DRAGONFLIES *(ODONATA)* OF CENTRAL AFRICA

This survey is primarily concerned with the dragonflies of Northern Rhodesia but some records are included for the neighbouring territories of Katanga (Southern Congo) and Nyasaland. It is a preliminary list for this area, since only in parts of Northern Rhodesia has extensive collecting been carried out, but it may help to bridge the gap between rather more comprehensive books by the Author on the species south of the Zambezi (*Dragonflies of Southern Africa*) and those in eastern Africa, Tanganyika northwards (*Survey of the Dragonflies of Eastern Africa*). Northern Rhodesia as here delineated includes *both* banks of the Zambezi River. Dragonflies, being aquatic by nature but not influenced by political boundaries, will not favour one side of the river more than another, except where limited local conditions—current, shade on the banks and so on—may suit their purposes. Many species, of course, depend on running water for their oviposition and life cycle, whilst others prefer quiet waters. The salinity and temperature and the presence or absence of vegetation in the water has a marked effect on population and species, as well as the nature of other living organisms, friend or foe; and the state of the banks is of importance in the case of species which prefer the shade of thick bush, or merely some perches for rest and surveillance, or bare, unhampered banks. Others prefer the presence of some rocks for camouflage and others, again, will haunt the bush or scrub at some distance from water. Northern Rhodesia, with its extensive lakes, swamps, rivers, and thickly forested streams (the "litus" of the north-west) provides a very wide range of habitats, lacking only the more extremes in altitude. A very few Odonata of those not present in this area would only favour coastal levels, whilst in East Africa (and probably on the peaks in Nyasaland) a few are confined to the higher altitudes. Nevertheless, this territory has a wide range of species, both with southern affinities and also some with tropical African, even equatorial connections.

The Author has not collected personally in Nyasaland, but he has visited certain parts of the other territories; the Zambezi River at various points between Kazungulu (and Katambora) and Chirundu

Bridge; the Copperbelt; Abercorn and Kalambo Falls; Mwinilunga District from Kabompo River westwards and northwards to Ikelenge. This latter area was visited in February–March, 1960, in the company of Mr. Peter Lascelles and an African assistant, Mr. Rafael Mpala, both of whom assisted in the collecting. On this expedition a brief excursion was made into Katanga, via Elizabethville and Jadotville to Lubudi, where the principal habitats were the waterfalls on the road to the Upembe National Park and patches of forest to the north of Lubudi. In January 1958, some collecting was also done in Katanga by the Author with the assistance of Mr. T. Coffin-Grey, during a rapid expedition through the Congo and equatorial Africa to the eastern border of Nigeria. The route lay through Jadotville but then turned north-east via the Mitwaba Escarpment and the Lufua River to Albertville; then northwards to Fizi, Uvira and the northern Congo. Only brief stops could be made for collecting, except where progress was delayed by storms, mud, fallen bridges and ferries.

Much of the acquired knowledge of the Northern Rhodesian dragonflies is due to Lascelles' enthusiasm. But other collectors have helped very considerably indeed: most of the Ndola records are due to extensive collecting by Mr. R. A. G. Green. Samfya and Lake Bangweulu have been collected mainly by Mr. R. C. Dening, who has since been active around Lusaka. Dr. P. Johnsen also assisted with valuable collections from Samfya and the Copperbelt. Mr. R. Watmough sent his records from Samfya and Lake Bangweulu. Extensive collections have been received from Mr. R. M. Kitchingman, formerly of Mwinilunga. Abercorn, Ufipa Plateau and Mweru records are largely due to Mr. L. D. E. F. Vesey Fitzgerald, particularly the Abercorn area, which thanks to his efforts must now be fairly well known for Odonata adult fauna. From Fort Jameson and elsewhere a few dragonflies were submitted by members of the Tsetse Control Unit.

Nyasaland records are chiefly due to Messrs. R. Wood, W. J. Gray and D. Eccles. A few were taken in the past by the late Mr. C. Smee.

The Author feels deeply appreciative of the assistance received from all these sources. It is to be hoped that the publication of this preliminary survey will stimulate further collecting. It is certain that many more interesting records are to be found and probably a number of further new species; particularly from Nyasaland.

A few general remarks may be made here on certain localities known to the Author.

Victoria Falls

Apart from the Falls themselves, the bush-covered islands, the rapids upstream and the nearby rocks, rock-pools and banks (with or without trees and shrubs) there is the thick fringe of bush receiving much of the spray (the so-called " rain forest "), which harbours certain species, in particular *Lestes amicus*. The thicker bush nearby and the bush near the Maramba River may have interesting Lestids, *Parazyxomma* and *Lestinogomphus*. In the rains isolated pools add to the variety of habitats.

Katambora Forest Reserve

Thick bush on the banks of the Zambezi, which is here notable for rapids, and small streams emptying into the river are productive of interesting species, notably in the genus *Neurogomphus*.

Copperbelt

The more interesting species are found at bush-fringed streams, reedy pools and extensive dambos or swamps.

Kabompo River

The collecting area was at the point where this river crosses the road from Solwezi to Mwinilunga. Besides the river species there are a few of interest in nearby swamps.

Mwinilunga

The most productive areas are the forested streams or lilus. But the open streams, the Zambezi torrents, the small swamps and the larger " dambos " are all highly productive. It is evidently a relic forest area with equatorial affinities.

Abercorn

By far the richest collecting area is the shallow peat-bottomed Lake Chila which terminates in swamp; it has a fast river running out of it; it is fringed with *Brachystegia* woodland and is further varied by a patch of swamp forest. Nearby are other pools and streams as well as swamps. A short distance away are the Kalambo Falls and a forest of tall *Brachystegia*.

Jadotville

Collecting was mainly in the woodlands in the Jadotville–Elizabethville road. Here and at the swamps Odonata life was poor.

Lubudi

Just off the main road to the north of this town there is a turning to the right leading to Upembe National Park. On the way there are several large waterfalls and forested gorges which are rich in Odonata. Also on the main road to the north there are forested streams.

Mitwaba Escarpment

A few minutes collecting only on a very small stream running down the escarpment on the road.

La Manda River

Where this crosses the road beyond the escarpment: an interesting selection of species.

Lufua River

Collecting was mainly a little way from either bank, at streams and floodwaters.

In the descriptive section of this paper keys are given to families, genera and species, the last chiefly for males. Females are often less adaptable to working keys but, at least in *Zygoptera*, mating pairs are usually readily obtainable in the field. Further descriptions and references may be obtained in the book on the Southern African species (Pinhey, 1951). Larvae are not described nor recorded in this paper but a short summary is available on them in the paper on Odonata nymphs (Pinhey, 1959).

Special acknowledgements are due to those who assisted the 1960 expedition: in Lusaka, the Bensons and Denings; in Ndola, the Greens; near Solwezi, the Staff of the R.S.T. Camp; and at Mwinilunga, the Fishers, Waugh and Chief Mwinimalamba. Lastly, for the publication of this paper the Author is indebted to Dr. Desmond Clark, of the Rhodes-Livingstone Museum.

INTRODUCTION

A very brief introduction to the study of dragonflies may be of some help to those readers not well acquainted with this group of insects.

Characteristics

Dragonflies are variously known also as " Horse Stingers ", " Devil's Darning Needles " or, more appropriately, the more slender species are referred to as " Damsel Flies ". Belonging to a distinctive order of the insect world known as **ODONATA**, they are predaceous insects, with mouthparts adapted for biting their food (they are not capable of stinging). Their compound eyes (i.e., the many-faceted eyes common to insects in general) are very large and prominent: in fact dragonflies are amongst the most alert of the insects (and so are Praying Mantids). They also have three small simple eyes or ocelli (Fig. H.42) on the top of the head or vertex. The antennae are always *very short*, scarcely visible to the naked eye; slender or filiform. The parts of the face include a *labium* (a sort of lower lip) and *labrum* or upper lip, with curved mandibles in between these lips; an epistome, consisting of two parts, the ante- and the post-clypeus; to the side of these portions are the " cheeks " or genae; and the forehead or frons forms the top of the face.

The thorax is separated into two portions by a flexible joint; the front or *prothorax* and the *synthorax* (or pterothorax). The prothorax bears the front or first pair of legs. The synthorax really consists of two segments, the meso- and the meta-thorax and these in turn give rise to the names of thoracic plates which are mentioned below. This portion bears the second and third pair of legs. The synthorax is, however, elongated obliquely forwards, so that the legs, instead of being directly under the wings as in other insects, are situated far forward, close to the head. The great advantage of this to the possessor is that the dragonfly can use all its legs to hold food between the lips and, moreover, it enables it to do so even in flight. In contrast the two pairs of wings are necessarily far back on the upper or dorsal surface of this thorax. The more important sections into which this synthorax is divided are firstly a pair of *mesepisterna* on the front, which often bear pale or dark markings known as *antehumeral stripes;* then, at each side there is a *mesepimeron* (separated from mesepisternum by a fusion line known as the humeral

suture), the *metepisternum* and the *metepimeron*, these last three plates being separated by the first and second lateral sutures. On the metepisternum there is one of the two pairs of thoracic breathing pores.

The abdomen is usually elongate, often very slender, and consists of ten segments. Ridges visible on the upper surface or along the sides of these segments are the transverse and lateral carinae. In the male, the last or tenth segment (denoted, simply, 10) bears appendages used for attaching on to the head or the prothorax of the other sex prior to mating. Dragonflies can carry out extraordinary aerial acrobatics, forwards, backwards, hovering or looping; and they will link up even in rapid flight, the pair flying thus in tandem for quite a while, with little apparent effect on their flying ability. The terminal or *anal appendages* of the male are on two levels, the upper or superior appendages and the inferior. In the female the terminal appendages are merely a pair of stylets or cerci. On the lower or ventral surface of the second segment in the male there are the actual mating appendages or accessory genitalia. After the tandem link-up the female connects the tip of her abdomen to this segment by curving her body upwards. The detailed study of the accessory appendages are beyond the scope of a brief introduction, although the comparative differences in the " hamules " and other organs are often essentially important in distinguishing species (c.f. the diagrams of male accessory genitalia of *Macromia*, Fig. C, D, and *Orthetrum*, Fig. E). However, the *sex* of a dragonfly can always be determined by the presence (male) or absence (female) of any appendages on the underside of segment 2: in the female the surface of this segment is quite smooth below.

The leg of a dragonfly, slender and spiny, consists, as in other insects, of several parts, the small coxae and trochanters at the base, a robust *femur*, a still longer *tibia* and the tarsal segments, the last of which bears a pair of claws. Near the tip of each claw there is a minute tooth or claw-hook.

The wings are provided with various strengthening features, apart from the " veins ", and these include a notch or *nodus* on the forward or costal margin and a thickened spot or *pterostigma* near the apex of the wing. The venational arrangement is very complicated and only the essential features (Fig. I.43) will be discussed here. Examining a wing from base outwards towards apex there is, firstly, the *costal vein* (*c*) on the anterior margin, followed by two radial veins, R_1 and R_2. Then, at the base, there is a gap closed by an angled vein, the *arculus*, from which is subtended the radial sector, RS. RS divides into R_3 and the combined vein R_{4+5} and in the outer part of the wing there are further short vein

sectors, such as IR_2, IR_3, Rspl. Then there is the median vein, MA, followed by the cubital, Cu and the anal vein 1A. The actual notation of these veins is derived from a study of more primitive wings in insects. The reason, for instance, that there is a Cu_2 but no Cu_1 is because it is regarded that the latter has become obsolete in the modern dragonfly wing.

A few more features are of special importance. At or near the bases of Cu_2 and 1A there is an enclosed space, the *discoidal cell* (d.c.), which may be a quadrilateral or a triangle in shape. To the outer side of the triangle in *Anisoptera* (see below) there are one, two or three rows of cells stretching to the margin, a region called the discoidal field (d.f.). Below the costal margin, the short transverse veins are known as *antenodal* cross-veins (Ax) between base and nodus, and postnodals (Px) beyond this notch. On the hindwing in *Anisoptera* the anal vein normally forms an extra loop (a.l.). And at the base of the anal margin there may be a supporting structure called the membranule.

Such, briefly, are the structural characters of the adult dragonfly. In certain features, such as the obliquely elongated thorax, the accessory genitalia on segment 2 of the male and some of the wing characters dragonflies are unique. But the layman sometimes confuses them with *Antlions*. Dragonflies always breed in water, their aquatic nymphs or larvae being totally unlike the adult in appearance. They may be squat and robust in *Anisoptera*, or slender and provided with broad tails in *Zygoptera*. They undergo no pupal state but when the adults are ready to emerge the adults crawl up any convenient object, tree-trunk at water's edge, a reed or rock, split down the back and, after an exhausting struggle, the adult emerges. The body and wings have to stretch and dry and the insect may then be ready for flight.

Antlions differ in many respects. Adults of one of the commoner species are illustrated at Plate 5. They are purely terrestrial creatures, belonging to the insect order *Neuroptera*. Their sickle-jawed larvae often make the familiar little pits in sandy soil to way-lay the unwary ant or other small insect. The adult has well-developed, conspicuous antennae, which are often knobbed (clavate) at the apices; the thorax is *not* elongated and the shortish legs are situated directly below the wings (as they are also in most insects). There are other notable differences but those already given will suffice to tell whether an insect is a dragonfly or an antlion. In habits, it might be added, adult antlions fold their wings, when at rest, roof-wise along their abdomen. They are frequently attracted to lights. In the damselfly the wings are usually *held together above their backs* (as in resting butterflies) or occasionally (in *Lestes*)

half-open. In other dragonflies the resting insect spreads its wings open, more or less horizontally. Dragonflies are only sometimes attracted to light, usually only when disturbed. There are a few nocturnal or crepuscular species but even these are not readily attracted.

In female dragonflies of the groups *Zygoptera* and *Aeshnidae* eggs are laid by means of an ovipositor which can pierce a hole in a reed or twig under or above the water surface, the eggs being inserted in the slit. Other dragonflies usually just select a stretch of water suitable to their species and drop eggs haphazardly, as their abdomen touches the water surface. Some species like still waters (the ubiquitous *Brachythemis leucosticta* and others will often carelessly distribute theirs in a temporary rain puddle); others prefer running water, or even rapids and waterfalls (*Zygonyx*). The presence or absence of shade or of reeds to act as perches; the degree of concentration of solutes in the water and the temperature will influence some species, although a few (like *Ischnura senegalensis*) are either much less particular or else more tolerant. The larvae hatching from these eggs move about by a swimming or wriggling motion in *Zygoptera* (the tailed larvae) or by a form of jet propulsion in others. Like the adults they are carnivorous, capturing any other creatures and devouring them. They catch their prey by means of a unique development of the labium, which, in the larva, is a hinged implement with jaws at the end which can be projected forward suddenly to seize the victim. The newly emerged adult is soft, often very pallid, with glistening wings. After a short period in this teneral state the insect gradually hardens and matures. In doing so it may undergo various colour changes. Consequently, a brief indication of the colour of a dragonfly will often be of little use in identifying the species unless supplementary details can be given. Moreover, being carnivorous, the food in the body decays rapidly after death and in the dried insect the surface colours may be altered by postmortem discolouration. Rapid drying or cleaning out the abdomen of the larger species is advisable to try and preserve original colours and if a fine piece of wire or other similar object is thrust right through thorax and abdomen it usually helps to prevent the body falling to pieces.

Dragonflies are harmless insects, as a whole, incapable of stinging. The adults may be considered moderately useful creatures in that they feed on flies and other insects. But they are not averse to eating other dragonflies. The larvae, on the other hand, are very important in fish dietary problems and may affect the balance of aquatic life in their own depradations on water insects. The larger species may also at times attack the smaller fish fry.

Classification

Dragonflies are easily separated into the two suborders, *Zygoptera* (damselflies) and *Anisoptera*. The former are usually slender-bodied, with widely separated eyes (Fig. H.42); their wings are all of the same shape and normally stalked or petioled at the base. In venation, the discoidal cell is always a quadrilateral. And there are numerous other characteristics. *Anisoptera* are more robust insects; their eyes usually touching one another (except in family *Gomphidae*); the hindwing is broader at the base than the forewing; the wings are not petioled; and the discoidal cell is nearly always a triangle (except *Tetrathemis* of the Central African fauna). Family divisions can be found in the following key; generic and specific separations are given on the respective pages of this survey. *Zygoptera* families considered here are *Lestidae*, *Protoneuridae*, *Platycnemididae*, *Coenagriidae*, *Agriidae* and *Chlorocyphidae*. Anisoptera consist of *Gomphidae*, *Aeshnidae*, *Corduliidae* and *Libellulidae*.

KEY TO FAMILIES OF DRAGONFLIES

1 Forewing and hindwing of same shape, usually stalked (petiolate); discoidal cell a quadrilateral.
Suborder *Zygoptera* 2

Forewing and hindwing dissimilar in shape, hindwing always broader in anal field. Discoidal cell triangular (diamond-shaped, quadrangular in *Tetrathemis*).
Suborder *Anisoptera* 7

2 (1) With five or more antenodal cross-veins. Nodus remote from base (at least two-fifths wing length from base). Discoidal cell elongate, crossed . . . . Superfamily *Agrioidea* 3

With two antenodal cross-veins. Nodus close to base (at one-third or less). Discoidal cell free 4

3 (2) Wings petiolate. Pterostigma long and narrow. Epistome enlarged, snout-like . . . Family *CHLOROCYPHIDAE*

Wings unstalked. Pterostigma small or absent. Epistome not enlarged . . . . . Family *AGRIIDAE*

4 (2) Pterostigma elongate, rectangular. An oblique cross-vein connecting R_3 to IR_3 . . . . . Superfamily *Lestoidea*
Family *LESTIDAE*

Pterostigma rhomboidal or a parallelogram. Without the oblique vein . . . . . Superfamily *Coenagrioidea* 5

5 (4) 1A absent or not more than one cell long.
Family *PROTONEURIDAE*

1A well developed 6

6 (5) Discoidal cell practically rectangular.
Family *PLATYCNEMIDIDAE*

This cell with lower distal angle very acute.
Family *COENAGRIIDAE*

7 (1) Antenodal cross-veins not normally coincident in costal and subcostal spaces. Triangles (discoidal cells) very similar in all wings and well distal to arculus.
Superfamily *Aeshnoidea* 8

Antenodal cross-veins mainly coincident in costal and subcostal spaces. Triangles markedly dissimilar in forewing and hindwing and at or adjacent to arculus.
Superfamily *Libelluloidea* 9

8 (7) Eyes widely separated . . . . . Family *GOMPHIDAE*
Eyes in contact with each other . . Family *AESHNIDAE*

9 (7) Primary antenodal cross-veins present. Males with auricles at base of abdomen and with keels along the tibiae.
Family *CORDULIIDAE*

No primary antenodals, auricles or tibial keels.
Family *LIBELLULIDAE*

Suborder **ZYGOPTERA**

Family **LESTIDAE**

Key to males of the genus *Lestes* Leach

1 Superior appendages bent distinctly downwards in apical half 2
Superior appendages forcipate, scarcely bent down . . . 4

2 (1) Thoracic dorsum in immature examples with slender, regular green stripes, in mature male largely pruinosed.
plagiatus

Thoracic dorsum with irregular stripes or spots, or entirely metallic green; but the dorsum non-pruinose 3

3 (2) Abdomen 37 mm. or more. Superior appendage curved downwards before apex, tapering, very hirsute . . . *uncifer*
Abdomen less than 33 mm. Superior angled downwards; not tapering and less hirsute . . . . . *pinheyi*

4 (1) Thorax with regular bright green dorsal bands. Wings yellowish 5
Thorax without stripes, or these darker and irregular . . 6

5 (4) Wings yellowish with golden brown apices . . . . *amicus*
Wings usually yellowish, but without darkening at apices.
virgatus

6 (4) Thorax blackish; or brown with dark or metallic bands or spots 7
Thorax uniformly brownish or greenish 9

7 (6) Thorax mainly black, without bands or spots. Abdominal segment 9 without yellow annulus . . . . . *wahlbergi*, which may be a melanic form of *pallidus*
Thorax brown, with irregular bands and spots. Segment 9 usually with yellow annulus 8

8 (7) Superior appendage with medial acute sub-basal tooth . *tridens*
Superior appendage with medial, rounded sub-basal swelling . . . . . *simulans*

9 (6) Superior appendage much paler than the body and without sub-basal tooth . . . . . *disarmata*
Superior appendage not markedly paler than body and provided with sub-basal tooth . . . . . *pallidus*

Lestes amicus Martin, 1910, *Ann. Soc. ent. Fr.* **79**: 85, 91

This species (Plate 1, fig. *a*) is restricted in distribution in Africa and the records are chiefly from Central Africa, where it may be locally abundant. Northern Rhodesia: Victoria Falls (in the " Rain Forest " during the dry months, July to October); Abercorn (in swamps); Mwinilunga (only one example taken). Katanga: Elizabethville.

Lestes ? disarmata Fraser, 1961, in Pinhey, *Brit. Mus.* (*Nat. Hist.*). 11

One female collected in the so-called " Rain Forest " at the Victoria Falls, in July, 1955, may perhaps be this little-known species, of which only the male has been described. [The identification has since been confirmed by the discovery of further examples—AUTHOR.]

It is a small light brown insect, abdomen 29.5 mm., hindwing 19 mm., similar in colour and markings and in the short, broad pterostigma to the male *disarmata*. Moreover, the mid-dorsal black line is reduced on the subterminal abdominal segments, and segment 10 and the cerci are yellow, corresponding to the pallid terminalia of that species. It cannot be described as an allotype until a male is found in that area which can confirm the identification. One of the more pallid female forms *pallidus* found in the same locality is larger, with the pterostigma longer and narrower and with well marked dorsal line on terminal segments.

Lestes pallidus Rambur, 1842, *Névr.* 252 (Senegal)

Forms of this very variable and widespread species may overlap in distribution at the Victoria Falls, as elsewhere. Northern Rhodesia: Victoria Falls and Katambora; Kalambo Falls. Katanga: Albertville.

Lestes pinheyi Fraser, 1955, Mission de Witte, *Parc. Nat. Upemba* **38**: *10 ff.*

A smaller insect than *uncifer*, for which it was mistaken by the present author (1951, *Transv. Mus. Mem.* **5**: 48). Northern Rhodesia: Victoria Falls; Samfya and Lake Bangweulu; Mwinilunga; Abercorn.

A very teneral female taken south of Ndola may also be this species.

Lestes plagiatus (Burmeister). *Agrion plagiatum* Burmeister, 1839, *Handb.* **2**: 824 (Natal)

Widespread. Northern Rhodesia: Ndola; Kabompo River; Kasempa; and on Tanganyika border at Ufipa Plateau (V. Fitzgerald). Katanga: La Manda River.

Lestes simulans Martin, 1910, loc. cit. 85, 88

The form taken at the Victoria Falls differs from those of Uganda in having the wings more fumose and in the form of the superior appendages which , in particular, are more curved in the Falls examples. It is possible that two species or subspecies are involved here, but since Martin's description was not illustrated it is difficult to decide which is the more typical.

Lestes tridens MacLachlan, 1895, *Ann. Mag. nat. Hist.* **6** (16): 24 (Moçambique)

A local species, mainly coastal. Northern Rhodesia: Abercorn.

Lestes uncifer Karsch, 1899, *Ent. Nachr.* **25**: 381 (Tanganyika)

A very local species. At the Victoria Falls the Author has only seen it in the undergrowth amongst thick bush near the Maramba River. Northern Rhodesia: Victoria Falls; Abercorn; Kalambo Falls. Katanga: Mubale.

Lestes virgatus (Burmeister). *Agrion virgatum* Burmeister, 1839, *Handb.* **2**: 824 (Natal)

Generally widespread in bush or forest. Northern Rhodesia: Ndola; Mwinilunga; Abercorn. Katanga: Upembe Nat. Park.

In addition females of two species too teneral for identification were found at Mwinilunga in March, 1960, evidently too early for mature examples. One was of the size of *pallidus;* the other larger with traces of green antehumerals, but with the pterostigma too small for *amicus*, *plagiatus* or *virgatus*.

Family **PROTONEURIDAE**

Key to genera

1 1A developed but only 1 cell long. Wings in male yellow. *Chlorocnemis*

1A absent. Wings uncoloured . . . . . *Elattoneura*

Key to *Chlorocnemis* Selys

1 Labrum pale blue. Frons and vertex with broad blue band. Superior appendage of male black .. . . . . *marshalli*

Labrum black. Frontal blue band narrow 2

2 (1) Superior appendage black . . . . . *lascellesi*

Superior appendage yellow . . . . . *wittei*

CHLOROCNEMIS LASCELLESI n.sp.

(Fig. 5)

Holotype male (mature). Labium creamy white, black on anterior third (including moving parts); the rest of the face and head, dorsally and ventrally, jet black, except for a pale blue transverse band across the frons in front and extending to the compound eyes. Prothorax jet black, the anterior and lateral margins pale blue and a minute lateral dot on posterior lobe whitish. Synthorax jet black dorsally and down to first lateral suture; with a broad pale blue antehumeral, not quite reaching upper dorsal limit of mesepisternum and tapering at its upper end; this stripe at its widest very slightly more than half the breadth of a mesepisternum. Lower sides of thorax pale blue, with a short black streak at upper end of second lateral suture; ventral surface pale yellowish.

Legs black; cream-coloured on coxae, trochanters and bases of femora; on meso- and meta-thoracic legs also a cream stripe on flexor surface of each femur. Wings with greenish yellow tint. Pterostigma and venation black. Forewing with 16–17 Px. Abdomen and anal appendages black, with pale markings. On 1–2 whitish lateral bands. Sky blue markings: a broad band covering proximal three-quarters of 2, tapering to a dorsal point in distal quarter; 3 with basal annulus which, on dorsum, extends posteriad for nearly one-third of this segment as an attenuate triangle; 4 with a small basal triangle; 5–7 with small rounded basal spot; 8–9 all black; 10 with dorsal patch as in the figure; and a small pale dorsal triangle near base of each superior appendage.

Appendages of the usual Chlorocnemine form; extended inwardly and broadly near bases. Pale colours in life: eye above brown, blue-green below; body markings deep sky blue with a tinge of green in some areas.

Abd. 38.5 mm., hw. 24 mm.

Paratype males. There is slight variation in size, the abdomen being almost 40 mm. in one example. Teneral males, as in others of the genus, have hyaline, uncoloured wings. This, incidentally, differs from some of the higher *Anisoptera* which have yellow on the wings, for in certain species at least this colour is brighter in the juveniles and may become less intense as the insect matures. In old males of *lascellesi* the pale dorsal spot on 10 is narrower, and that on the superior has vanished. In tenerals, again, the blue colour tends to be more violet, becoming sky blue with maturation. In these younger ones the appendages are pale brown at first.

Allotype female (almost mature). Head, thorax and legs as in male but the pale markings pale greenish instead of sky blue. Wings hyaline, untinted. Abdomen black, with similar lateral white bands, but the dorsal markings, which are bluish white, are reduced; a narrow sagittal mark on proximal half of 2; 3–5 with traces of basal annuli, with an even smaller trace on 6; 7–10 and the very short cerci black.

Abd. 38 mm., hw. 24 mm.

Paratype females. An old female is slightly larger, abdomen 39 mm., hindwing 25 mm., and the wings are faintly greenish yellow.

