* (RIS) and *L. corydoni* FRASER, by having short, normally shaped anal appendages. It differs from *L. gamblesi* not only in details of the genitalia, but also in being of superior size and by having the arculus placed further proximad (i.e. at a level between Ax<sub>1</sub> and Ax<sub>2</sub>). Additional characters that may serve to distinguish the male of *L. ellioti* from that of *L. gamblesi*, are the narrower fore wing triangle, the hind wing triangle in alignment with the arculus, and the wider Rs-Rspl space.

For a good description and figures, see PINHEY (1966b).

UPPER ZAMBEZI REGION: Zambia, North Mwinilunga, Ikelenge District, Zambezi Rapids, 21.I.1965, Pinhey (♂ adult, holotype, and ♂ juv. in Rijksmuseum van Natuurlijke Historie, Leiden).

Specimens of either sex are in the collection of my colleague Dr Elliot C.G. PINHEY, after whom the species has been named.

REMARKS. The holotype and unique male of *L. berenice* was collected near Eala (Congo ex-belge), I.1935, J. Ghesquière; it bears FRASER's type and identification labels (Musée royal de l'Afrique Centrale, Tervuren). It is an immature male corresponding exactly with FRASER's description, but direct comparisons have brought to light that it is the same species as *L. erythromelas* (RIS). The insect was held distinct from *L. erythromelas* probably on account of its body colours, which are of a uniform yellowish brown tint, not dark blackish brown alternated with red, as in adult males of *L. erythromelas*. There is a good series of full-coloured males of *L. erythromelas* (mostly from Eala) at Tervuren, and these were described in some detail by FRASER (1953, pp. 246-247, figs.). As *L. berenice* and *L. erythromelas* are of exactly the same build and size, having equally long and slender anal appendages and similarly shaped genital organs, I have no doubt that the two are conspecific, *L. berenice* only being a young individual of *L. erythromelas*.

#### *Lokia gamblesi* LIEFTINCK n. sp. — Fig. 2

Allied to *L. ellioti* LIEFTINCK n. sp., and superficially resembling *Nesciothemis fitzgeraldi* (PINHEY) in size and general appearance.

*Holotype* ♂ (adult). Labium, mandibles and labrum pale ochreous, the mandibles tipped with brown and all mouth-parts fringed with short golden bristles. Clypeus pale olive-green. Frons slightly darker, intermingled with brown dorsally and with an ill-defined blackish streak, one on each side extending down along eye-margin for two-thirds the distance; rather smooth and shiny anteriorly and alongside, its surface becoming wrinkled above, with ill-defined and very slightly flattened parts; median sulcus of frons moderately deep, impunctate. Vertex transverse, evenly rounded above, its surface densely punctate, dark brown slightly paler anteriorly. Antennae dark brown. Triangular area behind vertex large, almost polished, occipital triangle still longer, both black; eyes meeting only for a very short distance. Rear of the head brownish black with yellow patch at the temples.

Posterior lobe of prothorax very short, much broader than long, hind margin a little swollen but not raised and slightly emarginate medially, fringed with longish yellow-brown hair. Pro- and synthorax all black with low dark blue and bronze reflections; whole surface overlaid thinly with dark blue pruinescence especially evident on dorsum and underneath. Mesepimerum dorsally and metepisternum along upper end of second suture, with indications of some pale colouring, the spot at the hinder suture of minute size, crescent-shaped and sharply outlined.

Legs rather long and slender; coxae obscured. Trochanters and femora yellow, indistinctly striped with brown exteriorly; tibiae black but outer faces of all heavily striped with chrome-yellow along their entire length; tarsi obscured, yellowish brown exteriorly. Femora clothed with minute

black denticles, those at the longitudinal carinae of hinder pair regular, very numerous (34-36 in outer row) and all of about equal size, only the last one or two somewhat longer and spine-like. Tibial spines moderate, hardly longer than the interspaces. Claws with distinct interior tooth placed slightly beyond half-way their length.

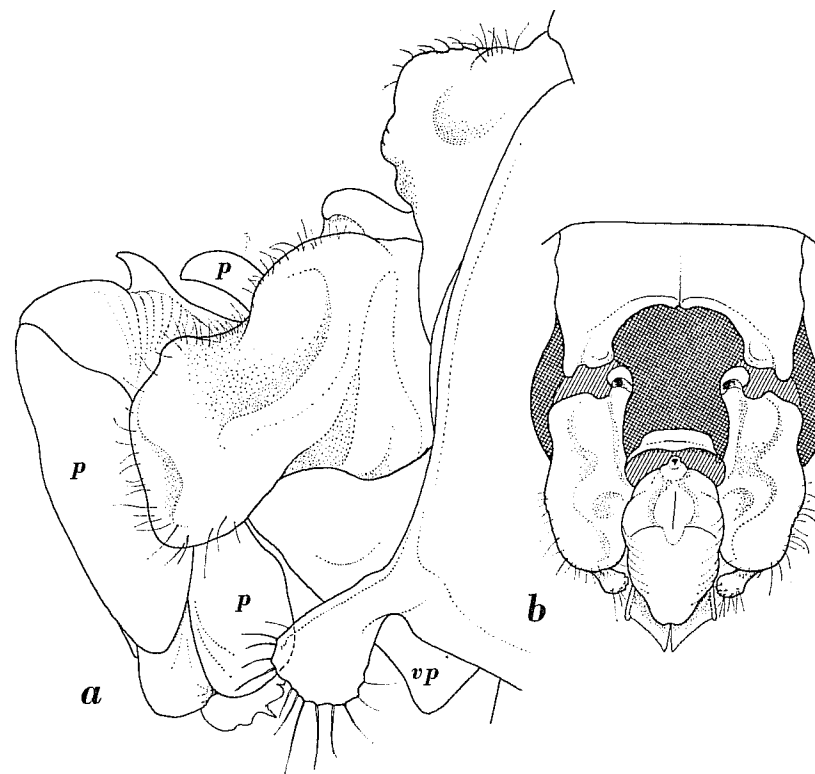


Fig. 2. — *Lokia gamblesi* LIEFTINCK n. sp., ♂ holotype (Kisongo, Symoens 9913): a, Genitalia, left side view, showing penis extruded; b, The same, ventral view, less highly enlarged (p, penis; vp, vesicle of penis).

Wings hyaline, hinder pair with faintest indication of minute yellow spots at extreme base. Neuration mainly dark; costa, from before nodus as far as the pterostigma, as well as the antenodal cross-veins in subcostal space, bright yellow; pterostigma large, bright yellow between black nervures, the costal side about twice as heavy as the opposite side, this cell practically identical in shape and size to that of *Nesciothemis fitzgeraldi*. Membranula white, greyish outwardly. Neuration with the following peculiarities. Nodus situated exactly midway the distance between base and middle of pterostigma. Arc a little distal to Ax<sub>2</sub> in all wings. Triangle of fore wing relatively wide, costal side

more than one-half length of proximal side, with a single cross-vein; ti three-celled. Triangle of hind wing free, placed a trifle distal to the arculus. Longitudinal veins rather straight,  $M_2$ -Rs weakly bisinuate; one cell-row Rs-Rspl and  $M_4$ -Mspl in all wings, Rspl weakly curved.  $Cu_1$  of fore wing moderately convex. Discoidal field of fore wing commencing with three cells, enclosing three to four antefurcal rows of two cells and then again widening and comprising eight marginal cells. Nodal index  $\frac{7.12.12.7}{8.9.10.7}$ . Last Ax complete, but in left fore wing the last two Ax are V-shaped. Anal loop of hind wing well developed, extending beyond apex of triangle, with Y-shaped basal cell.

Abdomen triquetral, not markedly swollen in either direction but widest at the junction of segments 2 and 3, from which point the body narrows gradually as far as the apex so as to attain only half its basal width. Dorsum of all tergites black, or almost so, with indication of some thin dark blue pruinescence on the basal segments. Supplementary transverse carinae present only on 2 and 3. Sides of 2 and ventral portions of tergites 3-8 light chrome (possibly bright greenish yellow in the living insect), surface with indication of basal and apical obscurations.

Genitalia: lamina anterior short and broad, its hind border somewhat swollen, arched and excavated, devoid of hair; hamulus of peculiar shape, its inner branch reduced to a tiny blunt hook, shaped as in fig. 2; lobus posterior narrow and of very small size. Penis conspicuous, apical joint lacking any processes.

Anal appendages black, superior pair straight and almost parallel, each very slightly constricted subbasally and gradually expanding to near the apex, which is abruptly narrowed with acuminate tip; no subapical angular projection but lower margin of each armed with a row of 8-9 minute triangular denticles which are directed slightly backward. Appendix inferior somewhat shorter than the superiors, very broadly triangular and widest a little beyond its base, strongly upcurved in profile, apex blunt, broadly rounded.

Measurements: abd. + app. 26.0 mm, hind wing 31.0 mm, pt. 4.0 mm.  
Female unknown.

The naming of this unique specimen, so similar in general appearance to a small-sized *Orthetrum* or *Nesciothemis*, has given me no little difficulty, even with regard to its generic assignment. This induced me to send it for inspection to Mr. M. GAMBLES, who kindly gave me his opinion on it, confirming my conjecture that it would be placed best in *Lokia*. Meantime, Dr PINHEY had presented me with a full-coloured male of alleged *Lokia berenice* FRASER, described by him (PINHEY, 1966b, pp. 304-305) from Zambia. As we have seen, however, the type of *L. berenice* is a juvenile example of *L. erythromelas* (RIS), the Zambian insect, which I have renamed *L. elliotti* LIEFTINCK n. sp., having been mistaken for *berenice* by PINHEY.

I have much pleasure in dedicating this peculiar species to Mr. M. GAMBLES, in appreciation of his careful and critical work on African Odonata.

Total: 1 ♂.

MIDDLE LUAPULA REGION: Kisongo, swampy "dembo" of the Loshi River, alt. 1190 m, 24.XII.1962, *Symoens* 9913 (holotype ♂ in Musée royal de l'Afrique Centrale, Tervuren).

#### Genus ORTHETRUM NEWMAN

##### *Orthetrum abbotti* CALVERT

CALVERT (1895) *Trans. Amer. Ent. Soc.*, 18, pp. 133-134, fig. 11 (♂♀ Kilimanjaro).

A small species, widely distributed over the Ethiopian Region, frequenting swamps and stagnant pools.

Total: 19 ♂, 3 ♀.

UPPER CHAMBESHI REGION: Lubwa, *Symoens* 10525 (2 ♂).

LAKE BANGWEULU REGION: Samfya, *Symoens* 10296 (♀).

UPPER LUAPULA REGION: Serenje, *Symoens* 10432 (4 ♂).

MIDDLE LUAPULA REGION: Mansa (Fort Rosebery), *Symoens* 10042b (♂); Chimese, *Symoens* 10186 (♂); Kale, *Symoens* 10291a and b (6 ♂).

LUBEMBE REGION: Sakania, *Symoens* 9292c (♂).

KAFUBU REGION: Tumbwe, *Symoens* 8823 (♂); 7 km S. of Lukuni, *Symoens* 8922b (♂); Kalota, near Kasokota, *Symoens* 8953b (♂), 8956 (♀); Lubumbashi, *Symoens* 9228 (2 ♂).

KUNDELUNGU PLATEAU: 15 km S.W. of Msipashi, *Symoens* 9754a (♂); 20 km S.W. of Msipashi, *Symoens* 9771b (♂); Lualala, *Symoens* 9794 (♀).

##### *Orthetrum brachiale* (PALISOT DE BEAUVOIS)

PALISOT DE BEAUVOIS (1805) *Ins. Afr. Amer.*, p. 171, tab. 2, fig. 3 (♂♀ le Royaume d'Oware, S. Nigeria).

A common species, occurring throughout the Ethiopian Region. The described populations from Mauritius are apparently partly intermediate between *O. brachiale* and *O. stemmale* (BURMEISTER), two species which may hybridize in the island (PINHEY, 1962c, pp. 118-119).

Total: 25 ♂, 15 ♀.

LAKE BANGWEULU REGION: Samfya, *Symoens* 9167d (♀), 9963 (♀); Chilupula, *Symoens* 9193 (2 ♂, 1 ♀).

MIDDLE LUAPULA REGION: Mansa (Fort Rosebery), *Symoens* 10042a and b (4 ♂, 1 ♀, in cop).

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 7693, 8650, 9166a, 9179, 9210, 9252a, 9253b, 9445, 9823a and b, 9955, 10650, 10900 (10 ♂, 9 ♀); Masika, *Symoens* 8714 (♀); Kalota, near Kasokota, *Symoens* 8956 (2 ♂, 1 ♀); Kipopo, *Symoens* 8959 (♂).

UPPER LUONGO REGION: 6 km from Chisunka, *Symoens* 10208b (♂).

LOWER LUAPULA REGION: Kikungu, *Symoens* 8432 (2 ♂); Mosesi, *Symoens* 8442 (♂); Mofati, *Symoens* 8477 (♂); Kimbeshie, *Malaise* 4761 (♂).

##### *Orthetrum caffrum* (BURMEISTER)

BURMEISTER (1839) *Handbuch d. Entomologie*, II. B., 2. Abth., p. 856 (♂♀ Port Natal).

Entire Ethiopian region and Madagascar.

Total: 1 ♂.

KAFUBU REGION: Tumbwe, *Symoens* 8235b (♂).

##### *Orthetrum chrysostigma* (BURMEISTER)

BURMEISTER (1839) *Handbuch d. Entomologie*, II. B., 2. Abth., p. 857 (♂♀ Teneriffa).

From the Canary Islands (terr. typ.) through the southeastern Mediterranean into the whole of continental Africa.

Total: 44 ♂, 4 ♀.

UPPER CHAMBESHI REGION: Lubwa, *Symoens* 10525 (♂).

LAKE BANGWEULU REGION: 9 km from Luwingu, *Symoens* 9544 (2 ♂); Samfya, *Symoens* 9628 (♂).

UPPER LUAPULA REGION: Kipushia, *Symoens* 9353 (3 ♂).

MIDDLE LUAPULA REGION: Mansa (Fort Rosebery), *Symoens* 10042a (♂); Chimese, *Symoens* 10186 (♂).

LUBEMBE REGION: 5 km E. of Libangila, *Symoens* 9342 (♂); Kalumbwe, *Symoens* 10174 (♂); Kikwashi, *Symoens* 10180 (♂).

KAFUBU REGION: 11 km from Lubumbashi (Elisabethville), *Symoens* 7710 (♂); Lubumbashi (Elisabethville), *Symoens* 7714, 8628, 8651, 8654, 8744b, 8842, 8877a, 8878, 9252a, 10125 (17 ♂, 2 ♀); Mukupa, *Symoens* 7989 (♂); Kikwanda, *Symoens* 8003 (♂); Munua, *Symoens* 8095 (2 ♂); Masika, *Symoens* 8714 (♂); Kitanda, *Symoens* 8769 (2 ♂, 1 ♀); Kipopo, *Symoens* 9453 (3 ♂); 7 km S. of Lukuni, *Symoens* 9682b (♂).

LOWER LUAPULA REGION: Mulundu, *Symoens* 8458 (♂); Kabiashia, *Malaisse* 4155 (♀); Kimbeshie, *Malaisse* 4761 (2 ♀).

#### *Orthetrum falsum* LONGFIELD

LONGFIELD (1955) *Publ. cult. Comp. de Diamantes de Angola*, No. 27, pp. 26, 57, fig. 3A, E and I (♂♀ Mt. Kenya, sub *O. capense falsum* subsp. n.).

For the synonymy of this species, see PINHEY (1962a).

Although the male genitalia are closely similar to those of *O. guineense* RIS, the status of this taxon as a distinct species is beyond question.

Most parts of continental Ethiopian Africa, except the southwestern Cape.

Total: 22 ♂, 3 ♀.

LAKE BANGWEULU REGION: Samfya, *Symoens* 9628 (♂).

LUBEMBE REGION: Kalumbwe, *Symoens* 10174 (3 ♂).

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 7693 (2 ♂), 7714 (♂), 8763 (2 ♂), 8766 (♂), 8842 (♂), 8846 (♀), 9228 (♂+exuviae), 10125 (♂), 10347a (♂), 10368 (♂); Tumbwe, *Symoens* 7727 (♂); 7 km S. of Lukuni, *Symoens* 8282 (♂); Kalota, near Kasokota, *Symoens* 8953a (♂); Lukuni, *Symoens* 9271 (2 ♀).

KUNDELUNGU PLATEAU: Katshupa, *Symoens* 9789 (4 ♂).

#### *Orthetrum guineense* RIS

RIS (1910) *Catalogue systématique et descriptif Coll. Selys, Libellulinen*, fasc. 10, pp. 179, 203 (keys), 207-208 (pars), fig. 143 (♂ lectotype Benguela, Angola, sub *O. chrysostigma guineense* n. subsp.); see also RIS (1919) *ibid.*, fasc. 16<sup>2</sup>, p. 1083; LONGFIELD (1955) *Publ. cult. Comp. de Diamantes de Angola*, No. 27 (Odon. 1), p. 27, fig. 3 C & H, notes and distrib.

This is one of the less easily named species of *Orthetrum*. Guided by Miss LONGFIELD's arguments sub *O. guineense*, I had first identified the present males with her "*capense capense*" (= *capicola* KIMMINS), but when I had received a good specimen of the latter from Dr PINHEY (collected in South Africa), this proved to be wrong. A series of seven males was then sent to Dr GAMBLES, who kindly wrote to me as follows: "In my opinion these are all *O. guineense*, which I see you have already considered as a possible identification for two of the specimens. I have compared them with my own specimens from Sierra Leone and Nigeria, where it is a common species, and can find no difference. I think my own are correctly determined. Miss LONGFIELD considered them to be this species. It was not necessary to relax any of them, as several specimens had the penis clearly visible" (*in litt.*, 14.VII.1968).

The species is very similar to *O. falsum* LONGFIELD and *O. machadoi* LONGFIELD, but can be distinguished from both by the differences in the male genitalia, *O. falsum* moreover having the pterostigma invariably darker and the Sc cross-veins black.

I am not quite sure about the correct placement of all females in SYMOENS' collection, only the specimen No. 9628 (from Samfya) being certainly conspecific.

Total: 71 ♂, 5 ♀.

UPPER CHAMBESHI REGION: Lubwa, *Symoens* 10525 (5 ♂).

LAKE BANGWEULU REGION: 12 km from Chibaye, *Symoens* 9506 (2 ♂); 9 km from Luwingu, *Symoens* 9544 (♂); 29 km N.W. of Chungu, *Symoens* 9548 (2 ♂); Samfya, *Symoens* 9628 (16 ♂, 1 ♀); 9945d (♂♀).

UPPER LUAPULA REGION: Kifumbe, *Symoens* 9348 (♂); Kabeleshi River, *Symoens* 9359 (10 ♂); Mufumbi, *Symoens* 9394a and b (5 ♂); Serenje, *Symoens* 10432 (♂).

MIDDLE LUAPULA REGION: Masaba, *Symoens* 10200 (5 ♂); Kale, *Symoens* 10291a (♂).

LUBEMBE REGION: Mipapa River, *Symoens* 9337 (2 ♂); Luankole River, *Symoens* 9341 (2 ♂); 5 km from Libangila, *Symoens* 9342 (♂); 4 km S. of Kalumbwe, *Symoens* 9672 (2 ♂); Kikwashi, *Symoens* 10180 (2 ♂).

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 8651 (♂), 8654 (♀), 8928a (♂), 9669b (♂); Tumbwe, *Symoens* 8723 (♂), 8729 (♂); Lukuni, *Symoens* 9271 (2 ♀); N.E. of Kilando, *Symoens* 9677 (♂).

KUNDELUNGU PLATEAU: 15 km S.W. of Msipashi, *Symoens* 9754a (♂).

