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A REVISION OF THE CHLOROCYPHIDAE
WITH NOTES ON THE DIFFERENTIATION
OF THE SELYSIAN SPECIES
RUBIDA, GLAUCA, CYANIFRONS AND CURTA,

by Lt Col. Frederick, Charles FRASER, I.M.S., Retd.
(Bournemouth).

The *Chlorocyphas* are a rather isolated and highly specialized family belonging to the suborder *Zygoptera*. Their comparatively large and closely-set eyes, the extraordinary development of the epistome, the long narrow wings and abbreviated abdomen make up a complex which is without parallel within the suborder. Apart from general characters, specialization is confined almost exclusively to the male sex, in which it has taken two distinct lines of evolution, the one tending to beautify the insect by development of brilliant colouring in the wings, the other by an equal development of colouring of the abdomen. Rarer lines of evolution are illustrated in the lengthened abdomen of *Rhinoneura*, the excessive reduction in the venation of the wings in *Disparocypha*, the extension of the mesothoracic triangle in some of the *Rhinocyphas*, the bizarre thickening of the Costa in *L. bisignatus* (McLACHLAN) and the dilatation of the tibiae in some of the *Chlorocyphas*, etc. It is evident from the homogeneous character of the females, even when species of distantly related genera are compared, that evolution has been arrested at a very early date in this sex and still remains static at a very primitive level: such remarkable similarities

can not be explained away on the grounds of either coincidence or convergence.

M. JOHN COWLEY has carried out an important study of the male genitalia, in an endeavour to find out if the penile organs throw any light on the relationships within the family, but his results have been as disappointing as mine have in a similar study of these organs in the case of the family *Gomphidae*, for they have served to show that the structure of these organs has only a specific value. It is true that he has established a number of groups but a glance at the fellow companions in individual groups shows how artificial they actually are, thus the very primitive *Libellago*s are found grouped with species like *Rhinocypha unimaculata* and *iridea* SELYS, which I regard as having attained the highest degree of evolution within the family. I am quite unable to accept M. COWLEY'S suggestion that these « *Rhinocypha* species are perhaps a heterogeneous assemblage of primitive forms », since the high specialization in the shape, venation and colouring of the wings of the males testifies to a much more recent origin.

Infinitely more valuable and offering more positive results both to a correct solution of relationships and the line of evolution pursued, is a study of the venation of the wings. In a former paper I have shown that the arching of *RII* towards the Radius, to be found in all the higher forms of the *Zygoptera*, is due to its continual recession towards the base of the wing until a point is reached where the resistance is so great, that further lengthening can not occur without an actual buckling of the vein. This buckling of *RII* is present in *Rhinocypha*, *Chlorocypha* and all other higher forms of the family but is entirely absent in the *Libellago* complex of forms where *RII* is seen to continue on in the same straight line as the superior sector of the arculus: thus it is possible at the outset, to place the genus *Libellago* at the very base of the family *Chlorocyphidae*. A study of the veins *CuP* and *AI* offers equally interesting results: they are short and not extending to the level of the nodus in the unspecialized, colourless-winged *Cyrano* and are therefore rather primitive: they are of greater length and extending far beyond the level of the nodus in the highly specialised, brilliant-winged *Rhinocypha unimaculata* SELYS, and, in addition, the Anal vein is found to possess a long if rudimentary branch, sure proof that in its venation, this species has attained the highest development found within the family.

Thus the *Libellagos* and this latter species, which COWLEY grouped together, are found actually to be as far apart as the poles.

ECOLOGY.

The *Chlorocyphas* breed solely in running water, clear sub-montane streams being preferred: to these habitats they are tied down to an extent rarely met with in the Order. I am unable to recall ever having seen among the thousands observed, a single specimen removed from its parent stream by as much as a distance of fifty metres: usually they are found closely hugging the banks of the streams or the females roosting on twigs in the immediately adjacent jungle, often at considerable heights. I am led to infer from this that migratory tendencies are practically nil. Nevertheless migration must certainly occur, either purposeful or adventitious (1), since the genus *Chlorocypha* has reached and populated the greater part of Africa, and some species, such as *Rhinocypha tincta* RAMBUR, have spread throughout the whole of the Sondaic Archipelago ultimately reaching New Guinea and Australia. The trail of this species has been mile-stoned by a chain of races or subspecies insulated in many isles. The distribution of the genus *Chlorocypha* is of especial interest, as although it has occupied the whole continent extending from south of the Sahara to Natal and from the east to west coasts in the tropical and subtropical zones, it has quite failed to penetrate to Madagascar or any of the mascarene islands: thus this genus is isolated from its nearest relatives in Asia by a distance of more than 2000 miles! It is manifest that insects with so weak and so unsustained flight could not possibly cross such vast distances of ocean, whilst they are too robust to be wind-borne as in the case of the smaller *Zygoptera*. The absence of the genus in Madagascar negatives any theory of spread by a former apposition of floating continents, so that we come to the inevitable conclusion that the *Chlorocyphas* arrived from the north by a land route presumably

(1) Adventitious in the sense that cyclones frequently tear vast numbers of insects from their habitats: caught up in the vortex, they may be wind-borne for vast distances. I have witnessed this on two occasions and once more than 40 miles out at sea when the sky was darkened with the insects. F. C. F.

during an interglacial epoch (2). Such a theory implies that the family as a whole, is very archaic, as indeed it is shown to be by its venation, which points to an Amphipterygine ancestor, especially in the case of the more primitive *Libellagos*.

The Nymphs. — These have been fully described by myself in the case of those of *Rhinocypha ignipennis* and *bisignata* and of *Libellago indica*, and by Dr KARSCH for an unknown *Chlorocypha*: Dr BARNARD has described the nymph of *Chlorocypha caligata* but was unable to secure living nymphs, his description being made from an exuvium. The difficulty in finding the nymphs is partly due to the camouflage imparted by clinging diatoms, infusoria and filth, and to the depth at which they dwell in streams. By pulling out submerged logs and boughs from deep pools, I obtained numbers of *Libellago* nymphs but only after leaving the submerged articles exposed for some time to the heat of the tropical sun, when the drying nymphs were compelled to crawl about in search of water out of sheer self-preservation. Exuviae were often found high up

(2) Although no species of the *Chlorocyphidae* are known at the present day from Europe or the Middle East, it is certain that they once flourished in these regions during the Tertiary period, for a number of the representatives of genera which we know to be associated with this family in tropical zones, are found in various parts of Europe and the Near East. Thus the *Macromiinae* are represented by *Macromia splendens* PICTET in France, the *Libellulinae* by *Zygonyx torrida* (KIRBY), the *Epallagidae* by *Epallage fatima* (CHARPENTIER) both reported from Palestine, the former also found in Spain and the latter extending into Greece and also known from Persia and north-west India, the *Coenagruidae* by *Ceriagrion glabrum* (BURMEISTER), the *Gomphidae* by species of *Paragomphus* and the *Aeshnidae* by *Caliaeschna microstigma* (SCHNEIDER). All these isolated species are strung out along the path of the exodus and have blazed the trail by which the ancestors of the genus *Chlorocypha* made their way from southern Asia to Europe and thence to Africa. This route extended northwards from Malaysia until it was arrested by the impassable ramparts of the Himalayan range, at which point, probably guided by the obliquity of this barrier and pressed between it and the sea, they took the sole line open to them and entered the Euphrates Valley and so made their way through Asia Minor to Europe. On the return of glacial conditions, the tide of emigration ebbed southwards, and because the bottle-neck of the Euphrates Valley was now closed to them, they were pressed back into the African Continent as the only road now open to them. A great and lasting gulf from that time separated them from their nearest relatives in Asia.

on the trunks of trees beside the streams. Full references to the nymphs are given at the end of this paper, but it may be mentioned here, that unlike most Zygopterous nymphs, they are pure proctobranchiates, the caudal gills serving purely for purposes of defence.

It was extremely rare to find any species *in cop.* but females were frequently observed ovipositing in floating debris and less often in the living tissues of floating water-weeds.

Courtship in the case of those species with dilated coloured tibiae is both surprising and beautiful: the males hover head-on to the settled female, the latter gazing apparently without any evoked emotion whilst the male sprawls its widely diverged tibiae in such a way as to display them to the best advantage. Professor HALE CARPENTER, *in litt.*, has informed me how intrigued he was in watching the display of the brilliantly scarlet coloured tibiae by the males of *Chlorocypha caligata* SELYS. Quite occasionally another male will join in the courtship, when the first will at once attack it: the two, hovering steadily, make circles round one another, always face to face, sparring as it were, like a couple of wrestlers but never coming to grips save for an occasional nose bumping. No visible damage ever comes from these encounters, the victory going apparently to the most persistent of the two, for sooner or later, one tires of the performance and flies off.

VARIATION IN THE AGE STATES.

The homogeneous character of the females has already been mentioned: their colouring consists of a more or less extensive pattern of black markings on a greenish yellow back-ground. In the teneral stage, the black markings are much restricted but these soon attain their full development, when the respective areas occupied by the yellow and black may be reversed. The teneral male is coloured similarly to its female but the adult colouring is attained much more slowly and, in the case of some species, may take several weeks before becoming fully developed. Thus, commenting on the age phases of *Chlorocypha tenuis* LONGFIELD, the author of the species states: « Males which I took in Uganda, in February and May, 1934, had the pale markings of the head, thorax and sides of abdomen a pure green, which faded to a clear yellow after death. In November, 1937 however, I took a male in the Kaimosi Forest, Kenya, in which, although

the brilliant red of the abdomen was already present, the pale green areas were of a pure yellow. In the same month I took another male in Uganda which still showed only yellow markings. In December 1937 and January 1938 I took several more males (and females) and although the red on the abdomen was brilliant and the colouring seemed to be mature, not a trace of the green had yet appeared on the yellow areas. So this species is definitely on the wing for five months and the beautiful green colouring is only developed in the fourth, viz, in February and March. » There is good evidence to show that these wide changes in colour and markings have been responsible for the same species being described under several names.

Of great interest are the yellow postocular spots found on each side of the occiput and which are evidently a persistence of similar spots found in their Coenagrine ancestors : these spots are invariable in all females throughout the family irrespective of the genus : they are present in all teneral males but tend to become obscured and lost in many species in full adult age, although, even in these they may persist as very tiny dots. Their presence or absence therefore, in the males, is a useful point for adjudging adult age.

GENERA OF THE FAMILY *Chlorocyphidae*.

1. *Libellago* SELYS. (Fig. 1, 2.)

Rather small species (with but few exceptions), with abdomen about 15 mm in length, and hindwing about 18 mm. Females with uncoloured wings and with pterostigma present in both fore- and hindwings. Males usually with apices of forewings tipped with black and without pterostigma: hindwings colourless but with pterostigma (exceptionally a pterostigma is present in all wings, as in *sticticus* SELYS and *naias* LIEFTINCK: in *hyalinus* SELYS, the forewing is without the black tip but has a pterostigma); not more than 6 antenodals (rarely 7 in one or more wings); sectors of arculus arising from a common point and the arculus itself bent at its middle to about a right angle; the Radial sector running straight distalwards in line with the superior sector of the arculus, not curving anteriorly towards the Radius at its outset; Anal vein leaving the posterior border of wing at a point well proximal to the basal antenodal; Females, as in all subsequent genera, with a drab coloured

scheme of black and yellow: males usually with the abdomen brightly coloured greenish-yellow, red, orange or blue more or less marked with black.