Remarks. A series of both sexes was collected in the Mwinilunga District, February–March, 1960, at the sources of the Zambezi and Sakeshi as well as on the latter river in Hillwood Farm. I take pleasure in naming the species after Mr. Peter Lascelles for his part in collecting some of these and for his enthusiastic support during the expedition. The species is nearest to *pauli* Longfield and *wittei* Fraser, but both those have yellow superior appendages. From *marshalli* Ris and the more tropical *superba* Schmidt *lascellesi* differs in several respects: the labrum is black instead of blue and the frontal band is narrower (in *marshalli* it is wide enough to cover part of the frons dorsally as well as anteriorly); and the abdominal markings are different.

The very teneral male captured on the Mitwaba escarpment, in company with *Allocnemis mitwabae*, in January, 1958, proves to be an example of *lascellesi*.

This species favours the edges of dense forest patches and evidently breeds in very small, quiet forest streams. Types and paratypes are in the National Museum, but one paratype male will be sent to the British Museum (Natural History).

Northern Rhodesia: Mwinilunga. Katanga: Mitwaba Escarpment.

Chlorocnemis marshalli Ris, 1921, *Ann. S. Afr. Mus.* **18**: 291 (S. Rhodesia)

This Southern Rhodesian species has been recorded from Nyasaland. It is probably to be found there in forested streams on the mountains.

Chlorocnemis wittei Fraser, 1955, *Parc Nat. Upemba, Mission de Witte* **38**: 7

Katanga: Kamitungulu (Upemba Nat. Park).

Key to males of *Elattoneura* Cowley

1 Superior appendage with two teeth, one long, one short, on a broad flange . . . . . *glauca*

Superior appendage with only one tooth, on a broad flange 2

2 (1) Larger species, abdomen 29 mm. or more. The tooth on the superior appendage like a small hook . . . . . *acuta*

Smaller species, abdomen 27 mm. or less. The tooth a robust continuation of the broad flange . . . *frenulata*

Elattoneura acuta Kimmins, 1938, *Ann. Mag. nat. Hist.* (11) **1**: 300, f (Nigeria)

A few speciments of this large species were taken at Lubudi (Katanga) in forested gorges near waterfalls.

Elattoneura frenulata (Hagen). *Disparoneura frenulata* Hagen, in Selys, 1860, *Bull. Acad. Belg.* **2** (10): 444 (17 Sep.) (Cape)

A widespread species. Northern Rhodesia: Victoria Falls and Katambora; Ndola; Lusaka; Kasempa; Kabompo River; Mwinilunga; Abercorn. Katanga: Lubudi; La Manda River; Bunkeya; Albertville. Nyasaland: Cholo.

Elattoneura glauca Selys. *Disparoneura glauca* Selys, 1860, *Bull. Acad. Belg.* **2** (10): 443

This appears to be less common in Northern Rhodesia than south of the Zambezi or in East Africa. (Plate 1, fig. *c*.) Northern Rhodesia: Victoria Falls (uncommon); Ndola; Kabompo River; Abercorn; Chongwe River, Lusaka (Dening).

Family PLATYCNEMIDIDAE

Key to genera in Northern Rhodesia

1 Origin of anal vein distinctly proximal to Ac. Wings hyaline . . . . . *Metacnemis*

Origin of anal vein at or almost at Ac. Wings, at least in male, distinctly yellow . . . . . *Allocnemis*

Metacnemis singularis (Karsch). *Mesocnemis singularis* Karsch, 1891, *Ent. Nachr.* **17**: 67

Generally common at rocky streams, the pruinosed male conspicuous by its extensively pale blue coloration. Northern Rhodesia: Victoria Falls and Katambora.

Allocnemis mitwabae Pinhey, 1960, *Ent. Mon. Mag.* **96**: 258. ? *Allocnemis* sp. Schouteden, 1934: 79 (Lubilash, Katanga)

Males (Plate 1, fig. *b*). Superficially like a very elongate *Chlorocnemis* until the venation is examined. Labrum, genae and a broad transverse band in frontal region yellow, the whole face appearing alternately striped: yellow, on labrum and laterally to the pale bluish ventral surface of the eye; black, on epistome, laterally to the eye, surrounding this as a black band; broad yellow frontal band, continuing as a pale bluish band around the eye; and a black vertex, extending as a black dorsal patch on the eye. Antehumeral stripes narrow, yellow. Legs yellow on flexor surfaces, black on extensor, except coxae and bases of femora; tarsi black. Wings greenish yellow to deep smoky yellow. Pterostigma black, framed with yellow.

In life the eye is blue with black rings; antehumeral yellow; sides of thorax pale bluish green; 9–10 and superior appendages bright orange red. Inferiors black.

In one male variety there is a tendency to a reduction in the black: legs, including tarsi, mainly yellow; abdominal segments 3–5 *broadly* yellowish above, suffused with black; inferior appendages partly yellow. In another male variety the left antehumeral is broken dorsally.

Abd. 42.5 mm., hw. 24 mm.

Allotype female (Mature; Lubudi). Head black, with two facial bands; a grey-yellow band at labrum, laterally extended, and a broad yellow frontal band. Trace of yellow at back of occipital plate. Prothorax black, broadly yellow anteriorly and laterally. Posterior lobe appearing laterally as a procumbent black flap, medially this lobe greatly reduced, but supporting a pair of vertical, rounded, cream-coloured, flattened stylets (Fig. 9).

Synthorax black to first lateral suture, with faintly greenish tinge. Slender antehumerals not reaching dorsum and expanding ventrally; a yellow lateral dot on mesothorax collar, and yellow dots just below upper end of humeral suture. Sides of thorax greenish to whitish blue; a broad black stripe on second lateral suture. Femora cream with black stripe on extensor surfaces; tibiae cream externally, black on flexor surfaces; tarsi black. Wings somewhat greenish-fumose; pterostigma dark brown, framed with yellow. Abdomen black, with continuous yellow sublateral stripe and some yellow dorsal markings: yellow mid-dorsal line on 1–4, progressively thinner; incomplete basal annuli on 3–6; 8 all yellow dorsally; 9 with yellow median band which expands distally as a saddle; 10 and the short cerci all black. Ovipositor yellowish, black ventrally. Abd. 43 mm., hw. 28 mm. In life, the eye was blue and black as in the male; sides of thorax whitish; 9–10 dull orange-red.

Paratype female. Abd. 41.5 mm., hw. 27 mm.

Remarks. The original series of this Katanga species consisted of a few males collected on the Mitwaba Escarpment at a small trickling stream. In February, 1960, several more specimens of both sexes were collected at forested streams and waterfalls and also in shade on a broadish river near Lubudi. It is a larger insect than the South African *A. leucosticta* Selys (1863) with darker and smaller pterostigma. The prothoracic stylets of the female are very similar but they are black in the latter species.

Family **COENAGRIIDAE**

Key to genera

1 Anal vein leaves margin at Ac or less than the length of Ac before this cross-vein 2
Anal vein leaves margin more than the length of Ac before this cross-vein 4

2 (1) Frons with well developed transverse crest. Abdominal colour yellow to red. Female without vulvar scale on 8th sternite . . . . . *Ceriagrion*
Frons without a very prominent crest. Abdomen not yellow or red (at least dorsally) 3

3 (2) Female without vulvar scale on 8th sternite . . *Pseudagrion*
Female with this scale . . . . . *Aciagrion*

4 (1) Arculus far distal to second Ax. Female without vulvar spine. Very small species, abdomen about 20 mm. or less . 5
Arculus at second Ax or barely distal to it. Female normally with vulvar spine. Abdomen generally more than 20 mm. . 6

5 (4) Anal vein angled at its junction with Ac. . . *Agriocnemis*
Anal vein merely slightly curved at its junction with Ac. *Mortonagrion*

6 (4) Pterostigma of male dissimilar in forewing and hindwing. Postclypeus strongly metallic (in Ethiopian species). Female polychroic . . . . . *Ischnura*
Pterostigma similar in all wings. Postclypeus dull. Female not polychroic . . . . . *Enallagma*

Key to males of genus *Ceriagrion* Selys

1 Thorax in front distinctly green 2
Thorax orange or red 3

2 (1) Smaller species, with basal half of wings yellowish. Arculus at or scarcely distal to second Ax. . . . . *whellani*
Larger species, with wings not saffronated. Arculus well distal to second Ax. . . . . *bidentatum*

3 (1) Tenth segment of abdomen with raised spines on distal margin . . . . . *glabrum*
Tenth segment without these raised spines 4

4 (3) Superior appendage considerably longer than inferior and armed with large median tooth; abdomen deep red. *katamborae* n. sp.
Superior appendage not or barely longer than inferior . 5

5 (4) Abdomen orange red to light red. Superior appendage slightly longer than inferior . . . . . *suave*
Abdomen deep red 6

6 (5) Small species, abdomen about 24 mm. Pterostigma elongate . . . . . *ignitum*
Large species, abdomen 35 mm. or more. Pterostigma rhomboidal, almost square . . . . . *platystigma*

Ceriagrion bidentatum Fraser, 1941, *Proc. R. ent. Soc. Lond.* B. **10**: 61, f (Uganda)

A local species favouring thick bush or tropical forest. Northern Rhodesia: Samfya (Dening); Lake Mweru (Johnsen).

Ceriagrion glabrum (Burmeister). *Agrion glabrum* Burmeister, 1839, *Handb.* **2**: 821

Abundant nearly throughout Africa but very variable in colour and size. Northern Rhodesia: Victoria Falls; Ndola; Kasempa; Samfya; Mwinilunga. Katanga: Jadotville (under trees in savannah); Albertville. Nyasaland: Port Herald (Gray); Bua River mouth, Kota Kota; Nkata Bay.

Ceriagrion ignitum Campion, 1914, *Ann. Mag. nat. Hist.* **14**: 281 (Ghana)

A series of males taken at swampy streams, chiefly at Sakeshi River source, are probably this species, but Campion's article is not illustrated. Thorax of the male deep reddish brown above, green laterally; abdomen crimson. Northern Rhodesia: Mwinilunga.

Ceriagrion platystigma Fraser, 1941, loc. cit. 63, ff. (Uganda)

Easily recognizable by its almost square pterostigma this large species has only so far been taken sparsely in the Federation at Abercorn, Northern Rhodesia, in the swamp forest and on the Lucheche River.

CERIAGRION KATAMBORAE n. sp.

(Fig. 41)

Holotype male (mature). Labium and lower surface of occiput creamy white; labrum and anteclypeus pale brown; rest of head above ferruginous; back of occiput pale brown, bordering a ferruginous area. Basal segment of antenna yellowish brown, blackish distally; flagellar segments blackish. Thorax pale brown, tinted with ferruginous dorsally; without any black markings. Legs pale brown, ungues amber but their apices and the claw-hooks black. Wings without any amber; venation grey-brown, the main radial vein pale brown; pterostigma elongate, reddish violet, between pale brown veins.

Forewing with 11–12 Px, hindwing with 10 Px. Arculus just distal to second Ax. Ac nearer to first than to second Ax and situated at end of petiole. In right forewing of type there is an abnormal cross-vein linking the anal vein to the margin.

Abdomen dorsally light crimson on distal end of 1, on dorsum of 2–3 and the proximal half of 4; rest of abdomen light brown, but tinged with red dorsally. Near distal ends of 4–6 there is a small black dorsal crescent, and a trace of one on 3. Superior appendage very distinctive,

porrect, about two-thirds as long as 10; with strong medial tooth halfway along its shaft. Inferior much shorter, broad and somewhat curved in lateral view; the apex black; posteriorly swollen almost as a tumour. Abdomen 27.5 mm., hindwing 17 mm.

Remarks. One male only taken on a stream leading into the Zambezi River at Katambora, 7th October, 1960. This type is in the National Museum, Bulawayo. This is a smallish species, coloured like a dwarf *C. platystigma* Fraser; but with an elongate pterostigma. The anal appendages are quite unlike those of other African species of the genus, in most of which the superior is somewhat curved, very short and without the medial tooth.

Ceriagrion suave Ris, 1921, *Ann. S. Afr. Mus.* **18**: 316 ff. (Katanga)

Northern Rhodesia: Victoria Falls; Ndola; Ngoma; Luanshya; Abercorn and Ufipa Plateau (V. Fitzgerald). Katanga: Lufua River; Elizabethville; Kapiri; Kanonga.

Ceriagrion whellani Longfield, 1952, *Proc. R. ent. Soc. Lond.* B. **21**: 42, ff. (S. Rhodesia)

This small species is abundant in the few swampy, bush localities where it has been found. In life, the lips of the male are yellow; eye and thorax green above, yellowish green below; abdomen orange-red above, paler below. Northern Rhodesia: Ndola (swamps at pool's edge); Mwinilunga (swampy streams, Sakeshi etc.); Abercorn (amongst *Brachystegia* bush at swamp-end of Lake Chila); Samfya ?

? Ceriagrion corallinum Campion, 1914, *Ann. Mag. nat. Hist.* (8) **14**: 279 (S. Leone)

Schouteden (1934: 82) records this from Albertville but this may be open to doubt ? *C. corallinum* is allied to *whellani* but has longer superior appendages; and less amber on the wings.

Key to males of genus *Aciagrion* Selys

1 Abdomen 25 mm. long or less, hw. 17.5 mm. or less. Abdomen with broad black dorsal band on third to seventh segments. Superior appendage much shorter than tenth segment and branched . . . . . *steeleae*

Abdomen 28 mm. or more. Abdomen without broad black dorsal band on third to seventh segments 2

2 (1) Abdomen 32 mm. or less, hindwing 18–22 mm. Superior appendage very large, longer than tenth segment, provided with inner basal spine . . . . . *africanum*

Abdomen 35 mm. or more 3

3 (2) Abdomen exceedingly long and slender, at least 38 mm. Superior and inferior appendages of about the same length, *both much shorter than tenth segment* . . . *heterosticta*

Abdomen about 35 mm. long. Inferior appendage longer than superior . . . . . *attenuatum*

Examples of this genus appear to be very local or distinctly scarce.

Aciagrion africanum Martin, 1908, *Ann. Mus. Stor. nat. Genova* **43**: 659 (Port. Guinea)

Northern Rhodesia: 1 ♂ in swamp, Ikelenge, Mwinilunga; 1 ♂ in large swamp or "dambo" near Solwezi (March, 1960); Samfya (Dening).

Aciagrion attenuatum Fraser, 1928, *Trans. Ent. Soc. Lond.* **1**: 126 (Nyasaland)

Ufipa Plateau, Rhodesia—Tanganyika border (V. Fitzgerald). It was described from Zomba, Nyasaland, where the type male was collected by the late Mr. Colin Smee. Nkata Bay (Eccles).

Aciagrion heterosticta Fraser, 1955, *Rev. Zool. Bot. afr.* **52**: 19 (Katanga)

A number of very teneral examples of this long, slender insect were taken at a swampy pool near a river 25 miles south of Ndola, March, 1960. In the field they were at first thought to be a species of *Teinobasis*, because of their attenuated shape. In life, the oldest example: thorax green, abdomen pink to pinkish red. Northern Rhodesia: Ndola; Ngoma (Kafue National Park). Katanga: Lubumbashi.

Aciagrion steeleae Kimmins, 1955, *Entomolgist* **88**: 109 ff (L. Bangweulu)

This small species is, in the field, easy to mistake for an *Enallagma* or a *Pseudagrion*. It is somewhat variable and the Author's *abercornensis* (Pinhey, 1958, *Occ. Pap. Nat. Mus. S. Rhod.* **22** B: 103, ff.) appears to be no more than the commoner form of this insect, at least in some localities. The anal appendages are very short, almost like certain *Enallagma*. In one example the anal vein leaves the petiole well

distal to Ac, instead of at Ac as in the normal position. In life the eye is dark blue above, green laterally, yellowish green ventrally; pale body colours cobalt. Northern Rhodesia: Mwinilunga (at swampy pool near Zambezi River); Lake Bangweulu (only the original types); Abercorn.

Key to mature males of the genus *Pseudagrion* Selys

In order to simplify this key a little it is divided into two main sections:

A. in which the thorax is more or less black, the antehumerals, if present, being not more than half the width of each mesepisternum. Sometimes strongly pruinosed.

B. in which the thorax dorsally is mainly pale coloured (red, blue, green), the medial and humeral black being narrow. Without pruinosity on the dorsum, except in *pseudomassaicum*.

Section A

1 Synthoracic dorsum all black in adult, without any antehumerals; if pruinosity is present it is scanty 2

Antehumerals visible or else masked by dense pruinosity . 6

2 (1) Labrum, tibiae, tarsi all black. Pt. blackish 3

Labrum, tibiae, tarsi not mainly black. Pt. more reddish . 4

3 (2) Synthoracic dorsum with pruinosed antehumerals. Superior appendage bifurcate, the lower branch the longer (like *kersteni*) . . . . . *inconspicuum*

Synthoracic dorsum black, without pruinosed antehumerals. Superior appendage short, not bifurcate . . *nigerrimum*

4 (2) Labrum red. Superior appendage unbranched and without interior tooth . . . . . *whellani*

Labrum green or greenish 5

5 (4) Superior appendage branched above (like *salisburyense*). *chongwe* n. sp.

Superior appendage unbranched but massive . *deningi* n. sp.

6 (1) Mature examples extensively pruinosed on thorax and abdomen 7

Mature examples with very little dorsal pruinosity or none. 11

7 (6) Superior appendage of *kersteni* form, with lower branch the longer and this branch angled below its origin . . . 8

Superior appendage not like *kersteni* 9

8 (7) Antehumerals broad. Labrum black . . . . . *kersteni*

Antehumerals very narrow. Labrum greenish . . *inconspicuum*

9 (7) Branches of superior appendage of equal length (the upper being downcurved), with fairly wide gap in between. Labrum blackish . . . . . *makabusiensis*

Branches of superior with the gap v-shaped or very narrow. Labrum greenish or brown 10

10 (9) Superior appendage not robust, the lower branch parallel to the upper . . . . . *gerstaeckeri* and *salisburyense*

Superior appendage robust; lower branch lying obliquely across broad end of the upper . . . . . *natalense*

11 (6) Superior appendage short, unbranched 12

Superior appendage distinctly branched 14

12 (11) Face bluish; antehumerals slender, bluish or greenish. An elongate blue spot on segment 2. Superior appendage with median lobe . . . . . *rubroviridis*

Face bluish; antehumerals very broad, blue. A black arrowhead on segment 2. Superior appendage without median lobe . . . . . *assegaii*

Face and antehumerals red. Without pale dorsal marking on 2. Superior appendage without median lobe . . . 13

13 (12) Antehumeral broad (but often in older examples obscured by black ground colour), of even width. Apex of superior appendage broad . . . . . *whellani*

Antehumeral narrow dorsally, expanding ventrally. Superior appendage narrowing apically and therefore conical . . . . . *jacksoni*

14 (11) Upper branch of superior appendage much longer than lower branch, the entire superior enormous, pincer-like. Labrum conspicuously yellow . . . . . *greeni*

Upper branch not longer than lower branch, the appendage not abnormally large 15

15 (14) Lower branch of superior the longer and usually more robust than the upper branch 16

Branches of superior of equal length, or the upper branch curls down slightly so that it does not extend further than the lower one 17

16 (15) Abdomen less than 35 mm. in length. Superior appendage of *kersteni* form. Labrum black or green . . . *inconspicuum*

Abdomen about 38 mm. The pincer-like superior with its lower branch not angled and thus not of *kersteni* pattern. Labrum yellow . . . . . *gigas*

17 (15) Superior appendage with narrow or v-shaped excision between the branches. Smaller species, abdomen 27 mm. or less 18

Branch of superior wide apart. Abdomen usually 28 mm. or more 20

18 (17) Antehumeral stripes almost absent, only represented as vestigial pruinosed traces . . . . . *chongwe* n. sp.

Antehumerals well developed 19

19 (18) Antehumerals blue or green. Labrum green. Abdomen 2 above with a black u-shaped mark . . . . . *nubicum*

Antehumerals and labrum red. Abdomen 2 above mainly black and without a black u . . . . . *rufostigma*

20 (17) Dorsum of thorax often thinly pruinosed, labrum blackish. The gap between the branches of the superior appendage not broadly rounded . . . . . *makabusiensis*

Dorsum not pruinosed. Labrum not blackish. The gap in the superior broadly rounded 21

21 (20) Labrum dull-coloured, not of a yellowish hue. Pterostigma blackish. Branches of superior appendage of equal width. *melanicterum*

Labrum and face bright orange. Pterostigma reddish. Lower branch of superior thicker than upper branch . . 22

22 (21) Branches of superior with deep incision between; lower branch not angled below origin . . . . . *angolense*

Branches of superior with shallow incision; lower branch broadly angled. Inferior appendage abnormally long. *fisheri* n. sp.

Section B

1 Face and thoracic dorsum red 2

Face and thoracic dorsum blue or green 5

2 (1) Humeral black stripe slender, almost linear. Inferior appendage conical 3

Humeral black thick. Inferior hatchet-shaped . . . 4

3 (2) Abdomen 2 all black above. Superior appendage shorter than inferior . . . . . *sjoestedti*

Abdomen 2 with black u-shaped mark above. Superior appendage at least as long as inferior . . . . . *acaciae*

4 (2) Superior appendage longer than inferior. Dorsum of thorax normally pruinosed voilet . . . *pseudomassaicum*

Superior appendage not longer than inferior. Dorsum of thorax without pruinosity and thus appearing red . *massaicum*

5 (1) Smallish species, abdomen about 26 mm. A black mark like a cat's head on segment 2 . . . . . *coelestis*

Larger, abdomen over 30 mm. Segment 2 with a black u-shaped mark 6

6 (5) Black thoracic marking vestigial. Branches of superior appendage of equal length . . . . . *glaucescens*

Black thoracic stripes on sutures developed, although slender. Lower branch of superior appendage longer than upper. *glaucoideum*

PSEUDAGRION CHONGWE n. sp.

(Fig. 1)

Holotype male (mature). One of the blacker species. Labrum, genae and epistome greenish white (might be bluish in life ?); base of postclypeus, the frons and head above black; with trace of yellow on posterior edge of occiput and with small round, greenish postocular spots. Prothorax dull black, with traces of yellow, laterally, on anterior and posterior lobes. Synthorax dull black above and down sides almost to first lateral suture, in fact in dorsal third coalescing with a short stripe on this seam; rest of sides greenish yellow, with a rather broad black band on second

lateral suture. Legs black, with mere trace of white pruinosity on femora; tibiae pale brown on outer (extensor) surfaces; tarsi light brown with distal black annuli, claws also brown with black apices. Venation black. Pterostigma elongate, dark reddish brown, with pale edging. Arculus very slightly distal to second Ax, Ac at or almost at commencement of anal vein. 13–14 Px in forewing, 12–13 in hindwing. Abdomen blackish to metallic green above, yellowish below; faint trace of white pruinosity on 1–2; 8–9 pale bluish above. Appendages short, narrowly forked, resembling those of *P. salisburyense* Ris, particularly in sideview, but with the upper branch of the superior perhaps less blunt. In dorsal view it is seen that the end of an inner ventral ridge slightly projects inwards from the superior; inferiors somewhat saucer-shaped.

Abd. 33 mm., hw. 23 mm.

Paratype male 1. Smaller, abd. 29 mm., hw. 21 mm. Pruinosity developed a stage further, so that faint whitish antehumerals appear on the black thorax, each less than half the width of a mesepisternum. *Paratype* 2 is of the same size as the last but has only a trace of the antehumeral in the dorsal portion of the thorax.

Female ? A *teneral* female *Pseudagrion*, together with a mature male of this species were sent from Fort Jameson. It is not certain that the female belongs to the same species, but a brief description may be of interest. Lips, face and frons dull orange brown; a black line at extreme lateral edge of labrum and a black basal line on postclypeus; rest of head above black except for the pale brown, elongate postocular spots which are connected together across the back of the occiput. Prothorax black above, pale orange brown on anterior lobe, also laterally and with sublateral spot and median dashes of this colour; prothoracic stylets entirely orange brown, over one third as long as middle lobe. Synthorax very like *salisburyense* but with black line on first lateral suture. Legs yellowish, with black external streak on femora.

Pterostigma light brown. Abdomen metallic bronze green above; distal end of 8 with a pale (? bluish) spot; 9 pale, except for a black latero-basal patch; 10 all pale; cerci short, pale.

Abd. 28 mm., hw. 22 mm.

Remarks. Males, including the types, were collected by Mr. R. C. Dening at Chongwe, in Northern Rhodesia. A further male, slightly blacker on sides of thorax than the Chongwe types, was caught by Mr. J. Clarke (?) at Fort Jameson, in a " fishpond, surrounded by grasses and Brachystegia Woodland ", 27th December, 1957; and he collected the teneral female described above at the " margin of a dam, over reeds and grass ", at Fort Jameson, on the 31st of that month.

This species is closest to *salisburyense*, but is blacker, with the appendages differing as stated above. The mature male does not develop the extensive blue pruinosity of *salisburyense*. In less mature *salisburyense* the thorax is metallic instead of dull black. Holotype and paratype No. 1 will be in the National Museum, paratype No. 2 will be sent to the British Museum (Natural History).

PSEUDAGRION DENINGI n. sp.

(Fig. 2)

Holotype male (mature). Lips, anteclypeus, sides of face and front of frons greenish white to yellowish, with trace of black on labrum. Postclypeus, rest of frons and entire head above black, without postocular spots; in fact even ventrally the occiput is mainly black. Prothorax all dull black except for a minute whitish lateral dot and fine white lateral edge to posterior lobe. Synthorax dull black to first lateral suture; rest of sides whitish (probably pale blue-green in life) except for a continuous black stripe on second lateral suture. Femora black, posterior femora pale brown on inner (flexor) surfaces; tibiae and tarsi brown, with narrow black streak on the tibiae.

Venation dark brown. Pterostigma elongate, reddish brown. Ac at commencement of anal vein in hindwings, but slightly distad to it in forewings; 12 Px in forewings, 10–11 in hindwings. Abdomen black above, pale greenish yellow below (1–2 with blue lateral spots), with only the merest trace of white pruinosity on 1–2; 8–9 entirely pale blue except for a minute black baso-lateral dot on 8; 10 black with pale blue lateral patch, widening distally. Superior appendages black and extraordinarily robust; knotched but not branched at apex and bearing apical spines. In lateral view the ventral portion of this massive appendage is seen to slope inwards to meet the corresponding appendage of the other side. Consequently, in dorsal view the inferior appendage cannot be seen. In dorsal aspect it is seen that the superior is hollowed out along its middle portion, the lining of this hollow being only thinly chitinized. Inferior appendage much smaller, tinged with bluish.

Abd. 26 mm., hw. 19 mm.

Remarks. The holotype male in the National Museum, Bulawayo, was presented by Mr. R. C. Dening, who collected this and others at Lake Chali, Bangweulu Swamps, on the 16th October, 1959. He stated this species was very common there at the time but being unaware that it would prove to be new he did not take further specimens. A single male from Lake Chila (Abercorn) is evidently a form of the same species. The face is distinctly yellow. The thorax above is metallic bronze-green; laterally and ventrally, as well as on base of abdomen there is some white

pruinosity. There are slight differences in the shape of the blue lateral patch on 10; but the appendages are similar. It seems inadvisable to call this a paratype in case it should eventually prove to be a separate race, although it is more likely that it is merely an older example.

A smaller species than the last, this is one of the blackest *Pseudagrion* yet examined by the Author. It is evidently near *whellani* Pinhey in general features, but the superior appendages, although also unbranched in the latter, are not nearly so robust.