UPPER LUONGO REGION: Chipili, *Symoens* 10232 (2 ♂); 25 km W.N.W. of Luwingu, *Symoens* 10572b (♂).

CONGO-LUANGWA WATERSHED REGION (S.E. SIDE): Mkushi River, *Symoens* 10411 a and b (2 ♂).

#### *Orthetrum hintzi* SCHMIDT

SCHMIDT (1951) *Arquivos Mus. Bocage*, 20, pp. 174, 178, figs. 26 a, 27 b (♂ Port. Guinea); FRASER (1954) *Rev. Zool. Bot. Afr.*, 50, p. 259-260, fig. 2f, genit. (♂ Congo, sub *Oxythemis aequatorialis* FRASER, n. sp.), syn. n.

*Aethiothemis paludinis* FRASER, 1954, is another synonym of this species.

Closely similar to *O. abbotti* and also fairly resembling small *O. caffrum*, *O. machadoi* and *O. monardi*, but easily known from all these by the shape of the male genitalia.

Tropical and subtropical Africa.

Total: 83 ♂, 16 ♀.

LAKE BANGWEULU REGION: Mundubi, *Symoens* 9149 (2 ♂); Chilupula, near Samfya, *Symoens* 9193 (5 ♂); Samfya, *Symoens* 9948c, 9950 e-g, 9951 c and d, 9954 (12 ♂, 1 ♀).

UPPER LUAPULA REGION: Serenje, *Symoens* 10676 (8 ♂); 10755 (♂); Munte River, *Symoens* 10679b (♂); Milenje River, *Symoens* 10759b and d (7 ♂); Chipundu, *Symoens* 10714a and b, 10716a and b (18 ♂, 5 ♀).

MIDDLE LUAPULA REGION: Masaba *Symoens* 10200 (♂); Kale, *Symoens* 10291a and b (10 ♂).

LUBEMBE REGION: Kikwashi, *Symoens* 10180 (2 ♂).

KAFUBU REGION: Mulemena, *Symoens* 7932 (2 ♂); Lubumbashi (Elisabethville), *Symoens* 8085 (♂), 8928a (♀); Tumbwe, *Symoens* 8409 (♀); Kalota, near Kasokota, *Symoens* 8953b (♂).

KUNDELUNGU PLATEAU: 15 km S.W. from Msipashi, *Symoens* 9754b (♂♀); 20 km S.W. of Msipashi, *Symoens* 9771a and b (2 ♂); Lualala, *Symoens* 9794 (8 ♂, 7 ♀).

LOWER LUAPULA REGION: 1 km W. of Kabiashia, *Malaisse* 4130 (♂).

**Orthetrum icteromelas** RIS

RIS (1910) Catalogue systématique et descriptif Coll. Selys, Libelluninen, fasc. 10, pp. 179, 197-198 (♂ ♀ Madagascar).

Originally described from Madagascar. Admittedly a scarce species in Central and East Africa but ranging to the southwestern Sudan and into Portuguese Guinea. Commoner towards the south. Frequents slow flowing streams, reedy dams and lakes.

Total: 6 ♂, 3 ♀.

UPPER CHAMBESI REGION: Lubwa, *Symoens* 10525 (♂).

LAKE BANGWEULU REGION: Mundubi, *Symoens* 9149 (4 ♂, 1 ♀); Samfya, *Symoens* 9946 (♀), 10296 (♀); Lubwe, *Symoens* 10018 (♂).

**Orthetrum julia** KIRBY

KIRBY (1900) *Ann. Mag. nat. Hist.*, 7th ser., 6 (No. 31), pp. 75-77, pl. 2, fig. 3 (♂ ♀ Sierra Leone).

A dark-coloured equatorial species, stated to be common and distributed from Uganda to West Africa, but mostly occurring in dense forest. Evidently very rare in the area under discussion.

Total: 1 ♂, 3 ♀.

KUNDELUNGU PLATEAU: 6.2 km N.N.W. of Katshupa, *Malaisse* 4688 (♀).

LOWER LUAPULA REGION: 3 km W of Kabiashia, *Malaisse* 4123 (♀); 6.1 km W.S.W. of Kaliashia, *Malaisse* 5104 (♀); 4.2 km W.S.W. of Kabiashia, *Malaisse* 5144 (♂).

**Orthetrum kalai** LONGFIELD — Fig. 3

LONGFIELD (1936) *Trans. Roy. ent. Soc. London*, 85, pp. 487-488, fig. 7 (♂ Zambezi river, sub *O. stemmale kalai*); ID. (1955) *Publ. cult. Comp. de Diamantes de Angola*, No. 27, pp. 21-22, fig. 2 C, G (♂ ♀, Zambia, Rhodesia, S. Nigeria, Gold Coast etc., sub *O. stemmale kalai* LONGFIELD).

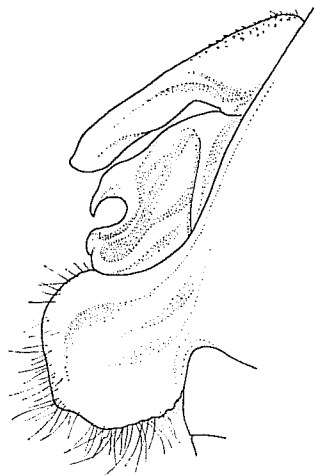


Fig. 3. — *Orthetrum kalai* LONGFIELD n. sp., ♂ (Mulundu, *Symoens* 8458): Genitalia, left side view.

This taxon has so far been regarded as a subspecies of *O. stemmale* (BURMEISTER), originally described from Mauritius, but I am unable to share this view. Also *O. wrighti* (SELYS), terr. typ. Seychelles, and *O. lemur* RIS, from Madagascar, are taken as insular races of *stemmale*. As far as my own experience goes, these insects differ so much from one another in general appearance, body size and structure of male accessory genitalia, that I am strongly inclined to consider them specifically distinct. See fig. 3.

Total: 1 ♂.

LOWER LUAPULA REGION: Mulundu, *Symoens* 8458 (♂).

**Orthetrum machadoi** LONGFIELD

LONGFIELD (1955) *Publ. cult. Comp. de Diamantes de Angola*, No. 27, pp. 35-39, fig. 5 A, E and J (♂ ♀ cop., Dundo, N.E. Angola).

Most parts of the Ethiopian Region and also occurring in South Africa.

Total: 48 ♂, 5 ♀.

LAKE BANGWEULU REGION: Mundubi, *Symoens* 9149 (♂).

UPPER LUAPULA REGION: Munte River, *Symoens* 10679b (♂); Chipundu, *Symoens* 10714a and b (12 ♂, 2 ♀), 10716a and b (2 ♂).

MIDDLE LUAPULA REGION: Mufuma, *Symoens* 9060 (♂); Kisongo, *Symoens* 9913 (♂).

LUBEMBE REGION: 2 km from Katala, *Symoens* 9329 (♂).

KAFUBU REGION: Kipuka, *Symoens* 7930 (♂); Mulemena, *Symoens* 7932 (2 ♂); Lubumbashi (Elisabethville), *Symoens* 8071 (♂), 8907b (♂), 8908 (♂), 9823a and b (2 ♂), 9859a (♂), 9861c (3 ♂), 10625 (♂); 12 km from Lubumbashi (Elisabethville), *Symoens* 8089 (♂); Tumbwe, *Symoens* 8235b (♂); Kalota, near Kasokota, *Symoens* 8953a and b, 8956 (4 ♂, 1 ♀); 7 km from Lubumbashi (Elisabethville), *Symoens* 9883 (2 ♂).

KUNDELUNGU PLATEAU: Lualala, *Symoens* 9794 (8 ♂, 2 ♀ and 3 ♀ immature, of doubtful identity).

**Orthetrum microstigma** RIS

RIS (1911) *Rev. Zool. Afr.*, 1, p. 128-131 (♂ ♀ Kamerun).

Widely spread across Central Africa but apparently local. Distribution, according to PINHEY, similar to *O. julia* KIRBY, but tends to prefer open swamps and streams to forest.

Total: 5 ♂.

MIDDLE LUAPULA REGION: Kale, *Symoens* 10291a (4 ♂).

UPPER LUONGO REGION: 12 km S.W. of Chipili, *Symoens* 10581 (♂).

**Orthetrum monardi** SCHMIDT

SCHMIDT (1951) *Arquivos Mus. Bocage*, 20, pp. 174, 179-180, fig. 26b (♂ Port. Guinea); PINHEY (1966a) *Exploration du Parc National de la Garamba. Mission H. De Saeger (1949-1952)*, fasc. 45, pp. 42-44, fig. 7 (♂ ♀ Congo).

Similar to *O. caffrum* but with a shorter yellow pterostigma and lacking cream lateral stripes on the thorax.

Apparently occurring throughout tropical Africa but uncommon and probably very local. The female has recently been described by PINHEY (1966a).

Total: 8 ♂, 1 ♀.

UPPER LUAPULA REGION: Pelu, *Symoens* 9346 (♂).

MIDDLE LUAPULA REGION: Chimese, *Symoens* 10186 (♂); Kale, *Symoens* 10291a (2 ♂).

LUBEMBE REGION: Kikwashi, *Symoens* 10180 (♂).

KAFUBU REGION: Kipopo, *Symoens* 8697, 9453 (2 ♂, 1 ♀).

UPPER LUONGO REGION: 12 km S.W. of Chipili, *Symoens* 10581 (♂).

#### Genus *NESCIOTHEMIS* LONGFIELD

##### *Nesciothemis farinosa* (FOERSTER)

FOERSTER (1898) *Ent. Nachr.*, 24, pp. 169-172 (♂ Transvaal).

Almost throughout the African continent and usually very abundant where found.

Total: 39 ♂, 2 ♀.

UPPER LUAPULA REGION: Milenje River, *Symoens* 10759b and c (3 ♂).

MIDDLE LUAPULA REGION: Mansa (Fort Rosebery), *Symoens* 9908 (3 ♂).

KAFUBU REGION: Mukupa, *Symoens* 7989 (5 ♂, 1 ♀); Lubumbashi (Elisabethville), *Symoens* 8085, 8906c, 8928a, 8944, 9722a and b, 9823d, 9861c, 9865, 9877, 9884, 9955, 10124 (21 ♂, 1 ♀); 11 km S.E. of Lubumbashi (Elisabethville), *Symoens* 9864 (7 ♂).

##### *Nesciothemis fitzgeraldi* LONGFIELD

LONGFIELD (1955) *Publ. cult. Comp. de Diamantes de Angola*, No. 27, pp. 61-63, fig. 10 B, D and F (♂♀ N. Rhodesia); PINHEY (1956) *Occas. Pap. Coryndon Mus.*, No. 4, pp. 30-32, fig. 6 (♂♀ Zambia = N. Rhodesia, as *Orthetrum fitzgeraldi* n. sp.).

A striking species, the male having a blue and red abdomen. Size smaller and of slenderer build than the very common *O. farinosum* (FOERSTER).

TOTAL: 3 ♂.

LAKE BANGWEULU REGION: Samfya, *Symoens* 9950f (♂), 9951c (♂).

MIDDLE LUAPULA REGION: Kisongo, *Symoens* 9058 (♂).

#### Genus *PALPOPLEURA* RAMBUR

##### *Palpopleura deceptor* (CALVERT)

CALVERT (1899) *Proc. Acad. nat. Sc. Philad.*, pp. 241-242, pl. 10, fig. 4 (♂ Somalia).

Less common than its congeners and very wary. Favours dams, pools and slow streams with lush vegetation. Locally distributed from Natal to Sudan and Somaliland.

Total: 2 ♂.

LOWER LUAPULA REGION: Mosesi, *Symoens* 8442 (2 ♂).

##### *Palpopleura jucunda* RAMBUR

RAMBUR (1842) *Hist. Nat. Ins. Névroptères in Suites à Buffon*, p. 134 (♂♀ Cape).

This species, according to PINHEY, is widespread and variable, but less common in the equatorial region than *P. lucia*. Prefers reedy water or swamp, in open country.

Total: 41 ♂, 33 ♀.

CONGO-LUANGWA WATERSHED REGION: 27 km S. of Shiwa Ngandu, *Symoens* 10475 (♂).

LAKE BANGWEULU REGION: 5 km from Chilubula, *Symoens* 9542 (2 ♂); 9 km from Luwingu, *Symoens* 9544 (4 ♂, 2 ♀); Samfya, *Symoens* 9959, 10296 (2 ♂, 2 ♀); Chikwanda, *Symoens* 10454 (♀).

UPPER LUAPULA REGION: W. of Mufumbi, *Symoens* 9399 (♀); Serenje, *Symoens* 10432, 10663a, 10676 (4 ♂, 1 ♀).

MIDDLE LUAPULA REGION: Mufuma, *Symoens* 9665 (♀); Lukangwa River, *Symoens* 9669a (1 ♂, 2 ♀); Chimese, *Symoens* 10186 (♂); Kale, *Symoens* 10291a and b (4 ♂, 14 ♀).

LUBEMBE REGION: Sakania, *Symoens* 9292c, 9298 (1 ♂, 5 ♀); 5 km E. of Libangila, *Symoens* 9342 (♀); Kikwashi, *Symoens* 10180 (♂).

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 8845 (♂); Kipopo, *Symoens* 9453, 9476 (1 ♂, 1 ♀); 7 km S. of Lukuni, *Symoens* 9682a (1 ♂, 1 ♀).

UPPER LUONGO REGION: 25 km W.N.W. of Luwingu, *Symoens* 10572b (1 ♂, 2 ♀).

KUNDELUNGU PLATEAU: 6.0-6.3 km N. of Katshupa, *Malaisse* 4196, 4238, 5186, 5201, 5241 5242 (13 ♂, 8 ♀).

LOWER LUAPULA REGION: Kabiashia, *Malaisse* 4155 (♀), 4548 (♀).

KIBARA PLATEAU: 12 km W.S.W. of Lusinga, *Symoens* 10266 (♂); Lusinga, *Symoens* 10269 (♂).

CONGO-LUANGWA WATERSHED REGION (S.E. SIDE): Mkushi River, *Symoens* 10411 a (♂♀).

##### *Palpopleura lucia* (DRURY)

DRURY (1773) *Ill. Exot. Ins.*, II, p. 82, pl. 451 (♀ Sierra Leone).

A very common and universally distributed insect in tropical Africa.

Total: 83 ♂, 20 ♀.

CONGO-LUANGWA WATERSHED REGION: Shiwa Ngandu, *Symoens* 10511 (♂).

UPPER LUAPULA REGION: Kabeleshi River, *Symoens* 9359 (2 ♂, 1 ♀); Pelu, *Symoens* 9346 (♂).

MIDDLE LUAPULA REGION: Mufuma, *Symoens* 9665 (♂); Masaba, *Symoens* 10200 (♂); Kale, *Symoens* 10291a and b (8 ♂).

LUBEMBE REGION: Sakania, *Symoens* 9292b and c (3 ♂, 2 ♀); Libangila, *Symoens* 9336 (9 ♂, 1 ♀); Kikwashi, *Symoens* 10180 (14 ♂, 4 ♀).

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 7693, 8650, 8651, 8654, 8842, 9229, 9444, 9445, 9552b, 9712, 9722a (12 ♂, 5 ♀); Kipopo, *Symoens* 8697 (2 ♂, 1 ♀); Kalota, near Kasokota, *Symoens* 8956 (♂♀).

UPPER LUONGO REGION: 6 km from Chisunka, *Symoens* 10208a and b (4 ♂, 1 ♀); 12 km S.W. of Chipili, *Symoens* 10581 (♂).

KUNDELUNGU PLATEAU: 6.0-6.2 km N. of Katshupa, *Malaisse* 4187 (♂), 4238 (♂), 4948 (♂), 5186 (♀).

LOWER LUAPULA REGION: Mosesi, *Symoens* 8442 (3 ♂); Kabiashia, *Malaisse* 4249, 4255, 5087 (17 ♂, 2 ♀).

KIBARA PLATEAU: 12 km W.S.W. of Lusinga, *Symoens* 10266 (♀); Lusinga, *Symoens* 10268 b (♀).

##### Var. *portia* (DRURY)

DRURY (1773) *Ill. Exot. Ins.*, p. 86, pl. 47<sup>3</sup> (♂ Sierra Leone).

Total: 15 ♂.

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 7697, 7714, 8651, 9254e (6 ♂); Kalota, near Kasokota, *Symoens* 8956 (2 ♂); Kipopo, *Symoens* 9453, 9476 (2 ♂).

LOWER LUAPULA REGION: Mosesi, *Symoens* 8442 (♂); Kabiashia, *Malaisse* 4141 (♂), 4249 (2 ♂).

KIBARA PLATEAU: 12 km W.S.W. of Lusinga, *Symoens* 10266 (♂).

### Genus AETHIOTHEMIS MARTIN

#### *Aethiothemis bequaerti* RIS

RIS (1919) Catalogue systématique et descriptif, Coll. Selys, Libellulinen, fasc. 16<sup>2</sup>, pp. 1125, 1127 (♂ Lubumbashi = Elisabethville, Congo); LONGFIELD (1959) *Publ. Cult. Comp. de Diamantes de Angola*, No. 45, pp. 38-39 (discussion with related species).

Evidently a somewhat rare and very local species. I have compared the males in the present collection with the holotype in the Congo Museum at Tervuren and found them well agreeing. In the female from Kale, the wing-bases are broadly amber to about half-way the nodus, as described by PINHEY (1962b, p. 909) for a female of supposed *A. diamangae* LONGFIELD, from Zambia.

Total: 2 ♂, 3 ♀ in the material collected by J.J. SYMOENS and F. MALAISSE.

LAKE BANGWEULU REGION: Samfya, *Symoens* 10296 (2 ♂, 1 ♀).

MIDDLE LUAPULA REGION: Kale, *Symoens* 10291b (♀).

KAFUBU REGION: Lubumbashi (Elisabethville), (2 ♂, 2 ♀, ex coll. PINHEY).

LOWER LUAPULA REGION: Kabiashia, *Malaisse* 5176 (♀).

#### *Aethiothemis discrepans* LIEFTINCK n. sp. — Fig. 4

(= *A. solitaria* Auct., nec RIS; = *A. mediofasciata* Auct., nec RIS)

RIS (1919) Catalogue systématique et descriptif Coll. Selys, Libellulinen, fasc. 16<sup>2</sup>, pp. 1125-1126 (pars, sub *A. solitaria*); SCHOUTEDEN (1934) *Ann. Mus. Congo Belge, Zool.* (3) 3: 21 (Congo, sub *A. solitaria*); PINHEY (1962) *Publ. cult. Comp. de Diamantes de Angola*, No. 45, p. 245 (pars, sub *A. solitaria* and *mediofasciata*); PINHEY (1966) *Exploration du Parc National de la Garamba, Mission H. De Saeger (1949-1952)*, fasc. 45, pp. 36-37 (gen. et spec. discussed).

This much discussed dragonfly can not possibly be referred to *A. solitaria* RIS, the type-species of *Aethiothemis*, nor to *mediofasciata* RIS. By lack of a better understanding of the status of these two taxa, it seems best to rename the present insect, leaving the position of the former undecided until the poorly defined types can be compared with fresh material of both. In point of fact, *A. solitaria* RIS in MARTIN (1908, p. 663, ♂ Bolama, Port. Guinea), is evidently a very different species, as is obvious from RIS' photograph of the wings and sketch of the genitalia of the type (RIS, 1910, pp. 366-367, figs. 217-218). The situation of the arculus at a level between Ax<sub>1</sub> and Ax<sub>2</sub>, the characteristic elongate form of the anal loop, as well as the shape of the genitalia of *A. solitaria*, are all characters foreign to the other species and sufficiently at variance to merit its separation therefrom.