Genotype. — *Calopteryx lineata* BURMEISTER.

2. *Melanocypha* gen. nov. (Fig. 1, 5.)

Rather larger species with abdomen about 16 mm and hindwing about 24 mm in length. Characters similar to the last genus except that all wings of the male are broadly marked with blackish brown from nodus to apex and the Anal vein separates from the posterior border of the wing opposite or distal to the basal antenodal. Antenodals never less than 8 or more than 9; abdomen of male entirely black. Differs from all following genera by not having any secondary (weak) antenodals between the two primaries (strong).

Genotype. — *Micromerus snellemanni* SELYS.

3. *Sclerocypha* gen. nov. (Fig. 2, 1.)

Larger species with abdomen of male 21 mm and hindwing 26 mm in length. Differs from *Libellago* in the following characters: 8-9 antenodals and at least 1 secondary placed between the two primaries; a long section of the costa, immediately proximal to the nodus, in the forewings of male greatly and noticeably thickened; similar but slighter thickenings of *MA* and *IA* distal to the discoidal cell: in addition to the black apical fascia of fore-wings of male, which extends proximally to the proximal end of pterostigma, a broad blackish band at the level of nodus. Female unknown.

Genotype. — *Micromerus bisignatus* McLACHLAN.

4. *Disparocypha* Rts. (Fig. 2, 2.)

An aberrant genus with greatly reduced venation of wings which are extremely narrow and with greatly elongated petiole. Not less than 11-12 antenodals of which at least 1 is placed between the 2 primaries; sectors of arculus distinctly separated at origins: arculus oblique, less angulated than in *Libellago* and situated at a level well distal to the distal primary antenodal; Radial sector distinctly arching towards the Radius

at origin of *RIV* + *V*: Anal vein completely absent and fused with the posterior border of wing save for a short curved cross-vein which runs from the border of wing to the middle of posterior side of discoidal cell; *CuP* vestigial, only 3 cells in length, ending well proximal to nodus; *MA* without an anterior curvature after leaving the discoidal cell; pterostigma present in all wings of both sexes, wedge-shaped in the male, with distal end much broader than the proximal.

Genotype. — *Disparocypha biedermanni* RIS.

5. *Calocypha* FRASER. (Fig. 1, 6.)

At least 9 antenodals, usually 11-13 with 1 or more secondaries separating the 2 primaries; sectors of arculus separated at origin; arculus obtusely angulated, situated opposite to the distal primary antenodal; Radial sector arching strongly towards the Radius and running closely parallel with it; Anal vein and *CuP* well developed, the former leaving the posterior border of wing *at about the middle of discoidal cell*: *MA* arching strongly anteriorly after leaving the discoidal cell; pterostigma present in all wings of both sexes, elongated, slightly fusiform in shape, with both ends a little oblique; mesothoracic triangle extended upwards for about half to the whole length of dorsum in the males and usually brightly coloured; apices of hindwings or of all wings of male tipped broadly with black: hindwings only, of the female, similarly coloured; head, thorax and abdomen with brilliant markings of scarlet and blue.

Genotype. — *Rhinocypha laidlawi* FRASER.

6. *Rhinoneura* LAIDLAW. (Fig. 1, 3.)

An aberrant genus in which the male abdomen is greatly elongated. Antenodals numerous, at least 12 to 13 with 1 or more separating the 2 primaries; sectors of arculus separated at origins; arculus oblique, obtusely angulate, situated opposite the distal primary antenodal; Radial sector arching strongly towards the Radius at origin of *RIV* + *V*; discoidal cell more than usually elongate and very narrow, traversed by 3 cross-veins; Anal vein leaving the posterior border of wing at about midway between the two primaries; pterostigma present in all

wings of both sexes, elongate and fusiform as in *Calocypha*; apices of hindwings in the male tipped with black; mesothoracic triangle not expanded or lengthened; abdomen of male greatly elongated, much longer than the wings, narrowly cylindrical, that of female shorter than the wings as in all other genera of the family. Genotype. — *Rhinoneura villosipes* LAIDLAW.

7. *Cyrano* NEEDHAM. (Fig. 2, 4.)

Much larger and more robust species with abdomen 20 mm and hindwing 28 mm in length. Wings in both sexes uncoloured and unmarked; pterostigma present in all wings of both sexes, narrow and elongate, slightly fusiform with obliquely cut ends; arcus situated well *distal* to the distal primary antenodal, its sectors, as in all the following genera, well separated; about 15 to 17 antenodals with at least one secondary between the two primaries; Anal vein *very short, ending before the level of nodus* in forewings and leaving the posterior border of wing distal to the level of the basal antenodal; *CuP* very short and strongly convex, ending opposite the nodus; *an intercalated vein between MA and CuP ending basally proximal to the nodus* in forewings. Abdomen of male black at base, bright red on dorsum thereafter to as far as segment 8.

Genotype. — *Libellago asiatica* SELYS.

8. *Indocypha* FRASER. (Fig. 1, 1.)

Large robust species with characters somewhat similar to those of *Cyrano*. Wings uncoloured and unmarked. Differs from *Cyrano* as follows: *MA* slightly undulated from origin; nodal index rather lower, 12 to 13 antenodals; arcus slightly *proximal* to the distal primary antenodal; Anal vein leaving posterior border of wing *proximal* to basal antenodal and extending distalwards to beyond the level of nodus (as in most other genera of the family); *CuP* also of greater length and ending far distal to nodus; intercalated vein present between *MA* and *CuP*, extending in forewing to only as far as level of nodus; abdomen of male black throughout.

Genotype. — *Libellago vittata* SELYS.

9. *Chlorocypha* FRASER. (Fig. 2, 3.)

Species of variable size, moderately large and robust or rather small and slim; wings without colour or markings; females inconspicuously coloured black and yellow as in all other females of the family; males showing a very high specialisation in the colouring of the head, thorax and more especially of the abdomen, which latter is often blood red, pale blue or a mixture of red and blue marked sparingly with black. *MA* slightly undulated even from its origin; no intercalated veins between *MA* and *CuP*; antenodals usually to the number of 12 and always 1 or more secondaries separating the primaries; arculus at the level of or distal to arculus; Anal vein separating from the posterior border of wing slightly proximal to the basal antenodal and extending distal to level of nodus; *CuP* of great length. Genotype. — *Agrion dispar* PALISOT DE BEAUVOIS.

10. *Platycypha* nov. gen.

Rather large species with characters similar to the last and differing only in that the tibiae of the males are very broadly dilated, brilliant scarlet on the extensor surface and chalky white on the flexor; an abdominal pattern of large paired and minute apical paired pale blue dorsal spots, thus differing from all other species of the genus *Chlorocypha*.

Genotype. — *Libellago caligata* SELYS.

11. *Rhinocypha* RAMBUR. (Fig. 1, 4.)

Species varying from moderately large to rather small and slim stature. Wings of males, with few exceptions, coloured and marked with brilliant iridescent, vitreous and opaque fasciae or spots, the opaque areas often with hyaline vitreous spots or striae. Wings of females colourless or rarely with opaque tips margined with lacteous or, in old adults, often assuming an uniform brownish or yellowish tint. Shape of wings of males very variable, very narrow and elongate or broader, the hind-wings often very broad and imparting an anisopterous character to the insects. Mesothoracic triangle variable, small and inconspicuous or extending the whole length of dorsum and markedly dilated below. Body markings usually restricted and not ordi-

narily conspicuous, but occasionally blue, greenish yellow or even brick red on the male abdomen. *MA* entirely straight throughout its course and rather closely parallel with *CuP* to as far as the wing margin: at least 2 intercalated veins between *RII* and *RIII*, the longest of which extends inwards to proximal of the pterostigma. Anal vein and *CuP* extending well beyond level of nodus; antenodals very numerous and always 1 or more secondaries between the two primaries (3).

Genotype. — *Rhinocypha tincta* RAMBUR.

12. *Paracypha* nov. gen. (Fig. 2, 5.)

A. monotypic genus containing the largest and most robust species of the family. Characters similar to *Rhinocypha* but differing by the presence of an undulated branch to the Anal vein, resulting in 2 rows of cells between the Anal vein and margin of wing, a character unique in the family. (Save in *M. Snellemanni* SELYS.)

Genotype. — *Rhinocypha unimaculata* SELYS.

KEY TO GENERA OF FAMILY *Chlorocyphidae*.

- | | |
|---|---|
| 1 | Sectors of arculus arising from the same point; <i>RII</i> running straight on from the superior sector of arculus and not curving strongly towards the Radius; arculus bent to a right angle at or about its centre; antenodals numbering from 6 to 9 2 |
| | Sectors of arculus distinctly separated at origins; <i>RII</i> making a strong curve towards the Radius immediately after the origin of <i>RIV</i> + <i>V</i> ; the latter vein continuing the line of the superior sector of arculus; arculus oblique and very obtusely angled; not less than 11 antenodals; 1 or more secondary antenodals present between the two primaries 4 |

(3) Dr F. F. LAIDLAW, in a recent letter, has suggested giving generic rank to Group *fenestrata* SELYS, section *b*, a group of species belonging to genus *Rhinocypha* RAMBUR, characterized by an almost equilateral mesothoracic triangle coloured rose pink and flanked on each side by an elongated triangular spot of a similar colour. Fore and hindwings are approximately the same breadth and both narrow, but I can find no venational differences to sepa-

- 2 } Anal vein separating from the posterior border of wing well proximal to basal antenodal; *Ac* situated nearer the basal primary antenodal than to the distal one; only 6 antenodals (rarely 7) *Libellago* SELYS.
 Genotype. — *Calopteryx lineata* BURMEISTER.
- 2 } Anal vein separating from the posterior border of wing distal to the basal antenodal; *Ac* situated nearer the distal primary antenodal than to the proximal one; at least 9 antenodals 3
- 3 } No secondary antenodals present between the two primaries; 2 rows of cells between the anal vein and posterior border of wing for some distance; a primitive, zigzagged branch to the anal vein in this space; arculus distal to the distal primary antenodal; all wings of male broadly opaquely coloured; costa not thickened at nodus *Melanocypha* n. gen.
 Genotype. — *Micromerus snellemanni* SELYS.
- 3 } At least 1 secondary antenodal present between the 2 primary antenodals; only a single row of cells between the anal vein and posterior border of wing; anal vein unbranched; arculus proximal to the distal primary antenodal; only the forewings of male marked with opaque colouring (at apex and nodus); costa conspicuously thickened at nodus
 *Sclerocypha* n. gen.
 Genotype. — *Micromerus bisignatus* McLACHLAN.
- 4 } Anal vein entirely absent (except as fused with posterior border of wing to as far as mid point of quadrilateral); *CuP* reduced to a short vein of not more than 3-4 cells in length; arculus widely distal to the distal primary antenodal *Disparocypha* RIS.
 Genotype. — *Disparocypha biedermanni* RIS.
- 4 } Anal vein and *CuP* both present and well developed; position of arculus variable 5

rate them from the rest of the genus. For this new genus he suggests the name of *Heliocypha* and I have therefore included it in my key.

