

PARC NATIONAL DE L'UPEMBA
I. MISSION G. F. DE WITTE
en collaboration avec
W. ADAM, A. JANSSENS, L. VAN MEEL
et R. VERHEYEN (1946-1949).
Fascicule 38 (1)

NATIONAAL UPEMBA PARK
I. ZENDING G. F. DE WITTE
met medewerking van
W. ADAM, A. JANSSENS, L. VAN MEEL
en R. VERHEYEN (1946-1949).
Afllevering 38 (1)

ODONATA

BY

Dr. FREDERICK C. FRASER (Bournemouth).

I am again indebted to Prof^r V. VAN STRAELEN for the opportunity of studying a large collection of *Odonata* from the National Parks of the Belgian Congo. The present one comes from the National Park of Upemba and its composition differs in many respects from that of the National Park Albert on which I reported in 1949, there being a greater variety of genera and species. The collection consists of about 2.700 specimens belonging to 42 genera and 78 species, some of which are new to science. Whilst this number is large coming from a single limited area, I do not think that it represents the total *Odonata* fauna of that area. In so far as my present studies of the *Odonata* of the Belgian Congo have progressed, it has become evident that it is one of the richest faunal areas in the world.

Specimens were collected in the following localities :

[Riv. Dipidi, affl. dr. Lufwa and sous-affl. dr. Lufira, 1.700 m];
Ganza, salterns near riv. Kamandula, affl. dr. Lukoka and sous-affl. g.
Lufira, 860 m;
Kakwe, riv. Muye, affl. dr. Lufira, 1.320 m;
Kagomwe, affl. Lusinga and sous-affl. Lufwa, 1.700 m;
Kalumengongo, affl. dr. Lualaba, 1.700 m;
Kamitungulu, affl. g. Lusinga and sous-affl. dr. Lufira, 1.760 m;
Kankunda, affl. g. Lupiala and sous-affl. dr. Lufira, 1.300 m;
Kanonga, affl. dr. Fungwe, 675-695-860 m;
Karibwe, affl. Lusinga and sous-affl. dr. Lufwa, 1.700 m;

Kaswabilenga, river bank dr. Lufira (Lusinga-Mabwe track), 680 m and left bank of Lufira, 750 m;
Kaziba, affl. g. Senze and sous-affl. dr. Lufira, 1.140 m;
[Kenia, affl. dr. Lusinga and sous-affl. dr. Lufwa, 1.585 m];
Kilolomatambo, affl. Lusinga and sous-affl. dr. Lufwa, 1.750 m;
Kilwezi, affl. dr. Lufira, 700-1.000-1.400 m;
Lupiala, affl. dr. Lufira, 900-1.200 m, banks of Lupiala, 900-1.200 m;
[Lusinga, banks of Dipidi (See Dipidi), 1.400 m];
Mabwe, eastern banks of lake Upemba, 585 m;
Mongolo, affl. g. Lufira, 1.800 m;
Mubale, affl. g. Munte and sous-affl. dr. Lufira, 1.480-1.780 m and region between Mubale-Munte, 1.480 m;
Mukana, marshes near Lusinga, 1.810 m;
Munoi, fork of Lupiala, affl. dr. Lufira, 890 m;
Gorges de la Pelenge, 1.250-1.600 m.

All the above localities lie within the boundaries of the « Parc National de l'Upemba » save Dipidi and Kenia.

SYSTEMATIC

Order **ODONATA.**

Suborder **ZYGOPTERA.**

Family **CÆNAGRIIDÆ.**

Genus **PSEUDAGRION** SELYS.

1. — **Pseudagrion gerstaeckeri** KARSCH.

One pair from Lusinga, 1.760 m, 3.VII.1947 : they are of great size, with ♂, abdomen 37 mm, hindwing 22,5 mm; ♀, abdomen 36 mm and hindwing 26 mm. The paucity of numbers is surprising as the species is the dominant *Pseudagrion* in the Belgian Congo.

2. — **Pseudagrion melanicterum** SELYS.

One doubtful male from Lusinga has the end of the abdomen missing; 2 males and a female from Ganza, 860 m, 20-25.VI.1949. A female from Kambi (affl. Kafwe), 25.VI.1945, may also belong to this species but is discoloured.

3. — **Pseudagrion angolense** SELYS.

One male : Mitoto (Lusinga), 9.VII.1945; 2 males and a female from Kambi (affl. Kafwe and sous-affl. dr. Lufwa towards Masombwe), 25-27.VI.1945. The species is widely distributed throughout tropical Africa.

4. — **Pseudagrion massaicum** SELYS.

A single male from Kambi, with same data as the last. The species is apparently a local one.

Genus **AGRIOCNEMIS** SELYS.

This genus is represented by only a single female which belongs doubtfully to *inversa* KARSCH. Affluence of Munte, left banks of Mubale, 28.V.1945. Several species should be found in the area but owing to their small inconspicuous size, and habit of low-flying, they are apt to be overlooked.

Genus **ENALLAGMA** CHARPENTIER.

Of the sixteen species reported from the african continent, three are present in the collection.

1. — **Enallagma subfurcatum** SELYS.

About 20 males and 10 females have been determined as this species but a number have the terminal segments of the abdomen missing so that identification cannot be certain. They are from Kamalonge near Lusinga, 21.IV.1945, 1.760 m. The species is the commonest and most widely distributed of the african *Enallagma*'s.

2. — **Enallagma elongatum** (MARTIN).

This species was described by MARTIN as an *Ischnura* and is either very local or uncommon; it is represented by only three females from Mukana, marshes near the river Lusinga, 1.810 m, 28.V-VI to 30.VI.1945; Kalumengongo, 1.780 m, at the affluence of the Lualaba, 18.IV.1947 and river Mubale, 1.480 m, 1-20.V.1947.

3. — **Enallagma pseudelongatum** LONGFIELD.

About a score of this species belonging almost equally to both sexes were taken in company with the other two species mentioned above. Many are defective but fortunately can be recognized by the markings of the basal abdominal segments. Like *elongatum*, it appears to be a local species.

Genus **CERIAGRION** SELYS.

This dominant ethiopian and oriental genus is represented by two species but the specimens are almost all defective and lack the terminal segments of the abdomen so that very few can be identified with certainty.

1. — **Ceriagrion glabrum** (BURMEISTER).

One male : Mabwe, 585 m, 12.VIII.1948; two females, one without data, other from Kilwezi, 750 m, 16-21.VIII.1948. One defective male, Munoi, fork of Lupiala, 890 m, 15-24.VI.1948. The species has a distribution throughout Africa, northwards into Palestine and eastwards to Mauritius and Madagascar.

2. — **Ceriagrion suave** RIS.

Twelve males and 3 females have been identified as belonging to this species but only one male is perfect and the determination of the others rests on the similarity of the locality, Kanonga, affluence of Fungwe, 675-860 m, 13-27.IX.1947. The *terra typica* is Kapiri, Katanga but it is distributed widely in tropical Africa and I have specimens from Uganda and Kenya.

Genus **ELATTONEURA** COWLEY.

The genus is essentially an oriental one with two or possibly three species found in Africa. These are *frenulata* (SELYS), *glauca* (SELYS) and *mutata* (SELYS), the latter probably a synonym for *glauca*.

Elattoneura glauca (SELYS).

A single male from Kambi, affluence of the Kafwe, 1.810 m, 25-27.VI.1945. The dorsum of thorax is pruinose white, the adult state.

Genus **ISOMECOCNEMIS** COWLEY.

This small african genus is represented by a single species, *subnodalis* (SELYS), a single male from Kamitungulu, 1.760 m, 4-7.III.1947. The species breeds in running water and usually in shaded spots beneath overhanging bushes or vegetation, so must be frequently overlooked; it is not a common insect in collections.

Genus **CHLOROCNEMIS** SELYS.

This genus is closely related to the last but more dominant in character and contains more species. In the present collection is a single defective male with segments 7 to 10 missing and in consequence difficult to determine; however the pale markings of the body are so different from any other known species that no doubt exists about it being new to science. I have named it in honour of its discoverer.

Chlorocnemis wittei n. sp.

(Fig. 1.)

Male. — Abdomen 17 mm (basal 6 segments only). Hindwing 26 mm.