The status of *A. mediofasciata* RIS (1931, pp. 106-107) has not yet been definitely established either. It was founded on a female in poor present insect, leaving the position of the former undecided until the poorly defined types can be compared with fresh material of both. In point of fact, *A. solitaria* RIS in MARTIN (1908, p. 663, ♂ Bolama, Port. Guinea), is evidently a very different species, as is obvious from RIS' photograph of the wings and sketch of the genitalia of the type (RIS, 1910, pp. 366-367, figs. 217-218). The situation of the arculus at a level between Ax<sub>1</sub> and Ax<sub>2</sub>, the characteristic elongate form of the anal loop, as well as the shape of the genitalia of *A. solitaria*, are all characters foreign to the other species and sufficiently at variance to merit its separation therefrom.

The status of *A. mediofasciata* RIS (1931, pp. 106-107) has not yet been definitely established either. It was founded on a female in poor present insect, leaving the position of the former undecided until the poorly defined types can be compared with fresh material of both. In point of fact, *A. solitaria* RIS in MARTIN (1908, p. 663, ♂ Bolama, Port. Guinea), is evidently a very different species, as is obvious from RIS' photograph of the wings and sketch of the genitalia of the type (RIS, 1910, pp. 366-367, figs. 217-218). The situation of the arculus at a level between Ax<sub>1</sub> and Ax<sub>2</sub>, the characteristic elongate form of the anal loop, as well as the shape of the genitalia of *A. solitaria*, are all characters foreign to the other species and sufficiently at variance to merit its separation therefrom.

The status of *A. mediofasciata* RIS (1931, pp. 106-107) has not yet been definitely established either. It was founded on a female in poor present insect, leaving the position of the former undecided until the poorly defined types can be compared with fresh material of both. In point of fact, *A. solitaria* RIS in MARTIN (1908, p. 663, ♂ Bolama, Port. Guinea), is evidently a very different species, as is obvious from RIS' photograph of the wings and sketch of the genitalia of the type (RIS, 1910, pp. 366-367, figs. 217-218). The situation of the arculus at a level between Ax<sub>1</sub> and Ax<sub>2</sub>, the characteristic elongate form of the anal loop, as well as the shape of the genitalia of *A. solitaria*, are all characters foreign to the other species and sufficiently at variance to merit its separation therefrom.

The status of *A. mediofasciata* RIS (1931, pp. 106-107) has not yet been definitely established either. It was founded on a female in poor present insect, leaving the position of the former undecided until the poorly defined types can be compared with fresh material of both. In point of fact, *A. solitaria* RIS in MARTIN (1908, p. 663, ♂ Bolama, Port. Guinea), is evidently a very different species, as is obvious from RIS' photograph of the wings and sketch of the genitalia of the type (RIS, 1910, pp. 366-367, figs. 217-218). The situation of the arculus at a level between Ax<sub>1</sub> and Ax<sub>2</sub>, the characteristic elongate form of the anal loop, as well as the shape of the genitalia of *A. solitaria*, are all characters foreign to the other species and sufficiently at variance to merit its separation therefrom.

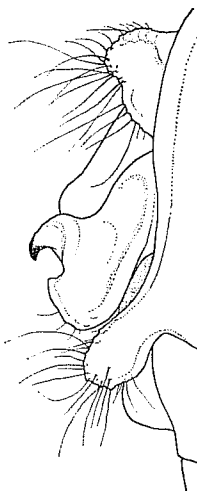


Fig. 4. — *Aethiothemis discrepans* LIEFTINCK n. sp., ♂ (Kabiashia, *Malaisse* 4155): Genitalia, left side view.

Wing membrane hyaline; extreme base of hind wings with diffuse amber spot. Neuration dark, cross-veins in anterior portion of wings conspicuously yellow. 9-11 Ax on fore wings, 8-9 on hinder pair. Arculus situated at or very slightly distal to Ax<sub>2</sub> on fore wings, a little further beyond that level in hinder pair. Discoidal field of fore wing usually commencing with 4-6 duplicated cells to a little beyond main fork, more rarely with 3 basal cells followed by two rows up to the same level. Cu<sub>1</sub> in hind wing at the anal angle of triangle. Pterostigma yellow, framed in black, the costal margin strengthened. Membranula light grey.

Abdomen depressed, not constricted at segment 3, gradually and but slightly diminishing in width towards the end. Genitalia shaped as in fig. 4; inner hamular branch black-tipped. Penis of huge size, usually exposed, black; apex blunt, provided on either side with a low crescent-shaped, acute, vertical plate, these two thin ridges converging towards the tip but not quite reaching it.

Female. — Differs from the original description of *mediofasciata* in the following respects. Thoracic dorsum (mesepisternites) yellowish brown, this colour deepening to dark brown and forming an undulated stripe at the humeral suture; sides beyond that level and ventral surface light greenish yellow lacking dark markings save for a diffuse, triangular brownish mesepimeral spot bordering mesinfraepisternal suture and an impressed brownish streak at upper end of second suture. Inner faces of all femora partly, and of the tibiae along their full length, striped with black; tarsi all black.

Neuration as in male. Fore wings colourless, hind wings with traces of amber at extreme base only. Abdomen coloured as described for the type, but 8th tergite ventrally without any indication of leaf-like expansions. Vulvar lamina much as described for *A. mediofasciata*: hind margin of 8th sternite a little projecting and swollen, ending in a pair of minute, closely approximated, roundish and somewhat shiny tubercles, which are either yellow or black, as is also the rest of the sternite.

Size variable. Measurements: ♂ abd. + app. 18.6-21.5 mm, hind wing 22.0-25.0 mm, pterostigma fore wing 2.5-3.0 mm; ♀ 18.0-22.5, 22.5-26.0, 2.3-3.0 mm.

This new species, and *A. carpenteri* (FRASER) as well, are placed in *Aethiothemis* with considerable doubt. It is impossible to give a better definition of this genus than the one published by RIS; and as this was based on a single immature and imperfectly understood male, nothing much can be said of its affinities with other species currently referred to *Aethiothemis*.

Under the present circumstances, it seems best to leave these species as they now stand. Ultimately, *Cirrothemis* FISHER may perhaps be restored to receive *A. hequaerti* RIS, *basilewskyi* FRASER, and *watulkii* PINHEY?

Total: 11 ♂, 10 ♀ in the material collected by J. J. SYMOENS and F. MALAISSE.

KAFUBU REGION: Lubumbashi (Elisabethville), Kafubu River, near the "Athénée de la Katuba", alt. 1170 m, 27.III.1963, *Symoens* 10158 (♂), and 29.V.1963, *Symoens* 10378 (♂); Lubumbashi (Elisabethville), IV-V.1953, *Ch. Seydel* (2 ♀ in Musée royal de l'Afrique Centrale, Tervuren, specimens identified by FRASER with *A. solitaria*).

LOWER LUAPULA REGION: Kabiashia, Luanza River, alt. 1000 m, 23.IV.1966, *Malaisse* 4155 (8 ♂, 8 ♀; holotype ♂ and allotype ♀ in Musée royal de l'Afrique Centrale, Tervuren).

LUVUA REGION: Kiambi, 1911, *Dr Valdonio* (♂ in Musée royal de l'Afrique Centrale, Tervuren, specimen examined and discussed by RIS, 1919, p. 1125, sub *A. solitaria*).

REMARKS. Besides the above, I have been able to examine a number of both sexes of evidently this same species from Ndola in Zambia (ex coll. PINHEY), North Nigeria (ex coll. GAMBLE), and from Sibweza in Tanzania, leg. *Kielland*, in the Leiden Museum. Most of these specimens had been named tentatively as *A. solitaria* or *mediofasciata* by the aforementioned specialists and myself.

#### Genus CHALCOSTEPHIA KIRBY

##### *Chalcostephia flavifrons flavifrons* KIRBY

KIRBY (1889) *Trans. zool. Soc. London*, 12, p. 337 (♂ Angola).

Tropical Africa, locally common in or at edges of forest or riverine bush, up to about 1400 m alt.

Total: 1 ♂, 1 ♀.

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 8913c and 9955 (♂ ♀).

#### Genus HEMISTIGMA KIRBY

##### *Hemistigma albipuncta* (RAMBUR)

RAMBUR (1842) *Hist. Nat. Ins. Névroptères in Suites à Buffon*, pp. 93-94 (♂ ♀ Sénégal).

A very variable species, both in size and wing pattern. Widely spread from South Africa to the Sudan.

Total: 20 ♂, 29 ♀.

LAKE BANGWEULU REGION: Ndoba, *Symoens* 9134, 10014a and b (5 ♂); Mundubi, *Symoens* 9149 (♂ ♀); Kabanga, *Symoens* 10247 (2 ♂); Samfya, *Symoens* 10296 (2 ♂, 3 ♀).

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 9859a (♀), 10152b (♀); 7 km from Lubumbashi (Elisabethville), *Symoens* 9883 (2 ♀).

LOWER LUAPULA REGION: Kikungu, *Symoens* 8425, 8432 (2 ♂, 6 ♀); Mosesi, *Symoens* 8442 (2 ♂, 6 ♀); Mutwale, near Kashiobwe, *Symoens* 8549 (2 ♂, 8 ♀), 8561 (♀).

#### Genus THERMOCHORIA KIRBY

##### *Thermochoria jeanneli* (MARTIN)

MARTIN (1915) *Voyage Alluaud et Jeannel, Ins. Pseudonévrop., 2*, pp. 29-31, pl. 1, figs. 1-2 (♀ Afrique orient. anglaise, sur la côte); PINHEY (1961a) *Surv. Drag. E. Africa, Brit. Mus.*, pp. 150-151, pl. 9, fig. 11 (♂ ♀ Tanganyika).

The discovery of this rare species in southern Katanga means an interesting addition to its recorded habitats in tropical East Africa. For particulars, see PINHEY (1961a).

Total: 7 ♂, 1 ♀.

KAFUBU REGION: 6 km S. of Mampa, *Symoens* 8903 (2 ♂); Lubumbashi (Elisabethville), *Symoens* 9877 (♀).

LOWER LUAPULA REGION: 3-4.2 km W. of Kabiashia, *Malaisse* 4123 (♂), 4559 (4 ♂).

#### Genus ELEUTHEMIS RIS

##### *Eleuthemis buettikoferi* RIS

RIS (1910) *Catalogue systématique et descriptif Coll. Selys, Libellulinen*, fasc. 11, pp. 382-384, figs. 231, 232 (♂ Liberia).

Evidently a somewhat scarce species but probably occurring right across tropical Africa.

The unique specimen in Prof. SYMOENS' collection does not differ in any way from the lectotype and a small series of male topotypes, in the Leiden Museum.

Total: 1 ♂.

MIDDLE LUAPULA REGION: Masaba, *Symoens* 10200 (♂).

#### Genus SLEUTHEMIS FRASER

##### *Sleuthemis diplacoides* FRASER

FRASER (1951) *Rev. fr. Ent.*, 18, pp. 96-98, figs. 2-3, wings and structures (♂ French Guinea); AGUESSE (1968) *Bull. Inst. fond. Afr. Noire*, sér. A, 30 (n° 2), pp. 525-529, figs. 3, 4, structures (♂ ♀, Sierra Leone, sub *Monardithemis leonensis* n. sp.), syn. n.

Although this species is not represented in Prof. SYMOENS' collection, I am taking advantage of the present opportunity to establish a case of synonymy in this family. A new libellulid, *Monardithemis leonensis* AGUESSE, described recently from the interior of Sierra Leone, is here considered to be the same insect as *Sleuthemis diplacoides* FRASER, known from a single male taken at Danane, in the Republic of Guinée, hence not far away from the type-locality of *M. leonensis*. The specific descriptions and illustrations of these insects correspond very nearly in most respects, although AGUESSE omitted to describe the head markings of his male and FRASER's sketch of the wings does not fit his own comments on the venation in all details. However, there can be little doubt about the correctness of the above synonymy, which could be checked easily by comparing the types of *S. dipla-*

*coides* and *M. leonensis*, both having been deposited in the Paris Museum. I agree with FRASER (1951) that the position of *Sleuthemis* is rather obscure, and the same applies to that of *Monardithemis* LONGFIELD (1947, pp. 21-25, figs.). Personally I am inclined to place *Sleuthemis* in the neighbourhood of *Eleuthemis*, from which it differs mainly by the complete row of Ax on the fore wings and also by the position of Cu<sub>1</sub> at the anal angle of the triangle of the hind wings. The monotypical genus *Monardithemis* would seem to be a more primitive member of the family, as indicated by the venation.

#### Genus PORPAX KARSCH

##### *Porpax risi* PINHEY

PINHEY (1958) *Occ. Pap. nat. Mus. S. Rhod.*, No. 22b, p. 115 (♂♀ Rhodesia, E. districts); Id. (1964) *Journ. Ent. Soc. S. Afr.*, 26 (No. 2), pp. 334-335, fig. 12 (♂ Zambia = N. Rhodesia); Id. (1966a) *Exploration du Parc National de la Garamba. Mission H. De Saeger (1949-1952)*, fasc. 45, pp. 49, 52-53, fig. 11 (♂♀ Zambia = N. Rhodesia).

Originally described as a subspecies of *Porpax asperipes* KARSCH (1896, pp. 18-19, ♀ Yaunde, Kamerun), this pretty little insect was subsequently separated off and recognized as a distinct species, which it undoubtedly is.

Our series would seem to differ somewhat from typical *P. risi*, described from the eastern districts of southern Rhodesia. The light bands and spots on the thorax are less extensive than in these, whereas examples from more northern countries are described as being lighter than our specimens. These latter do approach Zambian populations which PINHEY described and figured from the Ikelenge area of Mwinilunga, but the detached upper mesepisternal and mesepimeral green spots in SYMOENS' insects are larger than appears from PINHEY's sketch (1964, fig. 12) of the thoracic pattern; these are, in fact, at least as wide as the black space separating the spots from the broad bands lower down. Otherwise the difference between these populations would appear to be very slight.

Male. — Labrum bright greenish ochreous, narrowly bordered with black. Green patches on top of frons either isolated and band-like, or constricted in front of the median ocellus, or else (and more rarely), narrowly interrupted by black so as to form a pair of large pear-shaped spots. Thoracic markings light green. Legs black; coxae antero-laterally as well as inner faces of fore femora, bright ochreous. Outer carina of hind femur armed with a row of 16-19 black denticles, successively a little stronger and more widely spaced from base to apex, the distal tooth spine-like, about twice as long as the preceding ones. Inner as well as outer faces of mid and hind femora moreover sparsely clothed with long and fine, erect black hairs.

Wings entirely hyaline, or with merest trace of amber at extreme base of hind wing only. Arc situated a little proximal to Ax<sub>2</sub> in fore wings, at or slightly distal to Ax<sub>2</sub> in hind wings. Discoidal field of fore wing commencing with two cell rows. 8½-10½ Ax in fore wing, 6-9 in hinder pair. Pterostigma yellow, thickly framed in black. Membranula dark grey, almost white basally. Neuration otherwise as described by PINHEY (1966a).

Light green middorsal markings on abdominal segments 1-9 distinct in immature and subadult specimens, concealed from view by light blue pruinescence covering dorsum of 1-7 and base of 8 in fully coloured specimens; distal portion of 8 as well as 9-10 black, lacking pruinescence, the yellow middorsal streaks on 8-9 remaining visible. Anal appendages yellow.

Female. — Very similar to the male, except that the labrum is somewhat more broadly bordered with black and the abdominal markings are slightly larger, devoid of pruinescence. Legs with outer spines on femora fewer in number (11-13) and longer than in the opposite sex.

Valvula vulvae very short, divided into a pair of greatly swollen, bluntly triangular lobes, which are separated from each other by a wide U-shaped emargination.

Measurements: ♂ abd. + app. 18.5-20.5 mm, hind wing 23.0-24.5 mm, pterostigma fore wing 2.0-2.3 mm; ♀ 17.0-18.0, 24.0-25.0, 2.4-2.6 mm, respectively.

The males of *P. asperipes* and *P. risi* can be easily distinguished thus:

<i>P. asperipes</i>	<i>P. risi</i>
Labrum black;	Labrum ochreous, only anterior border black;
Green mesepimeral thoracic stripe entire;	Green mesepimeral thoracic stripe interrupted above;
Inner faces of trochanters and femora of posterior two pairs of legs densely hirsute, this pubescence most conspicuous on basal half of femora;	Inner faces of these parts sparsely clothed with longish hairs;
Pterostigma shorter (1.5 mm approx.), dark brown; frequently 3 basal cells in discoidal field of fore wing;	Pterostigma longer (see above), yellow; 2 basal cells in discoidal field of fore wing;
Abdomen slightly spindle-shaped; segm. 3-9 black, lacking pale middorsal spots;	Abdomen not constricted at segment 3, pale dorsal spots present on 3-9;
Size larger (e.g. abd. + app. 21-22 mm, hind wing 27 mm).	Size smaller (see above).

The above notes on *P. asperipes* are taken from a male in perfect condition, collected in West Africa (Kamerun).

Total: 24 ♂, 14 ♀.

KUNDELUNGU PLATEAU: Katshupa, *Symoens* 9731 (♂); 15 km S.W. of Msipashi, *Symoens* 9754a and b (3 ♂, 2 ♀); 20 km S.W. of Msipashi, *Symoens*, 9771a, b and c (20 ♂, 12 ♀).

#### Genus DIPLACODES KIRBY

As has been pointed out recently by PINHEY, this genus still requires careful revision in the Ethiopian region. Considerable variation in the colour design has been noted in populations of different body sizes; and the fact that names have been given to poorly defined forms, often of uncertain origin, has caused much uncertainty and given rise to confusion in the nomenclature. Unfortunately, some individuals on which the older descriptions are based either have become lost or are otherwise unrecognizable. In an attempt to clear up some of the dark points, I have re-examined a few specimens in SELYS' collection at the Institut royal des Sciences Naturelles, Brussels. They are a mixed lot, comprising many incomplete and improperly labelled specimens. Some may be considered as syntypes described by RAMBUR (1842) and on these the following notes (partly based on the original descriptions) can now be given.

*D. parvula* (RAMBUR, p. 116, ♀ "Sénégal"). — Coll. SELYS: 3 ♀, *Libellula parvula* RAMBUR/parvula à renvoyer, without indication of habitat. All labelled *parvula* by F. Ris but arranged under drawer-label *lefebvrei* (RAMBUR), with museum's identification labels *lefebvrei* with affix "type". Small-sized individuals, colour pattern as in immature *lefebvrei*. Possibly a composite species. "Colour pattern and colour of legs variable, at least the tibiae striped with yellow externally. Pterostigma reddish brown. Fore wing with 7-8 Ax. Slightly smaller than *Sympetrum flaveolum*." (after RAMBUR).



*D. flavistyla* (RAMBUR, p. 117, ♂ "Sénégal"). — Coll. SELYS: 1 ♂, locality illegible (probably the type), with label *flavistyla* (unknown writing), and *parvula* in RIS' hand. This is a larger specimen, unquestionable *lefebvrei*, as is evident also from the original description.

*D. tetra* (RAMBUR, p. 119, ♂ "Ile de France"). — Coll. SELYS: not present. According to the description ("De la grandeur de la *Vulgata*"; "fore wing with 9 Ax;" etc.), unquestionably also *D. lefebvrei* (RAMBUR), or subspecies *limbata* FRASER.

*D. concinna* (RAMBUR, p. 120, ♂ "Ile de France"). — Coll. SELYS: not present. "Same size as *tetra* but with variegated colour-pattern. Basal wing spots and pterostigma lighter and fore wing with 9-10 Ax" (after RAMBUR). According to these data, conspecific with *D. lefebvrei* (RAMBUR).

*D. exul* (SELYS, 1883, p. 96, ♀ "Afrique australe"). Type lost. A nondescript insect.

As will be seen from the above, not one of these names can be used any longer for the regional species presently recognized.