5 } Anal vein separating from posterior border of wing at the level of the middle of quadrilateral; apices of wings rounded, broadly black in the male in at least the hind wings *Calocypha* FRASER.

Genotype. — *Rhinocypha laidlawi* FRASER.

5 } Anal vein separating from posterior border of wing far proximal to the base of quadrilateral; apices of wings variable, usually obtusely pointed 6

6 } Abdomen of male of great length, considerably longer than the wings; those of female shorter than the wings *Rhinoneura* LAIDLAW.

Genotype. — *Rhinoneura villosipes* LAIDLAW.

6 } Abdomen of both sexes shorter than the wings 7

7 } *MA* and *CuP* diverging more or less strongly distally; a well developed intercalary separating them 8

7 } *MA* and *CuP* closely parallel throughout their course and without any intercalary separating them... .. 9

8 } Anal vein separating from the posterior border of wing *distal* to the basal antenodal; *MA* and *CuP* diverging strongly and with the intervening intercalary extending basally to proximal of level of nodus; *CuP* and Anal vein not extending beyond level of nodus
... .. *Cyrano* NEEDHAM.

Genotype. — *Libellago asiatica* SELYS.

8 } Anal vein separating from posterior border of wing *proximal* to the basal antenodal; *MA* and *CuP* diverging but slightly: the intervening intercalary not extending to as far as level of nodus; *CuP* and Anal vein extending well beyond the level of nodus... ..
... .. *Indocypha* FRASER.

Genotype. — *Libellago vittata* SELYS.

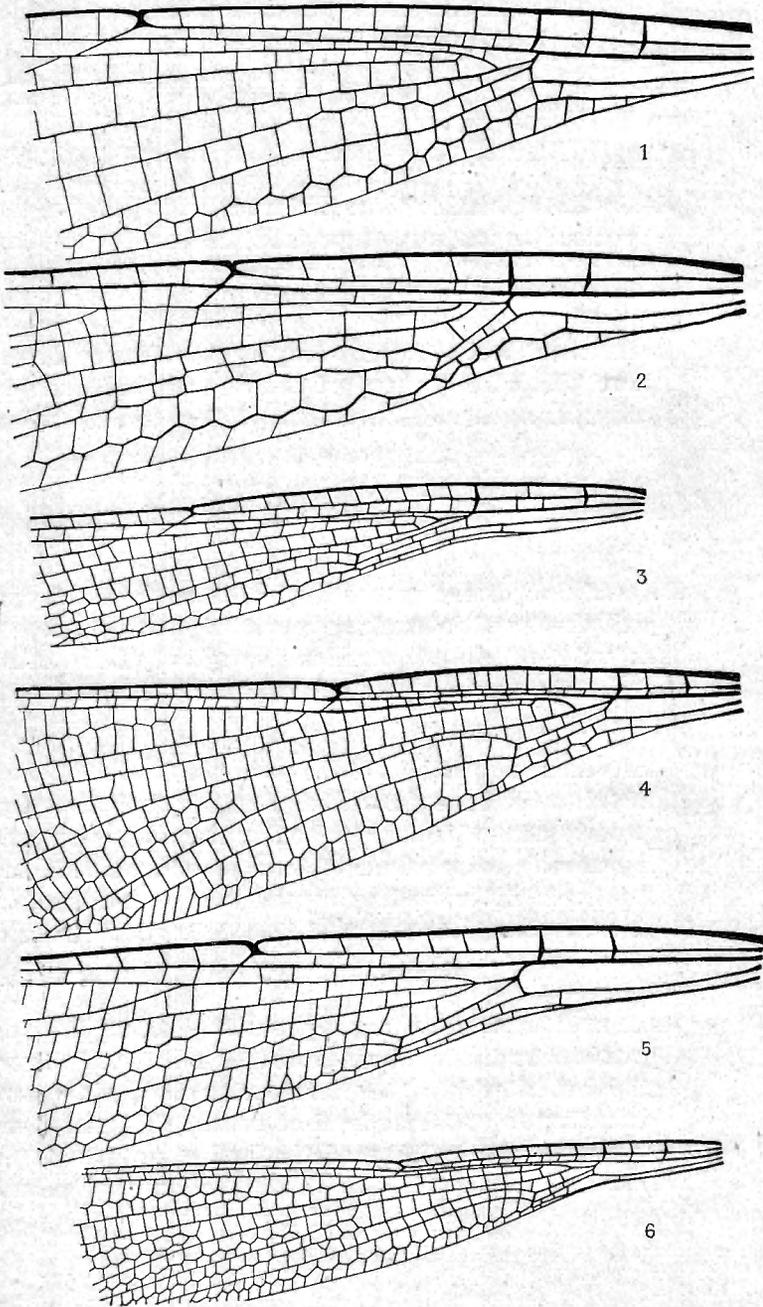


Fig. 1. — Wings of : 1. — *Indocypha* FRASER. 2. — *Libellago* SELYS.
 3. — *Rhinoneura* LAIDLAW. 4. — *Rhinocypha* RAMBUR. 5. — *Melanocypha* FRASER. 6. — *Calocypha* FRASER.

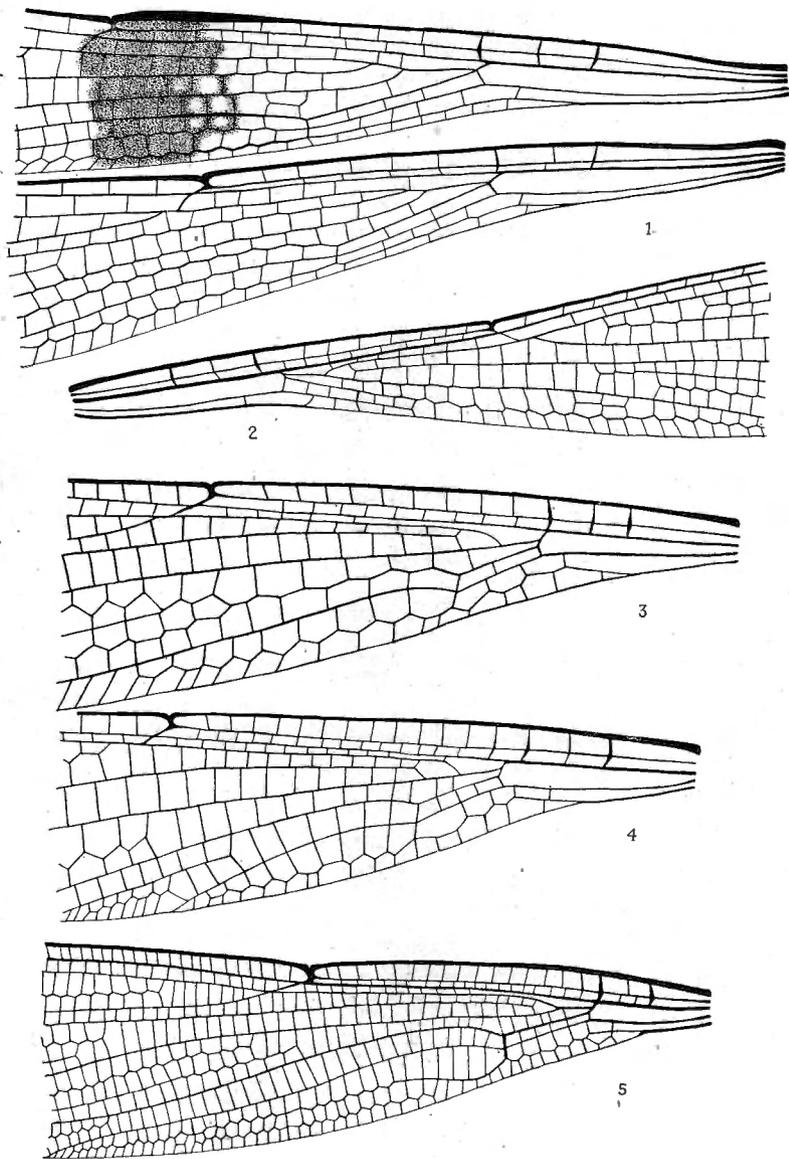


Fig. 2. — Wings of : 1. — *Sclerocypha* FRASER. 2. — *Disparocypha* RIS. 3. — *Chlorocypha* FRASER. 4. — *Cyrano* NEEDHAM. 5. — *Paracypha* FRASER.

- 9 } *MA*, especially in the hindwings, distinctly zigzagged for the greater part of its length; no intercalary veins between *RII* and *RIII*; wings uncoloured; abdomen usually brightly coloured red, blue or red and blue more or less marked with black 10
- 9 } *MA* entirely straight throughout its course; at least 2 intercalated veins between *RII* and *RIII*, the longest of which extends inwards proximal to pterostigma; wings of male usually brilliantly coloured and with vitreous spots; abdomen usually black, marked or not with yellow, blue or more rarely red 11
- 10 } Tibiæ of male neither dilated nor coloured
 *Chlorocypha* FRASER.
 Genotype. — *Agrion dispar* PALISOT DE BEAUVOIS.
- 10 } Tibiæ of male dilated and brilliantly coloured scarlet red and chalky white *Platycypha* gen. nov.
 Genotype. — *Libellago caligata* SELYS.
- 11 } Only a single row of cells between the Anal vein and the posterior border of wing 12
- 11 } Two rows of cells between the Anal vein and the posterior border of wing for at least 20 cells
 *Paracypha* gen. nov.
 Genotype. — *Rhinocypha unimaculata* SELYS.
- 12 } The mesothoracic triangle of male small, limited to lower part of dorsum and peach-blossom pink in colour, flanked on each side by a similarly coloured but larger triangular spot *Heliocypha* gen. nov.
 Genotype. — *Rhinocypha bisignata* SELYS.
- 12 } The mesothoracic triangle of male variable but usually extending the whole length of dorsum and never flanked by coloured triangular spots
 *Rhinocypha* RAMBUR.
 Genotype. — *Rhinocypha tincta* RAMBUR.

Genus *Chlorocypha* FRASER.