Head : labium dingy white, labrum entirely black; rest of head black save for a narrow transverse pale blue stripe across frons just before level of antennæ and extending from eye to eye. Prothorax black with only the

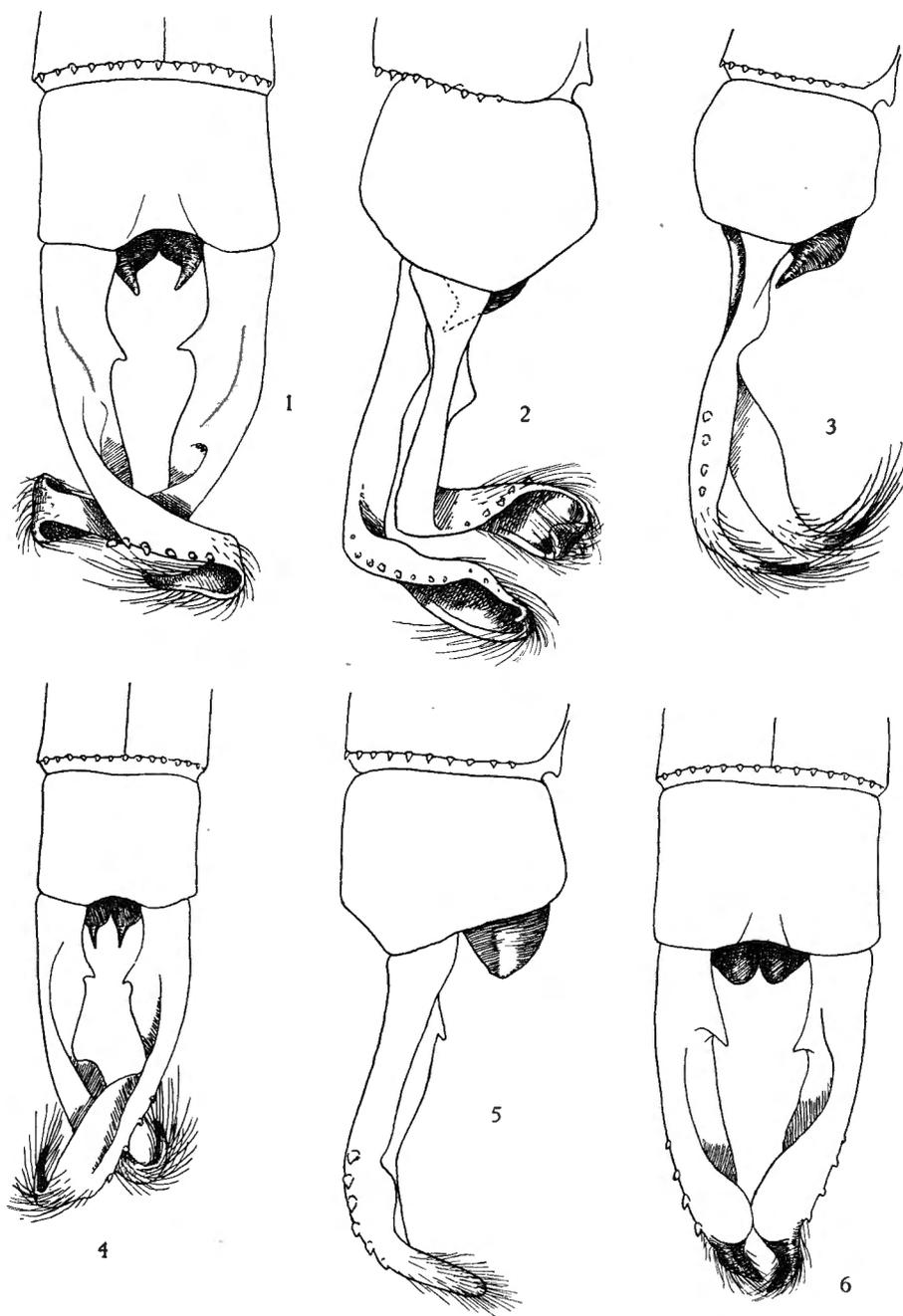


FIG. 1 to 4. — *Lestes uncifer* KARSCH.

1 and 2. Anal appendages of a male from Eala, Belgian Congo, dorsal and right lateral aspects (the appendages are distorted from compression in paper); 3 and 4. The same of a male from Mubale; 5 and 6. *Lestes pinheyi* n. sp., from Madi Opei, Achole, Uganda. (Note the inferior appendage without a spine.)

anterior lobe pale blue. Thorax pale blue with a broad middorsal and equally broad humeral stripe (or the dorsum broadly black to as far as the anterolateral suture marked by very broad antehumeral blue stripes which taper slightly above and are broadly concave on their inner border). A very short extension of the humeral black runs downwards along the anterolateral suture and the second suture is outlined in diffuse greyish black. Legs black. Wings pale sulphur yellow, 18 postnodals in forewings, 16 to 17 in the hind; pterostigma subquadrate, but slightly longer than broad, black. Abdomen black, segment 2 with a broad shield-like spot on dorsum of pale blue, extending from base and tapering from the middle of segment to a point which does not quite reach the apical border; segment 3 with a blue stripe extending and tapering from the base for about one third the length of segment, segment 4 with a similar but very much shorter basal spot, segment 5 with two minute basal points of blue.

A single defective male from Kamitungulu, 1.700 m, 4-7.III.1947 (n° 5 a). Type in the « Institut des Parcs Nationaux du Congo Belge ».

Family **LESTIDÆ**.

Genus **LESTES** LEACH.

The genus is represented by two species in the present collection, one of which is widely distributed and common, the other decidedly rare in collections, as a rule, and occurring as two different forms which I believe to be two different species. The form present in this collection is the true *uncifer* of KARSCH; the other form described by PINHEY (1951, Transvaal Mus. Mem., 5 : 48, pl. 4 b, fig. 63, 64) as *uncifer* I name *pinheyi* n. sp. The differences are given below.

1. — **Lestes virgatus** (BURMEISTER).

There are 22 males and 26 females of this common species from the river Mubale, 1.480 m, 1-20.V.1947; 1 male from the river Lusinga, 1.760 m, 22.IV.1949; 1 male, Buye-Bala, left bank of the Muye, 1.750 m and 1 female from Kamitungulu, 1.700 m, 7.IV.1947.

The specimens represent various age states but are all easily identifiable by their large size and the large bicolourous pterostigma.

2. — **Lestes uncifer** KARSCH.

(Fig. 1-4.)

Lestes uncifer KARSCH, 1899, Ent. Nachr., 25 : 381. — MARTIN, 1910, Ann. Soc. ent. France, 79 : 84, 90. — RIS, 1921, Ann. S. Afric. Mus., 18 : 269, 278, fig. 14.

Lestes uncifer PINHEY nec KARSCH, 1951, loc. cit., 48.

There are 5 males and 6 females in the collection all belonging to the typical form described by KARSCH and RIS. The form described by PINHEY is evidently new and differs from *uncifer* KARSCH by both the markings and the shape of the anal appendages. The differences are as follows :

L. uncifer KARSCH.

Posterior lobe of prothorax broadly arched, convex.
 Thorax with 2 middorsal parallel metallic bands deeply notched on the outer side.
 Apex of superior anal appendage tapering to a point, very hairy. Mid plate with one large spine.
 Inferior anal appendage with a robust upturned spine.

L. pinheyi n. sp.

Posterior lobe of prothorax emarginate, subbilobate.
 Thorax with 3 pairs of black spots or the whole of middorsum blackish.
 Apex of superior anal appendage obtuse, not very hairy. Mid plate with a spine and a projecting angle below it.
 Inferior anal appendage without any upturned spine; shaped as a simple obtuse cone.

All specimens from the river Mubale, 1.480 m, 20.V.1947 (324 a).

Family **CHLOROCYPHIDÆ** FRASER.

There are six species belonging to two genera of these beautiful riverine dragonflies; one of the species is new and I have much pleasure in naming it after M. G. F. DE WITTE.

Genus **CHLOROCYPHA** FRASER.1. — **Chlorocypha wittei** n. sp.

(Fig. 5 a to c.)

Male. — Abdomen with segments 4 to 10 missing. Hindwing 25 mm.

Head : labium blackish, labrum bright chrome yellow broadly bordered and traversed at its middle with black; epistome glossy black anteriorly, bright yellow above, frons with two large anterior quadrate spots and two small linear ones posterior to them yellow; small triangular postocular spots with a transverse stripe nearly joining them which traverses the

occiput; lastly oblique linear spots on each side of the ocelli. Thorax black, the dorsum with the median carina yellow throughout and with the conventional fish-hook shaped spot on each side. The sides yellow marked with a short posthumeral black stripe and another on the posterolateral suture which bifurcates deeply below. Legs entirely black, tibiae undilated.

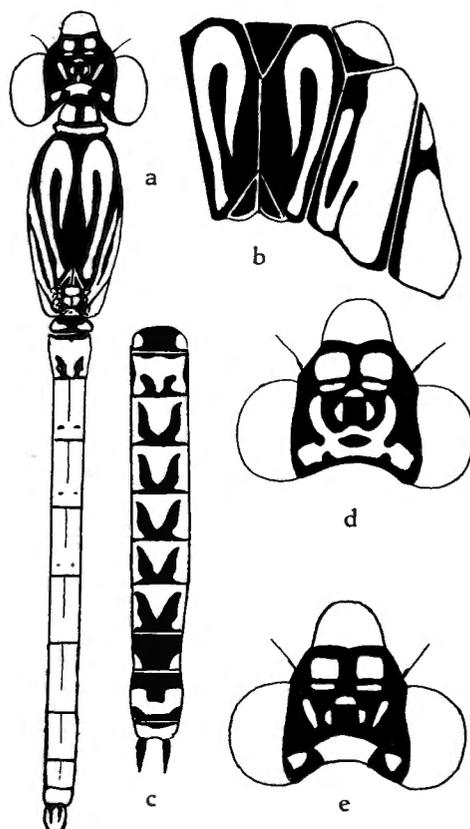


FIG. 5. — *Chlorocypha wittei* n. sp.

a. Male, dorsal aspect; b. Thoracic markings of male (diagrammatic); c. Abdomen of female, dorsal aspect; d. Head of female to show confluent yellow markings; e. Head of male to show restricted markings.