Disregarding *D. trivialis* (RAMBUR), the occurrence of two closely allied yet quite distinct species on the African continent is beyond dispute. One is *lefebvrei* (RAMBUR), while the other has so far been known as *D. exilis* RIS (1911, p. 464), originally described from Madagascar but subsequently reported also from Africa proper. PINHEY (1967) made a preliminary study of the male penile organ of *lefebvrei* and *exilis*, after specimens from Africa, Mauritius and Madagascar. He found some distinctive features in this organ but argued that further investigations were necessary before any conclusions could be drawn. I have taken the present opportunity to continue his work and characterize anew the species described below as *D. deminuta* n. sp., which is almost certainly the same insect as the one called *exilis*, reported from Rhodesia and other parts of Africa, by PINHEY and several authors before him.

***Diplacodes deminuta* LIEFTINCK n. sp. — Fig. 5, a-d**

PINHEY (1958) *Occas. Pap. Nat. Mus. S. Rhodesia*, No. 22B, pp. 115-116 (descr. ♂), Salisbury, Mbala = Abercorn etc., in the Rhodesias, sub *D. exilis* RIS; Id. (1967) *Arnoldia*, 3, pp. 14-15, fig. 4c (♂ Rhodesia, sub *D. exilis* RIS).

Stature of *D. lefebvrei* (RAMBUR) and *D. exilis* RIS, but smaller than the former and differently coloured from both. = holotype

**Male (adult).** — Mouth-parts, face, frons and the vertex and antennae, deep black; outer portions of lateral lobes of labium, mandibles at extreme base, anteclypeus, as well as antero-lateral edges of frons adjoining the eyes, obscurely brownish yellow; these latter areas ill-defined and inconspicuously coloured; postclypeus and frons anteriorly smooth and shiny. Occipital triangle and rear of the head likewise black. Pubescence black.

Pro- and synthorax almost wholly black, overlaid sparsely with grey-blue pruinescence but clothed conspicuously with white hair all over, the dorsal pubescence and tufts along upper carina of metepisternum long and dense. Light thoracic markings light green or chrome yellow, reduced to mere specks upon meso- and metinfraepisternites, somewhat enlarged, angular and patch-like upon metepimerum on which the light area occupies the dorsal one-fourth or less but not quite reaches the upper border. In one specimen the infraepisternal spots have disappeared altogether, there being only a diffuse greenish spot on the metepimerum. Ventral surface of thorax black.

Legs including the spines black, the rows of bristle-like hairs fringing inner faces of femora white.

Wings hyaline, bases of fore wings unmarked, though occasionally with vestigial amber yellow spot; hind wings either with more extensive spots of the same colour (very diffuse distally) in c-sc about half-way Ax<sub>1</sub>, trace in m, in cu to slightly beyond Cux, and 4-5 cells in anal area;

or more sharply defined, smaller and of a light ferruginous tinge: in cu only to Cux and 3-4 cells in anal area. Venation black but costal vein and numerous cross-nerve in antero-basal part of wings clear yellow. Fore wings invariably with 6½ Ax and 5-6 Px, hind wings with 5-6 (usually 5) Ax and Px. All triangles free, internal triangles (ti) also undivided, or with a single curved cross-vein in about 50% of the wings; costal side of fore wing triangle always fractured near distal angle. Discoidal field of fore wing commencing with two cell rows, gradually and but slightly expanded towards margin. Pterostigma palest yellow between thick black nervures. Membranula dark grey.

Abdomen slender, shaped as in *D. exilis*, basal segments as far as base of 4 thinly pruinose blue; markings light greenish yellow. Traces of transverse lateral spots of segm. 1-2, one each side of the transverse carina of 2; similar though much larger spots placed lengthwise at sides of 3; 4-8 laterally with elongate paired spots, all isolated and rounded off at either end, those of 4-6 subequal, of 7 shorter and of 8 vestigial; 9-10 black.

Genitalia black, shaped as in fig. 5a; pubescence of lamina anterior, hamulus and posterior lobe all white.

Anal appendages, superior pair pale yellow, black-tipped, inferior appendage obscured; superiors slender, subparallel in dorsal view, slightly downcurved in profile, tips sharply acuminate and a little outcurved, subapical angle rounded but armed ventrally before apex with a row of 8-10 minute, bluntly triangular, black tubercles.

Male (semiad.) — Less mature males differ from aged individuals in having the light spots at the sides of the head more extensive, but in nearly all the central area of the frontal surface remains black, as also the whole dorsal surface of the thorax. The thoracic sides have large bright yellow dots upon the infraepisternites, a pair of obscurely yellow mesepimeral and metepisternal bands of equal width but broadly separated by black parallel with the sutures, and also a yellow patch covering most of the metepimerum, the latter being separated from the others by a thick black stripe at the second suture; venter black. Elongate lateral spots of abdomen greatly enlarged on basal segments but successively narrower posteriorly though present also on segm. 9. Anal appendages, superior pair yellow, inferior one obscured.

Immature males are marked and coloured similarly to the female.

Female (adult). — Mouth-parts, face and frons bright greenish yellow; median lobe of labium and a joint band occupying inner one-fourth of lateral lobes black; a thick black non-metallic stripe at base of frons descends along eye margin to slightly beyond half-way down, or almost as far as, frontoclypeal suture. Antennae black. Vesicle black with greenish yellow median patch superiorly, but occasionally almost wholly obscured. Occipital triangle black above, rear of the head yellow with twice indented thick black band following curvature of orbit.

Prothorax yellow, the sutures broadly outlined in black; posterior lobe orangish with thick black border and fringed with long golden yellow pubescence. Synthorax varicoloured, as follows. Dorsum warm orange-cinnamon framed in deep black except across mesinfraepisternal suture: mesinterepisternum (mesoprescutum), middorsal carina, crests of ante-alar triangles, and a thick undulated stripe (widest at either end) over the humeral suture, deep black. Sides behind humeral suture bright greenish yellow striped with black; mesepimerum with oblique stripe extending from a point between mid and hind legs upward to a point about two-thirds the distance, tapering to a point above and connected below with the ventral extremity of the black humeral stripe; behind this a second, much shorter, black streak placed upon middle of metepisternum; black dots also below the spiracle and in lower edges of meso- and metinfraepisternites. A continuous stripe at second lateral suture, expanded near its upper end, suddenly broadens out below to form a black patch encroaching on the ventral surface, which carries two yellow spots separated by black at the metasternal suture. Coxae and trochanters of legs yellow, the coxae spotted with black anteriorly; outer faces of anterior femora broadly yellow, those of the second and third pair with fine, incomplete or obliterated, yellow carinal lines only (occasionally absent altogether).

Abdomen black: yellow markings at sides of segm. 1-10 greatly enlarged, forming together continuous broad bands of regularly shaped spots, interrupted only at the sutures; these spots occupy most of 1-2, then diminish gradually in breadth but always remain visible on segment 10 also.

Valvula vulvae black, surpassing segm. 8 for about one-fourth length of 9; free margin obtusely rounded with very shallow median emargination (fig. 5c). Tuberculum supraanale and cerci yellow, tips of the latter acuminate, black.

Measurements: ♂ abd. + app. 14.5-16.0 mm, hind wing 16.0-19.0 mm; ♀ 13.0-15.0 mm and 16.5-18.0 mm, respectively.

Holotype, allotype and paratypes in Musée royal de l'Afrique Centrale, Tervuren; four paratypes in the Leiden Museum.

For comparison with this new species, I have before me a good series of *D. exilis* (both sexes) from Madagascar. These correspond very nearly with the original description and, although differing in several respects from *deminuta*, are of the same small size.

Adult male and female *exilis* have a yellow face and are further characterized by the presence of an oval antehumeral patch of the same colour on the thoracic dorsum. In both sexes of mature

*deminuta* the head is almost all black anteriorly, the thorax above being either black (adult male) or uniform brown (teneral of both sexes), while the sides of the thorax also exhibit a pattern differing from that of *exilis*. The ultimate segment of the penis of Malegasan *exilis* has been figured by PINHEY (1967a); in *deminuta* this segment is slenderer in profile view and furnished intero-apically with very thin transparent appendages (fig. 5b); the same segment is also unlike that of *lefebvrei*, which is more squarely cut off and differently frilled (fig. 5f). The females of the two species, besides showing a different thorax pattern, also disagree slightly in other respects. In *exilis* the black stripe at base of frons is obliterated laterally, the vesicle is entirely yellow (or obscured only posteriorly), the middle and hind tibiae are all black, and the paired yellow spots on the abdominal segments are smaller, well isolated on the posterior ones and absent on 9-10. As will appear from our sketches (figs. 5c, e, g), the vulvar scales are also slightly different in form.

Total: 11 ♂, 11 ♀.

~~now *pumila*~~

LAKE BANGWEULU REGION: Samfya, uncultivated ground, near the Post Office and the Power Station, alt. 1160 m, 29.XII.1961, *Symoens* 9110 (♂) and 9111 (♀); same locality, near the water tower, alt. 1160 m, 9.I.1962, *Symoens* 9159a (♀); same locality, in front of the Government rest house, alt. 1160 m, 13.I.1962, *Symoens* 9167a (holotype ♂ in Musée royal de l'Afrique Centrale, Tervuren); same locality, near the Government rest house, alt. 1160 m, 16.I.1963, *Symoens* 9960 (♂); 3 km from Samfya, "dembo" of the Kasamba River, alt. 1160 m, 17.IV.1963, *Symoens* 10296 (♂ and allotype ♀ in Musée royal de l'Afrique Centrale, Tervuren); 2 km from Ndoba, *Hymenocardia acida* — *Euphorbia matabelensis* savanna, on sandy soil, alt. about 1150 m, 30.XII.1961, *Symoens* 9134 (3 ♂, 2 ♀) and 27.I.1963, *Symoens* 10014a (5 ♂, 1 ♀); 5 km S.S.E. of Chilubula, damp ground, left bank of Lukulu River (tribut. to Chambeshi River), alt. 1260 m, 2.VI.1962, *Symoens* 9542 (♀).

UPPER LUAPULA REGION: Chipundu, clearing around the David Livingstone Memorial, alt. 1180 m, 24.XII.1963, *Symoens* 10714a (3 ♀).

REMARKS. In the Musée royal de l'Afrique Centrale, at Tervuren, I have found two females of presumably this species, from Congo, Kifoko, 3.IX.1928, *Ch. Seydel*, and Marais Mulita, 26.VI.1928, *Ch. Seydel*, both wrongly identified and labelled with "*Aethriamanta rezia* RIS", by FRASER, 1953. Also a single ♂ from Tanzania, Kazoji (environs of Sibweza, alt. 1050 m), 17.I.1967, *J. Kielland*, in the Leiden Museum.

#### *Diplacodes lefebvrei* (RAMBUR) — Fig. 5f-g

RAMBUR (1842) Hist. Nat. Ins. Névroptères in Suites à Buffon, pp. 112-113 (♀ Egypte).

This is a very variable, widely distributed and common species. For the synonymy of *D. lefebvrei* see RIS (1911, p. 465) and PINHEY (1962a).

A homogeneous series, comprising full-coloured, almost black males, only the superior anal appendages of the latter remaining partly yellowish. The wing membrane is subhyaline, though some examples show distinct traces of a cloudy enfumation at the apices of both fore and hind wings. These patches are not nearly so strongly developed as in the majority of Malegasan populations (? = *limbata* FRASER).

The coloured spots at the base of the hind wings are dark ferruginous in the male, golden yellow in the female; they do not extend beyond Cux. There are 7½ Ax in the fore wings, 6 in hind wings (one male has 8½ Ax in the fore wings and another specimen only counts 5 Ax in the hinder pair).

Size variable. Measurements: ♂ abd. + app. 18.3-20.3 mm, hind wing 21.0-23.5 mm, pterostigma fore wing 2.5-2.7 mm (Welgelegen); 20.0, 23.0, 2.6 mm (Ndoba and Mosesi); ♀ 17.8-18.5, 22.7-23.5, 2.5 mm (Ndoba and Mosesi).

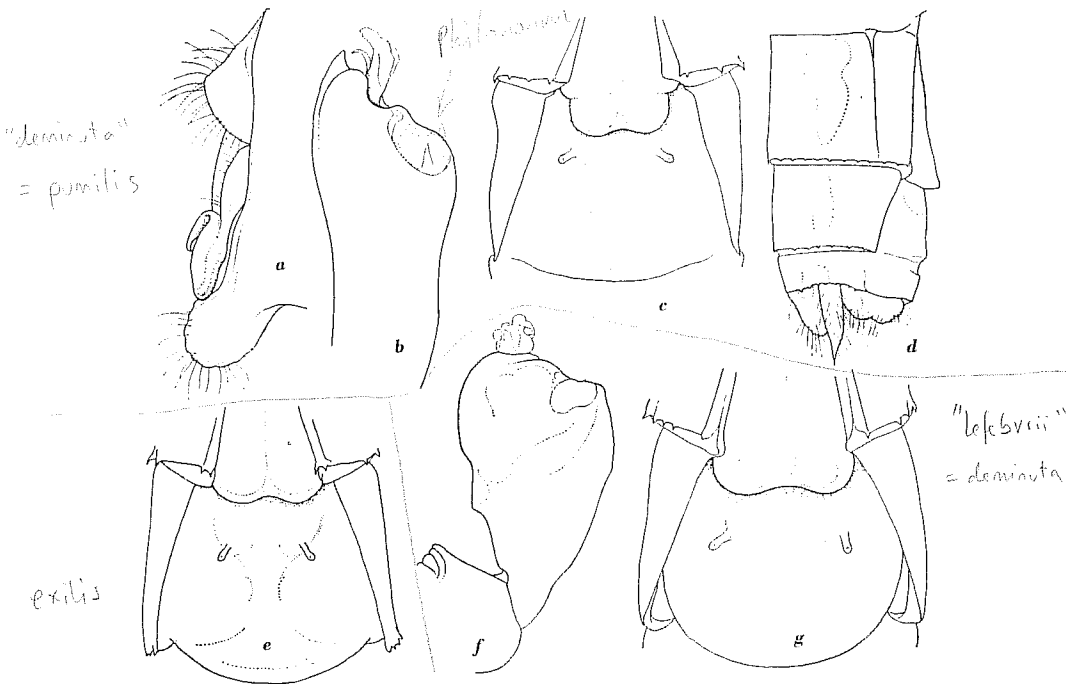


Fig. 5. — *Diplacodes deminuta* LIEFTINCK n. sp. (Ndoba and Samfya, *Symoens*): a, Genitalia of ♂, left side; b, penis, right side; c, valvula vulvae and sternal plates 8-9 of ♀, ventral view; d, apex of abdomen of ♀, right side. — *D. exilis* RIS (Madagascar): e, valvula vulvae and sternal plates 8-9 of ♀, ventral view. — *D. lefebvrei* (RAMBUR): f, ♂ (Samfya), penis, right side; g, ♀ (Korogwe), valvula vulvae and sternal plates, ventral view.

Apart from the specific differences in size, structure and thoracic pattern, regional *D. lefebvrei* is easily distinguished from *deminuta* by having narrower, more pointed wings and a much longer and also darker pterostigma. Fig. 5f shows a profile view of the apex of the penis, taken from a male collected at Samfya.

Total: 10 ♂, 2 ♀.

LAKE BANGWEULU REGION: Samfya, *Symoens* 9176a (♂), 10296 (♂); Ndoba, *Symoens* 10014b (♀).

KAFUBU REGION: 10 km from Welgelegen, *Symoens* 9202 (7 ♂).

LOWER LUAPULA REGION: Mosesi, *Symoens* 8442 (♂♀).

It is of particular interest to note that Prof. SYMOENS' records show that the two species occurred together at Ndoba and Samfya and that some were captured on the same day. *... indeed all three!*

#### Genus ACISOMA RAMBUR

##### *Acisoma panorpoides ascalaphoides* RAMBUR

RAMBUR (1842) Hist. Nat. Ins. Névroptères in Suites à Buffon, p. 29, pl. 2, fig. 3c (♀ Madagascar).

A well known, easily recognized and common libellulid, occurring over many parts of Africa, mostly in exposed marshy areas.

Total: 9 ♂, 3 ♀.

LAKE BANGWEULU REGION: Samfya, *Symoens* 9964 (♂).

KAFUBU REGION: Kipopo, *Symoens* 10645 (♂).

UPPER LUONGO REGION: 6 km from Chisunka, *Symoens* 10208b (♀).

LOWER LUAPULA REGION: Mosesi, *Symoens* 8442 (♂♀); Lukwesa, *Symoens* 8469a (♂); Mutwale, near Kashiobwe, *Symoens* 8549 (2 ♂).

UPPER LUFIRA REGION: Mulandi, *Symoens* 10071 (3 ♂, 1 ♀).

#### Genus CROCOTHEMIS BRAUER

##### *Crocothemis brevistigma* PINHEY

PINHEY (1961) *Occ. Pap. Rhodes-Livingstone Mus.*, No. 14, pp. 80-81, fig. F39 (♂♀ Zambia = N. Rhodesia).

A rather unexpected discovery of a scarce and little known species. Described from Zambia (N. Rhodesia), where it occurred together with *C. sanguinolenta* and *C. divisa* in certain localities. Our specimens agree in every respect with the original description.

Total: 1 ♂, 1 ♀.

UPPER CHAMBESHI REGION: 5 km S.E. of Katilungu, *Symoens* 10558 (♀).

CONGO-LUANGA WATERSHED REGION: 27 km S. of Shiwa Ngandu, *Symoens* 10475 (♂).

##### *Crocothemis divisa* BAUMANN

BAUMANN (1898) *Ent. Nachr.*, 24, p. 342 (♂♀ Togo).

Moderately common, particularly in rocky areas, in tropical and subtropical Africa (PINHEY).

Total: 14 ♂, 15 ♀.

UPPER LUAPULA REGION: 2 km from Namopala, *Symoens* 9368 (4 ♂, 4 ♀).

LUBEMBE REGION: 12 km S. of Sakania, *Symoens* 9280 (4 ♂, 4 ♀); Libangila, *Symoens* 9288 (♀); 2 km from Katala, *Symoens* 9329 (♀); Mipapa River, *Symoens* 9337 (♂); Luankole River, *Symoens* 9341 (2 ♂); 5 km from Libangila, *Symoens* 9343 (♀).

UPPER LUONGO REGION: 12 km from Chipili, *Symoens* 9549b (1 ♂, 3 ♀).

KUNDELUNGU PLATEAU: 6.2 km N. of Katshupa, *Malaisse* 5186 (2 ♂).

LOWER LUAPULA REGION: Kabiashia, *Malaisse* 5176 (♀).

##### *Crocothemis erythraea* (BRULLÉ)

BRULLÉ (1832) Expéd. Sc. Morée, 3 (1), p. 102, pl. 32, fig. 4 (♂ Morée).

Throughout Africa, West Asia, and southern Europe.

Total: 43 ♂, 27 ♀.

CONGO-LUANGWA WATERSHED REGION: 27 km S. of Shiwa Ngandu, *Symoens* 10475 (2 ♀).

LAKE BANGWEULU REGION: Kasela, *Symoens* 9577b (♂).

UPPER LUAPULA REGION: Namopala, *Symoens* 9382 (♂).

LUBEMBE REGION: 3 km S.E. of Kakiasu, *Symoens* 9284 (♀); Sakania, *Symoens* 9298 (♀).

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 7697, 7698, 7714, 8651, 8654, 8744b, 8840, 8842, 8845, 8878, 9207, 9228, 9254b, c and e, 9669b, 9712, 9865, 10152b, 10378 (27 ♂, 12 ♀). Masika, *Symoens* 8714 (♀); Kitanda, *Symoens* 8769 (♀); Kipopo, *Symoens* 9453 (♂); 11 km from Lubumbashi (Elisabethville), *Symoens* 9680 (♂).

LOWER LUAPULA REGION: Kasenga, *Symoens* 8415 (4 ♂, 6 ♀); Chibambo, *Symoens* 8438 (3 ♂, 2 ♀); Mosesi, *Symoens* 8442 (5 ♂, 1 ♀).