Whilst the comparatively simple colouring and markings of the body and the unvarying nature of the colouring and markings of the wings in most genera of the family *Chlorocyphidae* render the task of identification of the species a matter of simplicity, it is far otherwise in the case of the genus *Chlorocypha*. A number of causes has contributed to this and may be tabulated as follows :

1. The wings throughout the genus are unmarked and uncoloured and so offer no points suitable for differentiation.
2. The colour and markings of the head and body are subject to great variation, these variations being sometimes of a permanent nature but more often due to a series of changes incidental to the assumption or development of markings from the teneral to the adult state: quite often the teneral or subadult state is entirely different from that of the adult and whilst this applies to both sexes, it is more especially applicable to the males. Arising from this factor, a number of teneral forms have been described as new species and thus a synonymy has grown which it is extremely difficult to check without the availability of a long series of each of the species involved.
3. The colour and markings of the females, especially in the teneral condition when the black markings are much reduced, are remarkably homogeneous among the species, and as they are frequently subject to the same variations, it is often a matter of difficulty to differentiate the species in this sex.
4. A great deal of the colouring and markings in material received from collectors, is often lost from *post mortem* decomposition. This not only causes difficulty in identification, but has led in the past to faulty descriptions or to the description of obscurely marked specimens as new species.

Because females are more likely to be faulty in this respect, I am of opinion that this sex should never be employed for the type of a new species: unfortunately this has already been done more than once and the validity of such species has been, is and will always be questioned.

5. The early descriptions of species were communicated to SELYS: I can find no evidence that he ever saw the types of

C. dispar, *rubida*, *curta*, etc. Later on, when SELYS was confronted with fresh material, the difficulties mentioned above led to indecision and errors and the emendation of the primary descriptions to such a degree that they were often contradictory in most important characters.

6. Arising from the last, subsequent authors and more especially Dr KARSCH created further errors by employing the later descriptions of SELYS in preference to the originals, probably because these were fuller and more detailed. Species which conformed more to the original descriptions, were then named as new. KARSCH, who fell into this trap, bitterly complains of « the labyrinth of species » created by SELYS, but he himself contributed in great measure to the tortuosity of its windings!
7. The lack of adequate keys to differentiate the earlier described species. Even the author of these species was doubtful of their identity! for in his final summing up, SELYS said: « Quant aux quatre autres: *glauca*, *cyanifrons*, *rubida* et *curta*, ce sont des formes très voisines, et leur séparation formelle me paraît encore douteuse. »

When SELYS made his final summing up in 1879, he had only 20 examples before him on which to base his judgement; for these he said he was under obligation to Mr. McLACHLAN. This circumstance has operated fortunately in that I have been able to study anew the McLACHLAN types and paratypes and to make coloured figures of all as a first step in an attempt to clear up the confusion existing in the genus. It early became clear that a better knowledge of *rubida*-HAGEN SELYS was the key to solving the problem of the specific values of the four species which had so troubled SELYS: I have to thank Dr S. L. TUXEN for supplying me with notes and figures of this type, which after the lapse of nearly a century, still remains in good condition in the Copenhagen Museum, bearing a label. — « *Libellago rubida* HAGEN, male, Guinea, leg. THONNING ». With this information before me, it is clear that both *curta* and *cyanifrons*, as well as *glauca* are all specifically distinct from *rubida*.

In addition to Dr S. L. TUXEN I am greatly indebted for the gifts or loans of specimens to Dr V. VAN STRAELLEN for the loan of types from the Selysian collection, Brussels Museum, to Mr D. E. KIMMINS of the British Museum for assistance in the

examination of types in the McLACHLAN collection, British Museum, to Prof. G. HALE CARPENTER for the collecting of rich material in Uganda, to Mr John COWLEY for the loan of and gifts of specimens of *C. rubida* etc., to Drs R. PAULIAN and A. VILLIERS for the loan of material from French and Portuguese West Africa and lastly to the late Mr J. E. H. ROBERTS for great assistance in searching out and loaning me all references in literature on the subject, and finally reading through the manuscript at a time when he had been confined to his bed in his last and fatal illness. To all these gentlemen by best thanks are due.

LIST OF SPECIES OF *Chlorocypha* MENTIONED IN LITERATURE
INCLUDING MS NAMES AND NEW SPECIES.

- Libellago alata* MARTIN. (MS name: Type in Br. Museum coll.).
Libellago ambigua GERSTAECKER, 1873 (= *L. caligata* SELYS).
Libellago amboniensis MARTIN, 1915.
Libellago aphrodite LE ROI, 1915.
Chlorocypha armageddoni FRASER, 1940.
Libellago auripes FÖRSTER, 1906.
Libellago caligata SELYS, 1853.
Libellago caligata lacustris FÖRSTER, 1914.
Libellago camerunensis SJÖSTEDT, 1899.
Libellago cancellata SELYS, 1879.
Libellago collarti NAVAS, 1929.
Libellago consuetata KARSCH, 1899 (= *L. luminosa* KARSCH).
Chlorocypha croceus LONGFIELD, 1947.
Libellago curta HAGEN in SELYS, 1853 (nec *L. curta* SELYS, 1879).
Libellago cyanifrons SELYS, 1873.
Libellago decorata KARSCH, 1893 (= *L. curta* HAGEN in SELYS, 1853).
Libellago dispar (PALISOT DE BEAUVOIS), 1805 (= *Agrion dispar* PALISOT DE BEAUVOIS).
Libellago glauca SELYS, 1879.
Libellago glaucifrons SJÖSTEDT, 1899 (= *L. cyanifrons* SELYS).
Libellago gracilis KARSCH, 1899 [= *L. dispar* (PALISOT DE BEAUVOIS)].
Libellago grandis SJÖSTEDT, 1899.
Libellago hartmanni FÖRSTER, 1897 (= *L. caligata* SELYS).

- Libellago hintzi* GRUNBERG, 1914 (= *L. cancellata* SELYS).
Libellago jejuna KARSCH, 1898 (= *L. luminosa* KARSCH).
Libellago lacus elephantum KARSCH, 1899.
Libellago lanceolata MARTIN, 1912. (Probably intended for
L. alata MARTIN, an MSS name only.)
Libellago luminosa KARSCH, 1893.
Chlorocypha molindica FRASER, 1948.
Libellago neptunus SJÖSTEDT, 1899.
Libellago rubida HAGEN in SELYS, 1853.
Libellago rubida victoriae FÖRSTER, 1914.
Libellago selysi KARSCH, 1899 (= *L. curta* SELYS, 1879, *nec*
1853).
Chlorocypha straeleni FRASER, n. sp.
Chlorocypha tenuis LONGFIELD, 1936.
Libellago trifaria KARSCH, 1899.
Libellago trifascia GRUNBERG, 1914. (Probably intended for
L. trifaria KARSCH.)

In addition to the above list, SELYS mentioned in POLLEN & VAN DAM, Faune Madagascar Ins., 1867, p. 10, two « spec. nova HAGEN » from Madagascar. SELYS made no mention of these in his second paper on the Madagascar Odonata, Rev. de Zool. GUÉRIN-MÉNEVILLE (2) 23: 175 (1871-1872), nor were they ever alluded to again so that it must be presumed that their inclusion was an error. The family is quite unknown from Madagascar or any of the mascarene islands.

Chlorocypha rubida (HAGEN, 1853). (Figs. 3, 1 and 5, 12.)

- Libellago rubida* HAGEN in SELYS, 1853, Syn. Cal.: 58 (*Abdomen entièrement rouge en dessus*). Original description of male in Copenhagen Museum.
Libellago rubida HAGEN in SELYS, 1854, Mon. Cal.: 228 (Humeral and antehumeral stripes separated: colour of the first 3 abdominal segments given as *red*, that of the rest resembles *dispar*, which has the abdomen *entirely* red save for the black markings).
Libellago rubida WALKER, 1853, List Neur. Ins. Brit. Mus. 4: 644.
KIRBY, 1890, Cat. Odon.: 112.
MARTIN, 1907, Mem. S. R. Exp. H. N. L.: 427. Cabo S. Juan, Biafra.

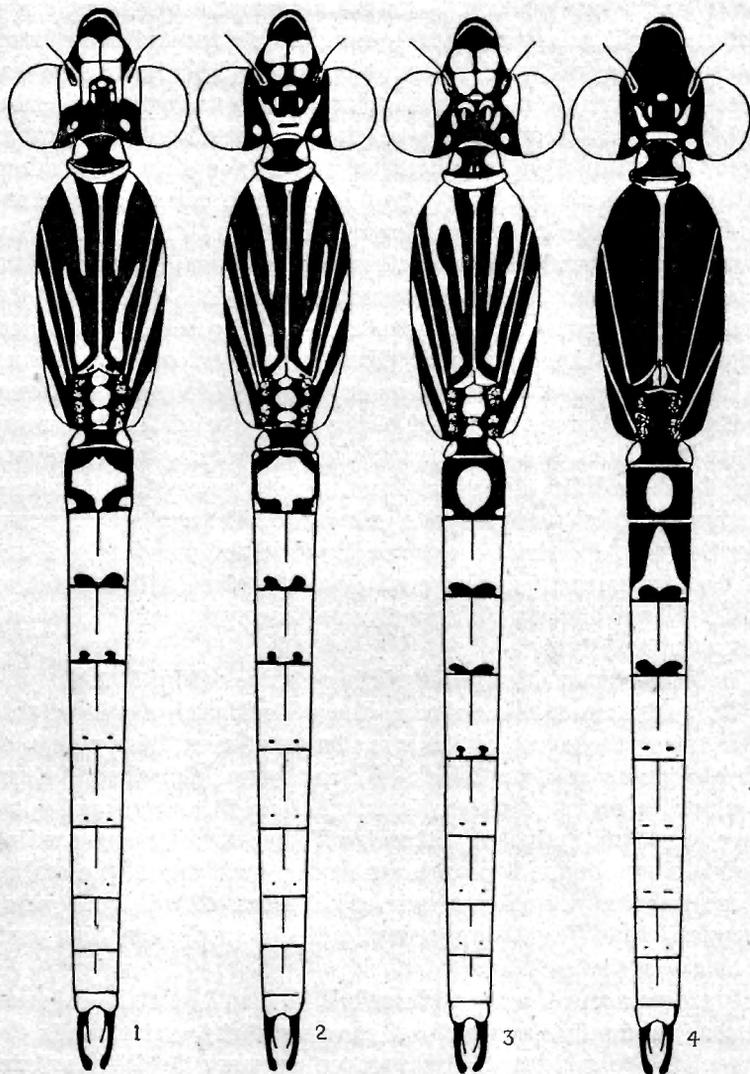


Fig. 3. — Dorsal view of body markings of : 1. — *Chlorocypha rubida* (HAGEN). 2. — *C. glauca* (SELYS). 3. — *C. cyanifrons* (SELYS). 4. — *C. dispar* (PALISOT DE BEAUVOIS), males.

The type is a male in the Copenhagen Museum bearing labels in HAGEN'S handwriting. — « *Libellago rubida* HAGEN, male, Guinea, leg. THONNING », which are in accordance with the information given in the *Mon. Calopterygines*: 229. Dr TUXEN has sent me figures of the markings and notes as to the colouring by which it is seen that the original description is correct, in that the humeral and antehumeral stripes are discrete, the loop of the fish-hook marking being incomplete above and below, and that the *whole* of the abdomen is red. Mr John COWLEY has loaned me a small series of this species from Denane in the Cameroons, collected by R. BORELLE who, with rare foresight, had taken the trouble to make coloured figures of the insect depicting the living colours. These show the *entire* abdomen brilliant blood-red on the dorsum, and highly pruinosed ventrally, the latter giving proof of the adult age of the specimens. Thus there is no doubt that *rubida* has the whole of the abdomen blood-red and the dorsal stripes entirely separated, a combination of two characters quite unknown in the rest of the genus. Mr COWLEY, to whom I am greatly indebted for the loan and gift of specimens, has also enabled me to give further notes on the markings of the male as well as a description of the hitherto unknown female.