Wings hyaline tinted palely with greenish yellow; pterostigma black, 11 antenodals, discoidal cells traversed once in forewings, twice in the hind; petiolation almost to level of 1st antenodal. Abdomen bright red, the base of segment 1 broadly and its apical border narrowly black, seg-

ment 2 with base narrowly black and with two divergent oval black spots which are confluent apically and extend basally for about half the length of segment, laterally a broad black stripe on the ventral border of segment; segment 3 with two subapical dorsal transverse black spots which almost meet across the midline (the rest missing).

Female. — Abdomen 18 mm. Hindwing 26 mm.

Head somewhat similar to the male but the yellow markings more extensive, the oblique latero-ocellar stripes confluent with the occipital stripe and the latter confluent with the very large postoculars; labium broadly yellow. Dorsal hook-shaped markings broader and crowding out the black, the sides of thorax almost unmarked. Legs striped with yellow. Abdomen bright greenish yellow with black markings, which are similar to those of the male on segments 1 and 2; segments 3 to 6 with broad forked black markings on dorsum, confluent at the apical border but the prongs of the forks falling short of the base of segments; segment 7 with the forks of the marking approximated to enclose a basal and dorsal T-shaped yellow spot; segment 8 with only small subdorsal apical spots, whilst 9 has a broad U-shaped yellow apical marking; segment 10 with its apical border broadly yellow; anal appendages black.

Two males and 3 females from the river Mubale, 1.480-1.780 m, 1-20.V.1947. This species is very like *victoriae* FORSTER and may be a local variety of the same; it differs by the yellow labrum, occipital stripe in the male. The female differs by the less restricted black on thorax and terminal markings of abdomen.

2. — *Chlorocypha straeleni* FRASER.

Three males of this fine species from the gorges de la Pelenge and Ganza, 28.V.1947 and 20-25.VI.1949 respectively. They were taken in company with the next species.

3. — *Chlorocypha rubida* (SELYS).

Eight males and a female from the same locality as the last. The two species are closely related but *rubida* is a much darker insect and is easily recognized by the antehumeral and humeral stripes separated by black thus breaking up the fish-hook dorsal marking so common in the genus; gorges de la Pelenge, 1.250-1.600 m, 22.V-12.VI.1947.

4. — **Chlorocypha victoriae** (FORSTER).

Two males and four females, all rather teneral appear to belong to this species but may be the new form described above as they come from the same locality : riv. Mubale, 1.480 m, 1-20.V.1947; Lusinga, 1.760 m, 15.III.1947. The ground colour is not yet fully developed and the markings are restricted.

5. — **Chlorocypha dispar** (BEAUVOIS).

One defective male from Lusinga, Kamitungulu, 26.VII.1945. The specimen has lost some of the end segments of the abdomen but the markings of the base of the abdomen are typical of this species.

Genus **PLATYCYPHA.**

Platygypha caligata (SELYS).

This ubiquitous but beautiful species is present in small numbers. 2 males from Kanonga, 695 m, 13-27.IX.1947; 1 male from Ganza, 20-25.VI.1949 and 1 female from Kaswabilenga, route Lusinga-Mabwe, 23.IX.1947.

Family **AGRIIDÆ.**

Genus **PHAON** SELYS.

Phaon iridipennis (BURMEISTER).

This species is the only wide spread AGRION found on the continent of Africa, its distribution running from N.W. Africa to the east and as far southwards as Madagascar. It appears to be in course of losing the pterostigma as many specimens are found to be without that organ; thus of 7 specimens from Kanonga, 13-27.IX.1947, 5 have a well developed pterostigma, whilst one of each sex lacks the organ; in another series of 49 specimens from the same locality, the whole of the females but only one male lacked the organ; one male had a very tiny remnant left. A third series from Kamusanga, affluence of the Lufira, on the face of Mt Sombwe, 700 m, 12.VII.1949, out of 6 males and 3 females, only one male was without a pterostigma. A male from Kambi (affluence of the Grande-Kafwe), 27.VI.1949 and another male from Difirinji, affluence of the Lufira, 750 m, 25.VI.1949 were both lacking this organ. Nothing has been written about its habits but as *iridipennis* bears a close resemblance to species of *vestalis*, which occur in very large colonies, I suspect from the numbers taken at Kanonga, that it has the same habits.

Genus **UMMA** KIRBY.

This genus is the most dominant of the *Agriidæ* in Africa and has developed a number of species, three of which are to be found in the present collection.

1. — **Umma cincta** (SELYS).

Two males only from Lusinga (Kamitungulu), 13-26.VI.1945. This species, which is the type of the genus, is common in W. Africa but appears to have been replaced in the Congo by *electa* LONGFIELD.

2. — **Umma electa** LONGFIELD.

About two dozen males and a score of females from Mubale, 1,480 m, 1-20.V.1947 and the gorges de la Pelenge, 1,150 m, 28.V.1947, the great majority from the former locality. Three males and a female from Kaziba, 1,140 m, 19.II.1948; 1 male, Kankunda, 1,300 m, 28.XI.1947 and 2 males and a female from riv. Lusinga, 1,760 m, 28.VI.1947. The brilliant blue metallic pterostigma is a feature of this species but for a sound determination, it is necessary to examine the genitalia.

3. — **Umma longistigma** (SELYS).

Three pairs from the Lusinga river, 10.VI to 20.VII.1945. It is probable that these various species are indistinguishable on the wing so that the rarer forms may be easily overlooked.

Suborder ANISOPTERA.

Family **ÆSHNIDÆ**.Genus **ÆSHNA** FABRICIUS.

Very few species belonging to the genus *Æshna* are to be found in Africa probably because it is essentially a palæarctic one and because there are comparatively few mountainous areas of sufficient altitude to give the low temperatures which they require. Two species have been found in the collection, one of which I have been unable to match with any known species and therefore describe it here as new. The other is the common *A. rileyi* CALVERT which is represented by two females from Kalumengongo on the Lualaba, 1,780-1,830 m, 8.IV.1947 and Kankunda, forking of Lupiala and Lufira, 1,300 m, 13-27.XI.1947, both localities of fair altitude.

***Æshna wittei* n. sp.**

Male. — Abdomen 56 mm. Hindwing 50 mm.

Face including labrum dull olivaceous green; frons dark blackish brown marked with a black conical spot at the base which is enclosed in a horseshoe shaped yellow frame. Labium and all legs ferruginous; thorax and abdomen discoloured but segments 3 to 8 have a pair of greenish yellow crescentic apical spots. Anal appendages black, the superiors fractured off, the inferior narrowly triangular, 2,75 mm in length, reddish brown. Wings hyaline, membrane white; pterostigma short, covering 3 to 4 cells, yellowish, braced; anal triangle with only 2 cells, divided by a short transverse vein near its apex; anal-loop 10-celled, 2 to 3 hypertrigonal cross-veins, 6 to 7 *Cuqs* in forewings, 4 to 5 in the hind, discoidal triangles 5-celled in forewings, 4 in the hind, only 2 rows of cells between the forks of *IRiii* and a maximum of 4 rows of cells between it and *Rspl*. Tornus not produced, base of hindwing only slightly concave. Costa yellow.

Female. — Abdomen 55 mm. Hindwing 52 mm.

(In poor condition with the head crushed and the abdomen broken at base). Head similar to the male and with the same pupil-like spot at the base of frons. Thorax blackish brown with two oblique bright yellow stripes on each side which are bordered anteriorly and posteriorly with black. Abdomen blackish brown, segment 2 with a narrow jugal stripe of yellow, segments 3 to 7 with large quadrate basal spots, bluish at base but changing to yellow on the jugum, the carina and jugal suture finely black over the area of the spots. Wings hyaline, venation differing from the male in having 3 to 4 rows of cells between the forks of *IRiii* and by a smaller anal-loop of 8 to 9 cells; membrane white with pale brown border, costa bright yellow, pterostigma yellow. (Segments 8 to 10 missing).

The male from Kaziba, 1.140 m, 19.II.1948; female from Kalumengongo, 1.800 m, 8.IV.1947. The female is assumed to be the correct one for this species on account of its similarity and great size. The species differs from *A. rileyi* CALVERT by its larger size and by the narrow forking of *IRiii*, and from *A. scotias* PINHEY, which is of nearly the same dimensions, by the frontal marking, pupil-shaped instead of a thick black T as in *scotias*. Type and allotype in the « Institut des Parcs Nationaux du Congo Belge ». It is unfortunate that the anal appendages of both sexes are missing.