##### *Crocothemis sanguinolenta* (BURMEISTER)

BURMEISTER (1839) Handbuch d. Entomologie. II. B., 2. Abth., p. 859 (♂ Kap).

Common throughout continental Ethiopian Africa and Madagascar; centred in the northeast and east of the continent.

Total: 23 ♂, 13 ♀.

CONGO-LUANGWA WATERSHED REGION: 25 km E.N.E. of Chitambo, *Symoens* 10448.

UPPER LUAPULA REGION: Kabeleshi River, *Symoens* 9359 (2 ♂); 2 km from Namopala, *Symoens* 9368 (♂); Serenje, *Symoens* 10432 (♂); Munte River, *Symoens* 10679b (♂).

LUBEMBE REGION: Luankole River, *Symoens* 9341 (♂♀); Kikwashi, *Symoens* 10180 (♂).

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 7693, 7714, 8651, 8654, 8842, 8845, 8877a, 8878, 8928b, 8944, 9223b, 9669b (14 ♂, 7 ♀); Mukupa, *Symoens* 7989 (♂); Kakonkonia, *Symoens* 8802 (♀); Kikoloma, *Symoens* 8813 (♂). Lukuni, *Symoens* 9271 (♀).

KUNDELUNGU PLATEAU: 6.2 km N. of Katshupa, *Malaisse* 5186 (♀).

LOWER LUAPULA REGION: 6.2 km W. of Kabiashia, *Malaisse* 4091 (♂).

#### Genus BRADINOPYGA KIRBY

##### *Bradinyoga strachani* (KIRBY)

KIRBY (1900) *Ann. Mag. nat. Hist.*, 7th ser., 6 (No. 31), pp. 74-75, pl. 2, figs. 4, 4a (♂♀ Sierra Leone).

Confined to equatorial Africa. A local insect which, according to PINHEY, frequents rocky hills and is often found at some distance from water.

Total: 1 ♀ (freshly emerged).

LOWER LUAPULA REGION: Kasenga, *Symoens* 8415 (♀).

#### Genus *SYMPETRUM* NEWMAN

##### *Sympetrum navasi* LACROIX — Fig. 6

LACROIX (1921) *Ann. Soc. ent. Belg.*, **61**, pp. 378-379, fig. 1 (♂ Côte d'Ivoire); PINHEY (1961) *Surv. Drag. E. Africa*, London, p. 154, pl. 9, fig. 12 (distrib.; notes on habits); ID. (1964) *J. Ent. Soc. S. Afr.*, **26** (2), p. 335 (Zambezi River, Zambia); ID. (1964) *Publ. cult. Comp. de Diamantes de Angola*, No. 63, p. 117 (same loc., notes); AGUESSE (1966) *Bull. Inst. fond. Afr. Noire*, sér. A, **28** (n° 2), p. 795, fig. 20; ID. (1968) *Bull. Inst. fond. Afr. Noire*, sér. A, **30** (n° 2), p. 531 (♂♀ Sierra Leone).

This is decidedly a very aberrant member of the genus, differing from most (if not all) other *Sympetrum* in that the sides of the discoidal field of the fore wing do not converge strongly towards the wing border but are instead parallel-sided, or even diverge slightly, at termen. Moreover, all specimens before me agree in having the distal antenodal cross-vein of the fore wing complete (though more oblique than the others), only in one male Ax being incomplete in one of the wings, the whole series numbering 7.7, 7.7, 7.7, 8.7, 7.8 and 7½.8.

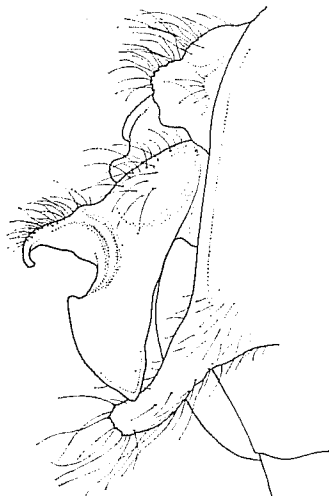


Fig. 6. — *Sympetrum navasi* LACROIX, ♂ (Samfya). Genitalia, left side view.

The shape of the hamulus corresponds with PINHEY's figure of the genitalia, the outer hamular branch showing a well pronounced angle beyond the emargination, which is nonapparent in LACROIX's and AGUESSE's sketches of this organ: are these structures incorrectly drawn? See fig. 6.

Measurements: ♂ abd. + app. 22.6-23.3 mm, hind wing 28.0-28.2 mm, pterostigma fore wing 2.3 mm.

REMARKS. A near ally, *S. navasi congoensis* AGUESSE (1966, p. 795, fig. 21) has been founded on a single male taken near Tsiami (Congo-Brazzaville). This insect is briefly characterized as black ("coloration noire au lieu de rouge"), its genital organs being shaped differently from those of *navasi*, as is evident also from the accompanying figures. The abdomen and hind wing lengths of *congoensis* are given as 23.5 and 25.5 mm, respectively, so that *navasi* also appears to be a shorter-bodied insect than *congoensis*. Considering all this, I would prefer to regard the latter as a distinct species rather than a subspecies of *S. navasi*.

The discovery of this species in the Lake Bangweulu Region means an interesting addition to the fauna of Zambia.

Total: 6 ♂.

LAKE BANGWEULU REGION: Samfya, *Symoens* 9937a and b, 9948c, 9950f, 9964 (6 ♂).

#### Genus *PHILONOMON* FOERSTER

##### *Philonomon luminans* (KARSCH)

KARSCH (1893) *Berl. ent. Zeitschr.*, **38**, pp. 22-23 (♂ Togo).

Locally common in tropical and subtropical Africa, usually found at reedy pools in open country.

Total: 2 ♂, 1 ♀.

LUBEMBE REGION: 5 km from Libangila, *Symoens* 9342 (♀).

KAFUBU REGION: Tumbwe, *Symoens* 8161 (♂).

LOWER LUAPULA REGION: Mosesi, *Symoens* 8442 (♂).

#### Genus *BRACHYTHEMIS* BRAUER

##### *Brachythemis lacustris* (KIRBY)

KIRBY (1889) *Trans. Zool. Soc. London*, **12**, p. 329 (♂ Wadelai, C. Africa).

Tropical and subtropical Africa, often common in swamps and at slow flowing streams.

Total: 20 ♂, 15 ♀.

MIDDLE LUAPULA REGION: Mwenda, *Symoens* 9895 (♂♀).

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 9262b (♀).

LOWER LUAPULA REGION: Kasenga, *Symoens* 8415 (2 ♂, 2 ♀); Chibambo, *Symoens* 8438 (5 ♂, 1 ♀); Kashiobwe *Symoens* 8537 (12 ♂, 10 ♀).

##### *Brachythemis leucosticta* (BURMEISTER)

BURMEISTER (1839) *Handbuch d. Entomologie*, II. B., 2. Abt., pp. 849-850 (♂ Port natal).

Occurs at stagnant waters all over Africa including the Mediterranean and, like *B. lacustris*, is gregariously abundant in these habitats.

Total: 76 ♂, 40 ♀.

LAKE BANGWEULU REGION: Samfya, *Symoens* 9074, 9080a, 9158b, 9159c, 9167a, 9169b, 9171a, 9176a and f, 9960, 9962, 10244, 10263 (20 ♂, 9 ♀); Mundubi, *Symoens* 9149 (2 ♂); Kabanga, *Symoens* 10247, 10248 (4 ♂).

MIDDLE LUAPULA REGION: Mwenda, *Symoens* 9981 (♀), 10044 (♂♀).

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 7713, 8928a, 9207, 9823a - c, 9848 (13 ♂, 2 ♀); Tumbwe, *Symoens* 8161 (♀); Kipopo, *Symoens* 9216, 9217, 9476 (6 ♂).

LOWER LUAPULA REGION: Kasenga, *Symoens* 8415 (5 ♂, 3 ♀); Chibambo, *Symoens* 8438 (♂); Lukwesa, *Symoens* 8469a (3 ♂); Nkumbi, *Symoens* 8473 (♂); Kashiobwe, *Symoens* 8537 (4 ♂, 1 ♀); 19 km from Mbereshi, *Symoens* 8594 (10 ♂, 16 ♀).

UPPER LUFIRA REGION: Mose, *Symoens* 10055 (♂); Mulandi, *Symoens* 10071 (2 ♂, 2 ♀).

### Genus TRITHEMIS BRAUER

#### *Trithemis aconita* LIEFTINCK n. sp. — Fig. 7C

PINHEY (1951) *Mem. Transvaal Mus.*, 5, p. 265, fig. 644 (♂ genit., Zululand, *T. basitincta*, nec Rts); Id. (1961) *Surv. Drag. E. Africa, Brit. Mus.*, pp. 167-168, group 2 pars; Id., pl. 11, fig. 22 (♂ genit., Turiani, *T. basitincta*, nec Rts); Id. (1961) *Occ. Pap. Rhodes-Livingstone Mus.*, No. 14, p. 87 (Congo and Zambia, *T. basitincta*, nec Rts).

A dark, slender-bodied species with pointed wings, small pterostigma and dense venation.

Male (adult, holotype). — Labium chrome, the median lobe and inner two-fifths of the lateral lobes deep black, these black areas forming together a broad band, widest at middle, and curving outwards so as to border the apical edges of the lobes for about half the distance. Labrum black. Base of mandibles, clypeus (except a black median transverse streak bordering postclypeus), whole anterior surface and sides of frons, brownish yellow. Upper part of frons and vertex dark metallic bronzy violet with dark blue sheen anteriorly, surface transversely wrinkled and clothed with stiff black hair. Antennae black. Occipital triangle brown, rear of the head black with narrow yellow obliterated stripe (two spots and a streak) bordering the eye-margin.

Pro- and synthorax, ground colour dirty yellowish brown marked broadly with black; pattern indistinct by a thin coating of dark grey-blue pruinescence covering entire surface but especially developed on dorsum and including the ante-alar triangles as well; ventral surface yellowish brown, the black metepimeral bands likewise thinly pruinescent blue. Long soft thoracic pubescence pale.

Legs entirely black except most of the posterior two pairs of coxae, which are obscurely yellow-brown; posterior femur devoid of long dense pubescence but armed with inner row of 26-27 short, nearly equally-sized denticles.

Wings broad at base though rapidly narrowing distad with rather pointed tips. Membrane enfumed greyish-brown, the base and costal area almost hyaline. Neuration dark brown. Base of fore wing uncoloured, that of hinder pair with dark rusty-brown spots, vestigial in c-m. to Cux in cu, and including 2-3 marginal cells along membranula in anal area. Membranula grey-brown, slightly lighter at extreme base. Pterostigma of small size, narrow with almost parallel sides, colour brown. Two rows Rs-Rspl; three rows of cells in anal field of hind wing. Nodal index  $\frac{9.11\frac{1}{2}.11\frac{1}{2}.8.}{10.9.8.9}$ .

Abdomen very slim and slender, basal segments compressed, moderately expanded in lateral dimension, rather considerably so dorso-ventrally, tapering strongly towards end of segm. 3; remaining segments thin, very little broadened to the end of 6, then parallel-sided, the terminal segments again distinctly narrowed. Colour dark, without any indication of pruinescence; segm. 1-3 with obscurely yellow-brown lateral spots, those on 1 of large size, the spots on 2 two-fold and the side marks on 3 consisting of four spots separated by black before and after the transverse carina, with an additional pale streak bordering ventral margin of tergite 3; segments 4 and 5 each with a pair of short basodorsal spots, followed behind the transverse carina by a second pair of lengthwise stripes not reaching base or apex of segments, the ventral portions of the tergites carrying a larger and more expanded ochreous band. Segm. 6 and 7 marked only with the dorsal and ventral stripes

on either side (incomplete on both ends); 8 with pair of much smaller, comma-shaped, spots restricted to proximal third of dorsum, and a pair of ventral stripes; 9-10 and anal appendages black.

Superior anal appendages little longer than segm. 9, approximated, subparallel and only slightly outbent subbasally in dorsal view, shaped as in fig. 7c when seen in profile. Genitalia prominent, black, with the exception of the inflated apex of the lamina anterior, which is yellow, as are also the outer face of the basal portion and ventral side of the end hook of the hamulus. Posterior

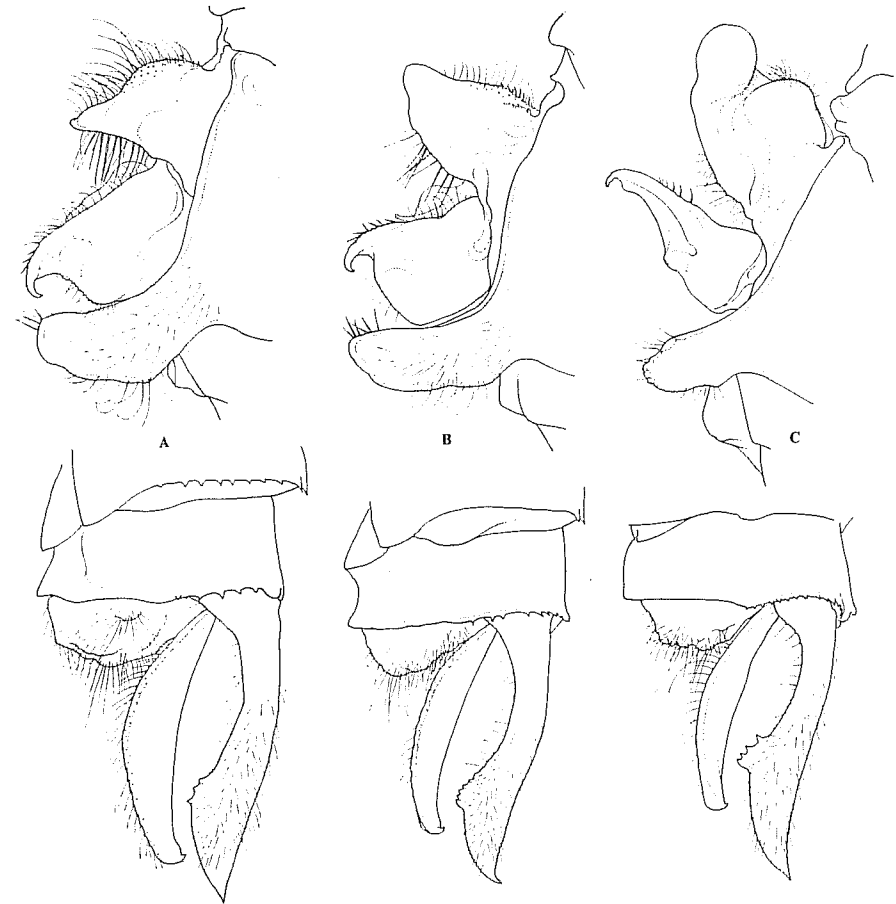


Fig. 7. — Genitalia (upper row) and anal appendages (lower row) of ♂, left side view; corresponding figures on the same scale: A, *Trithemis aequalis* LIEFTINCK n. sp. (Ndoba, *Symoens* 9134); B, *T. anomala* PINHEY (Mwinilunga); C, *T. aconita* LIEFTINCK n. sp. (Lubumbashi River, *Symoens*).

lobe black, hollowed out externally. Vesicle of penis yellowish. The genitalia in side view are shaped as in fig. 7c; when viewed from below, the bulbous part of the lamina is broad and slightly emarginate, more or less divided into two rounded lobes; hamulus armed with short stout spines.

Male (less mature paratypes). — Similar to the type, except for the following slight differences. Black on labium reduced to the median lobe and a narrow band of varying width edging inner border of lateral lobes. Summit of vertex brown, only slightly metallic. Thorax more bronze-brown above and only thinly pruinose; yellowish ground colour of lower parts at sides more vivid but dark pattern ill-defined. Ochreous markings of abdominal segments 3-8 slightly more extensive than in

the type. Nodal indices  $\frac{8.14\frac{1}{2}.12\frac{1}{2}.8}{9.9.8.9}$  and  $\frac{9.12\frac{1}{2}.12\frac{1}{2}.9}{11.9.9.10}$ . In one male the wing membrane is practi-

cally colourless, the anal appendages are brown and the median crest of the 10th segment is yellow.

Measurements: ♂ abd. + app. 25.4 mm, hind wing 28.7 mm, pterostigma fore wing 2.4 mm (holotype); 25.6-26.0, 30.4-30.8 and 2.3 mm, respectively (paratypes).

In some of the Korogwe males, which are otherwise very similar to the type series, the blackish banding on dorsum and sides of the thorax contrasts more strongly with the dull ochreous ground colour, so as to form a definite pattern of spots and coalescent stripes, but otherwise I can find no differences.

Female. — It seems better to await further specimens of this sex before describing it. The basal half of the frons above is dark metallic blue-black and the vertex is bright chrome. Vestiges of amber (not burnt brown) spots are present at the bases of the hind wings.

This new *Trithemis* is conspecific with certain individuals recorded by PINHEY (loc. cit.) under the name of *T. donaldsoni basitincta* RIS, or *T. basitincta* RIS, from Zambia and probably also from other localities in south and central Africa. The material of "typical" *T. donaldsoni* (CALVERT), examined by RIS, is not homogeneous. In any case the two males in the collection of mounted *donaldsoni* at Tervuren are not that species, the one from Kapiri labelled as such by RIS being *T. aconita* n. sp., while the second from Kamina (Katanga) is in bad condition, lacks an identification label and is perhaps a specimen of *T. parasticta* or *aenea*.

I have not seen *T. donaldsoni atra* LONGFIELD (1936, pp. 491-492, figs. 9-10), from Spanish Guinea, but this is evidently not at all related to the present species. Apart from the structural features and the almost unspotted abdomen of *T. atra*, it also differs from *T. aconita* in having much more rounded wing-tips and a larger, more expanded, pterostigma.

The name given to this species is an allusion to the peculiar form of the anterior lamina of the male genitalia, which reminds of a monk's hood or flower of *Aconitum*.

Holotype and one paratype ♂ in Musée royal de l'Afrique Centrale, Tervuren; one paratype ♂ in Rijksmuseum van Natuurlijke Historie, Leiden.

Total: 3 ♂.

KAFUBU REGION: Lukuni, Lubumbashi River, near the bridge on the Lukuni-Kipushi Road, alt. 1240 m, 20.VII.1961, *Symoens* 8826 (paratype ♂ in Musée royal de l'Afrique Centrale, Tervuren); Lubumbashi (Elisabethville), Lubumbashi River, at the bridge on the Golf Road, alt. 1200 m, 7.VIII.1961, *Symoens* 8837 (paratype ♂ in Rijksmuseum van Natuurlijke Historie, Leiden).

LOWER LUAPULA REGION: Kisamamba, S. of Kasenga, Mululushi River, at the bridge on the Kasenga-Kialwe Road, alt. 950 m, 3.IV.1961, *Symoens* 8504 (holotype ♂ in Musée royal de l'Afrique Centrale, Tervuren).

Further material. — 1 ♂, Katanga, Kapiri, IX.1912, *Miss. Agric., Trithemis Donaldsoni* ♂, det. F. RIS (Musée royal de l'Afrique Centrale, Tervuren). 2 ♂, Tanzania, Korogwe, 400-450 m, 12.VI.1963 and 1.V.1964, *G. M. L. Bergers* (Mus. Leiden). ♂♀, Rhodesia, Zambezi River, Victoria Falls, II.1957 (♂) and I.1956 (♀), *Pinhey* (*T. basitincta* RIS, ex coll. and det. E. PINHEY, Mus. Leiden). Six males, not in too good condition and labelled "Bipindihof near Kribi, South Kamerun" (Mus.

Leiden), also belong to this species; the genitalia and small basal spots at the hind wings are exactly similar to those of the other specimens.