Male. Abdomen 21 mm, Hindwing 23 mm. (Fig. 3, 1.)

Head: labium black; labrum glossy black with a pair of pale blue triangular spots at its base; bases of mandibles yellow or bluish green; epistome black in front, greenish yellow to turquoise blue or black above: frons with the 4 conventional spots very large and entirely confluent with one another and sending back a short tongue-like prolongation on each side of the ocellar space to embrace it like a pair of callipers, all this area being turquoise blue. Finally very tiny, quite inconspicuous blue post-ocular spots.

Prothorax and thorax as described in the *Mon. Cal.* Abdomen also as originally described but showing slight variations in the shape of the middorsal red spot on segment 2: this cordate, kite-shaped, trefoil-shaped or, as originally described, cross-shaped with an isolated red spot on each side of the apical border of segment. Occasionally a similar spot on each side of the basal border of segment. The subapical black spots are isolated from the apical black ring on segment 3 in the type but may be confluent with the ring and also present on segments 4 and, more rarely, 5. Beneath pruinosed more or less.

Female. Abdomen 16 mm. Hindwing 23 mm. (Fig. 5, 12.)

Head: labrum with 2 very large triangular spots separated by a black triangle of the same size as the yellow spots: the base and anterior border narrowly glossy black: bases of mandibles and genae bright citron yellow: frons marked and coloured similarly to the male but without the backward tongue-like extensions, the place of which is occupied by small isolated spots on each side: there is also a large bluish triangular spot on the outer side of the antennae with its base against the border of the eyes. (This latter spot is present in Mr COWLEY'S males but obliterated in the type, as also are most of the other head markings.)

Prothorax black with an anterior collar, a large spot on each side of the middle lobe and middle and lateral spots on the border of the posterior lobe greenish yellow. Thorax with the conventional fish-hook markings on dorsum, with barb of hooks facing medially, and with two moderately narrow, straight-sided stripes on the meso- and metepimeron. Beneath thorax and bases of legs white with pruinescence, the legs black save the trochanters and coxae which are yellowish. Wings hyaline but tinted with amber-brown, the hindwings especially, uniformly and deeply enfumed: 13 antenodals in all wings, discoidal cells traversed twice, arculus at the distal primary and petiole ceasing slightly distal to the basal antenodal. Abdomen black marked with greenish yellow: segment 1 with the sides broadly, segment 2 with a middorsal oval isolated spot and, on each side, a basal streak followed by a spot like an exclamation mark. This latter marking present also on segments 3 to 5 but the basal longitudinal stripe confluent with a basal yellow ring which is also prolonged along the middorsal carina, thus forming yellow tridents in reverse on each segment. Similar trident-markings on segments 6 and 7 but without the isolated lateral spots. Segment 8 immaculate, 9 with a large apico-dorsal spot on each side, 10 unmarked. Beneath abdomen pruinose white. Anal appendages black, nearly twice the length of segment 10, highly acuminate. Ovipositor extending a little beyond end of abdomen.

Chlorocypha glauca (SELYS, 1879). (Figs. 3, 2; 8, h.)

Libellago glauca SELYS, 1879, Bull. Acad. Belg. (2) 47: 380-381.
(Dorsum of thorax with « deux raies étroites isolées »).

Dessus de l'abdomen en général *bleuâtre* dans sa première moitié, passant au *roussâtre* ensuite, puis au rouge sur les derniers segments.)

Libellago rubida SELYS, 1879, *ibid.*, 47: 381.

Libellago glauca KIRBY, 1890, *Cat. Odon.*: 112.

This species was first described by SELYS in 1879, first as the 75th on page 380 and then again under the name *rubida* (Addition), the latter description almost word for word similar to that on the preceding page and evidently merely a description of the subadult stage of *L. glauca*. The type came from Mongo-Ma, Lobah (Vieux Calabar), the supposed *rubida* from Cape Coast, Guinea. SELYS expressed some doubt as to his determination as he ends with the remark: « Si c'est bien la *rubida* du Dr. HAGEN. » I have examined paratypes of *glauca* in the McLACHLAN collection belonging to the same series as the Selysian example from Mongo-Ma. One of these shows the dorsal spot on segment 2 isolated as in the original description, another shows the spot confluent with the lateral spots as given in the second description under *rubida*. It is at once evident that SELYS could not have had the whole series to examine or he would have hesitated to give the second description, as the sole point of differentiation vanishes. *C. glauca* may be determined by the combination of isolated dorsal thoracic stripes with an abdomen which is blue in its basal half (segments 1 to 4) and blood-red from thence to the end: no such combination is known throughout the rest of the genus. The female unfortunately, is still unknown but may be expected to be very similar to that of *rubida*. One of the males from Cape Coast, described by SELYS as doubtful *rubida*, is still in the McLACHLAN collection, and shows the dorsal spot of segment 2 prolonged apically to join the lateral apical spots: the apical black comma-like marks are found on segments 3 to 5. The head markings are as follows: a small round *blue* spot on the upper surface of epistome, only the two anterior quadrate spots on the frons, small postocular spots, also bluish and an occipital crown-shaped marking embracing the ocellar space from behind. Two males in my own collection vary in age: one has the blue colouring of segments 1 to 4 still *en passant* from reddish to blue and the middorsal spot on segment 2 narrowly joined to the apical spots: the second specimen is fully adult and has the blue colouring strikingly developed both on the

head, thorax and abdomen, this being of a pale wedgewood blue or Cambridge blue: the dorsal spot of 2 is now completely isolated.

Chlorocypha curta (HAGEN, 1853). (Figs. 4, 5; 8, d.)

Libellago curta HAGEN in SELYS, 1853, Syn. Cal., Bull. Acad. Belg., 20, Annexe: 58. (Original description of ♂♂ from types in Vienna Museum, from Guinea.)

HAGEN in SELYS, 1854, Mon. Cal. 229. (Amplified description of both sexes; female from Sierra Leone.)

Libellago curta KIRBY, 1890, Cat. Odon., 112.

SJÖSTEDT, 1899, Bih. t. Ks. Vet. Akad. Hdlgr., 25, 4: 50.

MARTIN, 1912, Feuille J. Nat. (5) 42, 499: 97.

MORTON, 1928, Ent. Mon. Mag. 64: 120.

LONGFIELD, 1936, Trans. R. ent. Soc. Lond., 85: 467.

FRASER, 1941, Proc. R. ent. Soc. Lond. (B) 10: 38 (race *bicolor*).

Libellago decorata KARSCH, 1893, Berlin ent. Zeit., 38: 34.

Id., 1899, Ent. Nachr., 25: 165.

Libellago dispar KARSCH, 1891, Ent. Nachr. (male *nec* female).

The description of supposed *L. curta* by SELYS in 1879 differed so widely from the first two descriptions (1853-54) that it was evident that he had before him an entirely different species. This latter was subsequently described again and named by KARSCH as *Libellago selysi*. *Curta* is perhaps the most easily identified of all the *Chlorocyphas*, if we except *caligata* SELYS with its unmistakable dilated tibiae and its fellow species *armageddoni* FRASER with even more widely dilated tibiae. The abdomen of *curta* has the first six basal segments blood-red, the following segments turquoise blue in the adults. The black markings are restricted to paired subapical transverse spots on segments 2 to 4 or 5. The only other species with a similar distribution of red and blue is *C. cancellata* (SELYS) but in this species the black markings on segments 2 to 6 are distributed to the sides, ends and middorsal carina and enclose paired elongated spots of the red ground-colour: it also differs from *curta* by having only a single stripe on each side of the middorsal carina, *curta* on the other hand having the fish-hook pattern of stripes normally developed. A specimen which

I have seen of *curta*, has the paired apical black spots on segments 2 and 3 confluent with the apical black rings, a race or variety I have named *bicolor*.

Chlorocypha cancellata (SELYS, 1879). (Figs. 5, 10; 8, c.)

Libellago cancellata SELYS, 1879, Bull. Acad. Belg. (2) 47: 383
(Original description of male).

KIRBY, 1890, Cat. Odon.: 112.

MARTIN, 1908, Ann. Mus. civ. Genova, 43: 659.

FRASER, 1941, Proc. R. ent. Soc. Lond. (B), 10: 39.

Libellago hintzi GRUNBERG, 1914, Ent. Rundsch., 31: 53 (Male and female from Cameroons).

The species is a rare one, but few males and only a single doubtful female being known, all from the Cameroons. There is never any difficulty in the determination of the adult male, the 6 basal segments of the abdomen being red framed in black and traversed by the black middorsal carina, whilst the 4 apical segments are blue with black apical rings. The teneral male is dull greenish with ill-defined black markings to abdomen so is more difficult to separate. The type of *L. hintzi* GRUNBERG belongs here, the male not showing any red on the abdomen and the apical segments black from *post mortem* changes. The dorsal markings of the thorax are reduced to a single antehumeral stripe with its lower end curling outwards: the humeral stripe is entirely absent save for the short outwardly bent end of the antehumeral one. The head markings are reduced to a pair of small frontal spots, an oblique elongated spot on each side of the ocellar space (vestigial remnant of the occipital fork) and small postoculars. The female has the occipital fork complete, the arms being connected to a transverse occipital stripe. (Some specimens of *C. neptunus* SJÖSTEDT in the Michigan Museum collection have been wrongly determined as this species, by FÖRSTER.)

Chlorocypha selysi (KARSCH, 1899). (Figs. 4, 6; 7, b and c.)

Libellago curta SELYS, 1879, Bull. Acad. Belg. (2), 47: 382.

Libellago curta KARSCH, 1893, Berlin ent. Zeit., 38: 35.

Libellago selysi KARSCH, 1899, Ent. Nachr., 25: 165.