PSEUDAGRION FISHERI n. sp.

(Fig. 3)

Holotype male (mature). Labium and ventral surface of occiput pale yellowish. Face in front deep orange; mere traces of three black basal dots on labrum; postclypeus entirely glossy bronze-black; frons above and entire vertex bronze-black except for a trace of orange on back of occiput and for the very small greenish yellow postucular spots. Antennae black.

Prothorax bronze-black, each lobe edged laterally with orange and with a small orange lateral triangle on the median lobe. Synthorax bronze-black dorsally and to below humeral suture (covering about half the mesepimeron); with very slender, but complete, yellow antehumerals; sides greenish yellow with rather narrow bronze-black stripes on the upper portions of the two lateral sutures. Legs pale brown, the femora entirely black on the outside, tibiae with black stripe on flexor surfaces, traces of black on tarsi; claw-hooks very short. Wings slightly fumose. Venation blackish brown, pterostigma dark reddish brown, rhomboidal. Ac at commencement of anal vein in hindwings but somewhat distad in forewings. Arculus a little beyond second Ax in forewings (by as much as the upper segment of the arculus). 14–15 Px in forewing, 12 in hindwing. Abdomen bronze-black above, with strong greenish tinge. 9–10 with blue lateral patch. Superior appendages black, very robust with broad anvil-like lower branch; the lower branch with prominent teeth before the apex and an inner flange along the stem. Inferior appendage light brown, exceptionally large, as long as the superior, and provided with a hirsute inner basal flap.

Abd. 33.5 mm., hw. 23 mm.

In life the face is bright orange, the side of the thorax green, the lower surface of the abdomen and the inferior appendages very pale ochreous.

Paratype males. The prothoracic orange triangles are larger in some individuals; and in rather less mature specimens the pterostigma is pale brown, while the legs have rather less black. Variation in size not appreciable. In tenerals the wings are slightly more fumose.

Allotype female (mature). Face greenish ochreous, the frons in front more brownish; postclypeus and head above black, scarcely with any bronze sheen; postocular spots as in male. Thorax entirely as in male, but the prothoracic triangles are slightly larger and the antehumerals a little broader, yet barely one third the width of the mesepisternum. Prothoracic stylets entirely absent. Legs greyish ochreous, with the black reduced to traces on the exterior surfaces. Wings also slightly fumose, pterostigma pale brown. Abdomen bronze-green above, strongly greenish; 10 pale laterally. Cerci black dorsally, two-thirds the length of 10.

Abd. 31 mm., hw. 22.5 mm.

Paratype females. These have more external black on femora and tibiae.

Remarks. A longish series, from which the types were selected, was taken at Ikelenge, Mwinilunga, chiefly on the Sakeshi stream at Hillwood Farm, in February and March, 1960. The Author would like to acknowledge the invaluable assistance received from the owner of the farm, Mr. A. Fisher, by naming this species after him. The species flies near the banks in the open, but near shading trees and shrubs. A few examples were taken on the Lucheche River, Abercorn, by Vesey Fitzgerald, February–March, 1957. The conspicuous orange face distinguishes this insect in the field from the yellow-faced *greeni*, of similar size. Types, three male and two female paratypes in the National Museum; one male and one female paratype will be sent to the British Museum (Natural History).

This species, in colour and markings, is near *angolense*, from which the male differs by the smaller postocular spots, the black leg markings and the peculiar appendages, with the two branches of the superior more massive and only moderately separated (widely so in *angolense*). The female is distinctive in lacking prothoracic stylets and in its narrow antehumerals. From *monardi* Longfield, of Angola, *fisheri* differs in its smaller postocular spots, the darker vertex, narrower antehumeral stripe; the appendages more massive and differing in shape. The female is close to *monardi* in many respects, particularly in having no stylets, but differs in the rather narrower antehumerals.

PSEUDAGRION GREENI Pinhey

(Fig. 4)

Pseudagrion greeni Pinhey, 1960, *Ent. Mon. Mag.* **96**: 260 (♂ Ndola)

Allotype female (Ndola). More examples of both sexes of this species which was first collected to the south of Ndola, in January, 1958, were found during the 1960 expedition to Northern Rhodesia and it can now be stated that the solitary female tentatively described with the original description of the male *greeni* can be taken as the allotype. An additional observation is that the cerci are very large, about one and a quarter times as long as 10.

Males. In life, the pale colours of males (Kabompo River): labrum pale lemon yellow to bright yellow; anteclypeus, genae, lower surface of eye greenish yellow, the rest of the eye dark brown; antehumeral pale green, sides and ventral surface of thorax pale blue-green; 8–9 violet blue above. In a teneral male the wings are slightly fumose, the labrum more ochreous; dorsum of 8–9 blue without violet tinge.

Remarks. In the field the male of this large species, like *gigas*, is distinguished by its yellow face, whereas in the superficially similar *fisheri* it is orange. *Greeni* is a much darker species, with very reduced antehumerals; and the superior appendages are enormous, pincer-like, and more akin to certain Madagascar species. The inferiors are far shorter and being flattened appear slender in sideview. The females, in size and in the possession of only vestigial prothoracic stylets, are allied to *monardi* Longfield and *superbum* Fraser, but with the antehumerals less yellowish, more reddish to violaceous. The exceptionally long cerci are distinctive and perhaps correlated in development with the long appendages of the male *greeni*.

The original short series was collected on the swampy banks of a small river to the south of Ndola in January, 1958. A further example was taken at the same stream in March, 1960, and others in February, 1960, at a swampy stream running into the Kabompo River, east of Mwinilunga, and others in similar situations on the Sakeshi stream. The allotype female is in the National Museum.

Pseudagrion acaciae Foerster, 1906, *Jber. Ver. Naturk. Mannheim* **71-72**: (56 sep.) (Transvaal)

An apparently uncommon species. Northern Rhodesia: Chirundu Bridge (Zambezi River), Victoria Falls and Katambora; Ndola.

Pseudagrion angolense Selys, 1876, *Bull. Acad. Belg.* (2) **42**: 493 (Angola)

A very common sciaphilous species in many parts of Africa. Northern Rhodesia: Ndola; Abercorn; Mwinilunga. Katanga: La Manda River; Lubudi; Lufua River; Fizi; Upemba nat. Park.

Pseudagrion assegaii Pinhey, 1950, *Ann. Transv. Mus.* **21**: 261, ff. (Transvaal and Southern Rhodesia)

An uncommon species taken by Dening (September 1960) at Mumbwa in Northern Rhodesia.

Pseudagrion coelestis Longfield, 1945, *Arch. Mus. Bocage* **16**: 9, 28, ff (Angola)

A rather sparsely scattered species. Northern Rhodesia: Victoria Falls and Katambora; Abercorn.

Pseudagrion gerstaeckeri Karsch, 1899, *Ent. Nachr.* **25**: 379, f. (Zanzibar)

Katanga: Lusinga. Nyasaland: Mzimba. Very closely allied to *salisburyense* but with distinct antehumeral stripes in mature examples.

Pseudagrion gigas Ris, 1936, *Abh. Senckenb. naturf. Ges.* **433**: 33 (Sikasso)

A local species, preferring the larger streams or rivers. Northern Rhodesia: Ndola; Kabompo River; Mwinilunga. Nyasaland: Cholo.

Pseudagrion glaucescens Selys, 1876, *Bull. Acad. Belg.* (2) **42**: 498 (Sierra Leone)

Another local species. Northern Rhodesia: Victoria Falls; Ndola; Samfya; Luanshya; Kasempa. Katanga: Kiambi and Lufua River. It has been recorded (under the name *zumbense* Návas, 1917) in Moçambique and it seems certain that the species occurs in Nyasaland.

Pseudagrion glaucoideum Ris, 1936, *Abh. Senckenb. naturf. Ges.* **433**: 66 (B. Congo)

Not a well known species. Katanga: Lufua River.

Pseudagrion inconspicuum Ris, 1931, *Rev. suisse Zool.* 98, f. (Angola)

There appear to be two distinct forms of this insect in Northern Rhodesia, with rather similar markings, and without clear distinctions in pterostigma or appendages. It is hoped that further material will be obtained, since it is locally common.

(*a*) Large form, similar to an example in the National Museum from Cazombo, Angola, November 1955. Labrum black; thorax very black, without antehumerals or with only a trace of pruinosed blue ones in older examples. Abd. 32–34 mm. Kabompo River, March 1960; Ndola (Green) May 1959; Kigwishi (Dening) July 1959; Chongwe River, Lusaka, March 1960 (Dening); Fort Rosebery (Dening).

(*b*) Small form. Labrum green, Antehumerals normally present, often pruinosed. Abd. 24–26 mm. Ndola (Green) May 1959; Luanshya December 1957; Abercorn (Vesey Fitzgerald) February, March, May, November, 1957; Mwinilunga February, March, 1960.

Pseudagrion jacksoni Pinhey, 1961, *Publications Brit. Mus.* (*Nat. Hist.*) 37

Hitherto only known from the type male and female from Northern Uganda, a single male was captured in March, 1960, on the Kabompo River. It belongs to the *whellani* group. Slightly larger than *rufostigma*, which is similar in general appearance, *jacksoni* has club-shaped antehumerals, unlike *rufostigma* and *whellani;* and the short superior appendage is unbranched and pointed (blunt, unbranched in *whellani*, branched in *rufostigma*).

Pseudagrion kersteni (Gerstaecker). *Agrion kersteni* Gerstaecker, 1869, *Arch. Naturgesch.* **35** (1): 222 (East Africa)

Perhaps the commonest Damselfly in most parts of Africa. Males (Plate 1, fig. *d*) are distinguishable in the field by the strongly pruinosed head and antehumerals and the green eyes. Northern Rhodesia: Victoria Falls; Ndola; Kasemba; Mwinilunga; Fort Rosebery; Lusaka; Abercorn. Katanga: Lubudi; Elizabethville; Albertville. Nyasaland: Mzimba; Fort Hill; Cholo; Nkata Bay.

Pseudagrion makabusiensis Pinhey, 1950, *Ann. Transv. Mus.* **21**: 263 (S. Rhodesia)

So far only known from the two Rhodesias. Abundant at Ndola and Mwinilunga; variable in size, males, abd. 28–33 mm. Northern Rhodesia: Ndola; Mwinilunga; Abercorn; Chongwe River, Lusaka.

Pseudagrion massaicum Sjoestedt. *Ps. punctum massaicum* Sjoestedt, 1909, *Kilim.-Meru Exp.* **2**: 48 (Kilimanjaro)

Certainly much more widespread in these territories than the records indicate. Northern Rhodesia: Ndola; Kabompo River (Johnsen). Katanga: Upemba Nat. Park. Nyasaland: Bua River mouth, Kota Kota.

(W. Africa)

Although Northern Rhodesia seems to be the southern limit of its range, it is abundant wherever it occurs in these territories, in rather dense bush or in forest. Pairs in copula were taken in Mwinilunga and other localities. One male was captured with a Tineoid moth as prey, another with a Jassid. The antehumerals of the male *melanicterum* may be slender and normal, as in West African examples, or slightly wider in some specimens from Mwinilunga. The size is variable: males, abd. 27–34 mm., hw. 18–23 mm. Northern Rhodesia: Ndola; Mufulira; Mwinilunga; Samfya; Abercorn (in swamp forest). Katanga: La Manda River; Lufua River; Upemba Nat. Park.

Pseudagrion natalense Ris, 1921, *Ann. S. Afr. Mus.* **18**: 307 (S. Africa)

Some of the larger males (abd. c. 35 mm.) seem indistinguishable from *spernatum* Selys (1881, *Ann. Mus. Stor. nat. Genova* **16**: 223) from further north. Northern Rhodesia: Victoria Falls; Ndola; Mwinilunga; Abercorn. Katanga: Lubudi.

Pseudagrion nigerrimum Pinhey, 1950, *Ann. Transv. Mus.* **21**: 265 (S. Rhodesia)

Northern Rhodesia: Victoria Falls.

Pseudagrion nubicum Selys, 1876, *Bull. Acad. Belg.* (2) **42**: 501 (Nubia)

A local species, Rhodesian examples are larger than the form which is abundant in Uganda on the reedy fringes of Lake Victoria. Northern Rhodesia: Victoria Falls; Kafue River; Samfya (common, according to Watmough). Katanga: Lufua River.

Pseudagrion pseudomassaicum Pinhey, 1951, *Transv. Mus. Mem.* **5**: 93, ff. (S. Africa)

A widespread species, preferring running water. Northern Rhodesia: Victoria Falls; Ndola; Mwinilunga. Katanga: Lufua River.

Pseudagrion rubroviridis Pinhey, 1956, *Occ. Pap. Coryndon. Mus.* **4**: 23, ff. (V. Falls)

A local insect. Northern Rhodesia: Victoria Falls.

Pseudagrion rufostigma Longfield, 1945, *Arch. Mus. Bocage* **16**: 11, 28, ff. (Angola)

Locally common in some parts of Northern Rhodesia and many were seen in copula. The face and antehumerals are vermillion, as in the rarer *jacksoni*. Pale colours of female in life: eye yellow, brown above; face pale yellow; antehumerals yellowish brown. Northern Rhodesia: Katambora; South of Ndola; Kabompo River; Mwinilunga.

sia, rica)

A common insect in the southern part of the continent. Very like *gerstaeckeri* but with the narrow antehumerals quite obscured by pruinosity. Northern Rhodesia: Victoria Falls and Katambora; Ndola; Abercorn. Katanga: Lubudi. Nyasaland: Mzimba.

Pseudagrion sjoestedti Foerster, 1906, *Jber. Ver. Naturk. Mannheim* **71-72**: (62 sep.) (Cameroons)

A very local species. Northern Rhodesia: Victoria Falls; Chongwe River, Lusaka (Dening). Katanga: Albertville; Elizabethville (*vide* Schouteden).

Pseudagrion whellani Pinhey, 1956, loc. cit. 18, ff.

Widespread. Northern Rhodesia: Victoria Falls; Kapiri Mposhi; Ndola; Kasempa; Abercorn. Katanga: Bunkeya; Lufua River.

Key to males of *Agriocnemis* Selys and *Mortonagrion* Fraser

1 Superior appendage forcipate and much longer than inferior . . . . . *forcipata*

Superior appendage not forcipate, not or scacely longer than inferior 2

2 (1) Superior appendage deeply bifid, with its lower branch the longer and sloping steeply downwards . . . . *gratiosa*

Superior appendage not deeply bifid, but broad and curled downwards 3

3 (2) Superior with a long medio-ventral spine. Postocular spots normally present . . . . . *exilis*

Superior without ventral spine. A darker insect, normally without postocular spots . . . . . *Mortonagrion stygium*

Agriocnemis exilis Selys, 1872, *Rev. Mag. Zool.* (182 sep.) (Madagascar etc.)

A very widespread insect, despite its minute size (Plate 1, fig. *e*). Generally gregarious at swampy pools and easy to collect by sweeping. Northern Rhodesia: Victoria Falls; Ndola; Mwinilunga; Abercorn; Samfya (Watmough: common in " dambos "). Nyasaland: Nkata Bay.

Agriocnemis forcipata Le Roi, 1915, *Ergebn. zte Z. Afr. Exp.* **1**: 341, pl. (Sudan). *A. victoria* Fraser, 1928, *Trans. Ent. Soc. Lond.* 123, f. (Uganda)

The common form in the Mwinilunga District, in swamps near Sakeshi River and at the source of that river, is the smaller form *victoria*. In the Northern Congo the Author has found the larger *forcipata* dominant. Northern Rhodesia: Mwinilunga.

Agriocnemis gratiosa Gerstaecker, 1891, *Jb. Hamburg. wiss. Anst.* **9**: 190 (Zanzibar)

Uncommon in Southern Africa. The Author has taken this at Vila Paiva in Portuguese East Africa but not in Rhodesia. Northern Rhodesia: *Lake Mweru (V. Fitzgerald); Samfya (Dening).*

Mortonagrion stygium (Fraser). *Agriocnemis stygia* Fraser, 1954, *Rev. Zool. bot. Afr.* **50**: 274, ff. (B. Congo)

Northern Rhodesia: Victoria Falls; Abercorn. Katanga: Bunkeya.

Key to males of *Enallagma* Charpentier

Records in Northern Rhodesia and Katanga for *Enallagma* are scarce.

1 Distal end of 10th segment raised and bifurcate, dorsally. Lower end of mesepisternum with rounded lappets. *subfurcatum*

Distal end of 10 not markedly raised nor bifurcate. Thorax without lappets 2

2 (1) Abdomen normally 21 mm. or less 3

Abdomen normally 23 mm. or more 4

3 (2) Pterostigma a pale rhombus, framed in rounded veins. Ac usually nearer second, than to first, Ax . . . . *minutum*

Pterostigma elongate at upper distal angle, framed in straight veins. Ac nearer first Ax or midway between the two . . . . . *nigridorsum*

4 (2) Superior appendages directed horizontally 5

Superior appendages bent downwards or sharply angled . 6

5 (4) Pale species with reduced dark markings. Pterostigma yellow . . . . . *subtile*

With dark markings on thorax and abdomen. Pterostigma brown or grey . . . . . *glaucum*

6 (4) Superior appendage sloping down for half its length, then bent anteriad at right angles: laterally, appearing like head and neck of a bird . . . . . *longfieldae*

Superior appendage bent straight down, or sinuously . 7

7 (6) Inferior appendage with long, slender spine. Abdomen 23–26 mm. . . . . *elongatum*

Inferior with short spine. Abdomen 28–30 mm. . *sinuatum*

Enallagma elongatum (Martin). *Ischnura elongata* Martin, 1906, *Bull. Mus. Hist. nat. Paris* **12**: 513

Probably more widespread than available records indicate. Northern Rhodesia: Ndola, February 1960. Katanga: Lualaba; Mubale.

Enallagma glaucum (Burmeister). *Agrion glaucum* Burmeister, 1839, *Handb.* **2**: 821 (Cape)

This species is rather less common north of the Zambezi than in Southern Africa. Northern Rhodesia: Ndola.

Enallagma longfieldae Fraser, 1947, *Proc. R. ent. Soc. Lond.* B**16**: 146, ff. (Uganda)

The Katanga records may be the southern limit of this Uganda species. Katanga: La Manda River; Kabambare.

Enallagma minutum Ris, 1931, *Rev. suisse Zool.* **38**: 102, f. (Angola)

A minute, uncommon insect. Northern Rhodesia: Abercorn.

Enallagma nigridorsum Selys, 1876, *Bull Acad. Belg.* (2) **41**: 531 (114 sep.) (Zanzibar)

No records from this area yet, although found in Tanganyika and south of the Zambesi. New records in Southern Rhodesia: Bulawayo and Balla Balla.

Enallagma sinuatum Ris, 1921, *Ann. S. Afr. Mus.* **18**: 330 f.

Apparently an uncommon insect. Northern Rhodesia: 35 miles north of Kapiri Mposhi; Milambo, Fort Rosebery; Abercorn and Ufipa Plateau (V. Fitzgerald).

Enallagma subfurcatum Selys, 1876, *Bull. Acad. Belg.* (2) **41**: 534 (117 sep.) (Abyssinia)

Normally a high altitude species. Northern Rhodesia: Fort Jameson.

Enallagma subtile Ris, 1921, *Ann. S. Afr. Mus.* **18**: 332 (Katanga). *Libyagrion decoloratum* Fraser, 1928, *Trans. Ent. Soc. Lond.* **76**: 126 (Nyasal.)

Taken on Ufipa Plateau (V. Fitzgerald) and Northern Rhodesia: Abercorn. Southern Rhodesia, on the Vumba and in South Melsetter. Also Katanga. Nyasaland: Zomba (described as *decoloratum* and originally captured by the late Mr. Colin Smee).

Ischnura senegalensis (Rambur). *Agrion senegalense* Rambur, 1842, *Névr.* 276

This widespread, abundant insect may appear in most dragonfly habitats. Northern Rhodesia: Victoria Falls; Abercorn. And certainly elsewhere. Katanga: Chembe.

Family **AGRIIDAE**

Key to genera

1 MA straight until nodus. Pterostigma small or absent . *Phaon*

MA curved before nodus. Pterostigma normally developed. *Umma*

Phaon iridipennis (Burmeister). *Calopteryx iridipennis* Burmeister, 1839, *Handb.* **2**: 827 (Durban)

A common shade-loving insect. Some examples from Northern Rhodesia have the thorax plain brown without the iridescent green bands, but they are otherwise normal. Northern Rhodesia: Victoria Falls; Ndola; Lusaka; Mwinilunga; Kasempe; Abercorn (in swamp forest). Katanga: Kanonga; Lufua River; Elizabethville etc. (*vide* Schouteden). Nyasaland: Mzimba; Njakwa Gorge; Nkata Bay.

Key to *Umma* Kirby

1 Pterostigma 1.5 mm. or less. Margins of wings densely black . . . . . *mesostigma*

Pterostigma 2 mm. or more. Wing margins not outlined in black 2

2 (1) Abdomen 38 mm. or less. Wings strongly greenish yellow. Pterostigma green or pale blue . . . . . *distincta*

Abdomen 45 mm. or more. Wings hyaline. Pterostigma lilac or violet . . . . . *electa*

Umma distincta Longfield, 1933, *Stylops* **2**: 139 (Kambove, Congo)

A beautiful insect, the male (Plate 1, fig. *h*) with metallic green body, the head, front of thorax and, in juvenile males, the dorsum of the abdomen royal blue; wings fumose; pterostigma metallic green, occasionally sprinkled with shimmering pale blue or violet (showing an apparent resemblance to *electa* Longfield). In the female the body is duller metallic green, only the face royal blue. The Pterostigma in this sex varies from 1.5 to 3 mm. The size is very variable. Abercorn specimens generally, and some Kabompo–Mwinilunga males having abdomens of 33.5–35.5 mm.; other Mwinilunga and the Ndola males having abdomens of 42–43 mm. Despite such variations there appear to be no valid distinctions: body coloration, wings, pterostigma, and appendages and the accessory organs are all similar. It is possible that the Abercorn specimens, being consistently small in a very long series, even at different times of the year, might be separated as a different race. On the other hand at the Kabompo River, examples of large and small forms were found in the same short stretch of semi-shaded, sandy-banked river. Northern Rhodesia: Ndola; Kabompo River; Mwinilunga (Sakeshi River, Zambezi River, Zambezi source and elsewhere, in or on edges of riverine bush or forest); Abercorn (swamp forest). Katanga: Kambove; Kamina.

Umma electa Longfield, 1933, ibid. 139 (Kambove)

The Author has not seen this species. Katanga: Kambove; Upembe National Park; Lubumbashi (*vide* Schouteden); Kapiri.

Umma mesostigma (Selys). *Cleis mesostigma* Selys, 1879, *Bull. Acad. Belg.* (2) **47**: 358 (Cameroons). Katanga: Kafukumba) *vide* Schouteden, as *fuscipleuris* (err. pro *fuscimarginis* Sjoest.)

Family **CHLOROCYPHIDAE**

Key to genera

1 Tibiae of male expanded, flattened and coloured . *Platycypha*

Tibiae of male not expanded, blackish . . . *Chlorocypha*

Platycypha caligata (Selys). *Libellago caligata* Selys, 1853, *Bull. Acad. Belg.* **20** *Suppl.*: 57 (Natal)

This widespread species (Plate 1, fig. *f*, *g*) the male with sky blue abdomen, red, basally, at the sides, the tibiae red and white (yellow and white in immature examples) is common in the Territory as elsewhere.

Occasionally, the investigator may be fortunate in seeing the courtship dance of the male (Pinhey, 1951: 133), although this is not always performed. Northern Rhodesia: Victoria Falls and Katambora; Ndola; Kasempa; Mwinilunga; Lusaka; Kabompo River; Solwezi; Abercorn. Katanga: Albertville; Fizi; Elizabethville; Kanonga. Nyasaland: Mzimba; Njakwa Gorge; Cholo.

CHLOROCYPHA Fraser

Apart from the well-known, crimson-bodied luminosa two new species of red-bodied *Chlorocypha* were collected in February–March, 1960, in the Ikelenge region of Mwinilunga. Unfortunately, although long series were collected, many were attacked by mould in their triangular envelopes, largely because of the excessively damp conditions.

Key to males

1 Second abdominal segment mainly black above, with pale central spot. The pale, branched antehumerals well developed or, in older specimens, entirely obscured by black. Epistome blackish in front, at least in mature examples . . . . . *luminosa*

Second abdominal segment mainly red, with black spots attached to distal margin. Antehumerals not obscured in the older examples 2

2 (1) Epistome dark in front or with white vertical lines. Branches of antehumerals slender. The distal spots on segment 2 large and bean-shaped 3

Epistome blue in front. Branches of antehumerals well-developed. Distal spots on segment 2 small and divergent *frigida* n. sp.

3 (2) Distal spots on segment 3–4 in the form of minute isolated dashes . . . . . *wittei*

Distal spots on 3–4 like small wedges joined to posterior margin . . . . . *fabamacula* n. sp.

Key to females

1 Second segment broadly black above, with pale central spot. Black U-shaped marks on third and fourth segments . 2

Second abdominal segment largely pale above, with small black spot attached to distal margin. Black dorsal markings on third and fourth segments slender, divergent . . . 3

2 (1) The black on second segment very broad, its lateral edge straight or concave. The U-marks on third and fourth broad and regular . . . . . *luminosa*

The black on second segment less broad, its lateral edge angular. The U on fourth broad and regular, but that on third tapering and incurved posteriorly . . *fabamacula* n. sp.

3 (1) Epistome blue . . . . . *frigida* n. sp.

Epistome black . . . . . *wittei*

Chlorocypha luminosa (Karsch). *Libellago luminosa* Karsch, 1893, *Berl. ent. Z.* **38**: 33 (Togo)

Libellago consueta Karsch, 1899, *Ent. Nachr.* **25**: 376 (Nyassa)

(Fig. 6). Central African specimens of this species might generally be referred to the form *consueta;* yet occasional examples similar to typical *luminosa*, which was described from West Africa, occur amongst the darker *consueta*. This may indicate that the slight differences are due to maturation changes.

The species, with its crimson-bodied male, is locally common in the warmer and moister parts of the Federation, more often in riverine bush. One very large female taken at Lubudi, with hindwing slightly over 29 mm., is more or less of the dimensions of *lacuselephantum* (Karsch, 1899, *Ent. Nachr.* **25**: 165) which was described from a female taken in the Cameroons.

Northern Rhodesia: Chirundu Bridge (Zambezi); Ndola; Fort Rosebery; Kabompo River; Mwinilunga (especially on the Zambezi River); Abercorn (swamp forest). Katanga: Lubudi (forested gorges); Lufua River; Fizi; Elizabethville. Nyasaland: The form *consueta* was described from the north of that territory. Nkata Bay.

CHLOROCYPHA FABAMACULA n. sp.

(Fig. 8)

Holotype male. (Solwezi). Face black in front, labrum with pale lateral spot. Head above with pale spots on epistome and frons; slender lateral stripes on vertex, pale postocular spots and a pale line on back of occiput. Prothorax with pale angular lateral spots. Synthorax greenish black almost down to first lateral suture; with fine yellowish

median line; slender, branched antehumerals, the outer branch almost or quite broken near dorsal end; a stripe below humeral suture. Sides greenish, with short black dorsal stripe on first lateral suture and continuous stripe on second suture. Legs black, tibiae white on flexor surfaces. Wings hyaline, with amber at bases, almost to arculus. Pterostigma dark brown. Quadrilateral in forewings with 1–2 cross-veins, in hindwings with 2–3 cross-veins.