REMARKS. The nearest ally of the species described above as *T. aconita* n. sp. is, I believe, a *Trithemis* that has probably been wrongly attributed to *T. basitincta* RIS (1912) originally described from "Kamerun" as a subspecies of *T. donaldsoni* (CALVERT). It must be pointed out that PINHEY (1961a), already suggested that *T. basitincta*, as it was then understood, is a composite species. We may now take for granted that PINHEY was right and that *T. basitincta* breaks up in a number of taxa differing from one another chiefly in the structure of the male genitalia, which are quite characteristic. One of these species, belonging to PINHEY'S Group 2, is identical with the insect described and figured as *T. donaldsoni basitincta* by NIELSEN (1934, pp. 176-177, pl. 16, figs. 1-3, genit. and wings), after specimens from Mobeka (Congo ex-belge). This is also the species whose genitalia were figured by PINHEY (loc. cit., pl. 11 fig. 22). It is a very dark species, averaging larger in size than *aconita* (abd. + app. 30 mm, hind wing 32.5 mm); the labium is wholly black, the hind wings are marked with a conspicuous blackish brown basal patch, and the abdomen is long and extremely slender. As to the shape of its genital organs, the male is practically indistinguishable from our new species *aconita* but can be at once distinguished therefrom by the characters just mentioned and by the different shape of the anal appendages, which are here shown (fig. 8) for comparison with those of *aconita*.

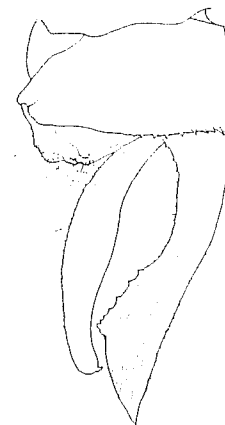


Fig. 8. — *Trithemis* sp., ♂ (Mobeka): Anal appendages, left side view.

It is hardly possible to associate this unnamed species with the type of *basitincta*, the male of which, according to fig. 447 in the monograph, possesses a much lower and more deeply emarginate anterior lamina and a sickle-shaped hamulus (see RIS, 1912, p. 784). This insect is represented in the Musée royal de l'Afrique Centrale at Tervuren by a homogeneous series of both sexes from various localities in Congo, all placed under the drawer-label *T. basitincta* RIS. One of these is the male from Kwango Atene, *Charlier*, listed in RIS' Selysian monograph (RIS, 1919) and bearing a label in RIS' own handwriting. The three other Congolese males in this series (from Eala and Kabinda)

agree in every detail with the latter and with one of NIELSEN's examples from Mobeka, now in the Leiden Museum.

As I have not been able to examine the type of *T. basitincta* RIS, in the Paris Museum (coll. R. MARTIN), it seems best to leave this species without a name.

***Trithemis aequalis* LIEFTINCK n. sp. — Fig. 7, A**

Belongs to the section of *T. stictica* (BURMEISTER), but is a very much darker, thinly darkish blue pruinosed insect, with the stature of *T. nuptialis* KARSCH, *T. aenea* PINHEY and *T. anomala* PINHEY.

Male (adult). — Labium yellow, the inner one-fifth of the lateral lobes and the midlobe, except a yellow anterolateral dot, black; this joint band on the lateral lobes constricted medially and spreading out for a short distance along anterior border of each. (In the paratype the median black is reduced, as described for the female). Labrum black. Mandible-bases, anteclypeus, postclypeus as well as the frons anteriorly and on either side, dirty grey-green; frons above and vesicle dark bronzy-violet, these surfaces shiny and transversely wrinkled. Occipital triangle and rear of the head dark brown; a yellow spot followed by a streak of same colour along margin of compound eye. Antennae black.

Pro- and synthorax dark brown, this colour here and there deepening to blackish but not at all forming a definite pattern; dorsum and sides dull, and with a thin dusting of fine dark bluish pruinoscence especially at the sutures; lower parts of sides dark greenish yellow; ventral surface with two transverse light yellow patches, one metepimeral band and one (somewhat smaller) crescentic spot upon poststernum, both spots framed in brown. Thoracic pubescence long and fine, brown.

Legs black, only the coxae and inner faces of anterior femora obscurely greenish yellow; posterior femora with few long erect hairs only on basal one-fifth or less, and armed interiorly with a row of 30-32 short, nearly equally-sized, denticles.

Wing venation black, membrane greyish yellow all over. Base of hind wings with small rusty brown (or ferruginous) spots in c-sc, m-cu and narrowly in anal area bordering the membranula, these spots largest in cu though not reaching Cux. Pterostigma light brown between black nervures,

the costal border strongest. Membranula unicoloured brownish black. Nodal index  $\frac{7.10\frac{1}{2}.10\frac{1}{2}.7}{8.8.8.8}$

(holotype),  $\frac{8.10\frac{1}{2}.10\frac{1}{2}.7}{8.8.8.9}$  (paratype).

Abdomen of the same slender form to its allies; colour black or very dark brown dorsally, as in *T. nuptialis*, but much darker than in *T. anomala*; markings olive-green on basal segments, yellow from the base of 3 onwards; 1-2 with the usual pattern outlined with dark sutures; 3-8 with longitudinal tergal spots and streaks in two rows, dorsal and lateral, the inner streaks tapering posteriorly and much larger than the outer, 8 having only a pair of inner (dorsal) triangular basal spots; 9-10 and anal appendages black. Ventral surface of tergites 3-9 for the greater part yellow, the light areas forming pale brownish ochreous patches, the apical one-fourth or less of the segments being obscured; sternites black.

Genitalia similar to those of *T. anomala*, but lamina anterior considerably smaller, less conical in lateral view, its tip directed ventrad instead of pointing anterad. Anterior lamina black, including its apex, the convex dorsal surface covered with a greater number of brown bristles than in *anomala*. Hamulus also similar to that species, greenish tipped with black, the curved lobus posterior of genitalia deep black (fig. 7, A). Anal appendages longer and more slender than in *T. anomala*, the superior pair distinctly longer than segm. 9 (not exceeding length of that segment in *anomala*); colour entirely black (fig. 7, A). The same organs of *T. anomala* are shown in fig. 7, B.

Female (adult, allotype). — Very similar to the male, but body colour generally less obscured, all dark markings brown instead of black. Labium pale, except inner border of lateral lobes narrowly brown. Labrum ochreous with a thick, wedge-shaped black median spot, widest apically, from base to apex. Face, frons and vertex greenish yellow, the frons marked with a diffuse blackish brown basal stripe slightly prolonged anterad into the sulcus. Legs black, femora with faint indication of greenish stripes interiorly.

Wings coloured and spotted as in male, except that the basal tinting of the hind wings is deep amber, reaching Cux in cubital space. Nodal index  $\frac{7.10\frac{1}{2}.10\frac{1}{2}.7}{8.8.8.9}$ .

Abdomen (laterally compressed) coloured and marked as in the opposite sex, segm. 8-10 and cerci black; valvula vulvae apparently vestigial, barely visible.

Measurements: ♂ abd. + app. 26.5 mm, hind wing 31.2 mm, pterostigma fore wing 3.0 mm (holotype); ♀ 27.0, 31.0 and 3.0 mm, respectively (paratype); ♂ 27.0, 30.2 and 3.3 mm (allotype).

Very similar superficially to *T. anomala* PINHEY (1956, pp. 38-39, fig. 8b), from Mwinilunga and Mbala (Abercorn), Zambia. Dr PINHEY has kindly presented me with two paratypical males and a female of this insect, so that the two species could be compared directly. *T. aequalis* differs from *T. anomala*, apart from the characters already mentioned, by the different colour of the frons, which in the male of *T. anomala* is marked only at its base with a narrow dark band. Another species coming into the picture and belonging to the same species group, is *T. aenea* PINHEY (1961b, p. 270, fig. 5<sup>b</sup>, ♂ genit., Congo). Of this insect Dr PINHEY also gave me a male for comparison with *T. aequalis*. This was taken at Abong-Mbang in Cameroons, 10.IX.1962, and found by its describer to be conspecific with *aenea*. It resembles *aequalis* greatly, especially in the colour of the frons and the shape of the anterior genital lamina, but differs from it in the following respects:

- (1) interval separating outer and inner branches of genital hamule seen in profile narrower, more like *anomala*, the outer branch much more angular and prominent than in *aequalis*;
- (2) hind wing lacking any basal colouring;
- (3) pterostigma longer and darker (3.4 mm long);
- (4) apices of wings enfumed.

Total: 2 ♂, 1 ♀.

LAKE BANGWEULU REGION: 2 km from Ndoba, *Hymenocardia acida-Euphorbia matabelensis* savanna, on sandy soil, alt. 1150 m, 30.XII.1961, *Symoens* 9134 (1 holotype ♂ in Musée royal de l'Afrique Centrale, Tervuren, 1 paratype ♂ in Rijksmuseum van Natuurlijke Historie, Leiden); Mundubi, western shore of Lake Chifunabuli, alt. 1140 m, 30.XII.1961, *Symoens* 9149 (1 allotype ♀ in Musée royal de l'Afrique Centrale, Tervuren).

***Trithemis annulata* (PALISOT DE BEAUVOIS)**

PALISOT DE BEAUVOIS (1805) Ins. Afr. Amer., p. 69, pl. 3, fig. 3 (le Royaume d'Oware, S. Nigeria).

Males of this species are vinaceous red with a metallic violet frons and a triquetral, non-constricted abdomen.

Found commonly all over Africa and most of the neighbouring islands, but most frequent in drier areas. Probably differentiated in a number of geographical subspecies requiring closer investigation.

Total: 3 ♂, 2 ♀.

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 7698 (♂), 9712 (2 ♀), 9713 (2 ♂).

**Trithemis arteriosa** (BURMEISTER)

BURMEISTER (1839) Handbuch d. Entomologie, II. B., 2. Abt., p. 850 (♂ Port natal).

Unlike the last, the male of this species is a much brighter red-bodied insect, with a more slender abdomen, constricted at the third segment.

Very abundant throughout the African continent and adjacent countries, including the archipelagoes.

Total: 879 ♂, 109 ♀.

UPPER CHAMBESHI REGION: About 7 km from Chinsali, *Symoens* 10516a; Lubwa, *Symoens* 10525; Mulanshi, *Symoens* 10551.

LAKE BANGWEULU REGION: 12 km from Chibaye, *Symoens* 9506; 32 km E.S.E. of Chalabesa, *Symoens* 9511 (1 specimen); 29 km N.W. of Chungu, *Symoens* 9548; Samfya, *Symoens* 9628.

UPPER LUAPULA REGION: Pelu, *Symoens* 9346; Kifumbe, *Symoens* 9348; Kipushia, *Symoens* 9351-9353, 9385; Kabeleshi River, *Symoens* 9359; Mufumbi, *Symoens* 9394a.

MIDDLE LUAPULA REGION: Kasomeno, *Symoens* 8622; Mabumba, *Symoens* 9056 (♂); Mufuma, *Symoens* 9665; Muwanguni River, *Symoens* 9668; Chimese, *Symoens* 10186; Mansa (Fort Rosebery), *Symoens* 10042a and b (2 ♂), 10191 (♂); Masaba, *Symoens* 10200 (2 ♀); Kale, *Symoens* 10291a (2 ♀).

LUBEMBE REGION: 3 km S.E. of Kakiasu, *Symoens* 9284; Sakania, *Symoens* 9292a and b, 9298; Mipapa River, *Symoens* 9337; Luankole River, *Symoens* 9341; 5 km from Libangila, *Symoens* 9342; 4 km S. of Kalumbwe, *Symoens* 9672; Kalumbwe, *Symoens* 10174; Kikwashi, *Symoens* 10180.

KAFUBU REGION: Lubumbashi (Elisabethville), all collecting stations, *Symoens* 7693, 8654, 8878, 9228, 9446, 9669b, 9720, 9823a, b and d, 9848, 9859a, 10152b, 10158, 10378, 10391, etc. (about 600 ♂, 85 ♀ and 1 exuvia, 9228); Kipopo, *Symoens* 7841, 8697, 8959, 9217, 9453, 9454, 10645 (72 ♂, 2 ♀); Mukupa, *Symoens* 7989 (♂); Tumbwe, *Symoens* 8161, 8729, 8823 (4 ♂); Kitanda, *Symoens* 8769 (2 ♂); Kakonkana, *Symoens* 8802 (20 ♂); 6 km S. of Mampa, *Symoens* 8899a (♂); 7 km S. of Lubuni, *Symoens* 8922a, 9682a and b (12 ♂); N.E. of Kilando, *Symoens* 9677 (2 ♂); 11 km S.E. of Lubumbashi (Elisabethville), *Symoens* 9864; Keyberg, *Symoens* 10165 (6 ♂).

UPPER LUONGO REGION: 6 km from Chisunka, *Symoens* 10208a, b and c (5 ♂, 1 ♀); Chipili, *Symoens* 10232 (♂); 12 km S.W. of Chipili, *Symoens* 10581 (2 ♂).

LOWER LUAPULA REGION: Kasenga, *Symoens* 8415 (2 ♂); Kikungu, *Symoens* 8425, 8432 (5 ♂, 1 ♀); Mulundi, *Symoens* 8458 (3 ♂, 2 ♀); Nkumbi, *Symoens* 8473 (5 ♂); Mofati, *Symoens* 8477 (2 ♂); Kisamamba, S. of Kasenga, *Symoens* 8504 (♂); 1 km W. of Kabiashia, *Malaisse* 4130 (2 ♂); 7 km N.N.W. of Kabiashia, *Malaisse* 4251 (3 ♂); Kabiashia, *Malaisse* 4255 (2 ♂), 4548 (♂); Kimbeshie, *Malaisse* 4266, 4761 (4 ♂).

**Trithemis atra** PINHEY

PINHEY (1961) Surv. Drag. E. Africa, Brit. Mus., pp. 166-167, pl. 11, fig. 14 (♂♀ Uganda); NIELSEN (1934) *Boll. Lab. Ent. Bologna*, 7, pp. 177-178, pl. 15, fig. 6, ♀ thorax (♂♀, Mobeka, Congo, sub *T. nuptialis* KARSCH).

The present specimens agree closely with the original description, and I believe to have identified correctly also the unique little female in Prof. SYMOENS' collection. *T. atra* is decidedly smaller than *T. nuptialis*, equalling *T. dichroa* KARSCH in size (1). There is, indeed, much evidence that these two species are nearly related, *nuptialis* (with its basally constricted abdomen) standing farther apart.

A remarkable, and possibly specific, feature, peculiar to both sexes of *atra*, is the presence of two rows of long stiff hairs arising from the inner faces of the middle femora, these hairs being less

(1) In the collection of mounted specimens in the Musée royal de l'Afrique Centrale, at Tervuren, these two species are mixed under the name of *T. dichroa*, the majority belonging, however, to *T. atra*.

crowded together than in *nuptialis* and, unlike that species, scarcely apparent on the hind femora. I have not examined *dichroa* on this character.

The thoracic pattern of the female agrees with NIELSEN's drawing of supposed "*nuptialis*", and the upper surface of the frons in all specimens is extensively metallic blue, presumably also a specific feature.

*T. atra* is possibly not a rare species in tropical Africa but may have been confused with *dichroa* and other species.

Total: 1 ♀.

LOWER LUAPULA REGION: Kashiobwe, *Symoens* 8537 (♀, semiadult).

Further material. — 3 ♂, 5 ♀ (adult), Congo, Bangala District, Mobeka, 1.1937, *T. nuptialis* KARSCH, det. C. NIELSEN (ex coll. NIELSEN, in the Leiden Museum).

**Trithemis donaldsoni** (CALVERT) — Fig. 9

CALVERT (1899). *Proc. Acad. Nat. Sc. Philad.*, pp. 235-236, p. 110, fig. 5 (♂ Somalia).

Not represented in Professor SYMOENS' collection.

The unique type of this large and interesting species has been kindly sent to me for inspection by the authorities of the Philadelphia Academy of Science. As it has presumably been misinterpreted by several authors, I have taken the present opportunity to offer a camera lucida drawing of the genitalia of the holotype, which is here reproduced (fig. 9) and may facilitate recognition.

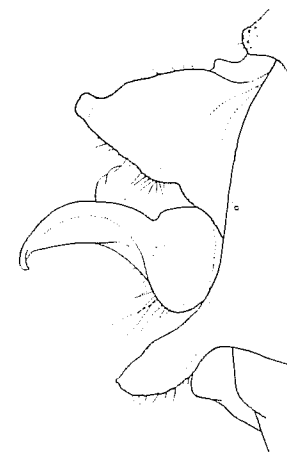


Fig. 9. — *Trithemis donaldsoni* (CALVERT), ♂ holotype (Somalia, coll. Academy nat. Sc. Philadelphia): Genitalia, left side view.

The specimen is still in very good condition and is easily distinguished from *T. basitincta* RIS and *T. aconita* LIEFTINCK n. sp. by the wholly different shape of the lamina anterior and hamulus of the genital organs. The apex of the lamina in frontal view appears to be deeply notched forming two lobes. The type is a very dark-coloured specimen. The frons and vertex are dull bluish-black



with faint purplish shine. The labium is ochreous, with a brownish-black median band occupying the midlobe and inner parts of the lateral lobes.

The two males from Katanga in the mounted collection of the Museum at Tervuren figuring under this name, are both of them wrongly identified. One of these, from Kapiri, IX.1912, *Mission Agric.*, bears F. Ris' identification label "*Trithemis Donaldsoni* ♂", but this is a specimen of *T. aconita* described and figured in the previous pages of this paper.

### *Trithemis dorsalis* (RAMBUR)

RAMBUR (1842) Hist. Nat. Ins. Névroptères in Suites à Buffon, p. 89 (♀ Cape).

Belongs to a group of dark-coloured species with a stout abdomen; adult male with thorax and body pruinose dark blue. Other similarly-looking species in the present collection are *pruinata* and *risi*.

Widespread in east and central Africa, but commonest in the south of the continent.

Total: 56 ♂, 10 ♀.

LAKE BANGWEULU REGION: 12 km from Chibaye, *Symoens* 9506 (3 ♂); 9 km from Luwingu, *Symoens* 9544 (♂); 29 km N.W. of Chungu, *Symoens* 9548 (♂).

UPPER LUAPULA REGION: Kifumbe, *Symoens* 9348 (2 ♂, 1 ♀); Kabeleshi River, *Symoens* 9359 (2 ♂); Kipushia, *Symoens* 9385 (♂); Mufumbi, *Symoens* 9394a (♂).

MIDDLE LUAPULA REGION: Muwanguni River, *Symoens* 9668 (♂); Lukangwa River, *Symoens* 9669a (♂).

LUBEMBE REGION: Sakania, *Symoens* 9292a and b (6 ♂); Mipapa River, *Symoens* 9337 (♀); 4 km S. of Kalumbwe, *Symoens* 9672 (2 ♂).

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 7714, 8651, 8654, 9447, 9561b, 9684, 9685, 9688b, 9720, 9859a, 10357, 10359, 10391 (env. 20 ♂, 6 ♀); Masika, *Symoens* 8714 (4 ♂, 1 ♀); Kakonkana, *Symoens* 8802 (♂); 7 km S. of Lukuni, *Symoens* 8922a, 9682a (4 ♂); 6 km S. of Mampa, *Symoens* 8899a (♀); N.E. of Kilando, *Symoens* 9677 (♂); 11 km from Lubumbashi (Elisabethville), *Symoens* 8735, 8875, 9680 (3 ♂).

LOWER LUAPULA REGION: 12.1 km W.S.W. of Kabiashia, *Malaisse* 4097 (♂).

### *Trithemis ellenbeckii* FOERSTER — Fig. 10, A

FOERSTER (1906) *Jahrb. Nassau. Ver. Naturk.*, 59, pp. 314-315, pl. A fig. 6 (♂ Abase-See, Südschoa); RIS (1912) Catalogue systématique et descriptif Coll. Selys, Libellulinen, fasc. 14, pp. 794-795, fig. 454 (♂♀ Eritrea and Asmara).