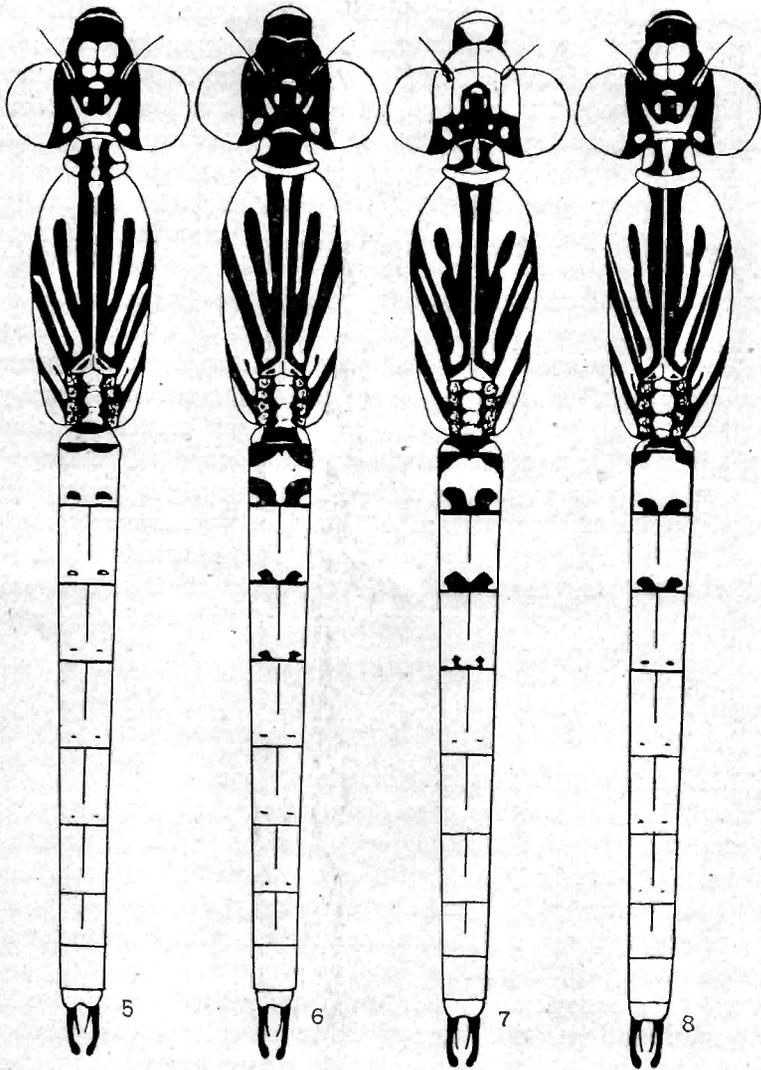


Fig. 4. — Dorsal view of body markings of : 5. — *Chlorocypha curta* (SELYS). 6. — *C. selysi* (KARSCH). 7. — *C. straeleni* n. sp. 8. — *C. victoriae* (FÖRSTER), males.

Chlorocypha selysi (KARSCH) was erected for the supposed *Libellago curta* described by SELYS in 1879. The description differs so widely from the originals of 1853/54 that it is difficult to understand how such an extraordinary error in diagnosis came to be made. KARŞCH employing the later 1879 description in his 1893 paper, was thus led into perpetuating the error. I have examined two males in the McLACHLAN collection, one adult, the other subadult, which are in all probability two of the three males quoted by SELYS in 1879 as from Monga-Ma, Lobah. They agree well with the Selysian description and it is only necessary to give the character-complex: « Labrum and anterior face of epistome greenish yellow, the dorsum of latter as well as the vertex and occiput *black*, the sole markings being the usual postocular spots and an oblique spot on the outer side of the ocellar area: dorsal stripes of thorax very broadly confluent below, the prong of the fish-hook marking facing medially: 2nd segment of abdomen with a broad red T-shaped spot on middorsum, with the foot of the upright resting on apical border of segment, and with a short, transversely elongated subdorsal, subapical spot on each side (in subadults, these latter spots are confluent with the foot of the T-shaped marking); whole of the ground-colour of abdomen blood-red. Habitat: West Africa.

Chlorocypha straeleni n. sp. (Figs. 4, 7; 8, a.)

Male. Abdomen 22-23 mm. Hindwing 25 mm.

Head. Labium pale brown to dirty yellow darkening at apex; labrum pale greenish blue narrowly bordered with black anteriorly and posteriorly and with a small medial prolongation from the latter which partially or wholly divides the paler colour into two spots. Epistome narrowly black along its lower border and sides, thereafter *both on front and upper surface* entirely and conspicuously bright chrome yellow, green or pale turquoise blue (probably always the latter colour during life); bases of mandibles and genae bluish green; basal segment of antennae bright yellow, frons and vertex bright chrome yellow, green or turquoise blue, the whole formed by a fusion of 4 large spots on the frons from which a prolongation runs back between the bases of antennae and the ocellar space. A large triangular spot with its base against the eyes, posterior to the level of the antennae, and confluent by its apex with the prolongation

from the frons bluish area. Small rounded postocular spots and, in some, a fine yellow line on the occiput. Prothorax black, with a narrow anterior collar, a large spot on each side, a small geminate spot on the middorsum of middle lobe and the whole of the posterior lobe bright chrome yellow (probably greenish-yellow in the living state). Thorax black marked broadly with yellow as follows: antehumeral and humeral stripes very broadly confluent below and forming the conventional fish-book marking with the prong of the hook facing medially, the antehumeral arm much broader than the humeral: the middorsal carina finely yellow: a triangular spot on the antealar sinus: a vestigial post-humeral stripe deficient above and below and separated from the humeral by the fine black sutural line only. Laterally also two broad greenish yellow stripes, an anterior from just anterior to the first lateral suture and a posterior covering the lower posterior three fourths of the metepimeron. The anterior stripe invaded by a fine black streak on the upper part of the first lateral suture. Beneath thorax pruinosed white. Wings hyaline, tinted with pale amber proximal to the nodus; pterostigma black, very long, covering about 5 cells; 12-14 antenodals. Legs black, pruinosed white on the flexor surfaces. Abdomen blood-red throughout on dorsum, black beneath but this obscured largely by dense white pruinescence. Segment 1 dorsally black from end to end, invaded on each side by red or yellow: segment 2 with the red on dorsum framed in black to form a medial kite-shaped spot extending rather broadly up to base of segment but tapering strongly to as far as apical border. Laterally the spot is broadly confluent with a broad longitudinal chrome yellow stripe. Segments 3 and 4 with black apical comma-like marks confluent to basal rings: segment 5 with 2 isolated black sub-apical subdorsal points. Anal appendages black, about twice the length of segment 10 and similar in shape to those of most other species of the genus. Female unknown.

Habitat: Uganda, Kyagwe coast stream, VI-27. Four males all similar in size and markings collected by G. HALE CARPENTER. This species which is the largest and most robust of the genus, is easily recognized by its bright yellow, blue or green face, a most striking character. *C. selysi* (KARSCH) also has the labrum and front of epistome yellow but in it, the upper surface of the latter is black and the markings of the frons and vertex are greatly restricted, in strong contrast to the broad and beautiful turquoise area of *straeleni*. The presence of a

vestigial posthumeral stripe is also foreign to *selysi* although present in *caligata* and *tenuis*, two very different species. The character-complex is: Ground-colour of abdomen blood-red throughout: greater part of labrum and whole of epistome in front and above bright greenish yellow or turquoise blue: frons and vertex turquoise blue to as far posterior as outer ocellus; dorsal thoracic stripes confluent below, with the prong of fish-hook marking facing medially; 2nd segment of abdomen with middorsal kite-shaped spot, broad basally, tapering apically and confluent laterally with a broad yellow stripe. Type in the Brussels Museum. Three co-types in my collection.

Chlorocypha victoriae (FÖRSTER, 1914),

(Figs. 4, 8; 7, a, d, e; 8, g, m; 9, i, k.)

Libellago rubida victoriae FÖRSTER, 1914, Archiv. f. Natur.
A. 2: 61. (Description of male. Entebbe.)

Libellago victoriae SJÖSTEDT, 1929, Rev. Zool. Bot. Afr. 17: 55,
fig. 2. (Entebbe.)

Male. Abdomen 22-23 mm. Hindwing 23 mm.

Head: labium reddish brown merging to black at apices: labrum and epistome in front glossy black, the latter above obscurely dark ochreous followed posteriorly on frons by two moderately large, similarly coloured quadrate spots obscure at their circumferences, paler at centres (as if in course of obliteration), very small and obscure postocular spots, and finally an oblique stripe on the outer side of the ocellar space (these two stripes the only vestiges of an « occipital fork » marking). Prothorax black with a small anterodorsal spot, a large spot on each side of the middle lobe and a small geminate spot on its middorsum, and finally the whole of the posterior lobe greenish yellow. Thorax black: greenish yellow or ochreous humeral and antehumeral stripes confluent broadly below and rather thicker than usual, the fish-hook marking thus formed with its prong facing inwards. (In one of FÖRSTER's series, the two stripes are so thick that they almost coalesce.) The middorsal carina finely yellow, a spot in the antealar sinus and two broad stripes on each side, the anterior invaded by a linear spot on the first lateral suture. Beneath yellow traversed by 3 black stripes. Legs black save the yellow coxae: hind tibiae only bright yellow on the flexor surface. Wings tinted with pale

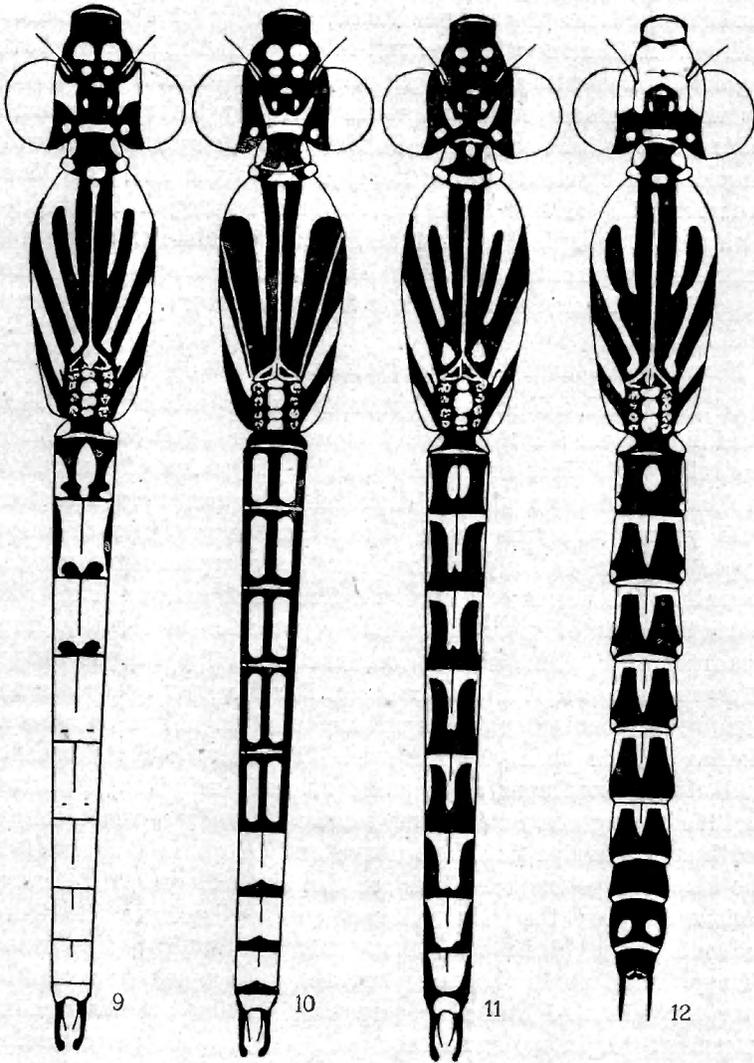


Fig. 5. — Dorsal view of body markings of : 9. — *Chlorocypha luminosa* (KARSCH). 10. — *C. cancellata* (SELYS). 11. — *C. neptunus* (SJÖSTEDT), males. 12. — *C. rubida* (HAGEN), female.

amber at bases only: 10-11 antenodals in forewing, 11-12 in the hind: discoidal cells of forewings traversed once, those of the hindwings twice: pterostigma black, covering 4 1/2 cells, rather narrow. Abdomen with ground-colour blood-red throughout, segment 1 black, its sides bright ochreous, segment 2 with nearly its whole surface red, the borders narrowly black, this encroaching on the base so as to constrict the red: apically narrowly ringed with black from which project into the red, two black processes shaped like miniature toad-stools. Segments 3 and 4 with paired subapical black spots, almost obsolete on segment 4, remaining segments with fine black apical rings only. Anal appendages black, not differing from the usual generic shape and length.