Abdomen orange-red on basal segments, more brick red on terminal segments; with sparse black markings: broad spot on 1; two large, stalked bean-shaped markings (after which the name is chosen) on 2; 3–4 with smaller distal spots on margins; 5–6 or 5–7 with mere traces of hyphens. A black basal band on 10; appendages black.

Abd. 19 mm., hw. 21.5 mm. pt. 2 mm.

Paratypes (all Mwinilunga). Essentially similar. In one male the distal spots on 2nd segment are free.

Allotype female (Mwinilunga). Face in front orange brown with black central patches on labrum and epistome. Head above as in male. Thorax with the stripe below humeral suture branched, but in opposite direction to the branched antehumeral: thus the thorax is paler laterally than in the male. Legs entirely black. Wings with the basal amber extending diffusely below costa to apex. Pterostigma with pale central spot. One cross-vein in all quadrilaterals. Abdomen: 1 with black central patch; 2 with central pale spot ringed with black, which is angular on lateral edges; 3–7 with broad black u-marks. 8–10 and cerci all black.

Abd. 18.5 mm., hw. 24 mm., pt. 2 mm.

Paratype female. Similar.

Remarks. This is a smaller species than *luminosa*, with the abdomen generally orange-red, but sometimes almost crimson. Both sexes have the saffron traces on the wings. It was noticeable in close inspection that, in life, there were fine white lines down the epistome of the male. The species is near to *basilewskyi* Fraser (1955, *Ann. Mus. Tervuren* 8. *Zool.* **36**: 23) but differs in having the antehumerals more complete and the spots on second segment joined to distal margin. From the incomplete type male of *wittei* it differs in pattern on the third segment. Types will be in the National Museum; one paratype of each sex (regrettably stained) will be sent to the British Museum (Nat. Hist.). All were collected in the Mwinilunga District at bush-fringed streams, except the Solwezi type.

CHLOROCYPHA FRIGIDA n. sp.

(Fig. 7)

Holotype male. Distinguished from its allies in Northern Rhodesia by the blue " nose ", i.e., the front of the face; hence the suggested name. Entire face in front pale greenish blue. Head above black with the usual pale spots, the lateral stripes on the vertex being joined to the pale stripe at back of occiput. Prothorax with pale anterior, posterior and lateral spots. Synthorax greenish black only to humeral suture, with broad, branched antehumerals, and pale median line. Sides greenish; with black streak on mesepimeron, a trace of black at upper end of first suture and a continuous stripe below second lateral suture. Legs entirely black, with trace of pruinosity. Wings with only the merest trace of basal amber and a tinge of apical fumosity. Pterostigma black.

Abdomen crimson above, with sparse black markings: central spot on 1; distal spots joined to margin on 2–5; hyphen traces on 6–7; basal band on 9. Appendages black.

Abd. 20 mm., hw. 26 mm., pt. 2.5 mm.

Paratypes. The distal hyphens may show also on segment 8.

Allotype female (mature). Face pale brownish. Head above with larger pale areas than male. Thorax and legs as in male. Wings faintly saffronated in anterior portion to pterostigma. Pterostigma with pale central spot. Abdomen with sparse black dorsal markings: central spot on 1; distal spots joined to margin on 2; a rectangular distal patch with lateral extensions directed posteriad on 3–5; on 6 this becomes a thin-limbed U; 7–8 with broad black dorso-lateral bands, incomplete on 7; 9 black with pale lateral patch and two small distal, dorsal dots; 10 and cerci black.

Abd. 18.5 mm., hw. 27 mm., pt. 2.5 mm.

Paratype (more teneral). Face in front greenish. Amber on wings a little more intense.

Remarks. With its blue face this species is distinct from other Central African species, but similar, in this feature, to other species taken by Gambles in Nigeria. It is comparable in size and abdominal coloration to *luminosa*, which, however, is dark on the two basal segments of the abdomen, in both sexes. In life, the labrum and epistome in front are pale blue-green; spots on dorsum of head pale grey-green; abdomen crimson. In the female, the " nose " is also pale bluish in life. The specimens were taken, from March 2nd–5th, 1960, in Mwinilunga:

streams chiefly in the Ikelenge area. They were shy insects, appearing in sunlit spots at forested streams. Examples were also taken at a waterfall. *Types will be in the National Museum; one paratype of each sex* will go to the British Museum (Nat. Hist.).

Chlorocypha wittei Fraser, 1955, *Parc Nat. Upemba* **38**: 10, ff. (Katanga)
Katanga: Mubale

In the genus *Chlorocypha* the pale dorsal markings on the head must not be considered too important in distinguishing species since they all seem to have them at sometime during the development. It is true, however, that in fully mature examples of certain species, such as *straeleni, cyanifrons* and *rubida,* these markings are more vivid, sky blue.

Other Chlorocypha are recorded by Fraser from Upembe National Park (Fraser, 1955: 12–13), such as *rubida* Selys, *dispar* Beauv., etc. It seems a little doubtful if these actually occur in this region of the Congo.

Suborder **ANISOPTERA**

Family **GOMPHIDAE**

Key to genera

1 All triangles and hypertriangles with more than one cross-vein 2
Triangles and hypertriangles normally free 4

2 (1) Foliations developed on 8th (but not 9th) segment in both sexes . . . . . *Ictinogomphus*
Foliations absent on 8 and 9: or present in female on 8 and 9 3

3 (2) Subpterostigmatal cells smaller than those just below them. Superior appendage of male bifurcate . . . *Diastatomma*
Subpterostigmatal cells of about same size as those below them. Superior appendage unbranched . . . *Gomphidia*

4 (1) Forewing with 3–4 cross-veins between RS and MA proximad to bifurcation of RS 5
Forewing with 1–2 cross-veins in this area 6

5 (4) 10th abdominal segment normal . . . . *Microgomphus*
10th segment exceedingly long, cylindrical . *Lestinogomphus*

6 (5) Hindfemur reaching beyond base of segment 2 or beyond middle of segment 2 . . . . *Notogomphus*
Hindfemur not reaching beyond base of segment 2 . . 7

7 (6) Frons rounded in front . . . . . Neurogomphus
Frons with well-developed crest 8

8 (7) *Hindwing with anal loop* 9
Hindwing without anal loop 10

9 (8) Abdomen with foliations on 8 and 9. Superior appendage of male much longer than 10 . . . . *Onychogomphus*
Abdomen with narrow foliations on 8, none on 9. Superior appendage much shorter than 10 . . . . *Ceratogomphus*

10 (9) Pterostigma at least 4 mm. long. Superior appendage of male scarcely longer than 10; inferior as long as superior. *Crenigomphus*
Pterostigma usually less than 3.5 mm. Superior much longer than 10, but inferior much shorter than superior. *Paragomphus*

Key to genus *Ictinogomphus* Cowley

1 Foliations on 8th segment very reduced. Triangles equilateral in shape . . . . . *dundoensis*
Foliations very large on 8. Triangles elongate at distal angle 2

2 (1) Labrum mainly yellowish. Frons above with or without a slender-stemmed T-mark. Thorax mainly greenish with short black stripes . . . . . *ferox*
Labrum mainly black. Frons above with broad-stemmed T. Thorax black with short yellowish stripes . . . *regisalberti*

Ictinogomphus ferox (Rambur). *Ictinus ferox* Rambur, 1842, *Névr.* 173 (Senegal)

A large, common insect (Plate 3, fig. *b*) addicted to settling on tall reeds in rivers, lakes or dams. Northern Rhodesia: Victoria Falls; Lake Bangweulu (Watmough). Katanga: Albertville.

Ictinogomphus regisalberti (Schout.). *Ictinus regisalberti* Schouteden, 1934, *Ann. Mus. Congo Belg. Zool.* Sér. **3** (1): 54, f. (Elizabethville)

Katanga: Elizabethville (Seydel).

Lestinogomphus dunaoensis Pinney 1961, *Publ. cult. Cia Diamant. Angola.*

Smaller than the common *I. ferox*, with reduced flaps on the 8th segment, this insect is only known so far in the female, which has been found in Angola and in Northern Rhodesia near Ndola.

Key to genus *Diastatomma* Burmeister

1 Thorax reddish brown with black and yellow stripes . *soror*
Thorax black with green stripes . . . . . *bicolor*

Diastatomma bicolor Selys, 1869, *Bull. Acad. Belg.* (2) **28**: 201 (S. Nigeria)

Katanga: Sashila (leg. Overlaet: *vide* Schouteden).

Diastatomma soror Schouteden, 1934, *Ann. Mus. Congo Belg. Zool.* Sér. **3** (1): 59 (Congo)

This very handsome Gomphid is known from Northern Rhodesia: Abercorn (in *Brachystegia* bush fringing Lake Chila) and Katanga: Penge (leg. Seydel); Lualaba.

Gomphidia quarrei (Schouteden). *Diastatomma quarrei* Schouteden, 1934, ibid. 57 (Congo)

A smaller, slimmer insect than *I. ferox*. Locally common in Rhodesia at the Victoria Falls and Katambora.

Microgomphus mozambicensis Pinhey, 1959, *Occ. Pap. nat. Mus. S. Rhod.* **23** B: 340, ff.

? Microgomphus sp. Fraser, 1955, *Parc. Nat. Upemba* **38**: 18 (female, Upemba Park)

This species, described from the Eastern border of Southern Rhodesia and neighbouring regions of Moçambique may be the same as Fraser's record from the Upemba National Park in the Katanga. A recent record in Southern Rhodesia is from the Vumba Mountains, Umtali, January, 1960 (one male in a rocky stream in Witchwood forest).

Lestinogomphus africanus (Fraser). *Echinopterogomphus africanus* Fraser, 1926, *Trans. Ent. Soc. Lond.* **74**: 355 ff. (Sierra Leone)

Northern Rhodesia: Maramba River, near Victoria Falls (in rather dense bush); Mwinilunga (teneral female only, March 1960). The Author has also taken it in recent years on the Hunyani River near Salisbury, October, 1956.

Key to genus *Notogomphus* Selys

1 Costa yellow. Face almost entirely yellow 2
Costa black. Face in front with black or brown markings . 3

2 (1) Inner antehumerals slender and continuous. Humeral stripes double . . . . . *praetorius*
Inner antehumerals short, fusiform. A single broad humeral stripe . . . . . *zernyi*

3 (1) Markings on face jet black: hind femora black . *dendrohyrax*
Markings on face brown. Hind femora not black . . . 4

4 (3) Superior appendage with conical, spiked apex . . *flavifrons*
Superior appendage fist-shaped . . . . . *lujai*

Notogomphus dendrohyrax (Foerster). *Podogomphus dendrohyrax* Foerster, 1906, *Jb. nassau Ver. Naturk.* **59**: 326 (Usambara Mountains)

Not recorded from the area under consideration but mentioned here since it was collected by the Author in January, 1960, on the Vumba Mountains, Umtali (stream in Witchwood Valley) and it occurs in Tanganyika.

Notogomphus flavifrons Fraser, 1952, *Occ. Pap. Coryndon Mus.* **3**: 8, ff. (Uganda)

A few examples of both sexes were collected in grass land near forested river and waterfall gorges, in Katanga: Lubudi.

Notogomphus lujai Schouteden, 1934, *Ann. Mus. Congo Belg. Zool.* Sér. **3** (1): 62 (Kivu)

Katanga: Mubale.

Notogomphus praetorius Selys, 1878, *Bull. Acad. Belg.* (2) **46**: 447 (Transvaal)

Widespread in this part of Africa. In life the body markings are bright or pale grass green. One female at Mwinilunga was captured devouring a Bombyliid (*Exoprosopa umbrosa* Loew.). Northern Rhodesia: Ndola; Chingola; Mwinilunga; Abercorn; Kalambo Falls. Katanga: Elizabethville; Mubale.

Notogomphus zernyi (St. Quentin). *Podogomphus zernyi* St. Quentin, 1942, *Ann. naturh. (Mus.) Hofmus. Wien.* **52**: 110 (Lupembeberg); *Notogomphus* sp. Pinhey, 1951, *Transv. Mus. Mem.* **5**: 145

The species described by the present Author in 1951 was probably *zernyi*, which St. Quentin obtained from near the Nyasa–Tanganyika border, at Mount Lupembe and Ugano. More recently it has been collected again in Southern Rhodesia at Inyanga (Turnbull-Kemp), on the Vumba (Pinhey) and in Melsetter (Plowes).

Key to genus *Neurogomphus* Karsch

1 Thorax black, with two green antehumeral stripes. Abdomen about 35 mm. . . . . *uelensis*

Thorax brown, with one antehumeral. Abdomen about 40 mm. . . . . *fuscifrons*

Examples of this genus appear to be distinctly scarce.

Neurogomphus fuscifrons Karsch, 1890, *Ent. Nachr.* **16**: 380 (Cameroons)

This magnificent insect (Plate 2, fig. *a*) was captured at Katambora. It has also been seen on an island near the Victoria Falls, but flying persistently high.

Neurogomphus uelensis Schouteden, 1934, *Ann. Mus. Congo Belge Zool.* Sér. **3** (2) 3: 65 (Congo)

The Author captured a solitary female at Katambora, January, 1956, and has only seen one other example in the field (also a female)—in central Tanganyika.

A variety under the name of *Neurog. vicinus* Schouteden (1934: 66) was recorded from Kibombo (Katanga) by Seydel.

Key to genus *Onychogomphus* Selys

1 Antehumeral stripes joined to pale collar so that the stripes appear 7-shaped *7-flavum*

Antehumerals not connected to collar 2

2 (1) Antehumerals short, rounded at ends . . . . *supinus*

Antehumerals elongate, angular at ends . . *kitchingmani*

Onychogomphus kitchingmani Pinhey, 1960, *Ent. Mon. Mag.* **96**: 265

Allotype female (unfortunately stained in preservation). (Fig. 10).

Examples were taken in copula and markings were seen, in the field, to be similar in the two sexes. In life, the eye of the male was greenish blue, grey ventrally; of the female green above, yellow below. Body

markings were bluish green in the male, greener in the female. In the preserved females the face in front is more ochreous than pale greyish (of the male); frons with broad black basal band. Thoracic markings (similar to male) almost obscured by the staining. Femora brown with black exterior distal streak; tibiae and tarsi black. Wings slightly fumose, pterostigma light brown between black veins. Abdomen blackish brown with yellowish markings: somewhat obscured on 1–2 but probably very like the male holotype; 3–6 with elongate basal triangles almost reaching distal ends, and yellow lateral band, the dorsal triangles being constricted so that their distal ends are spear-shaped; 7 with yellow basal annulus and sub-basal dorsal spot connected to it; 8 with trace of dorsal yellow at base; 9 dorsally with basal and distal spots and a lateral band; 10 and cerci all yellowish.

Abd. 30 mm., hw. 29 mm., pt. 3 mm.

The type male was collected by Kitchingman in May, 1957. A series of both sexes was collected on a stream south of Ikelenge, mostly near a waterfall or over rapids in March, 1960.

Northern Rhodesia: Mwinilunga.

It is possible that the better known and slightly larger *Onychogomphus supinus* Selys (1854) may be found in these territories since it occurs south of the Zambezi as well as in East Africa.

Onychogomphus 7-flavum Fraser, 1955, *Parc Nat. Upemba* **38**: 18

Known only from two females from Mubale (Katanga).

Ceratogomphus pictus Selys, 1854, *Bull. Acad. Belg.* (2) **21**: 42 (Cape)

A common insect in Southern Rhodesia but not yet recorded north of the Zambezi except from Lusinga (Congo) (*vide* Fraser, 1955: 26).

Key to males of genus *Crenigomphus* Selys

1 Abdomen with foliations on 8–9; segment 9 shorter than 10 *hartmanni*

Abdomen without foliations 2

2 (1) Segment 9 shorter than 10. Inferior appendage in sideview slender, ending in a long thin spine. Abdomen about 30 mm. . . . . *renei*

Segment 9 as long as 10. Inferior in sideview very robust to apex where there are short tumours carrying teeth. Abdomen 34 mm. or more . . . . . *cornutus*

Crenigomphus comutus Pinhey, 1956, *Occ. Pap. nat. Mus. S. Rhod.* **21B**: 83 f. (Zambezi)

Settles on grasses and reeds. (Plate 3, fig. *a*). Northern Rhodesia: Victoria Falls and Katambora; Kabompo River; Mwinilunga (Ikelenge).

Crenigomphus hartmanni (Foerster). *Onychogomphus hartmanni* Foerster, 1898, *Ent. Nachr.* **24**: 166 (S. Africa)

Nyasaland: Mzimba. It occurs in Southern Rhodesia and Tanganyika and so there is no reason why it should not be found in Northern Rhodesia.

Crenigomphus renei Fraser, 1936, *Proc. R. ent. Soc. Lond.* B.**5**: 137 (Uganda)

Katanga: Mubale (*vide* Fraser, 1955).

Key to males of *Paragomphus* Cowley

1 Face pale; at most with only faint brown markings. Thoracic markings usually obscure (except *elpidius*) . . 2

Face with distinct blackish bands. Thorax distinctly black with green markings 5

2 (1) Superior appendages diverge before apices; apices broad and truncate. Foliations on abdomen very broad . *nyassicus*

Superiors parallel in apical half and tapering 3

3 (2) Pterostigma brown. Thoracic markings distinct. Superior appendage tapering to a single point . . . . *elpidius*

Pterostigma yellow. Thoracic markings normally indistinct. Superior not ending merely in a single point 4

4 (3) Frons only green above. Superior terminating in a ledge with one point . . . . . *lacustris*

Frons with broad brown basal band. Superior terminating in two or more small teeth . . . . . *hageni*

5 (1) Superior appendages parallel to apices; each superior strongly curved and tapering. Abdomen about 36 mm. *sabicus*

Superiors divergent before apices. Abdomen 33 mm. or less 6

6 (5) Superiors strongly tapering. Antehumeral stripe 7-shaped *zambeziensis*

Superiors broad. Antehumeral fusiform . . . *cognatus*

Paragomphus cognatus (Rambur). *Gomphus cognatus* Rambur, 1842, *Névr.* 167

A common species in open, rocky streams; or, more often as its melanic form *nquelicus* Foerster, in thick bush or forest (for instance, examples of this occur at the Vumba Mountains in Southern Rhodesia). Northern Rhodesia: Ndola; Mwinilunga; Chifua River. Katanga: Albertville. Nyasaland: Fort William (Gray).

Paragomphus elpidius (Ris). *Mesogomphus elpidius* Ris, 1921, *Ann. S. Afr. Mus.* **18**: 346, ff. (S. Afr., Congo)

Zambezi River: Victoria Falls; Siachelaba; Chirundu Bridge. It has been recorded from Nyasaland and Katanga (Kapiri).

Paragomphus hageni (Selys). *Onychogomphus hageni* Selys, 1870, *Ann. Soc. ent. Belg.* **14**: 14, 15, 20 (Egypt)

Probably the commonest Gomphid in Africa. Northern Rhodesia: Chirundu Bridge; Samfya; Lake Bangweulu (sandy beaches: Watmough).

Paragomphus lacustris (Karsch). *Onychogomphus lacustris* Karsch, 1890, *Ent. Nachr.* **16**: 377 (Lake Tanganyika)

Northern Rhodesian examples of what the present Author considers to be this species: Victoria Falls and Katambora; Samfya. Katanga: Albertville (Mayné—*vide* Schouteden).

Paragomphus nyassicus Kimmins, 1955, *Entomologist* **88**: 111 (Nyasal.)

Described, as the name implies, from Nyasaland, it has been taken in that territory by Arnold at Salima Bay, November, 1943. Northern Rhodesia: Victoria Falls (Pinhey, in the dry season month of October). Nyasaland: Nkata Bay (Eccles); Salima Bay (Arnold).

Paragomphus sabicus Pinhey, 1950. *Ann. Transv. Mus.* **21**: 270 ff. (S. Rhodesia)

So far as this region is concerned, only known from the Victoria Falls.

Paragomphus zambeziensis Pinhey, 1960, *Ent. Mon. Mag.* **96**: 266

Only known from the type male, Chirundu Bridge, Zambezi River, January, 1958.

N.B.—*Notogomphus nyassicus* Gruenberg, rather inadequately described (1902) from a solitary female, is much more likely to be a *Paragomphus*. If so, and if distinct, Kimmins' *nyassicus* will prove to be a homonym.

Tragogomphus seydeli Schouteden (1934: 64, Lubumbashi, Elizabethville) may in reality be a *Paragomphus*.

Phyllogomphus sp. Eccles recently submitted a female of this genus, the first record for this area, from Monkey Bay, Nyasaland. Although possibly a new species it is too damaged for description.

Family **AESHNIDAE**

Key to genera

1 IR_3 forked proximally to pterostigma 2
IR_3 forked beyond middle of pterostigma 4

2 (1) Eyes normal, in contact for scarcely more than the dorsal length of the frons. Frons and face more than one third the transverse diameter of the head 3
Eyes enlarged, in contact for twice the dorsal length of the frons. Frons and face less than one-third the transverse diameter of the head 5

3 (2) R_3 gradually curved below pterostigma. Tornus of hindwing angled in male . . . . . *Aeshna*
R_3 almost angled below pterostigma. Tornus rounded in male. . . . . *Anaciaeschna*

4 (1) IA in hindwing forms a loop at start and then runs parallel to Cu_2 . . . . . *Hemianax*
IA in hindwing more or less parallel to Cu_2 at start . *Anax*

5 (2) Median space free . . . . . *Acanthagyna*
Median space traversed . . . . . *Heliaeschna*

Key to genus *Aeshna* Fabricius

1 Dorsal mark on frons a black spot and a semicircle . *rileyi*
Dorsal mark on frons a conical spot only . . . . *wittei*

Aeshna rileyi (Calvert). *Aeschna rileyi* Calvert, 1892, *Trans. Amer. ent Soc.* **19**: 164 (Kilimanjaro)

A common shade-loving species the male with the accessory appendages on second segment strongly projecting. Northern Rhodesia: Chifua River (Dening); Kabompo River; Mwinilunga. Katanga: Lubudi; Elizabethville. Nyasaland: Zomba.

Aeshna wittei Fraser, 1955, *Parc Nat. Upemba* **38**: 14

Very close to *rileyi*. Katanga: Kaziba.

It is very probable that *A. ellioti* Kirby may be found at the higher elevations, particularly in Nyasaland. It is a more brightly coloured insect and the appendages on second segment are not prominent.

Anaciaeschna triangulifera McLachlan, 1895, *Ann. Mag. nat. Hist.* (6) **17**: 409 (Moçambique)

Crepuscular. Northern Rhodesia: Ndola (Green). Katanga: Elizabethville (Seydel).

Hemianax ephippiger (Burmeister). *Aeschna ephippiger* Burmeister, 1839, *Handb.* **2**: 840 (Madras)

A common migrant, recognizable in the male by the blue dorsal saddle on second segment. Northern Rhodesia: Victoria Falls; Abercorn. Katanga: Elizabethville.

Key to genus *Anax* Leach

1 Abdominal segments 4–10 mainly red. Frons without black marking 2
Segments 4–10 not red. Frons with black dorsal marking . 3

2 (1) Abdomen (without appendages) at least 50 mm. Without brown subcostal streaks, merely traces of amber . . *speratus*
Abdomen (without appendages) 45–48 mm. Each wing with brown subcostal streak . . . . . *bangweuluensis*

3 (1) Abdomen mainly blue or greenish . . . . . *imperator*
Abdomen 4–10 mainly black 4

4 (3) Abdomen of male 78 mm. or more, female 67 mm. or more. Abdomen with yellow spots . . . . . *tristis*
Abdomen about 55 mm. Abdomen with blue or greenish spots . . . . . *chloromelas*

Anax bangweuluensis Kimmins, 1955, *Entomologist* **88**: 110

Described from a single rather immature male collected at Lake Bangweulu by Miss Steele in 1946, a few mature examples have been obtained by Dening from the same locality. All were taken at light or at dusk near Samfya (Dening).

Adult male. The only points to add to Kimmins' description are that the distal ends of the femora are black; the abdomen, as in *speratus*, uniformly reddish without yellowish markings; the " yellowish brown " basal patch of the teneral example has become a dark brown subcostal streak as far as the arculus in each wing; costa and pterostigma orange. Abd. 47–48 mm., hw. 46–48 mm. " Taken at light with two others, 24 Nov. 1959 " (Dening).

An immature male shows intermediate characters between the teneral and the adult; for instance the costa is still yellow, the abdomen paler.

Ne-Allotype female (just mature) (Fig. 11 and Plate 2, fig. *b*). Similar to the mature male in most respects, including the brown subcostal streak. Thorax slightly greener; abdomen dull yellowish orange on 1–2; the rest dull reddish brown (this colour starting on 2 as a mid-dorsal dark line); laterally on 3–9 with a very indistinct yellowish band; 10 and appendages light reddish. The cerci are flattened dorso-ventrally, with acute apices and with a convex ridge down the centre; each cercus about three times the length of segment 10. Abd. 48 mm., hw. 49 mm., pt. 5 mm. This female was taken at Samfya (Lake Bangweulu), 26th November, 1959.

Remarks. As so far known this smaller relative of *speratus* is confined to Lake Bangweulu and flies at dusk. The holotype is in the British Museum (Nat. Hist.), allotype in National Museum, Bulawayo.

Anax chloromelas Ris, 1911, *Ann. Soc. ent. Belg.* **55**: 321, ff. (West Africa)

Apparently a scarce insect. It is superficially like a dark *imperator*. Northern Rhodesia: Abercorn (Vesey Fitzgerald, October, 1957).

Anax imperator Leach, 1815, in Brewster's *Edinb. Encycl.* **9**: 137 (Europe)

A cosmopolitan species recognizable in the male by its pale blue abdomen. Northern Rhodesia: Victoria Falls; Mwinilunga; Abercorn; Samfya; Luaka Lagoon, Bangweulu (Watmough); Ndola.

Anax speratus Hagen, 1867, *Verh. Zool.-bot. Ges. Wien.* Wien **17**: 46 (Cape)

The widespread, large red species (thorax often green). Northern Rhodesia: Victoria Falls; Ndola; Mwinilunga. Nyasaland: Cholo.

Anax tristis Hagen, 1867, *loc. cit.* **17**: 35 (Guinea)

The immense black species with yellow abdominal markings and green thorax. Northern Rhodesia: Victoria Falls; Mwinilunga (hawking down the more open parts of forest streams); Samfya (seen by Watmough); Abercorn and Ufipa Plateau. Katanga: Kiambi; Mabwe.

Key to genus *Acanthagyna* Kirby

1 Hindwing shorter than abdomen. Small species, abdomen and hindwing less than 47 mm. long . . . . . *manderica*
Hindwing as long as or longer than abdomen. Abdomen and hindwing at least 50 mm. . . . . *villosa*
Species of this genus are crepuscular.

Acanthagyna manderica (Gruenberg). *Gynacantha manderica* Gruenberg, 1902, *S. B. Ges. Naturf. Fr. Berl.* **9**: 234 (Ukami)

Northern Rhodesia: Kafue River, Machiga, (Johnsen, April, 1958); Broken Hill (Dening); Abercorn and Ufipa Plateau. Katanga: Mubale.