Not represented in this collection.

Material: ♂ (adult, lectotype by present designation), with original collector's label "See Abassa 8/XII 00, DvE [rlanger]", and "*Trithemis Ellenbeckii* Foerster Type", ex coll. F. FOERSTER in Museum of Zoology, Ann Arbor, Michigan.

The present specimen, here selected as the lectotype, is one of two males on which the original description was based. Though the latter is quite good, it can be supplemented with a few notes on colour and venation; and a camera lucida drawing of the genitalia may help to recognize *T. ellenbeckii* from its allies.

Stature robust. Labium black, outer half of lateral lobes ochreous. Labrum deep black, not metallic. Frons dark purple with bronze reflex dorsally, sides yellow; a black tapered stripe extends from upper part of frons downward along margin of compound eye. Legs wholly black.

Wing membrane hyaline but hinder pair with conspicuous amber basal spot in anal one-third of c across sc, m and cu, this colouring in sc and cu extending to a little beyond Ax<sub>1</sub> and Cux; Nodal index  $\frac{9 \cdot 10\frac{1}{2} \cdot 9 \cdot -}{11 \cdot 7 \cdot 7 \cdot 11}$ ; last Ax in right fore wing Y-shaped. Arculus situated distal to the middle between

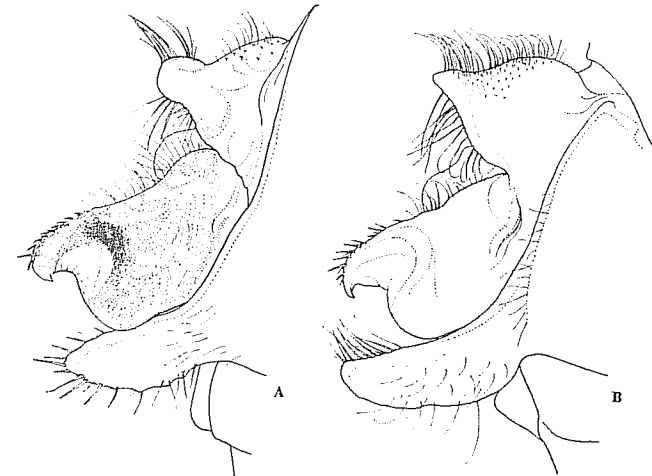


Fig. 10. — Genitalia of ♂, left side view: A, *Trithemis ellenbeckii* FOERSTER, lectotype (Abase); B, *T. nuptialis* KARSCH (Keyberg, Kimilolo River, *Symoens* 10165).

Ax<sub>1</sub> and Ax<sub>2</sub> and in hind wing also slightly distal to basal side of discoidal triangle. Pterostigma blackish brown between thick black nervures, the anal side distinctly convex; extreme inner edge of pterostigma yellowish, including the proximal side itself. Membranula smoky black.

Abdomen broad and almost parallel-sided, width across 6th segment 2.4 mm. Lamina anterior of genitalia distinctly swollen, apex rounded and a little upturned, carrying few very strong bristles (fig. 10, A).

Measurements: abd. + app. 27.5 mm, hind wing 31.8 mm, pterostigma hind wing 2.7 mm.

Very similar in general appearance to other dark bluish pruinose species having a stout, triquetral abdomen. The male resembles *T. pruinata* most closely but it can be distinguished from that species by the shape of the anterior lamina of the genital organs, which in *T. pruinata* is much more prominent and more densely clothed with strong black bristles. *T. ellenbeckii* also has an amber yellow spot at the base of the hind wings, which is lacking in *T. pruinata* and *T. risi*.

### *Trithemis hecate* RIS

RIS (1912) Catalogue systématique et descriptif Coll. Selys, Libellulinen, fasc. 14, pp. 76, 787-788 (♂ Madagascar).

This is a slender-bodied species with open venation (8½ or, more rarely, 9½ Ax in the fore wings) and a yellow pterostigma. The present males correspond well with one from Salisbury in

Rhodesia (det. E. PINHEY) and another from Okavango in Bechuanaland (ex S. African Mus.). Both are somewhat immature, the coalescent dark bands at the sides of the thorax still contrasting with the pale yellow ground colour. The large patch on top frons is dark purple. The females resemble the male and can be recognized by the shape of the metallic blue frontal spot (much more restricted than in the male), which is produced triangularly forward.

Total: 1 ♂, 2 ♀.

LAKE BANGWEULU REGION: Ndoba, *Symoens* 9134 (♀); Mundubi, *Symoens* 9149 (♀); Samfya, *Symoens* 9663 (♂).

#### *Trithemis kirbyi ardens* GERSTAECKER

GERSTAECKER (1891) *Jahrb. hamb. wiss. Anst.*, 9, p. 187 (♂♀ Mbusini, East Africa).

This is a fiery scarlet-bodied dragonfly, easily distinguished from its congeners by having an extensive patch of orange colour covering the basal third of the red-veined wings. The female is much paler and has shorter and broader wings, the hinder pair bearing a cloudy amber or faintly yellowish discal patch.

The nominotype, *T. kirbyi kirbyi* SELYS, occurs in India, the subspecies is found all over Africa, Madagascar and other island groups. It is a conspicuous insect, preferring open streams and rivers in dry areas.

Total: 1 ♂.

LOWER LUAPULA REGION: 4.2 km W. of Kabiashia, *Malaisse* 4559 (♂).

#### *Trithemis monardi* RIS

RIS (1931) *Revue suisse Zool.*, 38, (No. 7), pp. 108-110, fig. 5 (♂♀ Angola).

Males of this species are easily distinguished from those of *T. arteriosa* by the different shape of the genital organs, excellent figures of these having been supplied by RIS for both taxa.

A slender, mainly red-bodied species, males characterized by a broad amber-brown patch at the base of the hind wings. According to PINHEY (loc. cit., 1961), widespread in the southern and tropical parts of Africa, breeding in still waters.

Total: 8 ♂, 2 ♀.

UPPER CHAMBESHI REGION: Mundu, *Symoens* 10531 (♂).

LAKE BANGWEULU REGION: Kasela, *Symoens* 9577a (♀).

MIDDLE LUAPULA REGION: Mufuma, *Symoens* 9665 (♂).

KAFUBU REGION: 6 km S. of Mampa, *Symoens* 8899a (♂); Keyberg, *Symoens* 9847 (♂).

UPPER LUONGO REGION: 6 km from Chisunka, *Symoens* 10208a, b and c (5 ♂).

#### *Trithemis nuptialis* KARSCH — Fig. 10, B

KARSCH (1894) *Berl. Entom. Zeitschr.*, 39, pp. 12-14, figs. 10-13 (♂ genit., Yaunde, Kamerun); ID. (1899) *Ent. Nachr.*, 25, p. 370 (comparative notes, with *pruinata*); PINHEY (1966) *Exploration du Parc National de la Garamba*. Mission H. De Saeger (1949-1952), fasc. 45, pp. 64-65 and 104, fig. 14 (♂ Congo, sub *T. leptosoma* spec. nov.), syn. n.

This is evidently a member of the *T. stictica* group and not a near ally of *pruinata* as was believed by KARSCH, who described the latter five years afterwards. The two insects differ, among other characters, by the shape of the abdomen, which in *nuptialis* is more slender and a little constricted at the junction of the 3rd and 4th segments ("Hinterleib vor der Mitte am dünnsten, am Grunde wenig verdickt.") The male of this species resembles *T. stictica* and *parasticta* greatly,

but can be distinguished from either by the peculiar pilosity of the legs, the inner faces of the posterior two pairs of femora, and to a lesser extent also of the tibiae, being densely clothed with long erect hairs, a characteristic feature explicitly mentioned in KARSCH's complementary description (1899).

PINHEY's figure of the genital organs (PINHEY, 1966a, fig. 14) shows the anterior lamina unnaturally drawn out and also too much tapered; the accompanying camera lucida drawing of the hamular structure and lobes portrays these organs in profile view (fig. 10 B). The anterior lamina is wholly black and bluntly pointed at the tip, fringed densely with yellow hairs on the upper surface, the marginal bristles being stronger and black.

The taxon discussed by NIELSEN (1934, pp. 177-178, pl. 15 fig. 6) as *T. nuptialis*, is not that species but agrees with the description of *T. atra* PINHEY, a near ally of *T. dichroa* KARSCH. These two are smaller insects with a triquetral, non-constricted abdomen. In the Leiden Museum are specimens of both sexes of *atra* from Mobeka (Congo), identified as "*nuptialis*", which I had received from Dr NIELSEN himself, many years ago.

Female (Lubumbashi = Elisabethville). — Labium yellow, the midlobe with a black median stripe which is continued anterad so as to form a narrow joint stripe bordering the inner margin of each of the side lobes. Labrum black with a transverse, subrectangular ochreous spot on either side at base. Clypeus greenish ochreous, the postclypeus slightly obscured on each side of the middle. Frons bright pale ochreous, marked basally with a brownish black, slightly metallic blue, stripe, ill-defined anteriorly and descending about half-way down along margin of compound eye and occasionally also anterad into the sulcus; bristles strong, black. Vertex high, rounded, its summit carrying a pair of widely distant, minute tubercles; colour ochreous, marked with black low down against median ocellus and with a dark metallic blue patch on either side surrounding lateral ocellus. Occipital triangle glossy brownish black, ochreous posteriorly. Thorax bronze-brown growing paler laterally; areas between spiracle and legs brightest yellow; black lateral markings indistinct caused by a thin overlay of blue pruinescence. In the more teneral specimens the thoracic pattern is similar to that of the immature male. Legs black, coxae and inner faces of anterior femora pale greenish; soft bristle-like hairs of posterior two pairs of femora much less developed than in the male, the hairs more widely spaced and arranged in a single row at the carinae.

Wing membrane colourless, lacking yellow basal spots; neuration dark, pterostigma yellowish brown; membranula grey.

Abdomen partly discoloured, segments 4-8 marked with a double row of longitudinal yellow stripes on either side. Valvula vulvae very short, forming two crescentic lobes separated by a wide and shallow emargination.

Measurements: abd. + app. 24.0 mm, hind wing 28.0-29.5 mm, pterostigma fore wing 3.0-3.2 mm.

Total: 31 ♂, 5 ♀.

LAKE BANGWEULU REGION: Samfya, *Symoens* 9077, 9153b, 9167b, 9172b, 9176a, 9183a, 9937a, 9945d, 9951d, (10 ♂).

UPPER LUAPULA REGION: Namopala, *Symoens* 9381 (♂).

MIDDLE LUAPULA REGION: Namwandwe River, *Symoens* 9910a (♂).

LUBEMBE REGION: 3 km S.E. of Kakiasu, *Symoens* 9284 (♂); Sakania, *Symoens* 9292a and b (7 ♂).

KAFUBU REGION: 11 km S.E. of Lubumbashi (Elisabethville), *Symoens* 8073 (♂); Lubumbashi (Elisabethville), *Symoens* 8907a, 9712, 9861c, 9884, 9955, 9957, 10121, 10124, 10357 (10 ♂, 8 ♀). Keyberg, *Symoens* 10165 (♂).

LOWER LUAPULA REGION: Kabiashia, *Malaisse* 4255 (♂).

Further material. — ♂ Congo, Parc National de la Garamba, *G. Demoulin* 1/0/2, 30.X.1950, (holotype *T. leptosoma* PINHEY in Coll. Institut des Parcs Nationaux, Parc National de la Garamba,

Mission H. De Saeger, Brussels); about 60 ♂, Congo, Bambesa, 1939-1940, various dates, *J. Vrijdag* 111-113, (about 60 ♂ mounted, indet. in Institut royal des Sciences naturelles, Brussels); 2 ♂ (adult), labelled South Kamerun, Bipindihof, and Kamerun, *Tr. nuptialis* (det. ? in Rijksmuseum van natuurlijke Historie, Leiden).

#### *Trithemis parasticta* PINHEY

PINHEY (1956) *Occas. Pap. Coryndon Mus.*, No. 4 (1955), pp. 35-37, fig. 8a (♂ genit., Mbala = Abercorn, Zambia = N. Rhodesia).

This species is a very near ally of *T. stictica*, the males of both developing a delicate light blue pruinescence on the thoracic dorsum which also covers part of the sides and may spread over the whole of that surface. Certain individuals in the present series approach *stictica* in size and markings even more closely than it was thought when sorting them out initially. As stated already by PINHEY (1956) at the end of the original description, *parasticta* averages larger in size than *stictica* and lacks the saffron antenodal patch on the hind wings, so conspicuously present in the great majority of *stictica*. These two features can generally be relied upon to distinguish the two species. However, in three or four males of alleged *parasticta*, traces of yellow clouds are distinctly discernible in the anal loop of the hind wing, which led me to investigate further and look for other differences. First of all, the penis was extracted in a series of each, but appreciable differences in the structure of this organ could not be detected. PINHEY's drawings of the genitalia of *parasticta* and *stictica* show slight differences in the form of the anterior lamina, but here again I have been unable to corroborate this, as all individuals of *parasticta* have the lobe in profile shaped similarly to that figured for *stictica* (PINHEY, 1956, fig. 8c). The greater or lesser extent of the pruinose parts on the thorax does not hold as a specific character, for in our series there occur several full-coloured males of *parasticta* in which this powdering does not spread entirely over the yellow sides, while aged individuals of *stictica* sometimes show a quite similar pattern. Yet I am convinced that PINHEY is right in treating them as distinct species. Characters which are presumably stable enough to hold apart mature males of either species are the following:

<i>T. stictica</i>	<i>T. parasticta</i>
Sparse pubescence at sides of thorax silvery white;	This pubescence dark brown or black;
Pterostigma slightly shorter, dark brown to almost black, lighter only along anal (lower) side;	Pterostigma slightly longer, grey-yellow to light brown, darker only along costal side;
Base of hind wing relatively narrow, width at apex of discoidal triangle and total wing length in the ratio of 10 : 28.7;	Base of hind wing relatively broad, width at apex of discoidal triangle and total wing length in the ratio of 10 : 27.2;
Yellow antenodal patch on hind wing usually conspicuous;	Yellow antenodal patch on hind wing nearly always wanting;
Superior appendages wholly black;	Superior appendages nearly always with basal traces of yellow exteriorly;
Size very variable, but averages smaller, with slightly shorter abdomen (e.g. abd. + app. 21, hw. 25.5 mm).	Average size larger, abdomen relatively a little longer (e.g. abd. + app. 27, hw. 29 mm).

It is worthy of note that no less than 12 males (mostly from Samfya) have the last Ax complete on both fore wings, while in 9 males this is the case on one of the fore wings only. These irregularities seem to occur much less frequently in *T. stictica*.

For nomenclature, see note under *T. stictica*.

REMARKS. I have recently received from Dr PINHEY two paratype males of *T. parasticta*, from near Mbala (Abercorn), which agree with the material discussed above, conforming with the above statements.

As will appear from our locality records, the two species frequently occur in the same surroundings and in some places almost certainly fly in company of each other.

Total: 84 ♂, 21 ♀.

LAKE BANGWEULU REGION: Ndobu, *Symoens* 9134, 10014a, 10016 (3 ♂ 5 ♀); Mundubi, *Symoens* 9149 (2 ♂, 1 ♀); Samfya, *Symoens* 9153b, 9158a, 9159a and c, 9169c, 9172a, 9172b, 9176a, 9176b, 9937a and b, 9948 a, b and c, 9950 e, f and g, 9951 c and d, 9954, 9960, 9961, 9962, 9964, 10237b (63 ♂, 12 ♀); Chilupula, near Samfya, *Symoens* 9193 (♂); Musaba, *Symoens* 10032 (4 ♂).

UPPER LUAPULA REGION: Milenje River, *Symoens* 10759a (♀).

MIDDLE LUAPULA REGION: Mufuma, *Symoens* 9665 (♂); Kisongo, *Symoens* 9913 (♂♀).

UPPER LUONGO REGION: 6 km from Chisunka, *Symoens* 10208c (2 ♂); Chipili, *Symoens* 10232 (♂).

LOWER LUAPULA REGION: Nkumbi, *Symoens* 8473 (6 ♂); Kashiobwe, *Symoens* 8537 (♀).

#### *Trithemis pluvialis* FOERSTER

FOERSTER (1906) *Jahresber. Mamh. Ver. Naturk.*, 71-72 (1904-05), pp. 30-31 sep. (♂ W. Usambara).

This is another red-bodied species with a rather broad and flat abdomen lacking pruinescence, and with red venation.

Locally common in south and central Africa.

Total: 173 ♂, 6 ♀.

UPPER CHAMBESHI REGION: Lubwa, *Symoens* 10525 (3 ♂); Mulanshi, *Symoens* 10551 (5 ♂).

CONGO-LUANGWA WATERSHED REGION: 5 km from Shiwa Ngandu, *Symoens* 10511 (6 ♂).

LAKE BANGWEULU REGION: Samfya, *Symoens* 9159b (♂); 12 km from Chibaye, *Symoens* 9506 (2 ♂); 32 km E.S.E. of Chalabesa, *Symoens* 9511 (2 ♂); 9 km from Luwingu, *Symoens* 9544 (♂).

UPPER LUAPULA REGION: Kifumbe, *Symoens* 9348 (8 ♂); Kipushia, *Symoens* 9352 (♂); Kabel-eshi River, *Symoens* 9359 (2 ♀); Serenje, *Symoens* 10432 (♂).

MIDDLE LUAPULA REGION: Muwanguni River, *Symoens* 9668 (3 ♂); Lukangwa River, *Symoens* 9669a (2 ♂); Chimese, *Symoens* 10186 (7 ♂); Masaba, *Symoens* 10200 (28 ♂, 1 ♀); Matanda, *Symoens* 10207 (♂).

LUBEMBE REGION: Sakania, *Symoens* 9292b (♀); Mipapa River, *Symoens* 9337 (♂); Luankole River, *Symoens* 9341 (♂); 4 km S. of Kalumbwe, *Symoens* 9672 (♂).

KAFUBU REGION: Lubumbashi, *Symoens* 7693, 7714, 8650, 9262a, 9273, 9561b, 9684, 9688b, 10348, 10359, 10365, 10391 (47 ♂, 3 ♀); 11 km from Lubumbashi (Elisabethville), *Symoens* 7710 (2 ♂); Tumbwe, *Symoens* 8409, 8632, 8729, 8823 (6 ♂); 7 km S. of Lukuni, *Symoens* 9682a (♂).

UPPER LUONGO REGION: 6 km from Chisunka, *Symoens* 10208b (2 ♀); Chipili, *Symoens* 10232 (24 ♂); 25 km W.N.W. of Luwingu, *Symoens* 10572a and b (6 ♂).

KUNDELUNGU PLATEAU: 5.8 km N. of Katshupa, *Malaisse* 4193 (♀); 6.3 km N.N.E. of Katshupa, *Malaisse* 4196 (♂).

LOWER LUAPULA REGION: Kabiashia, *Malaisse* 4050d (♂), 4255 (♂); 12.1 km W.S.W. of Kabiashia, *Malaisse* 4097 (3 ♂); Kimbeshie, *Malaisse* 4266 (♂).

CONGO-LUANGWA WATERSHED REGION (S.E. SIDE): Mkushi River, *Symoens* 10411b (2 ♂).

#### *Trithemis pruinata* KARSCH

KARSCH (1894) *Berl. Entom. Zeitschr.*, 39, pp. 13-14 (♂ Sansibar, sine nomen); ID. (1899) *Ent. Nachr.*, 25, pp. 369-370 (pars, ♂ Sansibar).

A very dark species, easily confounded with *risi*, the body of the adult male overlaid with dark blue pruinescence, exactly similar to that of *T. ellenbeckii* and *T. risi*. Males are so similar in general appearance to those of *T. risi* that careful examination of the hamular structure of every specimen is necessary to hold these species apart. Recognition is, however, easy enough with the help of LONGFIELD's excellent outline drawings (see also under *T. risi* LONGFIELD). It can be distinguished from the latter also by the form of the pterostigma, which in *pruinata* is a little longer and parallel-sided, not expanded as in *risi*.