Female. Abdomen 18 mm. Hindwing 24 mm.

Of the usual ochreous or greenish yellow colour with black markings. Head: labium and labrum yellow, the latter finely encircled with black and with a medial projection of black from the base: epistome glossy black in front narrowly margined with yellow along its lower border and lower part of sides: upper surface entirely yellow and only separated from the greenish yellow area of frons by a fine black suture: frons with a smaller pair of spots immediately posterior to the two large quadrate ones, these almost confluent with the oblique stripes of a complete occipital fork marking. Basal segments of antennae yellow: postocular spots larger and oval in shape. Prothorax similar to the male. Thorax with the dorsal stripes broader and almost confluent at a point at their middles, the black included being almost isolated below: laterally a short convex posthumeral stripe deficient above and below and situated in the black stripe included between the humeral and first lateral yellow stripes; the sides almost entirely yellow, the black reduced. Legs black somewhat whitened with pruinescence. Wings tinted as in the male but the yellow colour extending over the whole of hindwing, venation similar but the quadrilateral of hindwing sometimes with only a single traversing vein: pterostigma black with the central area ochreous. Abdomen greenish yellow marked with black as follows: segment 1 with middorsum black: segment 2 with a pair of black subapical spots confluent with an apical black ring, closely similar to the 3rd segmental marking of male; segments 3 to 6 with narrow black apical rings from the middorsum of which arise two divergent narrow black stripes, which after first diverging, run

parallel to the border of segments, tapering and extending nearly to base of segments (each stripe is bayonet-shaped and, apart from its base, lies entirely encircled with the yellow ground-colour) : segment 7 roughly similar but the black stripes broader and attaining borders of segment save near the base: basally they are widely separated so that the ground-colour forms a yellow T-shaped dorsal marking: segment 8 with its apical membrane yellow but is otherwise black save for two minute middorsal subapical points of yellow: segment 9 with a large oval yellow spot on each side of the apical border : 10 entirely black, as also are the rather long and acuminate anal appendages.

Habitat: Uganda, the type from Entebbe. SJÖSTEDT's and my own material also come from this area, the latter from a coast stream on the Karagwe side of Lake Victoria, south of Entebbe, collected by G. HALE CARPENTER. FÖRSTER's description of the type is very laconic and he states that it is similar to *rubida* of SELYS and KARSCH, thereby implying the 1879 and 1893 descriptions respectively, as is seen by his further remarks. He contradicts this statement however by stating that his specimens differ by having the whole of the abdomen red and the thoracic stripes broad and confluent. Thus stress is laid on the two characters, and this together with the similarity of the locality leave no doubt in my mind that my own specimens are correctly identified. *Victoriae* is a smaller and slighter species than *rubida* or *straeleni* and the head markings in the male are frequently obscured: the dorsal marking on segment 2 is subject to considerable variation.

Chlorocypha cyanifrons (SELYS, 1873). (Fig. 3, 3.)

Libellago cyanifrons SELYS, 1873. Bull. Acad. Belg. (2) 35: 493.
(Original description: dorsal thoracic stripes confluent.)

Libellago cyanifrons SELYS (pars), 1879, Bull. Acad. Belg. (2) 47: 381. (Gaboon, not the Cameroon males.)

Libellago cyanifrons KIRBY, 1890. Cat. Odon.: 112.

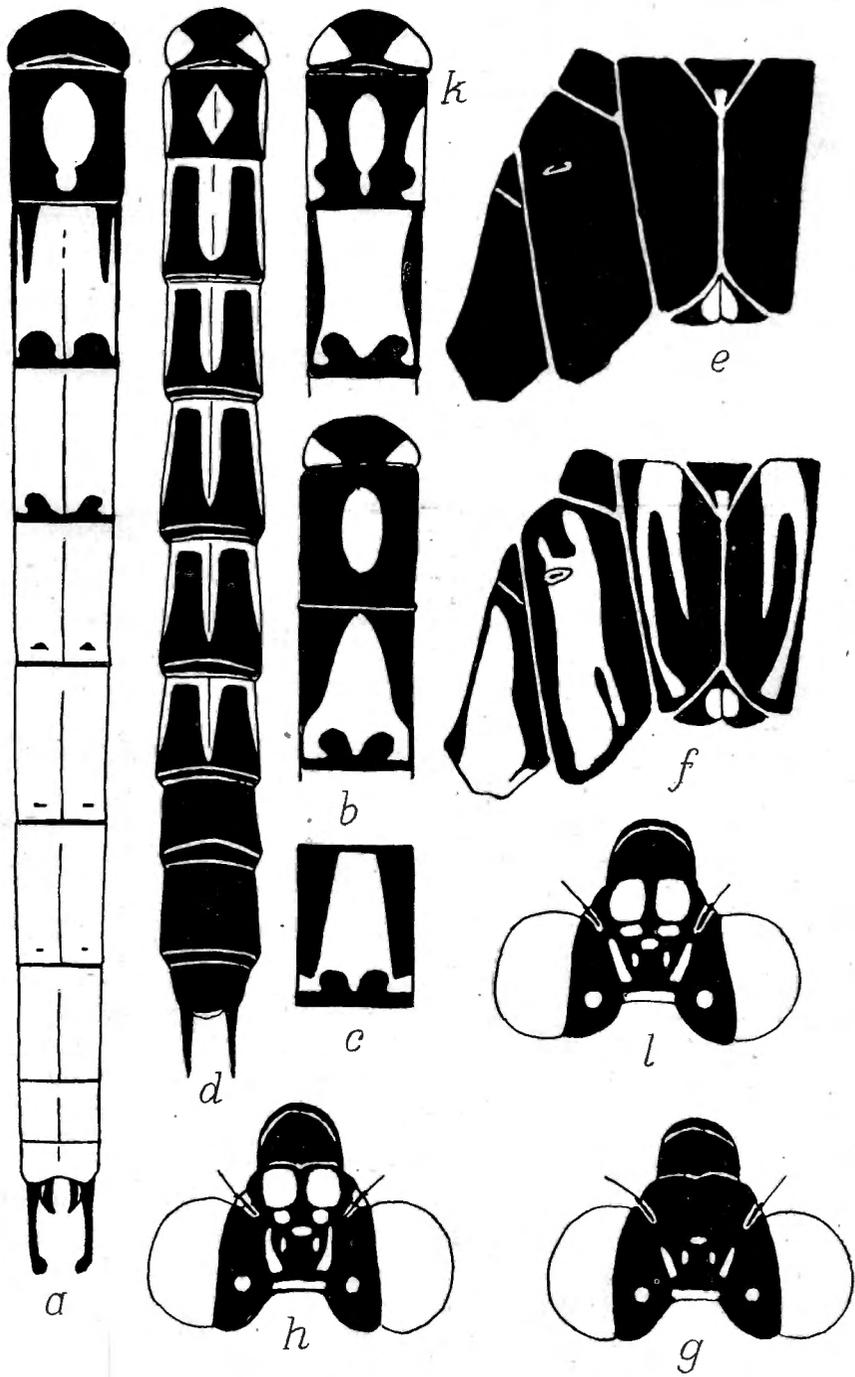
Libellago glaucifrons SJÖSTEDT, 1899. Bih. t. K. S. Vet. Akad. Handlingar, 25, 4. 2: 51. (Male described.)

Chlorocypha dispar race *cordosa* FRASER, 1947, Trans. R. ent. Soc. Lond. 98: 23.

I have made a fresh examination of the type and cotypes of this species: they are 2 males in the McLACHLAN collection (British Museum), numbered 245 and 246 respectively and slightly under adult age: and a single female in the Selysian collection (Brussels Museum), numbered 247. All are from the Gaboon and the latter is labelled the type. The insect was originally described from the male, a description of the female following and made by comparison with the male. It would appear that the male is therefore the actual type, and of the two males, number 246, as this is an entire specimen.

As for the two males from the Cameroons discussed as *cyanifrons* in the 1879 paper, I find on a reexamination that these are actually specimens of *rubida*. Of these two, SELYS said that the thoracic markings resembled those of *glauca* which has the thoracic stripes isolated, as also in *rubida*. The thoracic stripes of these Cameroon specimens are also isolated so that they can not belong to *cyanifrons* of which SELYS said (1873) that the two stripes were confluent below. SJÖSTEDT, basing his diagnosis on the 1879 description, said that his *glaucifrons* differed from *cyanifrons* in that it had the stripes confluent: thus the only point of difference between the two species vanishes and *glaucifrons* is seen to be only a synonym for the Selysian species. The character complex of *cyanifrons* is: Epistome black in front and above: dorsal thoracic stripes confluent below: ground-colour of abdomen red throughout: segment 2 with a small dorsal, cordate, usually isolated, red spot. The frons and vertex are bluish green to as far posterior as the lateral ocelli. The female is very similar to that of *rubida* (fig. 5, 12) but segment 9 has very large dorso-lateral spots extending right up to base of segment and there are vestiges of the occipital crown-shaped spot lateral to the ocellar space.

Fig. 6. — *a-h. Chlorocypha dispar* (PALISOT DE BEAUVOIS), *a*, Dorsal markings of male abdomen, variety, *b*, Normal markings of male, *c*, Variation of markings on segment 3, *d*, Dorsal markings of abdomen of female, *e*, Thorax of male, *f*, The same of female, *g*, Head markings of male, *h*, The same of female, *k, Chlorocypha luvminosa* (KARSCH), segments 1-3, *l*, Variation in the head markings of male.



Chlorocypha dispar (PALISOT DE BEAUVOIS, 1805).

(Figs. 3, 4; 6, a-h.)

Agrion dispar PALISOT DE BEAUVOIS, 1805, Ins. Afr. Amer. (Neur.), 7, 2: 85.*Libellago dispar* SELYS, 1853, Syn. Cal. 58.

WALKER, 1853, List. Neur. Ins. Br. Mus., 4: 644 (male and female, Sierra Leone).

SELYS, 1854, Mon. Cal.: 226.

SELYS, 1879, Bull. Acad. Belg. (2) 47: 383.

KIRBY, 1890, Cat. Odon.: 112.

KARSCH, 1891, Ent. Nachr. 17: 71.