Acanthagyna villosa (Gruenberg). *Gyn. villosa* Gruenberg, 1902, loc. cit. **9**: 233 (Langenberg).

This species was described from Nyassa District, but the present Author has only seen tropical African examples.

Katanga: Elizabethville (*vide* Schouteden).

Heliaeschna trinervulata Fraser, 1955, *Parc Nat. Upemba* **38**: 16 (Uganda and Katanga).

Katanga: Mubale.

Family **CORDULIIDAE**

The only genus so far recorded from the area under consideration is *Macromia* and despite the general scarcity and elusiveness of these insects the number of species recorded is moderately large. Certain of the species are hard to distinguish.

Key to *Macromia* Rambur

1 Thorax without pale antehumeral stripes 2
Thorax with at least a partial antehumeral 3

2 (1) Thorax without any pale lateral stripes . . . . . *reginae*
Thorax with one golden lateral stripe . . . . . *unifasciata*

3 (1) Thorax without pale lateral stripes 4
Thorax with 1–2 lateral stripes 5

4 (3) Abdomen 46–47 mm. . . . . *bifasciata*
Abdomen 48–51 mm. . . . . *reginae haleï*

5 (3) Segment 6 (and often 5) all black. Superior appendages black 6
Segments 5 and 6 with distinct yellow basal patches . . 9

6 (5) Abdomen 38 mm., hindwing about 36 mm. . . . *overlaeti*
Abdomen at least 42 mm. 7

7 (6) 10th segment in male with robust cone and spine. Wings of female fumose, but not distinctly yellow at apices (except in juvenile females) . . . . . *monoceros*

10th segment in male without cone or spine 8

8 (7) Hamule of male with very long hook. Female with all wings amber at apices . . . . . *sylvatica*

Hamule of male with short hook. Female unknown. *subtropicalis*

9 (5) Abdomen over 45 mm. Male with cone and spine on 10th segment. Both sexes normally with two rows in discoidal field 10

Abdomen 41 mm. or less. Male normally with 1 row in discoidal field 11

10 (9) 10th segment of male with one spine. Superior appendage black . . . . . *onerata*

10th segment of male with two well-developed spines. Superior appendage normally yellow . . . . *kimminsi*

11 (9) 10th segment of male flat, without cone or spine . *africana*

10th segment of male with cone and usually a spine . . 12

12 (11) Superior appendage yellow . . . . . *picta*

Superior appendage black 13

13 (12) Costa yellow . . . . . *overlaeti*

Costa black . . . . . *congolica*

Since this is rather an inadequately known genus the Author will indicate here and in diagrams from males in the National Museum, Bulawayo, some of the structural features that distinguish them. The identification, however, of one or two of them is not yet certain and further research may show changes.

Of the males of species considered here, only three have very well-developed foliations on segment 8 (see diagrams): *africana* (Fig. 12) *subtropicalis* (Fig. 14) and *sylvatica* (Fig. 17). In some species the dorsum of the 10th segment is flat, without any spine or cone: *africana*, *sylvatica*, *reginae* (Fig. 21) (and *bifasciata*); and in others this area is convex but lacking spines: ? *overlaeti* (Fig. 13), *subtropicalis* and *congolica* (Fig. 15). There are two spines in *kimminsi* (Fig. 22). In *picta* (Fig. 16) there is a single spine on a bulbous base; whilst in *onerata* (Fig. 18), *monoceros* (Fig. 19) and *unifasciata* (Fig. 20) the single spine

is mounted on a very prominent base. The hamules also show distinctive features but these will be considered under each species. In most species the posterior lobe and the hamule are glossy black. In *picta* the posterior lobe as well as the superior appendage are yellow. In *kimminsi* the posterior lobe is also yellow. The superior appendage in *unifasciata* has a ventro-basal ledge.

Macromia africana (Selys). *Phyllomacromia africana* Selys, 1871, *Bull. Acad. Belg.* (2) **31**: 554 (Nubia)

A small species. Hamule not very robust, hook long and slender Northern Rhodesia: Siachelaba, Zambezi River (D. Plowes).

Macromia ? bifasciata Martin. *Phyllom. bifasciata* Martin, 1912, *Feuill. jeun. Nat.* (5) **42**: 96 (W. Africa)

Except for its slightly smaller size there appears to be very little to distinguish the males of this from the large *reginae*. The accessory appendages are identical to *reginae*. The dark brown at the bases of the wings in the female is more restricted than in the latter insect. Northern Rhodesia: Samfya; Lake Mweru (V. Fitzgerald); Abercorn (Lucheche River).

Macromia congolica Fraser, 1955, *Rev. Zool. Bot. afr.* **52**: 21 (Katanga)

Described from Katanga. Not as small as *picta* and *africana*. Hamule very large and robust, angled ventro-posteriorly; with a short, broad, flattened hook. Northern Rhodesia: Kabompo River (males hovering over the river, in February and March, 1960). In life the eye was emerald; pale body markings greenish yellow.

Macromia kimminsi Fraser, 1954, ibid. **49**: 63, ff. (Sierra Leone)

A rather large species characterized by the dark crescent near the anterior edge of the frons. Hamule elongate, with a broad, stout hook. Northern Rhodesia: Mwinilunga. The single male has a well-developed metepimeral stripe. In life the eye was emerald; pale body markings greenish yellow.

Macromia monoceros Forster, 1906, *Jb. nassau. Ver. Naturk.* **59**: 319 (Somalia)

This species is found in Southern Rhodesia, Portuguese East Africa and northwards in East Africa. The hamule robust, with a moderately stout hook. Mwinilunga examples placed to this species correspond except in the hamular hook which is replaced in such examples by short

tumours. Whether they represent a separate race or species may be considered at a later date. Northern Rhodesia: Mwinilunga (forest streams); Abercorn (Lucheche River). In the Mwinilunga examples the eye, in both sexes was emerald in life; pale body markings yellow, with a faint tinge of green.

Macromia onerata Martin, 1906, *Coll. Zool. Selys* **17**: 74 (Tanganyika, S. Leone)

A fairly large species. Hamule moderate, with broad, flattened hook. Katanga: Lubudi (flying in open woodland). In life the eye of the male was emerald, yellow below; thoracic stripes greenish yellow. In the female the eye was pale dull green; pale markings on body yellow; wing apices with amber patches.

Macromia ? overlaeti Schouteden, 1934, *Ann. Mus. Congo Belg. Zool.* Sér. **3** (1): 45 (Congo)

A small example, allied to *picta*, but with very distinctive hamule and lacking a spine on the 10th segment, is tentatively placed here. There is no sub-basal spine on the superior appendage, unlike *schoutedeni* Fraser. The hamule is robust, angled ventro-posteriorly and has a prominent hook: very like the hamule in the larger species *congolica*. Katanga: Lubumbashi.

Macromia picta Selys, 1871, *Bull. Acad. Belg.* (2) **31**: 552 (Cape)

By far the commonest of the genus in Africa; a small species (Plate 2, fig. *e*). Hamule well developed but the hook rather small. Northern Rhodesia: Binga, Zambezi; Siachelaba, Zambezi; Katambora, Zambezi. Nyasaland: Njakwa Gorge.

Macromia reginae Le Roi, 1915, *Ergeb. d. Z. Afrika Exp. Zool.* **1**: 348 (Sudan)

The largest of the species occurring in the Federation; widespread in Africa. Hamule large, rounded, the hook moderate. *M. bifasciata* only seems to differ in minor characters. Northern Rhodesia: Samfya (Dening and Johnsen); Lake Bangweula and Lake Wumba (Watmough); Abercorn. The Author has also seen it at Binga, on the Zambezi River.

Macromia subtropicalis Fraser, 1954, *Rev. Zool. Bot. afr.* **49**: 60, ff. (Congo)

Larger and darker than the *picta* group. Hamule rather like *picta* but with longer hook. Northern Rhodesia: Victoria Falls.

Macromia sylvatica Fraser, 1954, ibid. 56, ff. (East Africa)

The typical form was described from Uganda. The Lubudi examples may represent a different race since they differ in certain respects: larger, the abdomen (male) with appendages 45 mm., instead of 42 mm. and with two rows in the discoidal field of the forewing instead of one. The hamule, however, is typical, with its very long curved hook and posterior inner flange. They eye of the Katanga male was emerald; thoracic stripes, greenish yellow; abdominal pale markings yellow. Katanga: Lubudi (forested gorge, near waterfall, February, 1960).

Macromia unifasciata Fraser, 1954, ibid. **49**: 67, ff. (Congo)

Described from Mubale, in the Congo, by Fraser, a single male of this magnificent insect, which eluded the Author, was captured by his assistant, Raphael Mpala, on the Sakeshi River, Hillwood Farm, February, 1960. In flight the unusual golden eyes and the single broad golden thoracic band are very distinctive, in this fairly large species. The other pale body markings are bright yellow. In all other living *Macromia* seen by the Author the eyes are emerald or greenish. The hamule is is moderately robust with broad, flattened hook. Northern Rhodesia: Mwinilunga (hawking occasionally up and down the river). Katanga: Mubale, Upemba Nat. Park.

Family **LIBELLULIDAE**

Key to genera

1 Triangle of forewing very broad, its costal edge more than half as long as the basal edge; or it is quadrangular. Hindwing with more than 1 Ac. Last Ax in forewing always complete 2

Triangle of forewing narrower (never quadrangular), its costal edge less than half the basal edge 5

2 (1) Discoidal cell in forewing obviously quadrangular. Discoidal field in forewing of one row right to termen. *Tetrathemis*

Discoidal cell in forewing triangular (although its costal edge may be broken towards one end) 3

3 (2) Discoidal field of one row, not expanding until beyond nodus. Anal loop 3–4 cells . . . . . *Allorhizucha*

Discoidal field of one row, but expanding before nodus. Anal loop more than 4 cells 4

4 (3) With 1–2 accessory bridge veins. Triangle in hindwing normally crossed . . . . . *Neodythemis*

Without accessory bridge veins. Triangle in hindwing free. *Notiothemis*

5 (1) Arculus at or distal to second Ax 6

Arculus distinctly proximal to second Ax 15

6 (5) Last Ax in forewing complete 7

Last Ax in forewing incomplete 12

7 (6) Hindwing with 2 Ac 8

Hindwing with 1 Ac 9

8 (7) Discoidal field in forewing of 3–5 rows . . *Hadrothemis*

Discoidal field in forewing of 2 rows . . . *Atoconeura*

9 (7) Discoidal field of 3 rows 10

Discoidal field of 2 rows (or with 3 cells at triangle) . . 11

10 (9) Vertex grooved; clypeus narrower than frons . . *Orthetrum*

Vertex rounded; clypeus broader than frons . *Nesciothemis* and some examples of *Hadrothemis*

11 (9) Triangle in forewing narrow. Cu_2 weakly curved. Anal loop elongate . . . . . *Oxythemis*

Triangle in forewing broadish. Cu_2 strongly curved. Anal loop blunt . . . . . *Aethiothemis*

12 (6) Hindwing with 3–4 Ac. Accessory bridge veins present. *Thermochoria*

Hindwing with 2–3 Ac. No accessory bridge veins . *Porpax*

Hindwing with 1 Ac. No accessory bridge veins . . . 13

13 (12) Discoidal field in forewing of 3 rows, expanding. Pterostigma bicolorous . . . . . *Hemistigma*

Discoidal field forewing of 2 rows 14

14 (13) Triangle in forewing broad. Discoidal field expanding. $8\frac{1}{2}$ Ax . . . . . *Eleuthemis*

Triangle forewing not broad. Discoidal field not expanding. 10–$10\frac{1}{2}$ Ax . . . . . *Porpacithemis*

15 (5) Costa with infraction before nodus . . . . . *Palpopleura*

Costa evenly curved or straightish to nodus 16

16 (15) Last Ax in forewing complete 17

Last Ax in forewing incomplete 22

17 (16) Discoidal field in forewing of 2 rows (but may start with 3 cells at triangle) 18

Discoidal field in forewing of 3 rows . . . . . *Trithemis*

18 (17) Discoidal field expanding distally 19

Discoidal field in forewing parallel or convergent . . . 20

19 (18) Abdomen triquetral or cylindrical. Triangle crossed in forewing . . . . . *Aethiothemis*

Abdomen swollen on basal 4 or 6 segments, the rest slender. Triangle free in forewing . . . . . *Acisoma*

20 (18) Forewing with 8 Ax or more . . . . . *Lokithemis*

Forewing with 6–7 Ax 21

21 (20) Large insects; forewing with 7 Ax . . . . . *Urothemis*

Small insects; forewing with 6 Ax . . . . *Aethriamanta*

22 (16) Discoidal field forewing at least slightly expanding . . 23

Discoidal field forewing contracting or parallel. 30

23 (22) Hindwing with 2 Ac. Small insects (abdomen under 20 mm.) . . . . . *Porpax*

Hindwing with 1 Ac 24

24 (23) Abdomen swollen on basal 4 or 6 segments, then slender. Forewing with $6\frac{1}{2}$–$8\frac{1}{2}$ Ax. Small insects . . . *Acisoma*

Abdomen normal, or only swollen on segments 1–3 . . 25

25 (24) Discoidal field in forewing starts 2 rows 26

Discoidal field in forewing starts 3 rows 27

26 (25) Cu_2 in forewing slightly curved, in hindwing it is at anal angle of triangle . . . . . *Chalcostephia*

Cu_2 in forewing strongly curved, in hindwing it is well distal to anal angle of triangle . . . . . *Diplacodes*

27 (25) Anal loop in hindwing short, not extending far distal to triangle . . . . . *Crocothemis*

Anal loop extending 2–4 cells beyond level of triangle . 28

28 (27) Forewing with $6\frac{1}{2}$–$7\frac{1}{2}$ Ax . . . . . *Brachythemis*

Forewing with at least $10\frac{1}{2}$ Ax 29

29 (28) Rspl. loop of 1 row. Eyes in contact for short distance. Pterostigma bicolorous . . . . . *Hemistigma*

Rspl. loop of 2–3 rows. Eyes in contact for long distance. Pterostigma unicolorous . . . . . *Bradinopyga*

30 (22) Discoidal field in forewing 2 rows (but may show 3 cells at triangle) 31

Discoidal field in forewing of 3–4 rows 33

31 (30) Forewing with less than 8 Ax. Prothoracic hindlobe large. (small examples) *Sympetrum*

Forewing with 8½ or more Ax. Prothoracic hindlobe small . 32

32 (31) Pterostigma longer, 2.5 mm. Eye contact long. *Porpacithemis*

Pterostigma shorter, 2 mm. Eye contact short . . *Lokithemis*

33 (30) Forewing with 6½–7½ Ax 34

Forewing with 8½ or more Ax 36

34 (33) Hindlobe of prothorax small. Abdomen short and broad. Pterostigma usually bicolorous . . . . . *Brachythemis*

Hindlobe of prothorax large. Abdomen slender. Pterostigma unicolorous 35

35 (34) Triangle crossed in forewing . . . . . *Sympetrum*

Triangle free in forewing . . . . . *Philonomon*

36 (33) Triangle in forewing and hindwing almost on the same level 37

Triangle in forewing 3 or more cells distal to triangle in hindwing 42

37 (36) Anal loop in hindwing open at margin . . . . *Tholymis*

Anal loop closed before margin 38

38 (37) Anal loop reaching 1–2 cells beyond triangle in hindwing. *Trithemis*

Anal loop reaching 3–4 cells beyond triangle 39

39 (38) Rspl. loop of 1 row. R3 in forewing slightly curved. Body non-metallic . . . . . *Parazyxomma*

Rspl. loop normally of 2 rows. R3 in forewing strongly sinuous. Body metallic 40

40 (39) Pterostigma usually 4 mm. or less. Tibial spines slender *Zygonyx*

Pterostigma usually over 4 mm. Tibial spines robust . . 41

41 (40) Abdomen very swollen at base, then very slender. *Olpogastra* s.g. *Olpogastra*

Abdomen swollen at base, then of average width. *Olpogastra* s.g. *Zygonoides*

42 (36) Pterostigma of same size in forewing and hindwing. Body blackish, metallic . . . . . *Rhyothemis*

Pterostigma distinctly longer in forewing than in hindwing. Body not nearly all black and non-metallic 43

43 (42) R_3 strongly sinuous. Hindwing with 2 Ac . . . *Pantala*

R_3 almost straight. Hindwing with 1 Ac . *Trapezostigma*

Tetrathemis polleni (Selys). *Neophlebia polleni* Selys, 1869, *Pollen et van Dam, Madag. Ins.* 18, pl.

Very few records yet from this area. The mature male is easily recognized in the field by its narrow, broadly blackened wings and its characteristic flight, slowly flapping its wings. Northern Rhodesia: Victoria Falls. Katanga: Lubudi (a muddy, forested stream).

Key to *Allorhizucha* Karsch

1 Labium broadly black in middle. Thorax without green humeral stripe . . . . . *klingi*

Labium all yellow. Thorax with broad green humeral band. *preussi*

Allorhizucha klingi Karsch, 1890, *Berl. ent. Z.* **33**: 390 (Togo)

In the Rhodesian examples the pale thoracic markings are much greener than normal: in equatorial Africa these areas are more strongly yellowish. In life, eye all blue-green, face pale green; pale body markings blue green. Northern Rhodesia: Mwinilunga (in dense forest).

Allorhizucha preussi Karsch, 1891, *Ent. Nachr.* 17: 80 (Cameroons)

Both sexes were fairly common at forest streams and at the Zambezi Source in Mwinilunga District. In life, eye of male grey-blue to blue-green, paler below; labium whitish; pale markings on the body grey-blue. In an immature male the eye was grey-green, brown above; labium yellow; body markings bright yellowish green. The black lateral stripes on the thorax, on first and second lateral sutures, are much better developed than in examples from equatorial Africa and it is probable that Rhodesian examples represent a distinctive race. However, series from the Northern Congo and Nigeria show a little variation in this respect.

Northern Rhodesia: Mwinilunga. Katanga: Kamina (Schouteden).

NEODYTHEMIS FITZGERALDI n. sp.

(Fig. 38)

The examples are juvenile but not teneral.

Holotype male. Labium bright yellow with black median band, broadened posteriorly. Face bright yellow; labrum with narrow black free border; frons and vertex steely blue, the latter with yellow dorsal " bow-tie " mark. Prothorax yellow on anterior and posterior lobes; middle lobe black with yellow median and lateral spots. Thorax black, with dark green tinge, to below humeral suture: with yellow median stripe and somewhat sinuous antehumeral; sides yellow, with irregular black bands on the sutures and a trace of black on the metepimeron. Legs black, with yellow areas on coxae and trochanters; claws ferruginous, hooks short. Venation black; pterostigma blackish, short, slightly convex, on inner and costal edges; trace of amber at base of all cubital spaces. 1 Ac in forewing, 2 in hindwing; anal loops of 6 cells; discoidal field in forewing expanding after 4 cells. All Ht crossed; t free, but crossed in right hindwing. Forewing with 10–11 Ax. Abdomen black, with yellow marking; 1 with dorsal triangle and lateral patch; 2 with dorsal band, constricted in middle and tapering posteriorly, and an angular lateral patch; 3 with two lateral stripes the upper one severed by transverse carina; 4–7 with one lateral strip (severed on 4–5); 8–10 black, 10 with yellow ventro-lateral spot. Appendages black, normal; superiors somewhat fusiform; inferiors slightly notched apically. Accessories normal, as in the figure.

Abd. 22 mm., hw. 26 mm., pt. 2.5 mm.

Allotype female. Very similar; metallic dorsal patch on frons somewhat reduced anteriorly; dorsal mark on vertex rectangular; pterostigma and venation brown; amber basal patches on wings slightly more developed. Forewing with 11–12 Ax; t in both hindwings crossed; and loop 6–7. Fore-femur yellow laterally. Abdomen slightly stouter; cerci short, black. Paratype female similar.

Remarks. Collected by L. D. Vesey Fitzgerald, at Abercorn, in swamp forest and on Lucheche River, in months of March and December. Of the known *Neodythemis*, most of which are Malgassian, this species is nearest to *africana* Fraser in body markings. In that species the labium is largely black, labrum all black; vesicle all metallic blue. And *africana* has less black in the region of the first lateral suture. Nodal index is higher in that species.

N. gorillae Pinhey is smaller, dark on the lips and with the thoracic stripes more regular.

In *hildebrandti* the labium has a black median triangle, the labrum is yellow but more broadly edged with black; antehumeral stripe incomplete; lateral black stripes rather similar but the abdominal markings are different, particularly those on dorsum of 1–2. The other Madagascar species, *arnoulti* and *pauliani* are darker on sides of thorax; while *trinervulata* lacks the antehumeral stripe, among other differences.

Holotype male and paratype female will be in National Museum, Bulawayo, allotype female in the British Museum (Nat. Hist.).

? *NEODYTHEMIS* species indet.

A solitary, teneral female dragonfly, taken at the same forest stream in Katanga as *Tetrathemis polleni* and, in the field, mistaken for a female of that species, has proved to be rather an enigma. It does not seem to belong to any known African genus. Since, however, females of many Libellulids may show aberrant venation it does not appear desirable to erect a new genus for it and the insect is, therefore, placed temporarily under *Neodythemis* which is one of its closest Tetrathemine relatives.

The following brief description may be recorded: a Tetrathemine with eye contact long; prothoracic hindlobe large. Discoidal triangles broad, in forewing broken on costal edge, free; Ht crossed in forewing, free in hindwing. Forewing with 10 Ax, the last complete; arc between 2nd and 3rd Ax. No Bsq. Discoidal field in forewing of one row for 4–5 cells, expanding before subnodus. Anal loop of 8 cells; membranule minute; Cu_2 in hindwing originates at or distal to lower angle of triangle. Forewing with 1 Ac, hindwing with 2. Sectors of arc in all wings on very long stalk. Abdomen 21 mm., hindwing 28 mm., pterostigma 2 mm.

These characters place this female near *Neodythemis*, from which it differs in lacking accessory bridge veins and its longer anal loop; and *Notiothemis* which is venationally close but differs notably in size and general facies. In general features it is surprisingly near *Archaeophlebia* of Madagascar, but in that genus the discoidal cell is obviously quadrangular; the forewing has 2 Ac, since the distal one has not properly developed as the proximal edge of the subtriangle (a subtriangle is definite in the Katanga female although it is quadrangular, having a short costal edge); and the hypertriangles in *Archaeophlebia* are free.

Katanga: Lubudi, February, 1960.

Key to genus *Notiothemis* Ris

1 Labrum nearly all pale. Hindwing with 2 Ac . . . *jonesi*
Labrum black. Hindwing with 3 Ac . . . . . *robertsi*

Notiothemis robertsi Fraser, 1944, *Proc. R. ent. Soc. Lond.* B. **13**: 42, ff. (Uganda)

Several of this Uganda-described insect where collected at pools in and near forest streams in the Mwinilunga District, including a pair in copula. One tortological male has a split vein at the bridge of the left forewing. Eye in male, in life, deep cobalt with chocolate patches; body markings green. One female was observed ovipositing, which she performed while at rest on the water, inserting her abdomen as in the manner of insertion-ovipositor-bearing families (as in *Aeshnidae*). Females of Tetrathemines (except *Micromacromia* and *Allorhizucha*) are, in the Author's experience, even shier than the males. Only one female was captured and in this the apex of the abdomen has shrunk and become distorted on drying. It does not appear, however, that there is any marked development of the ovipositor in this example.

Ne-Allotype female (Ikelenge, in copula). Like males except for stouter abdomen and traces of deep amber at all wing bases. Abd. 19 mm., hw. 25 mm., pt. 2 mm. Allotype in National Museum, Bulawayo.

Northern Rhodesia: Mwinilunga.

Notiothemis jonesi Ris, 1919, *Coll. Zool. Selys* **16** (2): 1054, f. (Tanganyika)

Katanga: Elizabethville (*vide* Schouteden, " johnesi ", 1934). It occurs in Southern Rhodesia, Moçambique and East Africa.

Key to genus *Hadrothemis* Karsch (Central African forms only)

1 Hindwing 34 mm. or less. Abdomen of male bright red, frons metallic violet or violet blue. Triangle in hindwing normally free. All wings with dark amber basal patches. *defecta*
Hindwing 35 mm. or more. Abdomen of male normally blue pruinosed, frons steely blue. Triangle in hindwing crossed 2

2 (1) Forewing with no more than a trace of basal amber, hindwing with palish amber basal patch . . . . . *camarensis*
Forewing with basal patch reaching arculus, hindwing with broad dark amber or brown patch . . . . *versuta*

Hadrothemis camarensis (Kirby). *Orthetrum camarense* Kirby, 1889, *Proc. zool. Soc. Lond.* **12**: 298 (Cameroons)

Katanga: Ganza (Upemba Park).

Hadrothemis defecta (Karsch). *Thermorthemis defecta* Karsch, 1891, *Ent. Nachr.* **17**: 61 (S. Leone)

Only two males (one very old and battered) found in swamp near forested stream, settling on reeds. Eye of male, in life, dark brown, with violet sheen on top, a green sheen laterally; abdomen crimson. Northern Rhodesia: Mwinilunga. In equatorial Africa the Author has found this species in or at the edges of forest settling on dead twigs. Katanga: Kamina (Schouteden, Seydel); Kilwezi.

Hadrothemis versuta (Karsch). *Thermorth. versuta* Karsch, 1891, ibid., 62 (Cameroons)

Several taken at forest streams; the males darting about, hovering and tending to be inquisitive. Eye in male dark red-brown; the dark abdomen covered with thin blue pruinosity. In a teneral female; eye pale grey-blue, brown above; body yellow; thorax with greenish tint, the antehumerals dark blue-green.

Northern Rhodesia: Mwinilunga.

Oxythemis sp. near *carpenteri* Fraser, 1944, *Proc. R. ent. Soc. Lond.* B. **18**: 85, ff. (Uganda)

A solitary female taken near Ndola, Northern Rhodesia, in March, 1959, may be this little-known species. More material is required for certain determination. It is superficially like *Orthetrum abbotti*, differing venationally. *Oxythemis* is very near *Aethiothemis*.

Key to genus *Nesciothemis* Longfield

1 In male, basal half of abdomen pruinosed blue, distal half distinctly red. Wings of female not brown at apices but with distinct amber spots at bases . . . . . *fitzgeraldi*
In male, basal half of abdomen pruinosed whitish blue, distal half not red. Wings of female usually with brown apical patches; the bases without or only faintly saffronated. *farinosum*

Nesciothemis farinosum (Foerster). *Orthetrum farinosum* Foerster, 1898, *Ent. Nachr.* **24**: 169 (Transvaal)

A common insect. Both large and dwarf forms occur on the Zambezi. Henri Bertrand collected a male at Kabanga, Congo, in 1958, in which

the arculus in each forewing was between 1st and 2nd Ax. Northern Rhodesia: Victoria Falls and Katambora; Ndola; Mwinilunga; Samfya; Lusaka. Nyasaland: Cholo.

Nesciothemis fitzgeraldi Longfield, 1955, *Publ. cult. Cia Diamant. Angola* **27** (1): 61 ff.

Orthetrum fitzgeraldi Pinhey, 1956, *Occ. Pap. Coryndon Mus.* **4**: 30 ff. (Abercorn)

A striking insect which lives in swamp (source of Sakeshi River) at Mwinilunga, or is common in Brachystegia woodland, fringing Lake Chila, at Abercorn. Northern Rhodesia: Abercorn; Mwinilunga; Samfya (Dening).