The type male comes from East Africa, not from Togo, as stated by PINHEY (1962a).

Less widely distributed than *T. risi* and apparently much rarer.

Total: 5 ♂.

LOWER LUAPULA REGION: Kisamamba, S. of Kasenga, *Symoens* 8504 (♂); 7 km N.N.W. of Kabiashia, *Malaisse* 4251 (2 ♂); Kimbeshie, *Malaisse* 4266 (2 ♂).

#### *Trithemis risi* LONGFIELD

LONGFIELD (1936) *Trans. roy. ent. Soc. London*, 85, pp. 490-491, 494, fig. 8a (♂) Brit. East Africa).

Males of *T. risi* are very similar to those of *T. dorsalis*, *T. ellenbeckii* and *T. pruinata*, but the wide V-shaped interval between the outer and inner branches of the genital hamule (seen in profile) is a good character to distinguish *T. risi* from its nearest allies. Attention may be drawn also to the shape of the jet-black pterostigma of the male, which is a little swollen in the middle.

Very common all over the Ethiopian region (? and Madagascar). The types in the British Museum (Nat. Hist.) are from "British E. Africa", not from Transvaal (see KIMMINS, 1968, p. 292).

Total: 15 ♂.

KAFUBU REGION: Mukupa, *Symoens* 7989 (8 ♂); Tumbwe, *Symoens* 8632 (♂); Lubumbashi (Elisabethville), *Symoens* 8654 (3 ♂), 10357 (♂).

LOWER LUAPULA REGION: 12.1 km W.S.W. of Kabiashia, *Malaisse* 4097 (2 ♂).

#### *Trithemis stictica* (BURMEISTER)

BURMEISTER (1839) *Handbuch d. Entomologie*, II. B., 2. Abth., p. 850 (♂ Port natal); CALVERT (1898) *Trans. Amer. Ent. Soc.*, 25, pp. 66-67, pl. 1 fig. 6 (♂ type, genit.; type redescribed); PINHEY (1956) *Occas. Pap. Coryndon Mus.*, No. 4, pp. 35-37, fig. 8c (♂ genit.), comp. notes.

For a comparison of this graceful and common insect with *T. parasticta* PINHEY, see under that species. I have failed to discover any females in our material other than those listed below that would differ in any way sufficiently from those of *T. parasticta* to warrant their placement with *T. stictica*.

REMARKS. It is not precluded that a re-examination of BURMEISTER's type (with uncoloured hind wings!) will reveal its identity with *T. parasticta* PINHEY, in which case the present species would

require a new name. It seems best to avoid any further disturbances in nomenclature and leave the two species with their present names.

TOTAL: 34♂, 2♀.

CONGO-LUANGWA WATERSHED REGION: Shiwa Ngandu, *Symoens* 10811 (♂).

LAKE BANGWEULU REGION: Mukaluka, *Symoens* 9016 (♂); Samfya, *Symoens* 9176a (♂), 9948b (♂), 9950e (♂), 9959 (♂).

UPPER LUAPULA REGION: Serenje, *Symoens* 10676 (♂); Munte River, *Symoens* 10679a and b (5 ♂); Milenje River, *Symoens* 10759a (6 ♂), 1 ♀ doubtful.

MIDDLE LUAPULA REGION: Chimpala, *Symoens* 9055 (♂); Namwandwe River, *Symoens* 9910a (♂); Kisongo, *Symoens* 9913 (♂).

KAFUBU REGION: Mukupa, *Symoens* 7989 (2 ♂); Tumbwe, *Symoens* 8013 (♂); Kalota, near Kasokota, *Symoens* 8953a (♂); Kipopo, *Symoens* 8959 (2 ♂); Lubumbashi (Elisabethville), *Symoens* 9712 (♀ ad.), 9859a (♂); Keyberg, *Symoens* 9847 (♂).

UPPER LUONGO REGION: Chipili, *Symoens* 10232 (4 ♂).

KUNDELUNGU PLATEAU: Lualala, *Symoens* 9794 (♂); 6.3 km N.N.E. of Katshupa, *Malaisse* 4196 (♂).

#### Genus *ATOCONEURA* KARSCH

##### *Atoconeura biordinata chirinda* LONGFIELD

LONGFIELD (1953) *Entomologist*, 86, pp. 42-49, figs. (♂ S. Rhodesia).

A rare insect, previously known only from certain districts in Southern Rhodesia. In the Leiden Museum both sexes are represented from the Inyanga National Park, 1960, Pinhey, and 1964, G.F. Mees. These individuals compare well with the original description. Even in juvenile females the labrum is black, but the postclypeus remains pale coloured, having only a pair of oblique brownish streaks, one on either side of the middle.

The present example is fully adult. Length of abdomen 28.0 mm, hind wing 32.0 mm, pterostigma 3.0 mm.

Total: 1 ♀.

KUNDELUNGU PLATEAU: 5.8 km N. of Katshupa, *Malaisse* 4193 (♀).

#### Genus *ZYGONYX* SELYS in HAGEN

SELYS in HAGEN (1867) *Verh. zool.-bot. Ges. Wien*, 17, p. 62 (brief diagn. of *Zygonyx* SELYS); FRASER in PINHEY (1962) *Publ. Cult. Comp. de Diamantes de Angola*, No. 59, p. 275, footnote.

Despite FRASER's elaborate efforts to prove that the type-species of this genus is *Zygonyx iris* SELYS (1869a, p. 97), it should be pointed out that this is an error since SELYS (loc. cit., p. 96) explicitly mentioned *ida* as the type: "... au genre *Zygonyx* Selys dont le type (*Z. ida* SELYS) est de Java ...". etc. This statement was repeated the same year in a second article on the Odonata of the Seychelles (SELYS, 1869b, p. 274), these two papers having been published almost simultaneously (April, 1869). Moreover, KARSCH (1889, p. 281), who gave further diagnostic characters of *Z. ida*, also designated it as the type, which therefore constitutes a second valid type-designation for this genus, both selections antedating and invalidating KIRBY's (1890) fixation of *Z. iris* SELYS. See also COWLEY (1934).

**Zygonyx atritibae** PINHEY

PINHEY (1964) *Publ. cult. Comp. de Diamantes de Angola*, No. 63, p. 119 (key), 120-123, pl. I fig. 1, text-fig. 11 (♂♀ Mwinilunga, Zambia = N. Rhodesia).

A beautiful species, very similar in general appearance and markings to *Z. speciosa* (KARSCH) and *regisalberti* (SCHOUTEDEN), but quite distinct from both. The characters separating the two sexes of *Z. atritibae* from those of *regisalberti* have been set forth by PINHEY and, after examining many more specimens of either species and sex, have proved to be quite constant. Apart from the partially dark-coloured labium and the black tibiae of *Z. atritibae*, the species can be easily distinguished from *regisalberti* by the conspicuous broad ivory band occupying the basal two-third of the third abdominal segment. In *Z. regisalberti* this segment is mainly dark brown above, carrying only tiny yellow streaks (subinterrupted in the median line), which are placed transversely at the base and jugal suture, encroaching on to the dorsum from the sides. In the colour and markings of the wings, all females agree with PINHEY's photograph of *atritibae*, on pl. II fig. 1 (loc. cit.).

The present male fits the description and figures supplied by PINHEY in every detail.

Total: 1 ♂ in Prof. SYMOENS' material.

KAFUBU REGION: 6 km S. of Mampa, *Symoens* 8899b (♂).

Further material. — Employing PINHEY's partial revision of the genus as a guide, I have ventured to re-identify the rich material of *Zygonyx* in the Musée royal de l'Afrique Centrale at Tervuren. In the collection of mounted specimens, two species, *Z. atritibae* PINHEY and *Z. regisalberti* (SCHOUTEDEN), were still mixed under the drawer labels *speciosa* and *regisalberti*. Here follows the list of the available specimens of *Z. atritibae* PINHEY: ♂, Lubumbashi (Elisabethville), XI.1926, *Ch. Seydel* (indet.); ♂, Katanga, Katentania, V.1924, *Ch. Seydel* (indet.); ♂, Kansenia, IX.1930, *G.F. de Witte* (indet.); ♂, Haut Luapula (?), Kansenia, 16.XII. 1929, *Dom de Montpellier* (indet.); ♂, Katanga, Bianco, X.1925, *Ch. Seydel* (indet.); ♂ (without abdomen), Katanga, Penge (?), I.1925, *Ch. Seydel* (indet.); ♀, Lubumbashi (Elisabethville), VI.1936, *Ch. Seydel* (*Z. regisalberti* SCHOUTEDEN, det. F.C. FRASER); ♀ (juv.), Lubumbashi, 26.IX.1934, *Ch. Seydel* (same identification label); ♀, Mungulungu, IX.1936, *G.F. Overlaet*, (same identification label). Papered specimens: 4 ♀, Lubumbashi, various dates (*Z. fallax* SCHOUTEDEN, det. F.C. FRASER).

**Zygonyx natalensis** (MARTIN)

MARTIN (1900) *Bull. Mus. Hist. nat. Paris*, 6, p. 106 (♀ Natal).

Occurs commonly at rapid running waters, from south to east Africa, Congo and Angola. The recently described *Z. elisabethae* LIEFTINCK (= *L. hova* RAMBUR), from Madagascar, is nearly related to *natalensis* (MARTIN) and possibly only a subspecies of it.

Total: 1 ♂.

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 8906b (♂).

**Zygonyx regisalberti** (SCHOUTEDEN)

SCHOUTEDEN (1934) *Ann. Mus. Congo belge Tervuren, Zool.*, sér. III, sect. II, 3 (fasc. 1), pp. 33-34, fig. 38 and pl. I. (♀ Katanga, Katombe).

Not represented in this collection.

As mentioned above, I have re-identified the material of *Zygonyx* in the Musée royal de l'Afrique Centrale at Tervuren. Here follows the list of the available specimens of *Z. regisalberti* (SCHOUTEDEN): ♂ (juv., incomplete), Uerre, *Don De Bauw* (*Pseudomacromia speciosa* KARSCH,

det. F. Ris); ♂, Kwango Atene, 1911, *Charlier* (same identification label); ♂ (allotype), Kalenge, XII.1933, *G.F. Overlaet* (*Z. regisalberti* SCHOUTEDEN, det. F.C. FRASER, with allotype label); ♂, Bambesa, Uele, XII.1938, *J. Vrijdagh* (*Z. regisalberti* SCHOUTEDEN, det. F.C. FRASER, also with allotype label in FRASER's hand); ♂, R. Kalani, 17.X.1933, *G.F. Overlaet* (indet.); ♂, Lisala, 1935, *Dr F. Tabacco* (indet.); ♂, Luiza, Lulua River, 16.X.1933, *G.F. Overlaet* (indet.); ♂, Tshibalaka, 13.X.1933 (*Z. speciosa* KARSCH, det. F.C. FRASER); ♂, Kisangani (Stanleyville), XI.1925, *J. Ghèsquière, Prince Léopold de Belgique* (indet.); ♀ (holotype), Katanga, Katombe, 9.II.1923, *Ch. Seydel* (with SCHOUTEDEN's type label *Pseudomacromia regisalberti* SCHOUTEDEN); 5 ♀, from L. Luiza, Tshibalaka and Kalenge, *G.F. Overlaet*, and Lisala, *Dr F. Tabacco* (indet.). Papered specimens: several dozens of males and some females from various Congolese localities (all sub *Z. regisalberti*).

**Zygonyx torrida** (KIRBY)

KIRBY (1889) *Trans. Zool. Soc. London*, 12, p. 299-300, 340, pl. 52 fig. 7 (♂ Sierra Leone).

A common species, found nearly all over Africa and neighbouring islands, including the Canaries; sparingly also in southern Spain. The subspecies *Z. t. isis* FRASER occurs in Peninsular India.

Total: 2 ♂.

KAFUBU REGION: Kikwanda, *Symoens* 8003 (♂); Lubumbashi (Elisabethville), *Symoens* 8877b (♂).

Genus **OLPOGAстра** KARSCH**Olpogastra lugubris** KARSCH

KARSCH (1895) *Ent. Nachr.*, 21, pp. 198-199 and 201-202 (♀ Dongola).

Recorded from subtropical Africa northwards into Sudan. An easily recognized, slender-bodied dragonfly, found mainly at the reedy edges of large pools and on rivers.

Total: 11 ♂.

LAKE BANGWEULU REGION: 32 km E. S. E. of Chalabesa, *Symoens* 9011 (♂); Samfya, *Symoens* 9167b, 9172b, 9950f (5 ♂).

MIDDLE LUAPULA REGION: Kisongo, *Symoens* 9058 (♂); Mufuma, *Symoens* 9060 (♂); Mansa (Fort Rosebery), *Symoens* 9908 (♂).

KAFUBU REGION: 11 km S. E. of Lubumbashi (Elisabethville), *Symoens* 9864 (♂).

LOWER LUAPULA REGION: Kikungu, *Symoens* 8425 (♂).

Genus **RHYOTHEMIS** HAGEN**Rhyothemis fenestrina** (RAMBUR)

RAMBUR (1842) *Hist. Nat. Ins. Névropt. Névroptères in Suites à Buffon*, p. 40 (♀ sine patria).

Locally abundant in forested areas of tropical West and Central Africa.

Total: 1 ♂, 1 ♀.

LAKE BANGWEULU REGION: Ndoba, *Symoens* 9134 (♀); Samfya, *Symoens* 9159a (♂).

**Rhyothemis mariposa** RIS

RIS (1913) Catalogue systématique et descriptif Coll. Selys. Libellulinen, fasc. 15, pp. 933, 961, fig. 555 (♂ S.W. Africa).

Apparently rather local. Described from southwest Africa but having its distribution centre in Central Africa, where it is most frequent.

Total: 14 ♂, 27 ♀.

LAKE BANGWEULU REGION: Samfya, *Symoens* 9110, 9111, 9157, 9158b, 9159a (4 ♂, 8 ♀); Ndoba, *Symoens* 9134, 10014a, 10016 (9 ♂, 15 ♀); Mundubi, *Symoens* 9149 (1 ♂, 4 ♀).

Genus **THOLYMIS** HAGEN

**Tholymis tillarga** (FABRICIUS)

FABRICIUS (1798) Ent. Syst. Suppl., p. 285 (in India orientali).

Widespread and common in the tropics of the Old World. A species with distinctly crepuscular habits.

Total: 2 ♂.

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 8929 (♂), 10624b (♂).

Genus **PANTALA** HAGEN

**Pantala flavescens** (FABRICIUS)

FABRICIUS (1798) Ent. Syst. Suppl., p. 285 (in India Dom. Daldorff).

A well-known cosmopolitan, mainly circumtropical, dragonfly with strong migratory habits.

Total: 19 ♂, 18 ♀.

CONGO-LUANGWA WATERSHED REGION: 25 km E.N.E. of Chitambo, *Symoens* 9001 (♀); 21 km N.N.E. of Kalonje, *Symoens* 9005 (♂♀).

LAKE BANGWEULU REGION: Samfya, *Symoens* 9074, 9111, 9153a, 9158a, 9176d and e, 9943, 9945c (3 ♂, 9 ♀).

LUBEMBE REGION: 5 km E. of Libangila, *Symoens* 9342 (3 ♂, 1 ♀).

KAFUBU REGION: Lubumbashi, *Symoens* 7790, 7797b, 7851, 7889, 8907b, 8924, 8970, 9165, 9181, 9199, 9716, 9955 (9 ♂, 6 ♀); Tumbwe, *Symoens* 8235b (♀); 12 km from Welgelegen, *Symoens* 9279 (♂).

LOWER LUAPULA REGION: Kashobwe, *Symoens* 8537 (♂).

Genus **TRAPEZOSTIGMA** HAGEN

**Trpezostigma basilare basilare** (PALISOT DE BEAUVOIS)

PALISOT DE BEAUVOIS (1805) Ins. Afr. Amér., p. 171 (le Royaume d'Oware, S. Nigeria).

Widely distributed in Africa and neighbouring islands. The subspecies *T. basilare burmeisteri* (KIRBY) occurs in India.

Total: 5 ♂.

LAKE BANGWEULU REGION: Samfya, *Symoens* 9096 (♂), 9167e (♂), 9943 (♂), 9980 (♂).

KAFUBU REGION: Lubumbashi (Elisabethville), *Symoens* 8926 (♂).

Genus **UROTHEMIS** BRAUER

**Urothemis edwardsi** (SELYS)

SELYS (1849) in LUCAS, *Algérie, Zool.* 3, p. 124, pl. 2 fig. 5-5a (♀ Algérie); RIS (1921) *Ann. S. Afr. Mus.*, 18, p. 435-436 (♀ S. Africa).

All males have small-spotted hind wing bases, the opaque colouring in c-sc reaching as far out as Ax<sub>1</sub> to slightly beyond Cux in the cubital space and then recurring in a deeply convex loop towards the end of the membranula. In this respect they resemble specimens of that sex in the Leiden Museum from Algeria, Uganda and Tanzania. In examples from Congo (Mobeka, ex coll. C. NIELSEN), also before me, the dark basal patches are much more extensive and, remarkably enough, quite similar in extent and equally dark in the two sexes. The differences between *U. edwardsi* and *U. assignata* (SELYS) have been set forth by RIS (1921). Males are easily distinguished from each other but in certain areas the females may be much difficult to hold apart. Body and wing colour of the examples from Tanzania (one taken in cop. with a dark-coloured male), and the present females from the Bangweulu-Luapula area as well, are considerably lighter than in the male, resembling females of *U. assignata* very closely. Female *edwardsi* differs from that of *assignata* by the presence of a black line at the base of frons, traces of black at the lateral thoracic sutures, and by having broader and more extensive black markings on the abdominal segments. Whereas in *edwardsi* median and transverse streaks are present also on segm. 1-3, in *assignata* these are invariably absent. The shape of the opaque spots at the hind wing bases may be exactly similar in females of the two species, but in *assignata* they are usually more extensive than in *edwardsi*, where they are only rarely fused together. The vulvar lamina of *edwardsi* is a little less deeply incised and the separate blades appear more closely approximated than they are in *assignata*; the form of the blades is, however, variable in either species.

I suspect that females of *U. edwardsi* and *U. assignata* are often mixed in collections.

Common in tropical and subtropical Africa as far north as the Mediterranean coast, but less frequent than *U. assignata* and apparently preferring larger stretches of water than the latter.

Total: 5 ♂, 6 ♀.

LAKE BANGWEULU REGION: Ndoba, *Symoens* 9134 (♂ juv.); Samfya, *Symoens* 9176c (♂ subad.), 10237a (♀ ad.), 10242 (♂ ad.), 10262 (♂ ad.), 3 ♀ semiad.).

UPPER LUONGO REGION: 6 km from Chisunka, *Symoens* 10208a (♂ ad.).

LOWER LUAPULA REGION: Mosesi, *Symoens* 8442 (♂ juv., 3 ♀ semiad.).

Genus **AETHRIAMANTA** KIRBY

**Aethriamanta rezia** KIRBY

KIRBY (1889) *Proc. zool. Soc. London*, 1889, p. 298 (♂ Madagascar).

A small red-bodied species with short wings and open venation, easily distinguished from *Crocotthemis* and other red species by brown and amber basal tinting of the hind wings and reduced number (six) of antenodal cross-veins on fore wings, the last Ax being complete.

Locally common throughout Central Africa, preferring reedy lakes, pools and slow-flowing streams.

Total: 3 ♂.

LAKE BANGWEULU REGION: Mundubi, *Symoens* 9149 (♂).

UPPER LUONGO REGION: 6 km from Chisunka, *Symoens* 10208a and c (2 ♂).

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