Genus ANAX LEACH.**1. — *Anax speratus* HAGEN.**

Two males from Lusinga belong to this fine species and were collected on 15.VI and 30.VI.1945. The species has a wide distribution throughout tropical Africa and is easily recognized by its bright ferruginous colouring and reddish venation.

2. — *Anax tristis* HAGEN.

A single female of this enormous species from Mabwe, 585 m, 17.XII.1948. Prior to the recent discovery of *A. congoliath*, it was the largest african dragonfly; the two species may be determined by the different shape of the anal appendages and by the longer abdomen of *tristis*. The blackish basal triangular marking of the hindwings will determine it from all others. It has a somewhat wider distribution than *speratus*, as it occurs in Madagascar as well as the whole of tropical Africa. PINHEY gives Mauritius but I think this must be an error as I know of no record of the insect from that island and it has never been included in the large collections which I have received from M. J. VINSON.

Genus *HELIÆSCHNA*.1. — *Heliaeschna trinervulata* FRASER (MSS).

Male. — Abdomen 44 mm. Appendages 5 mm. Hindwing 37 mm.

Head : frons rather narrow, slightly raised and coming to a distinct point at the middle of crest (very similar to that of *C. acutifrons* MARTIN), face and frons olivaceous green, labium ochreous, occiput very small, yellow. Thorax uniform olivaceous green, legs ferruginous including the spines. Wings hyaline, very palely enfumed; pterostigma dark brown between thick black veins, small, covering 2 cells, braced but divorced from same for an appreciable distance proximally; membrane pure white, small. 18 antenodals and 10 to 11 postnodals in forewings, 12 to 13 antenodals in hindwings, 12 postnodals. All median spaces traversed by 3 veins (which give the insect its name), 3 to 4 cells in discoidal triangle of forewings, 4 to 5 in the hind, 6 to 7 *Cuqs* in all wings, 2 rows of cells between forks of *IRiii* and 4 rows between it and *Rspl*, anal triangle 3 celled, anal-loop long and narrow, 7-celled, 3 cross veins in all hypertrigones. Abdomen reddish brown, only the sutures finely black; segment 1 pale ochreous on middorsum flanked by a large triangular black spot on each side. Anal appendages : superiors long and slim, outer side straight, inner curving strongly inwards at junction of basal and medial thirds, the apex bevelled strongly outwards and ending in a sharp point, a strong carina runs the whole length of appendages nearer to the inner side than the outer; inferior appendages paler and yellowish, half the length of the superiors, triangular, the apex turned slightly upwards.

This species is described from a male which has been for long undescribed in my own collection as I was doubtful of its distinctness; it was taken at Entebbe, Uganda by the late G. HALE CARPENTER. A second male from Mubale, 1.480 m, 1-20.V.1947 (n° 324 a) is entirely similar to the type and

so confirms it to be a good species. *H. trinervulata* is the smallest species so far described for the genus; it is distinguished by the cone-shaped, immaculate frons and by the small number of cross veins in the median space.

2. — **Heliaschna** sp.

A single female from Kalumengongo, 1.800 m, 8.IV.1947 is probably the female of the above described new species but it is even smaller and there are some slight venational differences. The colouring is similar to *trinervulata* and the shape of the frons identical, and it is quite unmarked.

Abdomen with segments 6-10 missing, probably about 40 mm. Hind-wing 32 mm, apices markedly rounded. All wings tinted with amber yellow at bases to level of arculus and along the antenodal complex; pterostigma very small, bright ochreous, braced or not or the organ divorced from its brace which lies somewhat proximal. Venational differences, — 4 cross-veins in the median space of forewings, anal-loop of only 5 cells.

The specimen agrees with *trinervulata* by its nodal index, pterostigma of small size and either braceless or divorced from same, the conical unmarked frons, and the majority of the venational details. It would be safe to regard this as the allotype until proved otherwise.

Genus **GYNACANTHA** RAMBUR.

Gynacantha manderica GRUNBERG.

A single male of this common species from Mubale, 1.480 m, 1-20.V.1947 (n° 324a). Distributed throughout tropical Africa and to as far south as S. Rhodesia.

Family **GOMPHIDÆ**.

Genus **CRENIGOMPHUS** SELYS.

Crenigomphus renei FRASER.

One male from Mubale, 1.480 m, 1-20.V.1947. Not a common species and probably known from less than a dozen specimens. The present specimen is xerophilous in colouration as is usual in these insects but PINHEY states that species of the genus, such as *hartmanni* are greenish during life.

Genus **MICROGOMPHUS** SELYS.

This genus formerly believed to be purely oriental, is now well established as an ethiopian one. The present collection contains a single very teneral female which it is impossible to identify with certainty. It does however differ from any african species so far described and lies nearest to *Microgomphus* sp. LONGFIELD from Portugese East Africa by its genitalia.

Abdomen 24 mm. Hindwing 24 mm. Head crushed.

Thorax similar to that of *schoutedeni* and *camerunensis*, with mesothoracic collar, isolated fusiform antehumeral stripes and two broad yellow stripes on each side. Wings uncoloured, 13 antenodals in forewing, 10 in the hind, 10 to 11 postnodals in forewings, 11 in the hind, 3 cubital veins in forewings, 2 in the hind; pterostigma large, unbraced, covering from $4\frac{1}{2}$ to $6\frac{1}{2}$ cells, yellow. Occiput shaped like an inverted cupid's bow at its posterior border and this margined with a number of minute black spines. Vulvar scale shaped as for the female sp., from East Portugese Africa but longer, nearly half the length of segment 8.

This female most closely resembles *schoutedeni* FRASER but the occiput is minutely emarginate at its centre and fringed with short black spines as in *camarunensis* LONGFIELD and the female sp., LONGFIELD from East Africa. The terebra is similar to that of *schoutedeni* and rather longer than that of the East African female. The abdominal markings are broader than in any but these would almost certainly be much more restricted in an adult example. My long experience of oriental species of this genus has shown them to be very shy and wary insects, taking flight to trees at the slightest hint of danger; thus a collector ignorant of their habits would scare them away long before he noticed them. There are probably several african species of which at least two are now known.

Genus **ONYCHOGOMPHUS** SELYS.

I place here a single female belonging to an unknown species because of its distinct although primitive anal-loop. The black costa debars it from *Crenigomphus* in which it might otherwise be placed. As it has distinctive characters, I have named it *7-flavum* from the shape of the dorsal thoracic markings.

Onychogomphus 7-flavum n. sp.

(Fig. 6 b and c.)

Female. — Abdomen 35 mm. Hindwing 31 mm. Pterostigma 4 mm.

Head : labium bright ochreous, labrum brownish, anteclypeus dull olivaceous, postclypeus and lower border of front of frons a dark warm

brown, the frons above bright citron yellow with broad dark brown base. Occiput and vertex dark reddish brown, the former fringed with long hairs and with a stout horn behind on each side (as in *O. supinus* SELYS). Prothorax a warm brown bordered with yellow anteriorly; thorax dark reddish brown on dorsum to a short distance posterior to the humeral suture, marked with citron yellow, — a complete mesothoracic collar confluent at its outer ends with thick oblique antehumeral stripes to form inverted figures of 7. Laterally olivaceous brown with a broad band on the mesepimeron and a spot over the spiracle citron yellow. Legs ferruginous, anterior femora broadly yellow, tibiae and tarsi black. Wings hyaline with the bases palely tinted with yellow; membrane white, costa black; ptero-

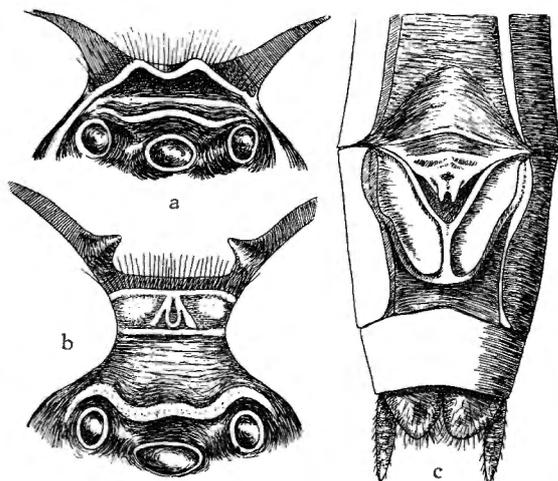


FIG. 6. — a. Occiput and vertex of *Notogomphus lujai* SCHOUTEDEN, female; b. The same of *Onychogomphus 7-flavum* n. sp., female; c. The terminal segments of abdomen of same species, female, ventral aspect, to show genitalia.

stigma dark ochreous between thick black nervures, braced or not, covering 4 to 4 ½ cells; 13 to 14 antenodals and 9 postnodals in the forewings, 9 antenodals and 10 to 11 postnodals in the hind; no incomplete basal antenodals; anal-loop of 2 to 3 cells. Abdomen black on dorsum, ferruginous ventrally marked with yellow; segments 2 and 3 with a middorsal stripe which expands apically on the former as an apical ring, and basally on the latter to form a broad basal annule, and then again at the jugal suture as a small oval spot, segments 4 to 6 with narrow basal annules which are confluent laterally with the pale ventral colouring, segment 4 has also an elongated oval dorsal spot, segment 5 with a smaller similar

and 6 with a mere point, segment 7 has the basal half yellow, remaining segments ferruginous. Anal appendages shortly conical, ferruginous. Terebra short, triangular, with a minute medial notch.