Key to genus *Orthetrum* Newman (partly after Longfield, 1955)

1 Thorax with distinct creamy or white lateral stripes . . 2
Thorax without pale stripes 6

2 (1) 1 row Rspl. 3
At least partially 2 rows Rspl. 4

3 (2) Pterostigma 3 mm. or less; 1 pale lateral stripe on thorax. *chrysostigma*
Pterostigma over 3 mm.; 1–2 pale lateral stripes . . *falsum*

4 (2) With pale stripes on front of thorax. Abdomen very long, with heavy black stripes . . . . . *trinacria*
Thorax with pale lateral stripes and sometimes distinct stripes also on front of thorax. Abdomen of normal dimensions, not very heavily black-striped 5

5 (4) With distinctive stripes on front and sides of thorax . *caffrum*
With faint stripes on sides only . . . . . *brachiale*

6 (1) Body with pruinosity 7
Body without pruinosity 27

7 (6) Pruinosity on thorax and abdomen 8
Pruinosity only on abdomen 18

8 (7) Male pale blue 9
Male dark blue (indigo) 16

9 (8) 2 rows Rspl. 10
1 row Rspl. 11

10 (9) Pterostigma 3 mm. or more . . . . . *brachiale*
Pterostigma less than 3 mm. . . . . *caffrum*

11 (9) Abdomen 23 mm. or less. Pterostigma 2.5 mm. . *rhodesiae*
Abdomen 24 mm. or more. Pterostigma usually more than 2.5 mm. 12

12 (11) Abdomen 28 mm. or less. Pterostigma 3 mm. or more . . 13
Abdomen 29 mm. or more. Pterostigma 3 mm. or less. *chrysostigma* or *guineense*

13 (12) Abdomen 25 mm. or less. Pterostigma 3.5 –4mm. . *abbotti*
Abdomen 26 mm. or more. Pterostigma 3–3.8 mm. . 14

14 (13) Abdomen 27 mm. or less . . . . . *hintzi*
Abdomen 28 mm. or more 15

15 (14) Abdomen 30 mm. or less. Pterostigma 3–3.5 mm. . *machadoi*
Abdomen 30 mm. or more. Pterostigma 3.5 mm. . . *falsum*

16 (8) Abdomen 38 mm. or more, not constricted on 3, not fusiform . . . . . *trinacria*
Abdomen 30 mm. or less, constricted on 3, slightly fusiform 17

17 (16) 1 row Rspl. Pterostigma 3–3.5 mm. . . . . *machadoi*
2 rows Rspl. Pterostigma 4–5 mm. . . . . *macrostigma*

18 (7) Abdomen with blue pruinosity; thorax may be thinly pruinose 19
Abdomen with whitish pruinosity; thorax black and green only 25

19 (18) 1 row Rspl. 20
2 rows Rspl. 22

20 (19) Subcostal cross-veins and pterostigma yellow. Thorax scarcely marked at sides with black . . . . *machadoi*
Subcostal cross-veins and pterostigma blackish. Thorax heavily striped 21

21 (20) Base of hindwing with pale amber spot . . . . *falsum*
Base of hindwing with dark amber spot. . . . . *julia*

22 (19) Subcostal cross-veins black. Thorax dull green or brownish. *stemmale kalai*

Subcostal cross-veins yellow. Thorax brighter green . . 23

23 (22) Thorax bright green with broad black stripes . . *icteromelas*

Thorax lighter green with slender blackish stripes . . . 24

24 (23) Abdomen about 28 mm. Pterostigma 4 mm. . *macrostigma*

Abdomen 30 mm. or more. Pterostigma 3.5 mm. . *brachiale*

25 (18) 2 rows Rspl. Pterostigma normally over 3 mm. . *stemmale kalai*

1 row Rspl. Pterostigma normally less than 3 mm. . . . 26

26 (25) Abdomen distinctly fusiform . . . . . *microstigma*

Abdomen scarcely fusiform . . . . . *julia*

27 (6) Subcostal cross-veins black 28

Subcostal cross-veins yellow 31

28 (27) 2 rows Rspl. . . . . *stemmale kalai*

1 row Rspl. 29

29 (28) Abdomen rather slender. Pterostigma 3 mm. or more . 30

Abdomen fusiform. Pterostigma 2.5 mm. or less. *microstigma*

30 (29) Base of hindwing with pale amber spot . . . . *falsum*

Base of hindwing with deep amber spot . . . . *julia*

31 (27) 1 row Rspl. almost entirely 32

2 rows Rspl. 35

32 (31) Abdomen with narrow black lateral stripe, terminal segments not broadly black . . . . . *guineense*

Abdomen with broad black lateral stripe, terminal segments mainly black 33

33 (32) Humeral black stripe very reduced, and only traces of lateral stripes on thorax . . . . . *abbotti*

Humeral black stripe broad 34

34 (33) Abdomen 27 mm. or less . . . . . *hintzi*

Abdomen 28 mm. or more . . . . . *machadoi*

35 (31) Thorax with several slender black stripes . . . *brachiale*

Thorax with reduced black marking or else with thick black stripes 36

36 (35) Thorax with broad stripes. Abdomen with broad mid-dorsal stripe; black ventrally. . . . . *icteromelas*

Thorax with narrow stripes. Abdomen without broad mid-dorsal stripe; largely yellowish ventrally . . *macrostigma*

As will be seen from the above key it is not easy to separate many of the species of this genus. In males it is advisable to refer to diagrams of the accessory appendages on segment 2. (Fig. E, 23–37).

Certain species are generally distinguishable in the males, particularly if the thorax is not heavily pruinosed. *O. trinacria* (Fig. 37), dark blue when mature, is the easiest to distinguish in both sexes because of its great size, elongate abdomen, large thorax and its hawking habit, usually flying low down over water or over the banks. The smaller *icteromelas* (Fig. 36) is also distinguishable because of its elongate abdomen, and its vivid green body with thick black stripes. Neither of these are forest insects. *O. caffrum* (Fig. 23), until fully pruinosed, is characterized by its bright white stripes, one on the front of the thorax, two on the sides, each edged by a black line. In immature *chrysostigma* (Fig. 24) there is normally one strong white lateral stripe. In *microstigma* (Fig. 34) the male is normally very dark on the thorax, the pterostigma short and pale; in the female the abdomen is unusually broad for Rhodesian species and the wings normally have extensive amber basal areas. *O. falsum* (Fig. 33) is generally in thickish bush or in forest and has rather bright markings: the green in the thorax or the incomplete blue on the abdomen of the less mature individuals; black thoracic stripes are clear-cut. *O. stemmale kalai* (Fig. 31) is a larger insect with the colour and markings less pronounced: but it is essential to determine this by genitalia. In *julia* (Fig. 32) the thorax is generally darker than the similar-sized *falsum*, the pterostigma rather short and the amber basal trace on the hindwing is deeply coloured. It is only found in or near real forest areas.

O. brachiale (Fig. 35) may be confused with *falsum* or *stemmale kalai* in the field. It is *usually* larger than the former and has a long pterostigma. Very often it can be distinguished at once by pale lateral stripes on the thorax.

The remaining species are small or smallish. The largest of these is *machadoi* (Fig. 26) with rather thin dark lines on the thorax. *O. guineense* (Fig. 29) and *hintzi* (Fig. 27) are heavily marked with black and hard to distinguish except by genitalia. *O. macrostigma* (Fig. 28) is a

small species characterized by a long, pale pterostigma. It is the scarcest of the species in Rhodesia known to the Author. *O. abbotti* (Fig. 25) is a very small species, the thorax very green due to reduction in black marking. The small *rhodesiae* (Fig. 30) is only readily separated on genitalia.

Orthetrum abbotti Calvert, 1892, *Trans. Amer. ent. Soc.* **19**: 162 (Kilimanjaro)

Common. Northern Rhodesia: Victoria Falls and Katambora; Luanshya; Mokambo (Rhodesia-Katanga border); Mwinilunga; Abercorn; Chinyunyu Hot Springs, east of Lusaka (Dening). Katanga: La Manda River; Lubumbashi; Kilwezi.

Orthetrum brachiale (Beauvois). *Libellula brachialis* Beauvois, 1805, *Ins. Afr. Amér.* 171, pl. (Nigeria)

Common. Northern Rhodesia: Victoria Falls and Zambezi River; Samfya; Abercorn. Katanga: Lufua River; Elizabethville; Albertville; Upemba Park. Nyasaland: Mzimba.

Orthetrum caffrum (Burm.). *Libellula caffra* Burmeister, 1839, *Handb.* **2**: 856 (Natal)

Common but scarcely known yet from this area. Northern Rhodesia: Abercorn. Katanga: Mubale.

Orthetrum chrysostigma (Burm.). *Libellula chrysostigma* Burmeister, 1839, id. loc. 857 (Teneriffe)

Common. Northern Rhodesia: Victoria Falls; Abercorn. Katanga: Lubudi; Kiambi; Elizabethville; Upemba Park. Nyasaland: Fort Hill.

Orthetrum falsum falsum Longfield. *Orthetrum capense falsum* Longfield, 1955, *Publ. cult. Cia Diamant. Angola* **27** (1): 26, ff. (Kenya)

Common. In one of the males taken in copula at Mwinilunga the brightly pruinosed blue abdomen was marked distinctly with yellow distal triangles on most abdominal segments. Clear-cut markings like this are rather a feature of this species. Northern Rhodesia: Victoria Falls; Solwezi; Samfya; Mwinilunga (especially Zambezi River); Abercorn; Ndola. Katanga: Lubudi; Albertville, etc.; Upemba Park. Nyasaland: Mzimba; Cholo.

Orthetrum guineense Ris. *Orth. chrysostigma guineense* Ris (pars.) 1909, *Coll. Zool. Selys.* **10**: 207 f. (Angola)

Common. Northern Rhodesia: Mwinilunga; Samfya; Abercorn; Ndola. Katanga: Upemba Nat. Park. Nyasaland: Nkata Bay.

Orthetrum hintzi hintzi Schmidt, 1949 (1951), *Arch. Mus. Bocage* **20**: 174, 178, ff. (Portug. Guinea)

Common. Northern Rhodesia: Ndola; Mwinilunga: Abercorn. Katanga: La Manda River; Fizi. Nyasaland: Mzimba.

Orthetrum icteromelas Ris, 1909, loc. cit. 197 (Madagascar)

A locally common species in Central Africa, less common further north. Northern Rhodesia: Samfya (Dening and Watmough); Abercorn. Katanga: Kongolo (*vide* Schouteden).

Orthetrum julia Kirby, 1900, *Ann. Mag. nat. Hist.* (7) **6**: 75, f. (S. Leone)

The Rhodesian examples of this common equatorial forest insect are rather less dark than their northern relatives.

Northern Rhodesia: Mwinilunga. Katanga: Lubudi.

Orthetrum machadoi Longfield, 1955, loc. cit. 35, ff. (Angola)

Less common here than in East Africa. Northern Rhodesia: Kabompo River; Abercorn.

Orthetrum macrostigma Longfield, 1945, *Arch. Mus. Bocage*, **16**: 25, 30, ff. (Angola)

An apparently scarce species of which the Author has so far only secured a single male. The hamular hook is very distinctive, almost more like a *Lokia* in appearance. Northern Rhodesia: Mwinilunga.

Orthetrum microstigma Ris, 1911, *Rev. Zool. Bot. afr.* **1**: 128, f. (Cameroons)

A very robust, local species, found at swamp-edged streams, especially at the fringes of forest patches. Some females show yellow cross-veins near anterior parts of wings, but these are not fully mature and cannot be considered to be race *imitans* Schmidt. The males all have black cross-veins. Northern Rhodesia: Mwinilunga (Sakeshi River and at its source). Katanga: Kamina; Albertville, etc.; Kilwezi; Upemba.

Orthetrum rhodesiae Pinhey, 1960, *Ent. Mon. Mag.* **96**: 269

So far known only from Kapiri M'poshi and from a river to the south of Ndola in Northern Rhodesia (Plate 2, fig. *f*).

Orthetrum stemmale kalai Longfield, 1936, *Trans. R. ent. Soc. Lond.* **85**: 487, 493 (Zambezi)

Although widespread and not uncommon in East and tropical Africa, it has so far proved elusive in the area under consideration. Northern Rhodesia: Victoria Falls (described from the island of Kalai); Samfya (Dening).

Orthetrum trinacria (Selys). *Libellula trinacria* Selys, 1841, *Rev. Zool.* 244 (Sicily)

Widespread but preferring open waters. Strong flight, of a steady, hawking nature. Northern Rhodesia: Samfya; Zambezi River; Abercorn (abundant).

Key to genus *Palpopleura* Rambur

1 Wings long. 1–2 black streaks below base of costa in forewing and a black spot at nodus . . . . . *deceptor*

Wings short and more extensively marked with black or brown 2

2 (1) Face and side of thorax mainly yellow; dark patches on each wing either confined to base (male) or in two isolated patches (female) . . . . . *jucunda*

Face and sides of thorax dark brown to blackish; sides of thorax with yellow stripes. Dark wing markings not confined to base and continuous, not in isolated patches. *lucia* 3

3 (2) In forewing the black covers whole wing area from base to pterostigma in male . . . . . *lucia* f. *lucia*

In forewing the black is incomplete posteriorly, invaginated (cut into) . . . . . *lucia* f. *portia*

Palpopleura deceptor (Calvert). *Hemistigmoides deceptor* Calvert, 1899, *Proc. Acad. nat. Sci. Philad.* 241, f. (Somalia)

Generally somewhat uncommon and a more alert insect than other *Palpopleura*. Prefers open, reedy pools. Northern Rhodesia: Victoria Falls (at pools near the river). Katanga: Albertville; Upemba Park. Nyasaland: Mzimba.

Palpopleura jucunda Rambur, 1842, *Névr.* 134 (Cape)

Commoner in south and central than in equatorial Africa. Reedy pools. One of the prettiest dragonflies (Plate 2, fig. *c*). Northern Rhodesia: Ndola; Mwinilunga; Abercorn; Chinyunyu Hot Springs, Lusaka (Dening). Katanga: Lubumbashi, etc.; Mubale.

Palpopleura lucia (Drury). *Libellula lucia* Drury, 1773, *Ill. Exot. Ins.* **2**: 82, pl. (Sierra Leone)

Libellula portia Drury, 1773, ibid. 86, pl. (S. Leone)

Abundant in most parts of the continental ethiopian region (Plate 2, 3). In some areas the darker form *lucia* is more abundant at the lower elevations, *portia* being at higher altitudes. Where there is thick bush or forest, however, *lucia* tends to be commoner, although *portia* may appear at the fringes of the bush or in forest clearings. The suggestion, however, that they are very close but distinct *species* seems doubtful, since intermediates do occur in parts of tropical Africa, although not in the regions under consideration here.

Northern Rhodesia: Victoria Falls; Mwinilunga; Samfya (Watmough; one male only); Abercorn; Lusaka. Katanga: Albertville; Elizabethville, etc.; Upemba Park. Nyasaland: Fort Hill; Nkata Bay.

Eleuthemis buettikoferi Ris, 1910, *Coll. Zool. Selys.* **11**: 384, ff. (Liberia)

This rather beautiful insect, the male (Plate 3, fig. *f*) with pale blue, rather flattened body, the forewing tipped with chocolate brown, is a rarity in many parts of Africa, but locally common in some parts of Rhodesia. It favours twigs in sunny spots over rivers or wide streams. The apical patch and the insects themselves vary in size. Forewing in male 26–28 mm. Northern Rhodesia: Victoria Falls and Katambora; Kabompo River; Mwinilunga. Katanga: Upemba Park (Fraser 1955: 26).

Tentative key to *Aethiothemis* Martin-Ris

1 Abdomen slender on segments 3–10, swollen at base. *bequaerti*

Abdomen somewhat flattened dorso-ventrally . *mediofasciata* and *solitaria*

Aethiothemis bequaerti Ris, 1919, *Coll. Zool. Selys* **16** (2): 1127 (Elizabethville)

This small, slender-bodied species is known in Rhodesia from a few males only, taken at the open swamp end of Lake Chila, Abercorn, in April. Fraser refers it to a genus *Nubiothemis* (Fraser, 1954, *Rev. Zool. bot. Afr.* **50**: 263) and it is evidently the same as Fisher's *Cirrothemis bella* (Fisher, 1939, *Notul. Nat.* **10**: 4). It was described from Elizabethville. The species *Oxythemis carpenteri* Fraser may also belong to this genus and, like *bequaerti*, it has a cylindrical abdomen.

Aethiothemis mediofasciata Ris, 1931, *Rev. suisse Zool.* **38**: 106 (Angola)

It is not quite certain yet how this species differs from *solitaria* Ris (Ris, 1908, *Ann. Mus. Stor. nat. Genova* **43**: 663), said to be a slightly smaller insect having brown wing apices. Most, if not all, Rhodesian, examples appear to be nearer *mediofasciata*, although there is a slight range in size. A few specimens amongst the very long series collected by Green near Ndola have deeply saffronated wings from base to nodus, rather like *palustris* Martin (Martin, 1912, *Feuille jeun. Nat.* (5) **42**: 95) but with general features, including wing venation, similar to the *mediofasciata* series. It does not appear that these heavily amber-tinted specimens are in any particular stage of maturity, as might be suspected in some Libellulid genera, in which less mature individuals have more amber on the wings than in mature examples. These *Aethiothemis* are confined to open swamps and it is interesting to find that they are only found in the adult state in or just after the rains. The Author collected a long series at Abercorn in April, 1954. In 1960 at Mwinilunga teneral examples (and one mature male) were just appearing in early March. Green has informed the Author that April and May are the months for this group near Ndola. In mid-March, 1960, during the return of the expedition one mature male was taken to the south of Ndola. In the immature male and female the eye is brown above, grey below; body chestnut and orange, with a broad black dorsal stripe down the abdomen. In the mature male, the abdomen is pruinosed blue above.

Northern Rhodesia: Ndola; Abercorn; Mwinilunga. Schouteden (1934) records *solitaria* from Kiambi (Katanga).

Chalcostephia flavifrons Kirby, 1889, *Trans. zool. Soc. Lond.* **12**: 337 (Angola)

Scarce in the area considered here. The male has a yellow face, a steely blue frons, and a forked process on the ventral surface of the base of the abdomen. Northern Rhodesia: Victoria Falls and Katambora; Ndola; Lufubu River mouth (southern end of Lake Tanganyika, Vesey Fitzgerald). Also recorded from Katanga (Ris.).

Lokithemis leakeyi Pinhey, 1956, *Occ. Pap. Coryndon Mus.* **4**: 34 (Abercorn)

This slender-bodied insect has so far only been taken in the type locality, Abercorn. Named after Dr. L. S. B. Leakey who sponsored the exhibition when the species was captured in 1954.

Porpacithemis dubia Fraser, 1954, *Rev. Zool. Bot. afr.* **50**: 261 (Gaboon)

Closely allied to the last insect. One male and one female were taken near the Zambezi River (Mwinilunga) 2 March, 1960, and a short series

in the Katanga, January, 1958. In the male the eye was grey, dark brown on top; thorax marked with pale green; abdomen pruinosed whitish blue. In the female the eye was grey, brown on top; pale marking on thorax green.

Northern Rhodesia: Mwinilunga. Katanga: La Manda River.

Porpax asperipes risi Pinhey, 1958, *Occ. Pap. nat. Mus. S. Rhod.* **22B**: 115

Smaller than the West African nominotypical race this elusive subspecies was described from the Vumba and Mount Selinda in Southern Rhodesia. One pair was collected by Lascelles at Hillwood Farm. Northern Rhodesia: Mwinilunga (February, 1960).

In the male, in life, eye pale blue, green above; labium yellow, labrum and clypeus pale green; frons and vertex pale blue; antehumeral stripe indicated by isolated blue pruinosity; other thoracic and abdominal pale markings green, the abdomen above thinly pruinosed blue. In the female the pale body markings were more yellowish green. Abdominal segments 2–7 pale blue pruinosed above.

Thermochoria equivocata Kirby, 1889, *Trans. zool. Soc. Lond.* **12**: 339, f. (W. Africa)

Schouteden (1934) records this from Katanga.

Hemistigma albipuncta (Rambur). *Libellula albipuncta* Rambur, 1842, *Névr.* 93 (Senegal)

A common species (Plate 3, fig. *e*). Fraser's form *neurothemoides* (Fraser, 1954, *Rev. Zool. Bot. afr.* **50**: 257) lacking the black rays, occurs amongst typical and other varieties. Wings in the female may be with or without brown apical patches. Northern Rhodesia: Victoria Falls and Katambora; Ngoma (Kafue National Park); Ndola; Samfya and Lake Bangweulu (common, according to Dening and Watmough); Mwinilunga; Abercorn. Katanga: Chembe; Mubale; Kanonga. Nyasaland: Port Herald; Bua River (Kota Kota); Nkata Bay.

Key to genus *Diplacodes* Kirby

1 Smaller insects, hindwing of male about 19 mm., the mature males black but coated with thin pruinosity; females and immature males reddish brown on front of thorax; black stripes on thorax and abdomen of immature males thicker. *exilis*

Larger insects, hindwing of male 21 mm. or more, the mature males black without dorsal pruinosity. Immature male and female ochreous on thorax with thinner lines. *lefebvrei*

Diplacodes exilis Ris, 1911, *Coll. Zool. Selys.* **12**: 464

A small local species. Northern Rhodesia: Mwinilunga; Abercorn.

Also recorded from Nyasaland, but the Author has not seen examples from there.

Diplacodes lefebvrei (Rambur). *Libellula lefebvrei* Rambur, 1842, loc. cit. 112, 117 (Egypt)

This dragonfly, very black in the mature male, is abundant in many parts of this continent. Northern Rhodesia: Victoria Falls; Broken Hill; Ndola; Mwinilunga; Samfya; Abercorn and Ufipa Plateau (V. Fitzgerald). Katanga: Elizabethville; Albertville; Upemba. Nyasaland: Salima Bay.

Key to genus *Acisoma* Kirby

1 Abdomen swollen on basal half, sharply contracted in the middle, then slender. Subtriangle on forewing free . *panorpoides*

Abdomen gradually tapering to the end. Subtriangle on forewing crossed . . . . . *trifidum*

Acisoma panorpoides ascalaphoides Rambur. *A. ascalaphoides* Rambur, 1842, *Névr.* 29, ff. (Madagascar)

A common species of quiet open waters, settling preferably on Water Lily leaves. Northern Rhodesia: Victoria Falls; Ndola; Abercorn; Samfya; Chinyunya Hot Springs, east of Lusaka (Dening).

Acisoma trifidum Kirby, 1889, *Trans. zool. Soc. Lond.* **12**: 341 (Congo)

A scarce and local forest species. Northern Rhodesia: Mwinilunga (Sakeshi River, and its source); Samfya. Katanga: Albertville (Schouteden, 1934).

Key to genus *Brachythemis* Brauer

1 Wings without basal amber. Base of frons with distinctive black band. Abdomen not markedly expanded; blackish in mature male; wings of male with black bands . *leucosticta*

Wings with very broad basal amber. Base of frons with only a trace of black. Abdomen swollen; red in male. Wings of male without black bands. . . . . *lacustris*

Brachythemis lacustris (Kirby). *Trithemis lacustris* Kirby, 1889, *Trans. zool. Soc. Lond.* **12**: 329 (Wadelai)

Locally abundant in swampy places. Northern Rhodesia: Victoria Falls; Kafue River; Lake Wumba, Bangweulu swamps (Watmough); Mwinilunga. Katanga: Chembe; Elizabethville, etc.

Brachythemis leucosticta (Burmeister). *Libellula leucosticta* Burmeister, 1839, *Handb.* **2**: 849 (loc. varia)

This black-banded dragonfly (Plate 3, fig. *g*) which settles or flies low over cleared banks of any pool or even near a temporary puddle, is familiar in most parts of Africa. Northern Rhodesia: Chirundu Bridge; Victoria Falls; Ndola; Samfya; Abercorn. Katanga: *vide* Schouteden 1934. Nyasaland: Cholo; Nkata Bay; Lake Shirwa (Arnold).

Key to genus *Crocothemis* Brauer

1 Abdomen broad, triquetral; vividly red in male; hindwing with small bright amber patch not or barely reaching the arculus 2

Abdomen slender, cylindrical (if narrowly triquetral, then with no amber at wing bases) 3

2 (1) Abdomen up to 3 mm. at widest. Pterostigma usually scarlet, 3 mm. or less. Lateral carina on segment 5 with 12 small teeth or less . . . . . *sanguinolenta*

Abdomen over 3 mm. at widest. Pterostigma yellow, over 3 mm. Lateral carina on segment 5 with 17 or more denticles . . . . . *erythraea*

3 (1) All wings broadly amber, forewing to base of triangle, hindwing to distal end of triangle. Pterostigma only 2.5 mm. . . . . *brevistigma* n.sp.

Wings without basal amber. Pterostigma 3 mm. or more . 4

4 (3) Hindwing triangle free. Thorax and abdomen chequered with black . . . . . *saxicolor*

Hindwing triangle often crossed. Thorax and abdomen only with minute traces of black . . . . . *divisa*

CROCOTHEMIS BREVISTIGMA n. sp.

(Fig. 39)

Holotype male, mature. Face and frons ochreous, labium paler, vertex and occiput browner. Pro- and synthorax ochreous brown, sides pale greenish ochreous. Legs ochreous brown with black spines. Venation brown, costa and subcostal cross-veins paler; pterostigma pale brown between black veins. Wings broadly amber at base: forewing in subcostal and cubital spaces as far as proximal angle of triangle, in median and anal fields to level of subtriangle; in hindwing to just beyond distal angle of triangle, covering two-thirds of anal loop and almost reaching tornus. Forewing with 9½ Ax, 8 Px; triangle and subtriangle crossed in forewings, free in hindwing. Venation close. Abdomen and all appendages brownish (redder in life); discontinuous black smears along lateral carina of 4–9. 11–12 denticles on this carina on segment 5. Anal appendages normal; accessories on 2 typical of the genus which is very uniform in these organs; in *erythraea* they are more obviously robust but then this is the largest known African species. Abd. 19 mm., hw. 25 mm., pt. 2.5 mm. In less mature paratypes the costa is more yellow.

Allotype female. Very similar. Abd. 18 mm., hw. 24 mm., pt. 2.5 mm.

In life the abdomen of the male was as red as *sanguinolenta;* eye in both sexes pale blue, maroon on top.

Remarks. The first example seen of this insect was a headless male taken at Abercorn in June, 1943. Its broadly amber wings, small pterostigma and slender body suggested a new species or very aberrant variety of one of the species and it was submitted to Longfield in 1953, who considered it to be *sanguinolenta* or a new subspecies of this. In April, 1957, Kitchingham collected two more males (the paratypes, unfortunately, lacking terminal 5 segments of abdomen). In February–March, 1960, at Mwinilunga, the Author collected two more males (holotype and a damaged example) and the allotype female. The species was settling on granite rocks close to the Zambezi and also, amongst typical *sanguinolenta* and *divisa* it was settling on muddy tracks near Mwinimalamba. Holotype, allotype and one male paratype in National Museum, Bulawayo, one paratype male (lacking abdomen 6–10) will be in the British Museum (Nat. Hist.). Northern Rhodesia: Abercorn; Mwinilunga.

Crocothemis divisa Baumann, 1898, *Ent. Nachr.* **24**: 242 (Togo)

Like *saxicolor* this more widespread insect particularly likes to settle on rocks, either on the banks of rivers and streams or on rocks on hills. Northern Rhodesia: Ndola; Mwinilunga; Lusaka; Abercorn. Katanga: La Manda River; Elizabethville; Albertville, etc.; Upemba Park.

Crocothemis erythraea (Brullé). *Libellula erythraea* Brullé, 1832, *Expéd. Sci. Morée* **3** (1): 102, f. (Moravia)

One of the commonest of the larger red-bodied dragonflies (Plate 3, fig. *h*), principally at open waters. Northern Rhodesia: Victoria Falls; Mwinilunga; Abercorn; Samfya; Fort Rosebery. Katanga: Chembe; Elizabethville, etc. (*vide* Schouteden, 1934); Upemba Park.

Crocothemis sanguinolenta (Burmeister). *Libellula sanguinolenta* Burmeister, 1839, *Handb.* **2**: 859 (Cape)

Very similar in appearance and distribution to the previous species but usually readily distinguished by its shorter, red pterostigma. Northern Rhodesia: Victoria Falls; Ndola; Lusaka; Mwinilunga; Abercorn and Ufipa Plateau. Katanga: Chembe; Elizabethville, etc.; Upemba Park. Nyasaland: Cholo; Zomba; Fort Hill.

Crocothemis saxicolor Ris, 1919, *Coll. Zool. Selys* **16** (2): 1164 (S. Rhodesia)

A scarcer and more local insect than the last three, this was described from Southern Rhodesia, but has been recorded from Nyasaland (Miss B. Rankine). It generally settles on rocks near water or on hill-sides. It varies in colour from a drab light brown, with black reticulation, a form blending very well with granite rocks; to a dark red form.

Bradinopyga cornuta Ris, 1911, *Coll. Zool. Selys* **13**: 547, f. (Moçambique; Tanganyika)

A local insect, favouring granite rocks, near the faster running streams or rivers. Northern Rhodesia: Mwinilunga (f. *cornuta* Ris) (Zambezi River). Katanga: Upemba National Park.

Sympterum fonscolombei (Selys). *Libellula fonscolombei* Selys, 1840, *Libell. Eur.* 29, 49, 208 (France)

No record from this area yet of this rather cosmopolitan insect, although there is little doubt that it occurs in many areas. It favours open reedy pools.

Philonomon luminans (Karsch). *Sympetrum luminans* Karsch, 1893, *Berl. ent. Z.* **38**: 22 (loc. varia)

Widespread, preferring reedy pools. Northern Rhodesia: Victoria Falls; Solwezi; Abercorn. Nyasaland: Mzimba.

Atoconeura biordinata biordinata Karsch, 1899, *Ent. Nachr.* **25**: 371 (Tanganyika)

Although the race *chirinda* Longfield occurs in Southern Rhodesia, Gray sent the larger nominotypical race from Nyasaland; this was described from Tanganyika. It will probably be found on the lower slopes of hills in the north-east of Northern Rhodesia but so far there are no records from Northern Rhodesia. Katanga: 40 miles north of Kuibo Falls; Katentania (Seydel); Upemba. Nyasaland: Mzimba.

Key to genus *Trithemis* Brauer

Males:

1 Body colour mainly red or reddish; sometimes with thin violet pruinosity 2

Body mainly bronze-brown to black, normally with yellow markings; or adults with dense or dark blue pruinosity, at least on thorax or occasionally all black 7

2 (1) Abdomen slender, distinctly constricted at 3 3

Abdomen broader, triquetral, scarcely constricted at 3 . 5

3 (2) Forewing without distinct basal colouring. Abdomen dull orange or red. Hindwing at least 30 mm. . . . . *werneri*

Forewing with basal amber. Abdomen bright red. Hindwing less than 30 mm. 4

4 (3) Basal amber in hindwing scarcely reaching proximal edge of triangle, not covering anal loop, the cellules not darkened . . . . . *arteriosa arteriosa*

Basal amber hindwing reaching beyond t., covering most of loop, the cellules usually filled in with brown.

monardi monardi

5 (2) Frons red, non-metallic. Amber patch on hindwing reaches beyond triangle. Pterostigma less than 2 mm.

kirbyi ardens

Frons metallic or non-metallic. Amber patch hindwing not reaching beyond proximal edge of t. Pterostigma 2.5 mm. or more 6

6 (5) Pterostigma mainly black. Frons not metallic. Abdomen always distinctly red . . . . . *pluvialis*

Pterostigma yellow to brown. Frons metallic violet. Abdomen of adult coated with pruinosity to give a reddish violet colour . . . . . *annulata*

7 (1) Abdomen broad, tapering, but not distinctly constricted . 8

Abdomen slender, distinctly constricted at 3 12

8 (7) Last Ax forewing normally complete. Black lateral bands on thorax separate (but thoracic marking may be obscured by dark blue pruinosity). Hamular hook small . . *dorsalis*

Last Ax forewing incomplete. Black lateral bands on thorax linked together (but may be obscured by pale or dark pruinosity) 9

9 (8) Frons glossy dark brown. Labium all black . . . *dichroa*

Frons metallic violet. Labium with yellow lateral spots . 10

10 (9) Hindwing about 26–27 mm. Body of adult all black . . *atra*

Hindwing normally at least 30 mm. Body not completely black 11

11 (10) Abdomen (without appendages) four-fifth as long as hindwing. Hook of hamule very large . . . . . *ellenbecki*

Abdomen three-quarters as long as hindwing. Hook of hamule small . . . . . *pruinata*

12 (7) Adult not pruinosed, but bronze-brown. Abdomen slender. Wings uniformly yellowish . . . . . *anomala*

Adult with dark or light blue pruinosity; in less mature condition not bronzed. Wings not uniformly yellow . . 13

13 (12) Abdomen *very* slender. Pruinosity dark blue. Hindwing with trace of basal amber or brown 14

Abdomen not excessively slender. Pruinosity pale blue. Hindwing without basal amber 15

14 (13) Forewing with not more than 9½ Ax. Pterostigma whitish on ventral surface . . . . . *hecate*

Forewing with at least 10½ Ax. Pterostigma almost as dark ventrally as dorsally . . . . . *basitincta*

15 (13) Hindwing with an isolated saffron patch in anal area. Frons metallic blue. Pruinosity pale blue . . . . . *stictica*

Hindwing without saffron marking 16

16 (15) Thorax in mature individual yellow at sides, pale blue in front . . . . . *parasticta*

Adult, thorax all blue 17

17 (16) Frons metallic violet. Hamule scimitar-shaped . . *donaldsoni*

Frons metallic blue. Hamular hook small, curved . *nuptialis*

Females:

1 Frons with deep furrow between conical lobes. Hindwing with small isolated yellow spot between anal loop and tornus . . . . . *kirbyi ardens*

Frontal furrow shallow, the lobes rounded. No isolated yellow spot on hindwing 2

2 (1) Abdomen mainly yellowish to reddish brown with black markings 3

Abdomen mainly black with short yellow streaks . . 12

3 (2) Abdomen with short black subdorsal bands on 2–3 (or 2–4) and a lateral stripe on 4–7 4

Abdomen either with continuous black dorsal and lateral bands on 2–10 or else with scarcely any black markings . 6

4 (3) Hindwing 30 mm. or more. Forewing hyaline at base . . . . . *werneri*

Hindwing 29 mm. or less. Forewing with basal amber . 5

5 (4) Basal amber on hindwing not reaching beyond proximal edge of triangle . . . . . *arteriosa*

Basal amber on hindwing extending beyond distal edge of triangle . . . . . *monardi*

6 (3) Pterostigma ochreous to brown or reddish . . *annulata*

Pterostigma brown to black; at most a pale posterior edging 7

7 (6) Veins mostly red. Amber patch on hindwing nearly reaching tornus. Abdomen with narrow black lateral stripe. *pluvialis*

Veins mainly black (subcostal cross-veins may be yellowish). Hindwing with, at most, only very small amber spot. Abdomen with broad black lateral band 8

8 (7) Last Ax in forewing normally complete. Lateral black lines on thorax separate . . . . . *dorsalis*

Last Ax in forewing incomplete. Lateral stripes in thorax linked up 9

9 (8) Synthorax in front normally with two confluent yellow triangles. Frons above partly dark metallic blue. Pterostigma brown. Hindwing 30 mm. . . . . *nuptialis*

Synthorax with complete yellow antehumeral stripes . . 10

10 (9) Frons with glossy black basal band. Wing apices with brown patches. Pterostigma paler posteriorly. Hindwing about 29 mm. . . . . *dichroa*

Band on frons metallic blue-black. No brown at wing apices. Hindwing usually over 30 mm. 11

11 (10) Pterostigma with pale posterior line. Lateral lobe of labium yellow at margin . . . . . *ellenbecki*

Pterostigma without pale posterior line. Lateral lobe of labium black, enclosing small yellow spot . . . *pruinata*

12 (2) Hindwing over 31 mm., without basal amber. Frons with steely blue basal band . . . . . *donaldsoni*

Hindwing 30 mm. or less; with trace of basal amber . 13

13 (12) Abdomen about 30 mm., with double row of pale streaks on each side 14

Abdomen 27 mm. or less, with single row of pale streaks on each side 15

14 (13) Wings strongly yellow all over . . . . . *anomala*

Wings with patch of basal amber . . . . . *parasticta*

15 (13) Abdomen robust, 22–24 mm. Pale markings pale yellow. Hindwing often with yellow cloud near anal loop . . *stictica*

Abdomen more slender, 24 mm. or more, Pale markings more ochreous. No yellow cloud on hindwing . . . 16

16 (15) Forewing with 9½ Ax or less . . . . . *hecate*

Forewing with 10½ Ax or more 17

17 (16) Thorax laterally with vertical black stripe . . . *basitincta*

Thorax with broad blackish lateral horizontal stripe . . *atra*

TRITHEMIS Brauer

Subgenus *Helothemis* Karsch

T. dorsalis (Rambur). *Libellula dorsalis* Rambur, 1842, *Névr.* 89 (Cape)

Common Species. Northern Rhodesia: Kapiri M'Poshi; Ndola; Lusaka; Mwinilunga (Sakeshi River source); Kabompo River; Abercorn; Mokambo (on Katanga border). Katanga: Bunkeya; Elizabethville, etc.; Upemba Park.

Subgenus *Trithemis* Brauer

Trithemis annulata (Beauvois). *Libellula annulata Beauvois*, 1805, *Ins. Afr. Amér.* 69, f. (Oware)

Common. Male conspicuous by its pinkish "claret-coloured" abdomen. Northern Rhodesia: Victoria Falls; Ndola; Mwinilunga; Samfya. Katanga: Upemba Park.

Trithemis anomala Pinhey, 1956, *Occ. Pap. Coryndon Mus.* **4**: 38, ff. (Abercorn)

Characterized by its bronze-brown body and yellowish wings. Extremely local, in swamp. Northern Rhodesia: Mwinilunga (Sakeshi River source); Abercorn (swamp-end of Lake Chila).

Trithemis arteriosa arteriosa (Burmeister). *Libellula arteriosa* Burmeister, 1839, *Handb.* **2**: 850 (Natal)

One of the commonest dragonflies in the whole African continent. Northern Rhodesia: Victoria Falls; Ndola; Kitwe; Chingola; Mwinilunga; Abercorn; Fort Rosebery; Lusaka. Katanga: Lufua River; Elizabethville etc.; Upemba. Nyasaland: Cholo; Nkata Bay.

Trithemis atra Pinhey, 1961, *Publn. Brit. Mus.* (*Nat. Hist.*). 166

A very little-known small black species, easy to confuse with *dichroa* or, in the field, with *Diplacodes lefebvrei*. Northern Rhodesia: 30 miles south of Ndola.

Trithemis basitincta Ris. *Tr. donaldsoni basitincta* Ris, 1912, *Coll. Zool. Selys*, **14**: 784 (Cameroons)

Mwinilunga examples (Zambezi River, and at various waterfalls and rapids) are variable in size and have a distinct but small basal amber ray in cubital space and a trace of amber against the anal triangle, in hindwing: this amber is slightly more marked than in the Victoria Falls series. But the variation in Rhodesia is not nearly as great as in tropical Africa. A local species. Northern Rhodesia: Victoria Falls; Kafue River; Ndola; Mwinilunga; Abercorn. Katanga; Mubale.

Trithemis dichroa Karsch, 1893, *Berl. ent. Z.* **38**: 24 (Togo)

A scarce small black species (*vide atra*). Northern Rhodesia: Mwinilunga.

Trithemis donaldsoni (Calvert). *Pseudomacromia donaldsoni* Calvert, 1899, *Proc. Acad. nat. Sci. Philad.* 235, f. (Somalia)

This pale blue species is scarcely known yet in the territories considered here although common in Southern Rhodesia. Prefers open streams and rivers. Northern Rhodesia: Victoria Falls. Katanga: Mubali; Pelenge Gorge.

Trithemis ellenbecki Foerster, 1906, *Jb. nassau. Ver. Naturk.* **59**: 314 f. (Abysinnia)

A very common darkish blue insect (male), not very particular about habitat although less common in thicker bush. Northern Rhodesia: Victoria Falls; Mwinilunga; Abercorn; Lusaka. Katanga: Lubudi; Elizabethville; Upemba. Nyasaland: Cholo.

Trithemis hecate Ris, 1912, *Coll. Zool. Selys* **14**: 787 (Madagascar)

Rather uncommon and local, but apparently migratory, since it suddenly appeared at lakes near Salisbury (Southern Rhodesia) where it was evidently absent before. Northern Rhodesia: Samfya; Abercorn.

Trithemis kirbyi ardens Gerstaecker, *Tr. ardens* Gerstaecker, 1891, *Jb. Hamburg wiss. Anst.* **9**: (5, 9, 187 sep.) (East Africa)

The nominotypical race is Asiatic. Normally abundant, particularly on rocky streams or rivers, yet scarcely recorded yet in these areas. Northern Rhodesia: Victoria Falls. Katanga: Upemba Park.

Trithemis monardi Ris, 1931, *Rev. suisse Zool.* **38**: 108, f. (Angola)

Not uncommon in Central Africa but rare outside that region. At reedy pools. Males often adopt a fluttering flight. Northern Rhodesia: Chingali (? Kafue River); Kapiri M'Poshi; Katambora; Ndola; Kabompo River (swamp); Mwinilunga; Abercorn.

Trithemis nuptialis Karsch, 1894, *Berl. ent. Z.* **39**: 12 ff. (Cameroons)

A dark blue West African species found sparsely in Central Africa. Northern Rhodesia: Ndola; Mwinilunga. Katanga: Elizabethville.

Trithemis parasticta Pinhey, 1956, loc. cit. 35, ff. (Abercorn)

A very local Northern Rhodesian insect. Northern Rhodesia: Ndola; Abercorn; Samfya (Dening).

Trithemis pluvialis Foerster, 1906, *Jber. Ver. Naturk. Mannheim* **71-72**: (30 sep.). (Tanganyika)

A not uncommon red species which it is possible to confuse in the field with *arteriosa*. The abdomen is slightly broader and less marked with black; the wings with larger amber patch. Northern Rhodesia: Fort Rosebery; Lusaka; Ndola; Kabompo River (swamp); Mwinilunga; Abercorn. Katanga: Elizabethville; Albertville; Mubale.

Trithemis pruinata Karsch, 1898, *Ent. Nachr.* **24**: 342; idem, 1899, ibid. **25**: 369 (Togo)

This species is extraordinarily similar to *ellenbecki*, and the only way of distinguishing them in the field is to examine the hamular hook, which is so large in the latter species. The Author has examined great numbers in the field and his conclusion at present is that *pruinata* is generally scarce in most areas of Central and Eastern Africa and he has only seen few examples from West Africa. At Mwinilunga it appears to be slightly less scarce than elsewhere in Central Africa. One male captured there has two incomplete final antenodals in one forewing. Northern Rhodesia: Ndola; Mwinilunga (chiefly on the Zambezi River).

Trithemis stictica (Burmeister). *Libellula stictica* Burmeister, 1839, loc. cit. 850 (Natal)

At the Victoria Falls dwarf examples are numerous as well as the normal ones. This also applies at Mwinilunga. Common in swamps, reedy pools or rivers. Northern Rhodesia: Victoria Falls; Kapiri M'Poshi; Luanshya (dwarf); Ndola: Mwinilunga; Abercorn; Bangweulu Swamps. Katanga: La Manda River; Upemba Park. Nyasaland: Nkata Bay.

Trithemis werneri Ris, 1912, *Coll. Zool. Selys* **14**: 765, f. (Sudan)

This dull-coloured species appears to be scarce. So far only from Chirundu Bridge on the Zambezi, where it was taken by the Author in 1948 and has not been seen there since. It occurs in Southern Rhodesia (sparsely) and in the northern limits of East Africa. Katanga: Albertville (Mayné: *vide* Schouteden, 1934).

Key to genus *Zygonyx* Hagen-Selys

1 No pale transverse band on front of thorax. Abdomen not conspicuously club-shaped 2

Thorax with a broken whitish transverse band in front. Abdomen in male inflated before the end and therefore club-shaped; a broad yellow band on 7th segment 4

2 (1) Abdomen only about three-quarters the length of the hindwing. A conspicuous yellow band on segment 7, but without conspicuous spots on other segments and without pruinosity . . . . . *flavicosta*

Abdomen almost the same length as the hindwing. Abdomen either pruinose or with yellow spots on most segments 3

3 (2) Labium with broad black median band. Adults without blue pruinosity. Abdomen with conspicuous rounded orange lateral spots. Pterostigma black . . . . *torrida*

Labium with median lobe black. Both sexes developing blue pruinosity. Orange abdominal spots when visible are elongate. Pterostigma reddish brown . . . . *natalensis*

4 (1) Hindwing not excessively broad, with 3–4 rows of cells between anal loop and base. Wings in both sexes hyaline . . . . . *speciosa*

Hindwing very broad, with 7–8 rows between loop and base. Female with large brown fasciae on the wings (male unknown) . . . . . *eusebia*

Zygonyx flavicosta (Sjoestedt). *Pseudomacromia flavicosta* Sjoestedt, 1899, *Bih. svensk. Vetensk. Akad. Handl.* **25** (4): 24 (Congo)

A series of this tropical West African insect was taken at the Kabompo River and at Mwinilunga (Sakeshi and Zambezi Rivers), all hovering over running waters. These differed slightly but consistently from examples taken in equatorial Africa.

ZYGONYX FLAVICOSTA MWINILUNGAE n. ssp.

(Fig. 40)

Holotype male. Lateral lobes of labium more broadly black on inner (medial) edges. The metallic blue colouring on the frons extending to a lesser degree down the sides than in the northerly race. In the female *Allotype* the labial black is similar to the male. The frontal metallic coloration is, however, reduced in females of both races and does not extend down the front or sides.

Remarks. Two pairs were taken in copula others singly. Holotype and allotype of this race, the latter with a male in copula, are in the National Museum, Bulawayo. A paratype male and female will go to the British Museum (Nat. Hist.). Seydel has taken the species in the Katanga at Katentania.

Zygonyx natalensis (Martin). *Pseudomacromia natalensis* Martin, 1900, *Bull. Mus. Hist. nat. Paris* 106, 107 (Natal)

Usually very common at waterfalls and rapids. The only continental African species of the genus which develops any extent of blue pruinosity. Northern Rhodesia: Victoria Falls; Ndola; Mufulira; Kabompo River; Mwinilunga. Katanga: Lubudi; Elizabethville; Upemba Park. Nyasaland: Njakwa Gorge.

Zygonyx speciosa Karsch. *Pseudom. speciosa* Karsch, 1891, *Ent. Nachr.* **17**: 74 (Cameroons)

Prefers the broader streams or rivers, hovering over the rapids or waterfalls. (Plate 4, fig. *b*). Eye in male whitish grey, pale body markings ivory white. The only female seen by the Author is in the private collection of the late Charles Seydel and was taken in Elizabethville. It has more extensive brown basal marks on the hindwing than the male. Both sexes are readily distinguished from other species from this area by the presence of the ivory transverse band on the front of the thorax. Northern Rhodesia: Mwinilunga (Zambezi River); Kabompo River (seen but not captured); Abercorn; Ndola.

Zygonyx torrida (Kirby). *Pseudom. torrida* Kirby, 1889, *Trans. zool. Soc. Lond.* **12**: 299, 340 (loc. varia)

Very widespread; conspicuous by the orange spots on the abdomen, in which it superficially resembles *Olpogastra fuelleborni*. However, the latter is not a waterfall-rapids species, nor a hoverer; and its abdomen is much more swollen at the base. Northern Rhodesia: Victoria Falls and Zambezi River. Katanga: Elizabethville.

Zygonyx eusebia (Ris). *Pseudomacromia eusebia* Ris, 1912, *Coll. Zool. Selys.* **14**: 814 (Congo)

One female of this magnificent species was taken in the Katanga by Seydel at Kamina.

Key to genus *Olpogastra* Karsch

1 Abdomen longer than hindwing, very swollen at base, the remaining segments very slender . . subgenus *Olpogastra* *lugubris*

Abdomen shorter than hindwing; fusiform, not slender. subgenus *Zygonoides* . . . . . *fuelleborni*

Subgenus *Olpogastra* Karsch

Olpogastra lugubris Karsch, 1895 (Ehrenberg mss), *Ent. Nachr.* **21**: 199, 201 (Dongola)

Not uncommon at reedy edges of large pools or rivers. Its peculiar abdomen and the yellow speckled, metallic black thorax readily distinguish it. Northern Rhodesia: Victoria Falls; Kapiri M'Poshi; Samfya. Katanga: Kuibo Falls; Upemba Park.

Subgenus *Zygonoides* Fraser

Olpogastra fuelleborni fuelleborni Gruenberg, 1902, *S. B. Ges. Naturf. Fr. Berl.* **9**: 235 (Nubia, Langenberg)

In this area it is so far known only from the Victoria Falls—Katambora section of the Zambezi River, where it settles on bushes overhanging the river.

Key to genus *Rhyothemis* Hagen

1 Forewing hyaline or with only the merest trace of amber at extreme base. Hindwing with large basal metallic—black area reaching from base to halfway between distal angle of discoidal cell and nodus . . . . . *semihyalina*

Both wings coloured from base to at least the nodus . . 2

2 (1) Wings yellow at base, with intricate pattern of black bands and spots between base and nodus. Pterostigma ochreous.

mariposa

Wings largely metallic black up to the black pterostigma, with a few hyaline spots . . . . . *fenestrina*

All species of this genus are conspicuous and they tend to have a fluttering flight. They generally prefer swamps or reedy pools.

Rhyothemis fenestrina (Rambur). *Libellula fenestrina* Rambur, 1842, *Névr.* 40

Although locally abundant in parts of tropical Africa (e.g. Uganda) where it is found in or at the edges of forest, in Central Africa only few examples are recorded so far, from swamps. (Plate 4, fig. *c*). Northern Rhodesia: Samfya (Watmough and Dening); Katambora; Mwinilunga; Abercorn. It has also been taken in Katanga (Lamaire).

Rhyothemis mariposa Ris, 1913, *Coll. Zool. Selys* **15**: 961, f. (South West Africa)

This attractive insect is practically only known in the area under consideration, with one or two sparse records elsewhere such as the type locality in South West Africa. Northern Rhodesia: Ndola; Chingola; Kabompo River (swamp); Mukende swamp (North-Western Province); Samfya and Lake Bangweulu; Abercorn. Katanga: Elizabethville; Kafakumba (Overlaet: *vide* Schouteden).

Rhyothemis semihyalina (Desjardins). *Libellula semihyalina* Desjardins, 1832, *Rapp. Soc. Maurice Isl.* 1; idem, 1835, *Ann. Soc. ent. Fr.* **4**: 4 (Mauritius)

The common form (Plate 4, fig. *d*) found in most parts of Africa is referable to the race *separata* Selys (Selys, 1849, in Lucas, *Algérie* **3**: 115 (Algeria)). The nominotypical race is Mauritian. Northern Rhodesia: Katambora; Broken Hill; Ndola; Samfya; Lake Bangweulu; Lusaka. Katanga: Lubumbashi; Elizabethville, etc.

Parazyxomma flavicans (Martin). *Zyxomma flavicans* Martin, 1908, *Ann. Mus. Stor. nat. Genova* **43**: 657 (Portug. Guinea)

This remarkably local and scarce insect somewhat resembling a rather large *Brachythemis leucosticta* but more retiring and crepuscular in habits, has been found in Northern Rhodesia in recent years: near Maramba River (Victoria Falls; in thick bush); Samfya (Dening).

Tholymis tillarga (Fabricius). *Libellula tillarga* Fabricius, 1798, *Suppl. Ent. Syst.* 285 (East Indies)

A cosmopolitan, crepuscular species marked in the male with a brown and milky-white patch on the hindwing near the nodus. Northern Rhodesia: Victoria Falls; Chirundu Bridge; Ndola; Samfya; Mwinilunga; Buleya-Mweru; Fort Jameson; Abercorn. Katanga: Albertville; Mubali.

The continental African form can be referred to forma *pallida* Beauvois.

Pantala flavescens (Fabr.). *Libellula flavescens* Fabricius, 1798, ibid. 285 (India)

A cosmopolitan migrant, found anywhere except in the denser forests; even at rain-puddles, like *Brachythemis leucosticta*. Northern Rhodesia: Victoria Falls; Ndola; Kabompo River; Bangweulu; Lusaka; Mwinilunga; Abercorn. Katanga: Elizabethville, etc.; Upemba Park.

Trapezostigma basilaris (Beauvois). *Libellula basilaris* Beauvois, 1805, *Ins. Afr. Amér.* 171, f. (Nigeria)

A strongly flying migrant in Africa and Asia. Examples are sometimes referrable to f. *burmeisteri* Kirby, with the red patches on the hindwing linked up, but more often they have them separate, like typical *basilaris*. (Plate 4, fig. *a*). Northern Rhodesia: Victoria Falls; Chingola; Solwezi (procured with dust shot on a swamp by Lascelles); Fort Jameson; Bangweulu; Abercorn; Lusaka. Katanga: Albertville, etc. Nyasaland: Mzimba.

Key to genus *Urothemis* Brauer

1 Abdomen with narrow blackish stripe on 4–6, broadening on 7–9; frons and abdomen of male red. Basal patch on hindwing in both sexes yellow with reddish brown marking.

assignata

Abdomen with broad black band on 4–10; frons of male metallic blue-black, abdomen in adult male coated with grey-blue pruinosity. Basal patch on hindwing blackish in male; in female more broadly amber with sparser red marking . . . . . *edwardsi*

Urothemis assignata (Selys). *Libellula assignata* Selys, 1872, *Rev. Zool.* (2) **23**: 176 (Madagascar)

Often a common red-bodied species at reedy pools, but so far, in this area, only recorded from Katambora on the Zambezi River, and in Katanga at Albertville and Mabwe (Upemba).

Urothemis edwardsi (Selys). *Lib. edwardsi* Selys, 1849, in Lucas, *Algérie* **3**: 124, ff. (Algeria)

Prefers rivers or broad streams to pools. The dark blue-bodied male is a conspicuous insect. Northern Rhodesia: Victoria Falls and Katambora; Broken Hill; Samfya; Lake Bangweulu; Abercorn. Katanga: Luapula River (Chembe); Albertville; Kiambi, etc.