Two females, one in poor condition, from Mubale, 1-21.V.1947. This species stands nearest to *O. supinus* SELYS, from which it differs by the head unmarked with black, the antehumeral stripes confluent with the mesothoracic collar; the genitalia of the two are closely similar. Type in the « Institut des Parcs Nationaux du Congo Belge ».

Genus **NOTOGOMPHUS** SELYS.

Under this genus I include *Podogomphus* KARSCH as the latter has now come to be regarded as a synonym. There are two species represented.

1. — **Notogomphus lujai** SCHOUTEDEN.

(Fig. 6 a.)

A female from Mubale on the same date as the last species. The occiput in this sex is markedly raised, emarginate at its middle, concave anteriorly and with a deep narrow sulcus separating it from the vertex. The lateral ocelli lie in deep pits with short raised bases running obliquely towards the medial ocellus. The occiput is evenly globular posteriorly and its free border is fringed with long coarse hairs (fig. 6 a).

2. — **Notogomphus pratorius** (KARSCH).

A male from Mubale, 1-20.V.1947 and a female from Lusinga, 1.760 m, 11.IV.1947. Both are quite typical specimens.

Genus **PARAGOMPHUS** COWLEY.

The only representative of this prolific genus is the common *Paragomphus hageni* (SELYS) of which there is a single female from Kamitungulu, 1.700 m, 16.IV.1947 (264 b).

Genus **CERATOGOMPHUS** SELYS.

The genus is a monotypic one and is represented in the present collection by a single typical female of *C. pictus* SELYS from Lusinga, 1.760 m, 12.IV.1947. The specimen is not quite fully adult. I have seen very few specimens of this rare insect, which is of great interest on account of the extraordinary anal appendages of the male. RIS reports it from South

Africa mentioning 2 males and 7 females, a reversal and remarkable disproportion of the two sexes. PINHEY states that it is probably the commonest Gomphid in Mashonaland-Salisbury and neighbouring districts. The species has not been recorded from the Belgian Congo before and its distribution so far northwards was unsuspected.

It should be noted that HAGEN's figure of the male abdomen (plate 4, fig. 3, Mon. Gomph., 1855) shows the prolongation of the dorsal crest of segment 10 erect; this is because he has shown the segment strongly flexed. Normally the segment is in line with the rest of the abdomen and the spine, resulting from the prolongation of the crest, is housed snugly in a deep groove on the dorsum of segment 9, in which position, the spine is apt to be overlooked.

Genus **PHYLLOGOMPHUS** SELYS.

A female of *P. selysi* SCHOUTEDEN from Kilwezi, 16-21.VIII.1948. The specimen is teneral and in poor condition; the species is found only in the Belgian Congo.

Family **CORDULIIDÆ**.

Subfamily **MACROMIINÆ**.

Genus **MACROMIA** RAMBUR.

The genus *Macromia* has probably the most curious distribution of all the *Odonata*; it is abundantly represented in tropical Africa and Asia; there is a small section distributed throughout the United States of America and there are single species isolated in S.W. Europe, Ceylon, Australia, Formosa, Madagascar and Japan; on the other hand it is unknown in South America. There is only a single species in the Upemba collection although the genus is well represented throughout the Belgian Congo. This sole species is new and as I have already described it in a short monograph of the ethiopian species in the Rev. Zool. Bot. Africaine, I give here only a brief outline of its characters sufficient to recognize the species.

Macromia unifasciata FRASER.

Male. — Abdomen 54 mm. Hindwing 40 mm.

General colour ferruginous with restricted yellow markings. Frons with a greenish yellow area on its superior surface; thorax ferruginous, thinly coppery metallic, the sole marking being a broad oblique yellow stripe on each side; wings without dark basal markings in both sexes;

pterostigma black; discoidal field with 2 rows of cells proximally; superior anal appendages black, with a robust external basal spine; terebra of female small and inconspicuous.

Female. — Abdomen 50 mm. Hindwing 44 mm. Segment 3 with only small basal spots and jugal lunates.

Habitat : 1 male and 2 females from Mubale, 1-20.V.1947; 1 male, gorges de la Pelenge, 1.150 m, 28.V.1947. This species is one of three which have a spine to the superior anal appendages, but *M. schoutedeni* FRASER has the spine at the middle of the inner side of the appendages and *M. seydeli* FRASER is a dark blue metallic species with the frons entirely blue metallic, whilst its female has well-marked blackish brown vittæ at the bases of all wings.

Family LIBELLULIDÆ.

Genus UROTHEMIS BRAUER.

I place this genus first because it is now manifest that the group *Macrodiplax-Ethriamanta-Selysiothermis* to which it belongs is very closely related to the *Corduliidæ*. Thus the group becomes the most archaic of the *Libellulidæ* instead of the most recent as Dr RIS' classification gave it. It is represented in the present collection by two species of *Urothemis*.

1. — *Urothemis assignata* SELYS.

Three females from Mabwe, 585 m, 28.IX-1.XII.1948. Variation is restricted to the basal marking of the hindwings; in one the dark marking covers 4 cells at the membrane and then after an interval, to 10 cells and the greater part of the cubital space; in a second female 6-8 cells are covered at the membrane, then 7 cells in the anal field and the whole of the cubital space; in the third, 4-5 cells at the membrane, only to 5 cells in the anal field, the whole of the cubital space and, in the subcostal space, to as far as the arculus.

2. — *Urothemis edwardsi* SELYS.

One female and 11 males from the some locality and same dates as the last. There is remarkable variation in the basal marking of the hindwings. In three specimens it extends only up to the *cug* and just meets the anal-loop; in other extremes, it extends to halfway between the *cug* and discoidal triangle or to as far as the latter; in these the outer border of the marking is serrate, in the others evenly rounded except for the prolongation to the *cug*. In a remarkable female which I have seen from the West Coast of Africa, the marking covers half the anal-loop and discoidal triangle and extends to halfway between the 1st and 2nd antenodals and there is also an appreciable basal marking to the forewings at the tornal angle.

Genus **OXYTHEMIS** RIS.

There is a single female with segments 4 to 10 missing, which by its venation, evidently belongs to this genus but it is not possible to place its species. It is an uniform ochreous with narrow complete but diffuse blackish brown antehumeral thoracic stripes; sutures on segments 1 to 3 are finely mapped out in black. The wings are hyaline with slight tinting of yellow only at the extreme bases of wings; pterostigma yellow between moderately thick black veins; membrane grey. Nodal index : 12 antenodals and 9 to 10 postnodals to forewing and 9 to 10 antenodals and postnodals in the hind; discoidal field begins with a row of 3 cells and is then continued as 2 rows; the anal-loop has split cells at base and outer angle; 3 rows of cells between anal-loop and base of wing; I row of cells between *IRiii* and *Rspl*; discoidal triangle of forewing traversed once, that of the hind free; no accessory archaic veins. Hindwing 28 mm in length. The specimen is from Lusinga, 3.VII.1947. Although the venation agrees closely with *phaenicosceles* RIS, the type species of the genus, its size is greater and the colouring of the body very different, the legs also not coloured bright red, so that I do not think it can be the unknown female of *phaenicosceles*. The specimen differs more widely in its venation from *carpenteri* FRASER, but agrees closely in the body colouring.

Genus **HADROTHEMIS** KARSCH.

This genus is represented by two species and four specimens only which fact seems to indicate that the genus is very local in the Belgian Congo as I have received many hundreds of specimens belonging to six species from other parts of the neighbouring areas.

1. — **Hadrothemis camarensis** (KIRBY).

A single male from Ganza, 860 m, 20-25.VI.1949. The specimen is quite typical.

2.— **Hadrothemis defecta** KARSCH.

Two males and a female from Kilwezi, 2-21.VIII.1948. Next to *versuta* KARSCH, this species is the one most often met with in the Belgian Congo. Examination of many scores of specimens has shown that these two species are distinct and that the entire discoidal cell of the hindwing of *defecta* is not just an aberrational difference in the venation. *defecta* is smaller and the colouring of the wings always more restricted.

Genus **ORTHETRUM** NEWMAN.

This is the dominant african genus of the *Odonata* and is represented in the present collection by no less than 7 species most of which are quite common and widely distributed in tropical Africa.

1. — **Orthetrum abbotti** CALVERT.