Aethriamanta rezia Kirby, 1889, *Trans. zool. Soc. Lond.* **12**: 298 (Madagascar)

A small red species with very open venation and short brown basal rays on the hindwing. Settles on reeds or twigs over or near water. Not very common. Northern Rhodesia: Victoria Falls; Ndola; Abercorn.

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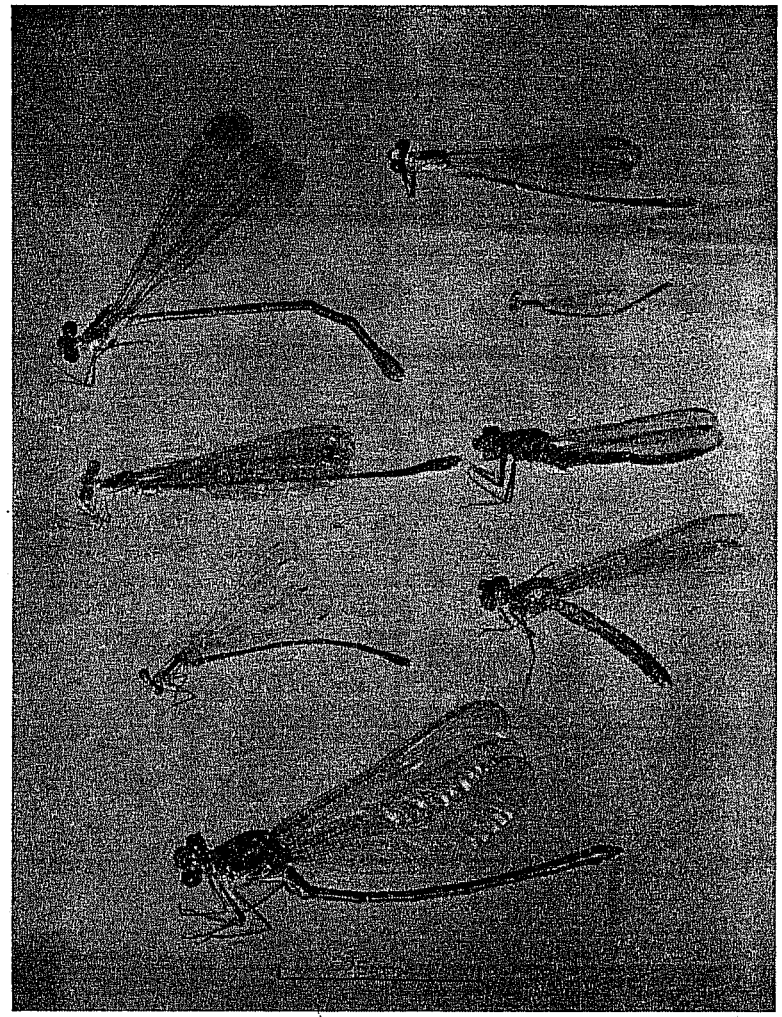
PLATE 1

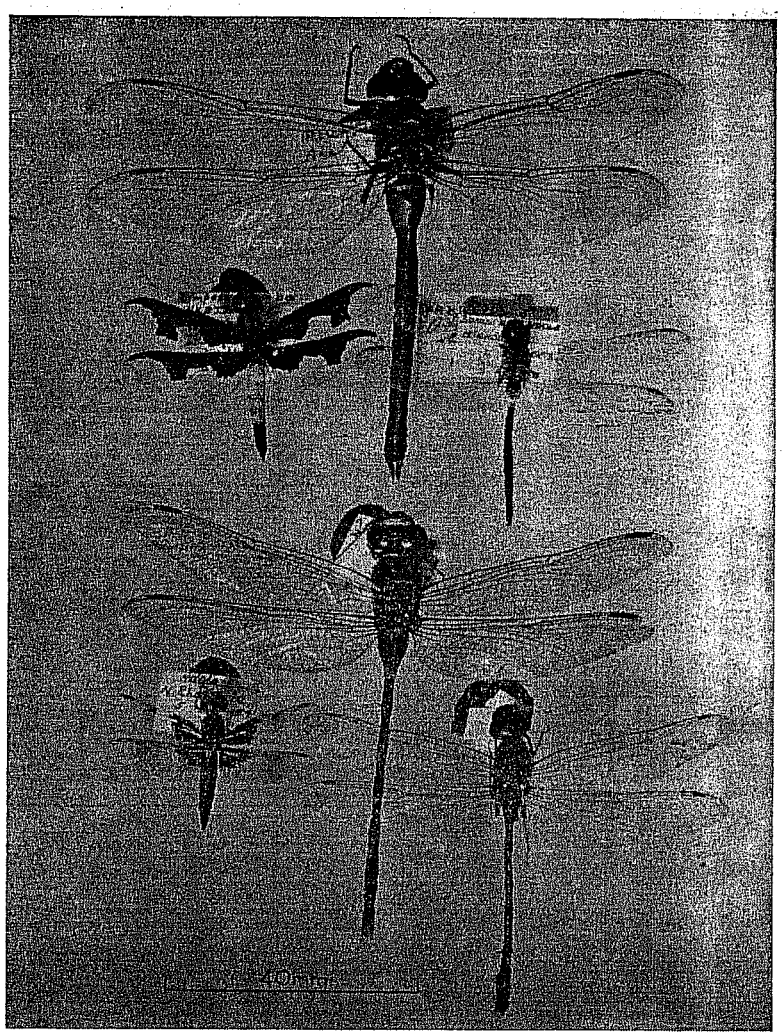
Some damselflies, *Zygoptera*



a. *Lestes amicus* Martin, ♀
b. *Allocnemis mitwabae* Pinhey, ♂
c. *Elattoneura glauca* (Selys), ♂
d. *Pseudagrion kersteni* Gerstaecker, ♂
e. *Agriocnemis exilis* Selys, ♂
f. *Platycypha caligata* (Selys), ♂
g. *P. caligata*, ♀
h. *Umma distincta* Longfield, ♂

PLATE 2

Miscellaneous Dragonflies



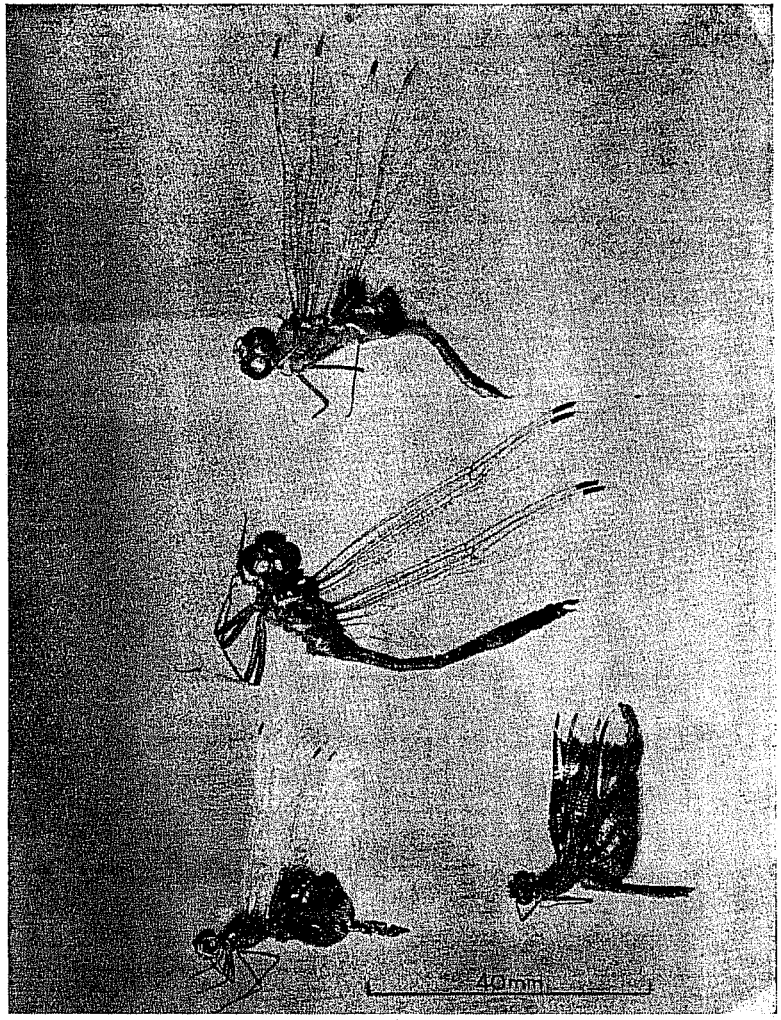
a. *Neurogomphus fuscifrons* Karsch, ♀
b. *Anax bangweuluensis* Kimmins, allotype ♀
c. *Palpopleura jucunda* Rambur, ♂
d. *P. lucia* form *portia* (Drury), ♂
e. *Macromia picta* Selys, ♂
f. *Orthetrum rhodesiae* Pinhey, paratype ♂

PLATE 3

Some *Anisoptera*

a. *Crenigomphus cornutus* Pinhey, ♀
b. *Ictingomphus ferox* (Rambur), ♂
c. *Palpopleura lucia* (Drury), ♂
d. *P. lucia* (Drury), ♀
e. *Hemistigma albipuncta* (Rambur), ♂
f. *Eleuthemis buettikofferi* Ris, ♂
g. *Brachythemis leucosticta* (Burmeister), ♂
h. *Crocothemis erythraea* (Brullé), ♂

PLATE 4



a. *Trapezostigma basilaris* (Beauvois), ♀

b. *Zygonyx speciosa* (Karsch), ♂

c. *Rhyothemis fenestrina* (Rambur), ♂

d. *Rhyothemis semihyalina* (Desjardins), ♂

PLATE 5

A typical Antlion, *Palpares sparsus* McLachlan, ♂ (Family *Myrmeleonidae*)

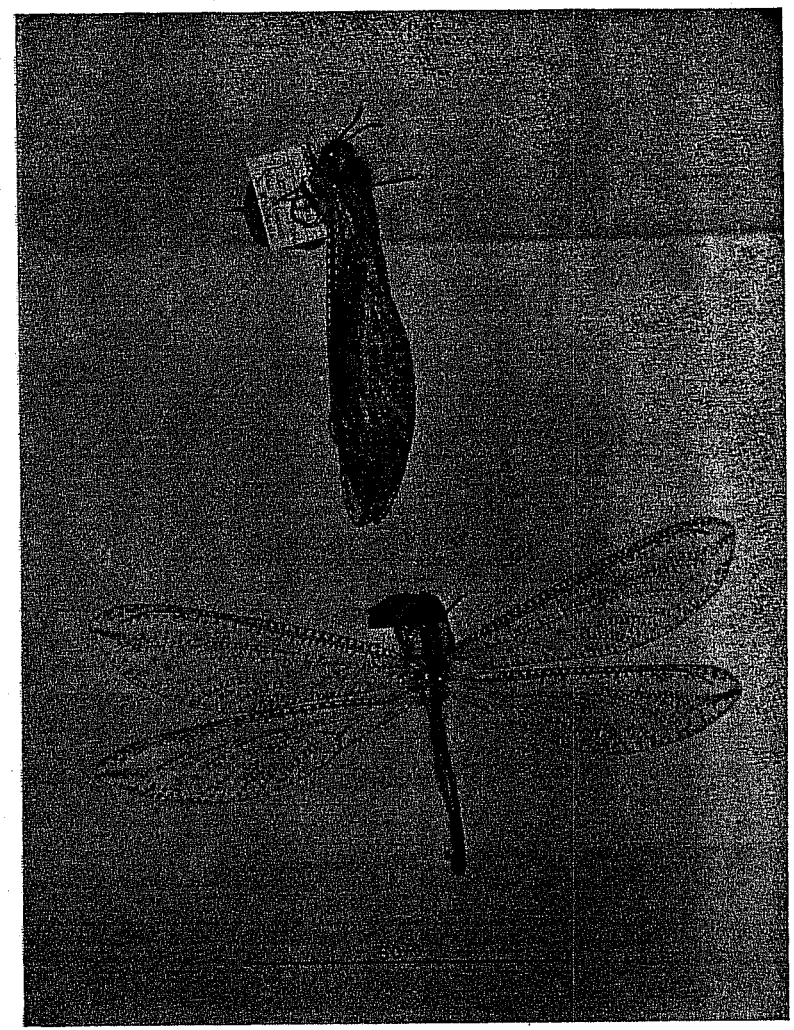
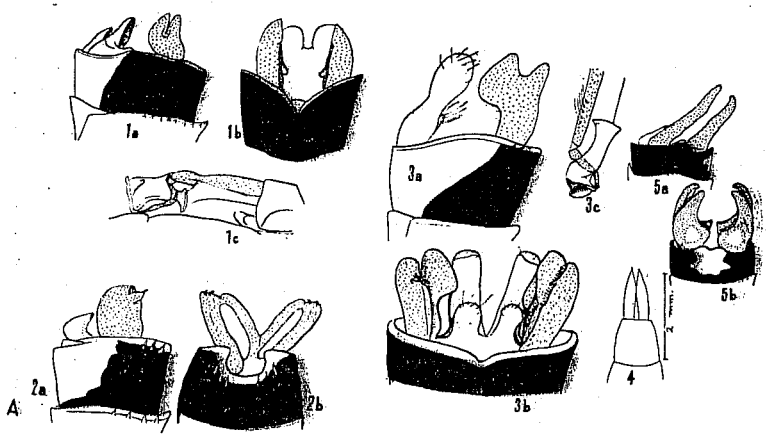
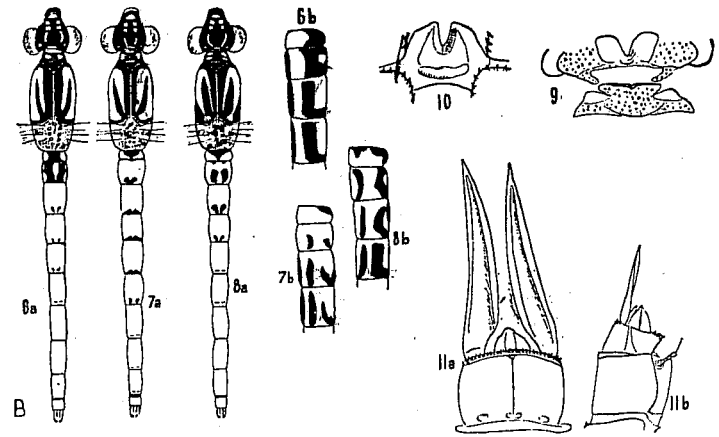


FIGURE A



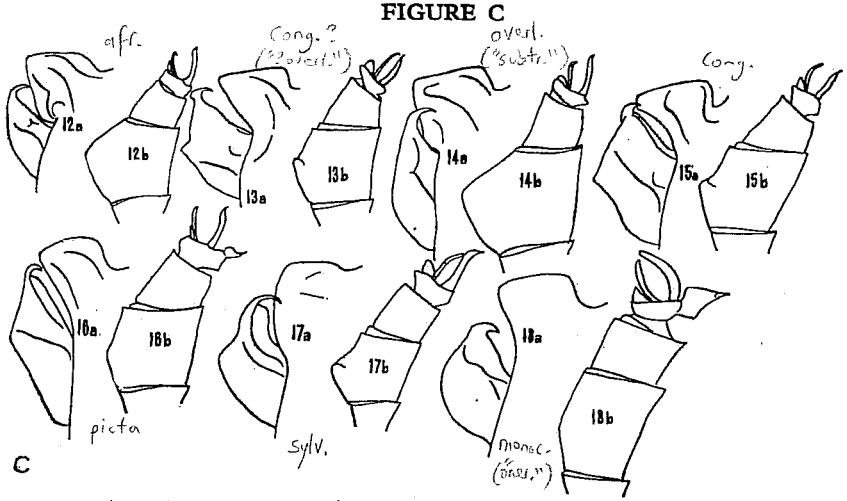
1. *Pseudagrion chongwe* n. sp.
   a. *b*. anal appendages of male, from right and from above.
   c. penis, from left, and left hamule.
2. *Pseudagrion deningi* n. sp.
   a, *b*. anal appendages, from right and from above (in dorsal view the inferiors are not visible).
3. *Pseudagrion fisheri* n. sp.
   a, *b*. anal appendages, from right and from above.
   c. penis, from left.
4. *Pseudagrion greeni* Pinhey. Cerci and 10th segment of female, from above.
5. *Chlorocnemis lascellesi* n. sp.
   a, *b*. anal appendages of male, from right and from above.

FIGURE B



6. *Chlorocypha luminosa* (Karsch).
   a. male (not mature), from above.
   b. basal segments of female, from left.
7. *Chlorocypha frigida* n. sp.
   a. male, from above.
   b. basal segments of female, from left.
8. *Chlorocypha fabamacula* n. sp.
   a. male, from above.
   b. basal segments of female, from left.
9. *Allocnemis mitwabae* Pinhey. Posterior lobe of prothorax (with stylets) and anterior part of mesothorax, from above.
10. *Onychogomphus kitchingmani* Pinhey. Female vulvar scale.
11. *Anax bangweuluensis* Kimmins.
    a. 10th segment and cerci of female, from above.
    b. 9–10 and cerci, from left (less enlarged).

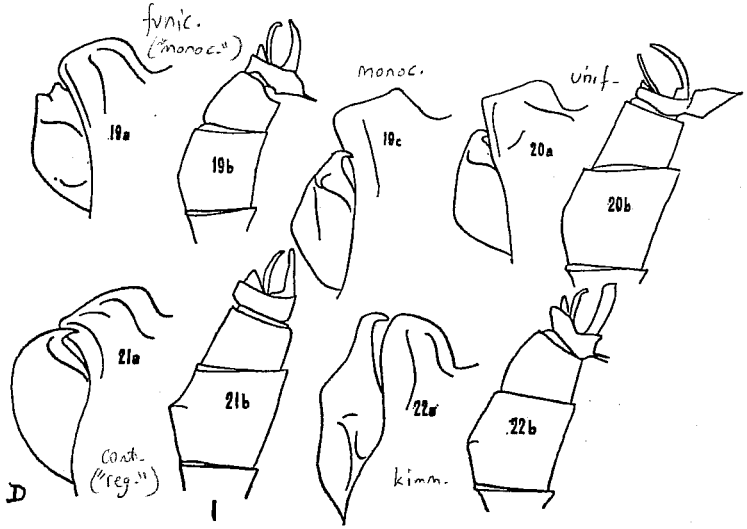
FIGURE C



Macromia. Accessory genitalia of males, (*a*) from right; *b*. terminal segments and anal appendages, from right (less enlarged):

12. *africana.*
13. *? overlaeti.*
14. *subtropicalis.*
15. *congolica.*
16. *picta.*
17. *sylvatica.*
18. *onerata.*

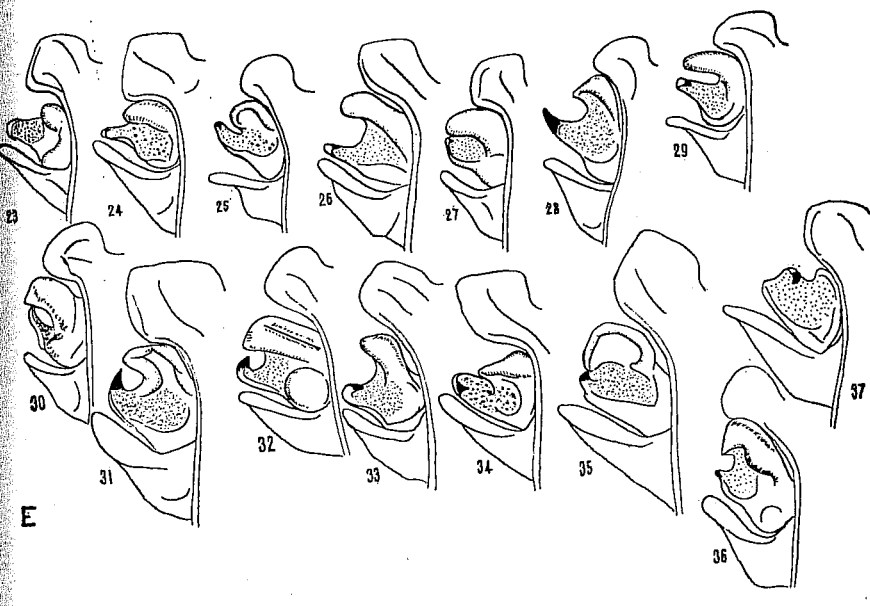
FIGURE D



Macromia. Accessory genitalia of males (*a, c*), from right; *b*. terminal segments and anal appendages, from right (less enlarged):

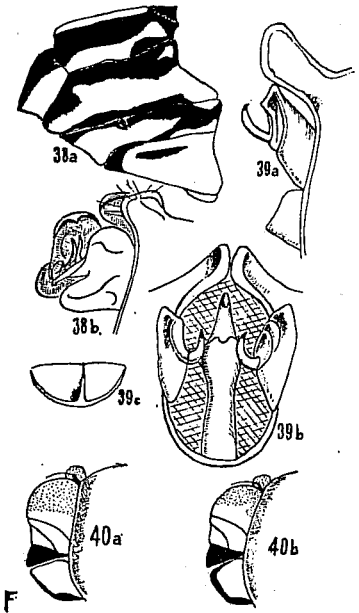
19. *monoceros: a, b.* ex Mwinilunga; *c.* ex Moçambique.
20. *unifasciata.*
21. *reginae* (*bifasciata* very similar).
22. *kimminsi.*

FIGURE E

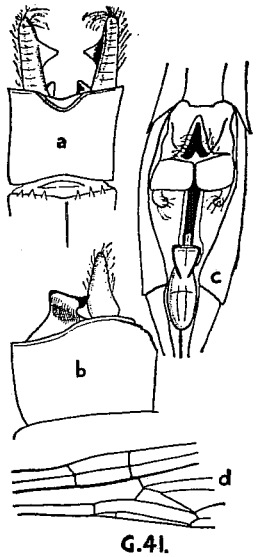


Orthetrum. Accessory genitalia of males, from right:

23. *caffrum.*
24. *chrysostigma.*
25. *abbotti.*
26. *machadoi.*
27. *hintzi.*
28. *macrostigma.*
29. *guineense.*
30. *rhodesiae.*
31. *stemmale kalai.*
32. *julia.*
33. *falsum falsum.*
34. *microstigma.*
35. *brachiale.*
36. *icteromelas.*
37. *trinacria.*



F



G.41.

FIGURE F

38. *Neodythemis fitzgeraldi* n. sp. Male.
a. thorax, from left.
b. accessory genitalia, from right, latero-ventrally.

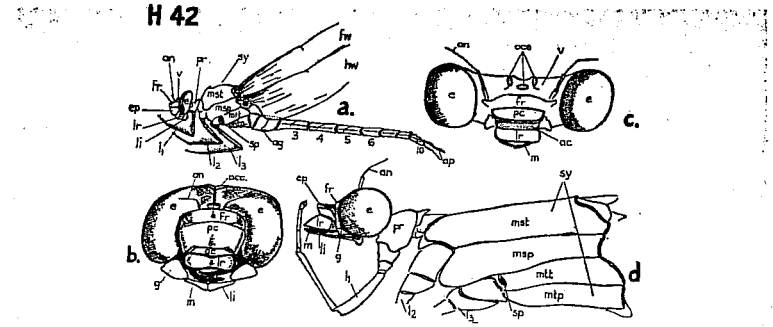
39. *Crocothemis brevistigma* n. sp.
a, b. accessory genitalia of male, from right and from below.
c. vulvar scale of female.

40. *Zygonyx flavicosta* (Sjoestedt). Face of male, from left:
a. flavicosta flavicosta Sjoestedt.
b. flavicosta mwinilungae n. ssp.

FIGURE G

41. *Ceriagrion katamborae* n. sp. Male.
a, b. anal appendages, from above and from right.
c. second abdominal segment, from below.
d. base of right forewing with abnormal cross-vein.

FIGURE H



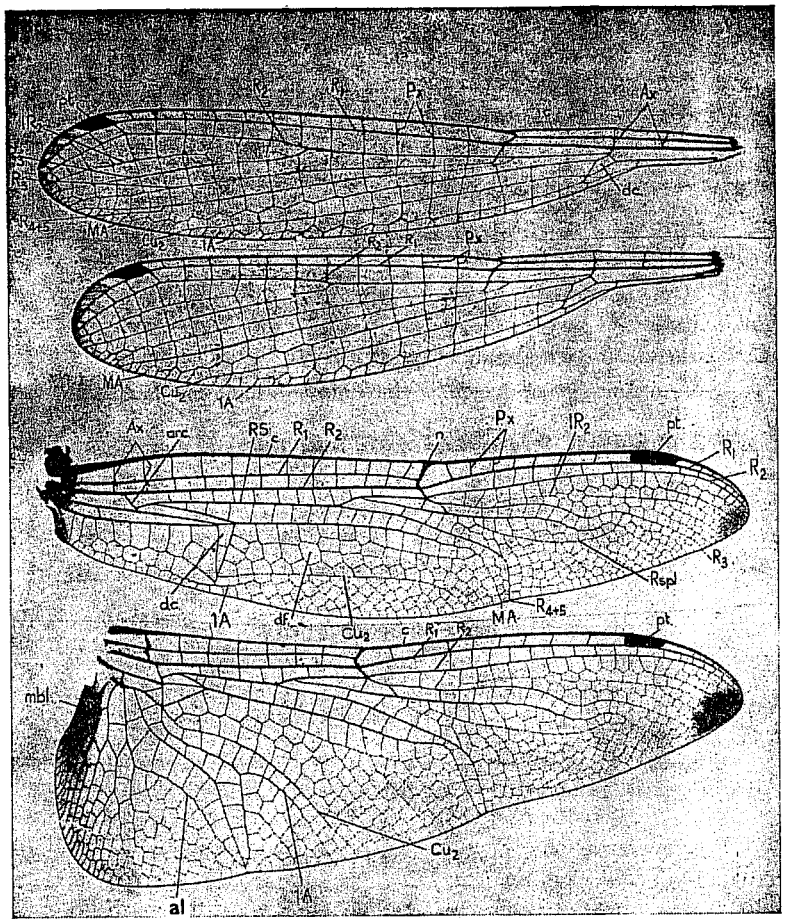
42. Structure of the dragonfly body.

a, b. An Anisopteran dragonfly, *Anax speratus*, male and an enlarged view of its face.

c, d. A damselfly, *Pseudagrion kersteni*, face; head and thorax.

ac—anteclypeus.
ag—accessory genitalia on segment 2.
an—antenna.
ap—anal appendages (superior and inferior).
e—compound eye.
ep—epistome (ante- and post-clypeus).
fr—frons.
fw—forewing.
g—gena.
hw—hindwing.
l_1, l_2, l_3—legs.
li—labium.
lr—labrum.
m—mandible.
msp—mesepimeron.
mst—mesepisternum.
mtp—metepimeron.
mtt—metepisternum.
occ—occiput.
oce—ocelli.
pc—post-clypeus.
pr—prothorax.
sp—thoracic spiracle or breathing pore.
sy—synthorax.
v—vertex.
3, 4, 5—abdominal segments.

FIGURE I



43. Wing venation.

a. A Zygopteran dragonfly, *Pseudagrion kersteni*.

b. An Anisopteran, *Pantala flavescens*.

arc—arculus.
mbl—membranule.
n—nodus.
pt—pterostigma.

NOTE—Other lettering in text, pp. 6-7.