A widely distributed species in tropical Africa although not as common as most; represented by 8 males and 3 females from Lusinga, 1.760 m, 3.VII.1947; 2 males, Kilwezi, 16-27.VIII.1948; 8 males and 3 females from the gorges de la Pelenge, 22.V-21.VI.1947. Only two of the males are fully pruinosed bluish, the rest are subadult with but traces of pruinosity.

2. — **Orthetrum brachiale** (PALISOT DE BEAUVOIS).

This species is found throughout the greater part of Africa and Madagascar, extending as far east as Mauritius. There are 8 males and 4 females from a number of localities : Kagomwe, affluence of Lusinga, 1.700 m, 12.VI.1945; Kanonga, 14-23.II.1949; gorges de la Pelenge, 22.V-21.VI.1947; riv. Mubale, 1-20.V.1947; route Lupiala, 900-1.200 m, 23.X.1947; Kaswabilenga, riv. Lufira, 700 m, 18-23.IX.1947; Kamitungulu, 1.760 m, 16.IV.1947 and Kankunda, 1.300 m, 14-28.XI.1947.

3. — **Orthetrum caffrum** (BURMEISTER).

One of the commonest african dragonflies and represented by some 20 males and a similar number of females, all from the same localities as the last. Many specimens, especially from Mubale are very teneral and were probably taken emerging. The nymph, which is unknown, might have been found without much difficulty under such favourable circumstances.

4. — **Orthetrum chryso stigma chryso stigma** (BURMEISTER).

Some 24 males and 9 females from the same localities as *O. brachiale* but in addition, from Difirinji, left bank of Lufira, 700 m, 27.VI.1949 and Kalumengongo, 8.IV.1947 and 2.VIII.1948. The species has the same distribution as *caffrum*.

5. — **Orthetrum guineense** RIS.

This species formerly regarded as a subspecies of *chryso stigma* appears to be more common than the latter in tropical Africa, especially in the Belgian Congo; it forms the bulk of the *Orthetrum* in the collection from

Upemba and there are over 100 males and some 50 females the majority of which are from the gorges de la Pelenge, 22.V-21.VI.1947. Other localities are similar to those given for *brachiale*, with the addition of Munoi on the bifurcation of the riv. Lupiala; Ganza, 860 m, 20-25.VI.1949; Kaswabilenga, riv. Lufira, 700 m, 18-23.IX.1947. The males are not difficult to distinguish from *chryso stigma* by the character of their genitalia but the same can not be said of the females.

6. — *Orthetrum microstigma* Rts.

I place here a single male from [Kenia, junction of the Lusinga and Lufwa, 28.III.1947] and a male from Kilwezi, 16-21.VIII.1948, chiefly on account of the markedly small size of their pterostigma. The latter specimen is damaged and the determination a little doubtful.

7. — *Orthetrum stemmale capense* CALVERT.

This ubiquitous species rivals *caffrum* in its incidence and wide distribution; it has also given rise to a number of subspecies some of which are insular in distribution. There are 51 males and 16 females mostly from the gorges de la Pelenge on the dates given above; other localities are Kilolomatambo, junction of Lusinga and Lufwa and other localities on the Lusinga River. It appears to be on the wing the whole year round, and is distributed throughout tropical Africa.

Genus *PALPOPLEURA* RAMBUR.

All three african species are represented in the present collection, *lucia* with its andromorphic and heteromorphic males being by far the most common species.

1. — *Palpopleura lucia* (DRURY).

There are 34 females from the riv. Mubale, 1-20.V.1947; 20 from the gorges de la Pelenge, 1.150 m, 22.V-21.VI.1947 and 4 from Kaziba, 19.II.1948; 34 heteromorphs and 1 andromorph males from the riv. Mubale; 17 andromorphs from the gorges de la Pelenge and 12 heteromorphs. Other localities are : Kaswabilenga, riv. Lufira, 700 m, 18-23.IX.1947; Kabwe-sur-Muye, 1.140 m, 19.II.1948 and Kanonga, 695 m, 13-27.IX.1947, a total of 72 females and 80 males. One male from Kabwe is remarkably small, with abdomen of 16 mm and hindwing 19 mm (head missing).

2. — *Palpopleura jucunda* RAMBUR.

Three males and 2 females from the riv. Mubale, 1-20.V.1947 and 2 males and a female from the gorges de la Pelenge, 22.V-21.VI.1948. *jucunda* is not only smaller but probably has different habits to those of *lucia*. It is more nearly related to *P. sexmaculata* of the orient which latter keeps to grassy places and is quite difficult to see in such a habitat.

3. — *Palpopleura deceptor* (CALVERT).

Only a single specimen of this species which is much larger than the other two and closely resembles species of *Hemistigma*; a single male from Kamitungulu, 1.700 m, 16.IV.1947. CALVERT placed this species in a separate genus *Hemistigmoides* and I am inclined to think that he was justified in doing so, as the costa is only very slightly sinuous as compared to the other species of the genus.

Genus **HEMISTIGMA** KIRBY.

The genus is represented in continental Africa by only a single species : *albistyla* (RAMBUR) of which there are 17 males and 24 females nearly all from riv. Mubale, 1-20.V.1947. A female and 6 males are from Kanonga, 1.695 m, 13-27.IX.1947. It has a wide distribution throughout tropical Africa.

Genus **ELEUTHEMIS** RIS.

The genus is known only from a single species and this only from two males from West Africa. There is in the collection a single female which by its size, colour, markings and venation seems to agree closely with the Risian type male of *E. buttikoferi*.

Abdomen 21 mm. Hindwing 29 mm. Labrum ochreous, vesicle without the lateral metallic glaze. Posterior lobe of prothorax enlarged, projecting, bright ochreous fringed with yellow hairs. Thorax ochreous on dorsum enclosing in each antehumeral area a rhomboid of poorly blue metallic brown; the sides bright greenish yellow marked as in the male but the shoulder stripe strongly angulated posteriorly. Legs as in the male. Abdomen greenish yellow, the two broad black bands broken up into rhomboidal spots by basal and apical rings, the yellow middorsal carina and, in the case of segment 3, by a ring at the jugal suture; the rest as for the male. Anal appendages short, conical, black. Wings hyaline; only a trace of yellow at the bases; pterostigma ferruginous between very thick

black nervures. There are 9 $\frac{1}{2}$ antenodals in forewings but only 7 in the hind otherwise the venation as in the male.

Habitat : Kaswabilenga, Lufira, 28.IX.1947. I have a single female from the Bwamba Forest, Uganda, collected by G. HALE CARPENTER.

Genus **BRACHYTHEMIS** BRAUER.

Brachythemis leucosticta (BURMEISTER).

There are over 600 females and about 150 males in the collection of this extremely common dragonfly. Nearly the whole of these are from Mabwe, 585 m, 1.XII.1947-VIII.1948. Other localities are Kalumengongo, 8.IV.1947; Lusinga river, 23.VI.1945.

Genus **CROCOTHEMIS** BRAUER.

This genus is represented by 3 species, one of which, *erythræa* (BRULLÉ) is widely spread throughout continental Africa, Madagascar and the Mediterranean basin. The others are far less common and usually local.

1. — **Crocothemis erythræa** (BRULLÉ).

Lusinga river, 1.760 m, 1 male, 5 females, 3.VII.1947; 1 male, 30.VI.1947; 1 male 30.VII.1947 and 2 males, 18.III.1947. Mubale river, 1.480 m, 1-20.V.1947; Mabwe, 585 m, 18 males and 10 females, 1-12.VIII.1947; Kamitungulu, 1.700 m, 14.VII.1947, 1 female; gorges de la Pelenge, 1.150 m, 28.V.1947, 7 males and a female; Kilwezi, 760 m, 16-21.VIII.1948, 3 males and 1 male; Mitoto, affl. Lusinga, \pm 1.760 m, 9.VIII.1945.

2. — **Crocothemis sanguinolenta** (BURMEISTER).

Lusinga river, 5 males and a female, 3.VII.1947; 7 males and 2 females, 15-20.VI.1947, 3 males, 26.IV.1947; Kalumengongo, 1 female and 3 males, 3.VII.1947 and 8.IV.1947; Kambi (affl. Kafwe), 3 males, 25-27.VI.1945; gorges de la Pelenge, 25 males and a female, 28.V.1947; riv. Mubale, a male, 1-20.V.1947; [riv. Dipidi, 1.700 m, one pair, 22.IV.1947].

3. — **Crocothemis divisa** KARSCH.

Kaswabilenga : Lufira, 2 males, 25.IX.1947; Kambi (affl. Kafwe), a female, 25-27.VI.1945; Mabwe, 4 males, 6 females, 1-12.VIII.1948; Kanonga, 3 males and a female, 22.II.1949 and 14-23.II.1949; gorges de la Pelenge, 3 males and a female, 28.V.1947; Kilwezi, 17 males and 13 females, 16-21.VIII.1948; route Lupiala, 900-1.200 m, 1 defective male, 23.X.1947.

Genus **BRADINOPYGA** KIRBY.

An oriental and ethiopian genus represented in Africa by two species, one of which, *cornuta* RIS is represented by 2 males from Mongolo (affl. of Lufira), 350 m, 28.X.1948. The species is a comparatively rare one; the present examples have a golden brown basal marking to all wings extending to the 3rd antenodal, arculus, and to the end of the cubital space in the hindwings. The species is named from the curious horns projecting from the frons.

Genus **DIPLACODES** KIRBY.

The two species of this genus found in Africa are both represented in the collection, although *D. exilis* RIS, by only a single female from the Lusinga river, 20.VII.1945. Females of this species are difficult to distinguish from small specimens of the same sex of *D. lefebvrei* (RAMBUR). *D. exilis* is almost solely confined to Madagascar but I have examined undoubted specimens from the neighbouring continent. *D. lefebvrei* is much more widely distributed, extending from Iraq down the western coasts of India, Mauritius, Réunion, Madagascar and the whole of Africa. It is represented by specimens from Kilwezi, 750 m, 16-20.VIII.1948; 3 females from Mubale, 1-20.V.1947 and a male from the gorges de la Pelenge, 22.V-21.VI.1947.

Genus **ÆTHIOTHEMIS** RIS in MARTIN.

Very little material exists belonging to this genus and the characters of the three species differ so widely that it appears that more than a single genus is concerned. Of the 3 species known, *solitaria* was described from a single teneral male, to which later were added 3 other males and a single female. *A. palustris* MARTIN was described from a single male and the same applies to *A. bequaerti* RIS, the former from W. Africa, the latter from the Belgian Congo. There are 3 males and 5 females in the present collection which agree closely with the description of *solitaria* given by RIS (1916, Cat. Coll. SELYS, Libellulines, 1125), and are all from one locality, Kalumengongo, 8.IV.1947. Recently I have described two new species of *Æthiothemis* and a new genus and species closely related, the types of which are in the Musée Royal du Congo Belge, Tervueren (1954, Rev. Zool. Bot. Afr., L, 3-4 : 262-268).

Genus **ATOCONEURA** KARSCH.

RIS placed this genus immediately prior to *Trithemis* but I believe it to be considerably more archaic than this implies on account of the complete, erect distal antenodals in the forewings. It is represented by a large number of specimens of *biordinata* KARSCH in the collection.

Atoconeura biordinata KARSCH.

Atoconeura biordinata KARSCH, 1899, Ent. Nachr., **25** : 371.

Atoconeura leopardina FORSTER, 1906, Jahrb. Mannheim, **71-72** : 38.

Atoconeura biordinata FRASER, 1950, Proc. R. ent. Soc. Lond., (B), **19** : 56.

Atoconeura biordinata PINHEY, 1951, Mem. Transvaal Mus., **5** : 230.

Atoconeura biordinata and *eudoxia* (KIRBY) were confused as one species for many years. The error arose in the first place by KIRBY failing to note the bifid character of the inferior anal appendage of his type of *Accaphila* and later by HERBERT CAMPION informing RIS that this type species was identical to KARSCH's *biordinata*. In reply to a letter from Dr RIS, he wrote : « I have compared the two specimens from Ruwenzori which you have identified as belonging to this species (*biordinata*) with the type of *Accaphila eudoxia* KIRBY, also from Ruwenzori. I have come to the conclusion that these insects are conspecific and that consequently Mr KIRBY's genus and species must be sunk as synonyms ». It was on the findings of these three eminent specialists that I neglected to make another examination of KIRBY's type and so when a specimen came to me from Uganda with a remarkable bifid inferior appendix, I took it for granted that the species was new. Subsequent to the publication of my *extraordinata*, Miss LONGFIELD made a reexamination of the type of *eudoxia* and discovered that this extraordinary character had been entirely overlooked by both KIRBY and CAMPION. There are 55 males and 57 females of *biordinata* in the collection, all of which are from riv. Mubale, 1.480 m, 1-20.V.1947, so that it is evident that the species is locally common, although hitherto regarded as rare. The apex of the inferior anal appendage is variably emarginate but not bifid; the females have the apices of the wings tipped with yellowish brown from well proximal of the pterostigma.

Genus **TRITHEMIS** BRAUER.

This genus is essentially an african one although a number of species are found in the orient to as far as the Philippines. There are no less than 10 species belonging to the genus in the collection but I include in this number *Helothemis dorsalis* which I regard as a slightly aberrant species of *Trithemis*.

1. — **Trithemis (Helothemis) dorsalis** (RAMBUR).

This species agrees with *Trithemis* in its genitalia, colour and markings, the only point of difference being a complete distal antenodal in the forewings. A long series of specimens sent to me by Dr NEWTON from Zululand, showed that this vein was quite occasionally complete in one forewing and incomplete in the other, or incomplete in both. On the contrary, some specimens of *Trithemis* such as *risi* LONGFIELD, may have the antenodal complete. The collection contains 3 males and 19 females from Lusinga, 11-26.IV.1947; 1 male from Mubale, 1-20.V.1947 and 7 males and 3 females from Kamitungulu, 1.700 m, 16.IV.1947.

2. — **Trithemis risi** LONGFIELD.

Two males from Lusinga and 3 males from Mubale with the same data as for the last species; 5 males and 4 females from the gorges de la Pelenge, 28.V.1947; 1 male from [riv. Dipidi, 1.700 m, 22.IV.1947] and 1 male from Ganza, 860 m, 20-25.VI.1949. The species is widely distributed throughout tropical Africa.

3. — **Trithemis dichroa** KARSCH.

Only a single female of somewhat doubtful identification, from the gorges de la Pelenge, with same data as for last. I separate it from the female of *risi* by the character of its thoracic markings. The species is not at all uncommon in the Belgian Congo as I have seen numbers from Eala, Bunia and Katanga sent to me from the Congo Museum, Tervuren.

4. — **Trithemis donaldsoni** CALVERT.

Ten males and 9 females from Mubale, 1-20.V.1947 and 2 females from the gorges de la Pelenge, 28.V.1947. One female has the distal antenodal in right forewing complete as in *Trithemis (Helothemis) dorsalis* and it is irregularly incomplete in the left; quite occasionally specimens have spaces of 2 rows of cells in the discoidal field of forewings.

5. — **Trithemis basitineta** RIS.

One male from Mubale and 2 males from the gorges de la Pelenge with the same data as for the last. The basal marking is present only in the hindwings and is here very restricted. I distinguish them from *donaldsoni* which has the wings devoid of any marking, otherwise the two species are closely similar.

6. — *Trithemis stictica* KARSCH.

One pair from Lusinga, 7.IV.1947; 1 female, gorges de la Pelenge, 1 female from Mubale with same data as for last; 1 male, Kamitungulu, 16.IV.1947 and one from [Dipidi, 1.700 m, 22.IV.1947]. The species is easily distinguished by the bright yellow area in the basal area of the hindwings. It has a wide distribution in tropical Africa but does not appear to be at all common anywhere.

7. — *Trithemis arteriosa* (BURMEISTER).

This very common and very widely distributed african species is represented by a large number of both sexes from a number of localities but mainly from Mubale and Lusinga. From the former locality, 3 males and a female, 1-20.V.1947; from the latter 16 males and 3 females; Kanonga, 675 m, 1 male; Kilwezi, 750 m, 2 females, 16.VIII.1948; gorges de la Pelenge, 15 males and 8 females, 28.V.1947, 1 pair 3.VII.1947; riv. Lupiala, 700 m, 1 male, 21.IV.1949 and 1 male from Kamitungulu, 16.IV.1947.

8. — *Trithemis annulata* (PALISOT DE BEAUVOIS).

There is a single male of this widely distributed species from Lusinga river, 29.III.1947 and a single pair from Kalumengongo, 8.IV.1947. It is a more northern insect than the other african species of the genus.

9. — *Trithemis pluvialis* FORSTER.

This species closely resembles the last and is probably often mistaken for it on the wing when they would be indistinguishable. It is overwhelmingly more common than *annulata* in the Congo and I have received numbers from Zululand to the south. It is represented by 42 males and 26 females from Mubale, 1.480 m, 1-20.V.1947 and 43 males and 9 females from the gorges de la Pelenge, 1.150 m, 28.V.1947.

10. — *Trithemis kirbyi ardens* GERSTAECKER.

There is a single male of this brilliant red and orange species from Kaswabilenga, riv. Lusinga, 700 m, 18-23.IX.1947. It is more common in East Africa and prefers dry zones. Its habits, as described by PINHEY (1951, Transvaal Museum Mem., 5 : 263) are entirely similar to those of the subspecies *kirbyi kirbyi* SELYS which I have frequently captured in several localities in India. It settles on slab rock where its colour is very

conspicuous. It probably relies on its warning colours and on its extremely wary swift flight. Females are rarely taken as they hide up in the scrub. The wing marking varies in extent according to the season.

Genus **ZYGONYX** SELYS.

The only species in the collection belonging to this genus is *Z. natalensis* (MARTIN) of which there is a single male from Kaswabilenga : Lufira, 18-23.IX.1947. The genus is a dominant one in the Belgian Congo so that it is surprising that it is so poorly represented in the collection. The species is distributed throughout Central Africa, extending into South Africa, Natal, Rhodesia and Portuguese East Africa.

Genus **OLPOGASTRA** KARSCH.

The genus is represented by a single male of *O. lugubris* KARSCH from Kambi, affluence of the Kafwe, 25-27.VI.1945. PINHEY describes the habits of this fine dragonfly (1951, loc. cit., 277) and it is probably because of its habit of soaring far out of reach that specimens in collections are so rare. This species has a distribution throughout Central tropical Africa.

Genus **THOLYMIS** HAGEN.

The genus is circumtropical, represented in the Old World by *tillarga* (FABRICIUS) and in the New by *citrina* HAGEN. There is a single male and 2 females in the collection from riv. Mubale, 1-20.V.1947. The species is crepuscular and often comes to light. It is given to migrating and is often seen accompanying species of *Tramea* and *Pantala* when these are flying in September.

Genus **PANTALA** HAGEN.

Represented by 2 males of *flavescens* (FABRICIUS) from Lusinga, 10-15.III.1947; 3 females, Kanonga, 23.II.1949; 1 female, Mukana, marshes near Lusinga, 14.IV.1947 and a female from Kaswabilenga, Lufira, 25.IX.1947. The species is the most cosmopolitan species of the Order and is distributed round the entire equator.

INDEX ARRANGED ALPHABETICALLY.

GENERA.

	Pages.		Pages.
<i>Aeshna</i> FABRICIUS	14	<i>Lestes</i> LEACH	9
<i>Æthisthemis</i> RIS in MARTIN	28	<i>Macromia</i> RAMBUR	21
<i>Agriocnemis</i> SELYS	5	<i>Microgomphus</i> SELYS	18
<i>Anax</i> LEACH	15	<i>Notogomphus</i> SELYS	20
<i>Atoconeura</i> KARSCH	29	<i>Olpogastra</i> KARSCH	32
<i>Brachythemis</i> BRAUER	27	<i>Onychogomphus</i> SELYS	18
<i>Bradynopyga</i> KIRBY	28	<i>Orthetrum</i> NEWMAN	24
<i>Ceratogomphus</i> SELYS	20	<i>Oxythemis</i> RIS	23
<i>Ceriagrion</i> SELYS	6	<i>Palpopleura</i> RAMBUR	25
<i>Chlorocnemis</i> SELYS	7	<i>Pantala</i> HAGEN	32
<i>Chlorocypha</i> FRASER	10	<i>Paragomphus</i> COWLEY	20
<i>Crenigomphus</i> SELYS	17	<i>Phaon</i> SELYS	13
<i>Crocothemis</i> BRAUER	27	<i>Phyllogomphus</i> SELYS	21
<i>Diplacodes</i> KIRBY	28	<i>Platycypha</i>	13
<i>Elatoneura</i> COWLEY	7	<i>Pseudagrion</i> SELYS	5
<i>Eleuthemis</i> RIS	26	<i>Tholymis</i> HAGEN	32
<i>Enallagma</i> CHARPENTIER	6	<i>Trithemis</i> BRAUER	29
<i>Gynacantha</i> RAMBUR	17	<i>Umma</i> KIRBY	14
<i>Hadrothemis</i> KARSCH	23	<i>Urothemis</i> BRAUER	22
<i>Heliascha</i>	16	<i>Zygonyx</i> SELYS	32
<i>Hemistigma</i> KIRBY	26		
<i>Isomecocypha</i> COWLEY	7		

SPECIES.

	Pages.		Pages.
<i>abbottii</i> CALVERT (<i>Orthetrum</i>)	24	<i>brachiale</i> (PALISOT DE BEAUVOIS)	
<i>angolense</i> SELYS (<i>Pseudagrion</i>)	5	(<i>Orthetrum</i>)	24
<i>annulata</i> (PALISOT DE BEAUVOIS)		<i>caffrum</i> (BURMEISTER) (<i>Orthetrum</i>) ..	24
(<i>Trithemis</i>)	31	<i>caligata</i> (SELYS) (<i>Platycypha</i>)	13
<i>arteriosa</i> (BURMEISTER) (<i>Trithemis</i>)	34	<i>camarensis</i> (KIRBY) (<i>Hadrothemis</i>) ...	23
<i>assignata</i> SELYS (<i>Urothemis</i>)	22	<i>chrysostigma chrysostigma</i> (BURMEIS-	
<i>basitincta</i> RIS (<i>Trithemis</i>)	30	TER) (<i>Orthetrum</i>)	24
<i>biordinata</i> KARSCH (<i>Atoconeura</i>) ...	29	<i>cincta</i> (SELYS) (<i>Umma</i>)	14

	Pages.		Pages.
<i>deceptor</i> (CALVERT) (<i>Palpopleura</i>) ...	26	<i>massaicum</i> SELYS (<i>Pseudagrion</i>) ...	5
<i>defecta</i> KARSCH (<i>Hadrothemis</i>) ...	23	<i>melanicterum</i> SELYS (<i>Pseudagrion</i>) ...	5
<i>dichroa</i> KARSCH (<i>Trithemis</i>)	30	<i>microstigma</i> RIS (<i>Orthetrum</i>)	25
<i>dispar</i> (BEAUVOIS) (<i>Chlorocypha</i>) ...	13	<i>pluvialis</i> FORSTER (<i>Trithemis</i>)	31
<i>divisa</i> KARSCH (<i>Crocothemis</i>)	27	<i>prætorius</i> (KARSCH) (<i>Notogomphus</i>) ..	20
<i>donaldsoni</i> CALVERT (<i>Trithemis</i>) ...	30	<i>pseudelongatum</i> LONGFIELD (<i>Enallagma</i>)	6
<i>dorsalis</i> (RAMBUR) [<i>Trithemis</i> (<i>Helothemis</i>)]	30	<i>renei</i> FRASER (<i>Crenigomphus</i>)	17
<i>edwardsi</i> SELYS (<i>Urothemis</i>)	22	<i>risi</i> LONGFIELD (<i>Trithemis</i>)	30
<i>electa</i> LONGFIELD (<i>Umma</i>)	14	<i>rubida</i> (SELYS) (<i>Chlorocypha</i>)	12
<i>elongatum</i> (MARTIN) (<i>Enallagma</i>) ...	6	<i>sanguinolenta</i> (BURMEISTER) (<i>Crocothemis</i>)	27
<i>erythræa</i> (BRULLÉ) (<i>Crocothemis</i>) ...	27	<i>speratus</i> HAGEN (<i>Anax</i>)	15
<i>flavum</i> nov. (<i>Onychogomphus</i>)	18	<i>stemmale capense</i> CALVERT (<i>Orthetrum</i>)	25
<i>gerstaeckeri</i> KARSCH (<i>Pseudagrion</i>) ...	5	<i>stictica</i> KARSCH (<i>Trithemis</i>)	31
<i>glabrum</i> (BURMEISTER) (<i>Ceriagrion</i>) ..	6	<i>straeleni</i> FRASER (<i>Chlorocypha</i>)	12
<i>glauca</i> (SELYS) (<i>Elatoneura</i>)	7	<i>suave</i> RIS (<i>Ceriagrion</i>)	7
<i>guineense</i> RIS (<i>Orthetrum</i>)	24	<i>subfurcatum</i> SELYS (<i>Enallagma</i>) ...	6
<i>iridipennis</i> (BURMEISTER) (<i>Phaon</i>) ...	13	<i>trinervulata</i> FRASER (<i>Heliæschna</i>) ...	16
<i>jucunda</i> RAMBUR (<i>Palpopleura</i>) ...	26	<i>tristis</i> HAGEN (<i>Anax</i>)	16
<i>kirbyi ardens</i> GERSTAECKER (<i>Trithemis</i>)	31	<i>uncifer</i> KARSCH (<i>Lestes</i>)	10
<i>leucosticta</i> (BURMEISTER) (<i>Brachythemis</i>)	27	<i>unifasciata</i> FRASER (<i>Macromia</i>) ...	21
<i>longistigma</i> (SELYS) (<i>Umma</i>)	14	<i>victoriæ</i> (FORSTER) (<i>Chlorocypha</i>) ...	13
<i>lucia</i> (DRURY) (<i>Palpopleura</i>)	25	<i>virgatus</i> (BURMEISTER) (<i>Lestes</i>) ...	9
<i>lujai</i> SCHOUTEDEN (<i>Notogomphus</i>) ...	20	<i>wittei</i> nov. (<i>Æshna</i>)	15
<i>manderica</i> GRUNBERG (<i>Gymacantha</i>) ..	17	<i>wittei</i> nov. (<i>Chlorocnemis</i>)	7
		<i>wittei</i> nov. (<i>Chlorocypha</i>)	10