KARSCH, 1893, Berlin ent. Zeit. 38: 34.

KARSCH, 1898, *ibid.* 17: 345.*Libellago gracilis* KARSCH, 1899, Ent. Nachr. 25: 163.*Libellago gracilis* LE ROI, 1915, Zentr. Afr. Exp. Zool.: 331.*Libellago dispar* MARTIN, 1912, Feuille j. Nat. (5) 42, 499: 97.*Agrion dispar* FRASER, 1934, Fauna Br. Ind. Odonata 2: 56.(As genotype of *Chlorocypha* nov. gen.)*Chlorocypha dispar* FRASER, 1941, Proc. R. ent. Soc. Lond. (B) 10: 39 (races or subspecies of *dispar*).*Chlorocypha dispar* FRASER, 1947, Trans. R. ent. Soc. Lond. 98: 21 (Races, subspecies and vars of *dispar*).

In my discussion of this species in the Transactions R. ent. Soc. Lond., of 1947, I gave as one of the characters: Dorsal stripes of thorax confluent below, obsolete or interrupted above. This, of course applies only to the subadult: in the full adult state, the dorsal markings of the thorax become completely obliterated, and for this reason, *C. dispar* is the most melanotic species found in the genus. In discussing the probable races or subspecies, I included one from the Gaboon in the McLACHLAN collection: I now see that this is the *cyanifrons* described by SELYS from the Gaboon and because of its larger size and more robust build, and because of the absence of the typical markings found on segment 3 in *dispar*, I now relegate *dispar* subspecies *cordosa* FRASER as a synonym of *cyanifrons* SELYS.

In the Syn. Cal., page 58 (sep.) SELYS gave the measurements for *dispar* as: abdomen 29 mm; hindwing 19-21 mm. The first measurement of 29 mm for the abdomen, is so obvious an error

that it is surprising that KARSCH did not immediately recognise it as such; the actual length of the abdomen is 19 mm. *C. dispar* is comparatively both small and slender: in the adult state, melanism practically blots out the whole of the pale markings (blue, red or yellow) on the head, prothorax, thorax and first 3 basal segments of the abdomen. On the head are found greenish-yellow minute postocular spots, a narrow transverse line on the occiput which is separated from a short oblique stripe on each side of the ocellar space; the only markings on the prothorax are the middle third of the posterior lobe and a small middorsal spot on the median lobe. The sole thoracic markings are the middorsal carina and a small oval spot in the antearlar sinus, both of which are, curiously enough, of a very bright chrome yellow. Segment 1 of the abdomen has the sides blood-red, segment 2 has a smallish middorsal oval red spot similar to that found in *cyanifrons* but subject to some considerable variations in size and shape. Segments 3 and 4 have the conventional apical comma-shaped spots confluent with narrow apical black rings, whilst 3 has the sides of the dorsum also black, this increasing in depth from apex to base of segment, so that the included red ground-colour is conical in shape and deeply indented apically by the two black commas. This marking on segment 3 is very typical of the species and is subject to but very slight variation depending on the depth of the bordering black, the apex of the cone-shaped red space being either acute, obtuse or even slightly squared and resting on the base of the segment. I am unable to understand KARSCH's complaint that the two Selysian descriptions differed in this latter respect, since to me, although differently worded, the two are merely paraphrases of the other. The character complex of *dispar* may be given as: Thorax entirely black; ground-colour of abdomen entirely red; segment 2 with a small, oval middorsal isolated spot; segment 3 with a broad conical red area with its apex directed towards base of segment.

***Chlorocypha luminosa* (KARSCH, 1893). (Figs. 5, 9; 6, k and l.)**

Libellago luminosa KARSCH, 1893, Berlin ent. Zeit. 38 : 33.
(Description of type from Togo-Land.)

Libellago jejuna KARSCH, 1898, Ent. Nachr. 24: 345 (Teneral male described.)

Libellago consueta KARSCH, 1899, Ent. Nachr. 25: 376.

GRUNBERG, 1903, Zool. Jahrb. Syst. 18: 696. (States near *jejuna*, and probably only a local form.)

Chlorocypha luminosa and *consueta* differ only by the black lateral bordering of segment 3 in the latter, as acknowledged by KARSCH himself, but when a series of *luminosa* is examined, it is seen that the very adult specimens often have this marking, so that there can be no doubt that they are one and the same species. Under the description of *jejuna* it is said that it comes near *luminosa*. GRÜNBERG later, describing 4 males, stated that in only one example was the typical abdominal marking of *consueta* found: in fact they showed all the intermediary stages from *consueta* to *luminosa*. GRÜNBERG concludes by saying that *consueta* is probably only a local form of *luminosa*. It is obvious that *consueta* can not lay claim even to this status and that it is only an age state of one species. The character complex is as follows: Markings of head and thorax often obscure but when visible, the dorsal thoracic stripes are confluent and with the prong of the fish-hook marking facing medially: ground-colour of abdomen blood-red throughout: segment 2 with a small middorsal spot of red elongated in the long axis of the segment, and on each side an irregular red stripe indenting the black surround of the red spot at its middle and again near the apical border of the segment, the whole black marking thus shaped like an urn with a red medallion on its front; segment 3 usually with only a pair of the conventional apical comma-like markings confluent with an apical black ring but in most specimens, a narrow black border on each side, strongly convex medially. Habitat: W. Africa, Togo-land. The species appears to be closely related to *C. dispar* but is somewhat larger and more robust.

Chlorocypha neptunus (SJÖSTEDT, 1899).

(Figs. 5, 11; 7, f, g; 8, f, i.)

Libellago neptunus SJÖSTEDT, 1899, Bih. t. K. Svensk. Vet. Akad. Handlingar, 25, 4, 2: 54. (Description of teneral male and a female. Bonge.)

Libellago sp.? MORTON, 1928, Ent. Mon. Mag. 64: 120. (A male from Meanja, Cameroons, probably near *neptunus*.)

The type was somewhat teneral and the pale markings more in evidence than in some specimens which I have been able to

examine from the FÖRSTER collection, but labelled by him as *cancellata*.

Male. The head markings are reduced to two small rounded yellowish green spots on the frons, small triangular postocular spots and an elongated narrow triangular spot on the outer side of the ocellar space (all that remains of the occipital forked

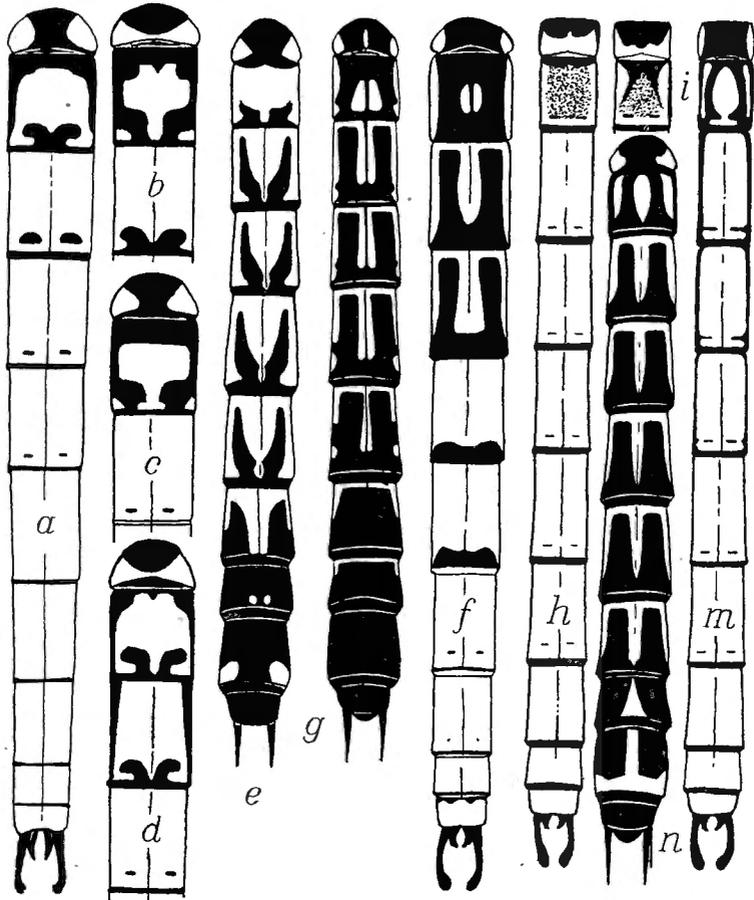


Fig. 7. — Dorsal markings of abdomen of : *a*, *Chlorocypha victoriae* (FÖRSTER), male, *b*, *C. selysi* (KARSCH), male, variety, *c*, The same, of the type male; *d*, *C. victoriae*, showing slight variation, *e*, *C. victoriae*, female, *f*, *C. neptunus* (SJÖSTEDT), male, variety, *g*, The same species, female, *h*, *C. tenuis* LONGFIELD, male, *i*, Variation in markings of basal segments of the same species, *m*, *C. molindica* FRASER, male, *n*, Female of the same species.

spot found in the teneral males and, usually persisting in the female adults). The dorsal thoracic stripes are very broadly confluent below, the humeral stripe is broken above, leaving a small isolated upper triangular spot: the antehumeral is shorter and sometimes tails off into a number of minute spots. The basal five segments of abdomen are citron yellow with a decided greenish tint, whilst the five apical ones are red, this colour pale on segment 6 and gradually intensifying to the 10th. Segment 1 has the dorsum black from base to apical border, the sides greenish: segment 2 has a middorsal small oval greenish spot finely bisected by black, segments 3 to 6 have the black horse-shoe marks described by SJÖSTEDT, the middorsum and the sides of the segments being narrowly greenish yellow and confluent with narrow basal rings of the same colour: thus inverted tridents of this colour intermesh with the two prongs of the black horse-shoes. Segment 7 has the same markings with the trident coloured red and its outer prongs very fine. Segments 8 and 9 have no pale bordering, the horse-shoes on these being widely splayed out to meet the sides of the segments: segment 10 has the sides only narrowly black. Beneath segments 3 to 6 are paired tapering longitudinal greenish yellow spots.

Female. This is very similar to the male, in fact, in no other species of the genus are the two sexes so very similar, from which it is evident that *neptunus* is the most archaic species of the Chlorocyphas and comes very near *Libellago*: this relationship is further emphasized by the very small size of the species. In the female, the forked occipital marking is present but the lateral arms are separated from the transverse occipital line by a slight interval: the frontal spots are rectangular and much larger than in the male. The humeral stripes of thorax are interrupted above as in the male: the horse-shoe markings of the abdomen are much stouter and almost conceal the outer prongs of the tridents, whilst on segments 7 to 10 they become confluent and blot out entirely all pale markings (fig. 7, g). The character-complex is as follows: Head markings reduced to 2 frontal spots, small postocular spots and an outer elongate spot on each side of the ocellar space: dorsal stripes of thorax broadly confluent below, the prong of the fork facing medially, the humeral stripe interrupted above (in the full adult only): ground-colour of abdomen greenish yellow for the basal five segments, red for the apical five, segment 2 with a small oval

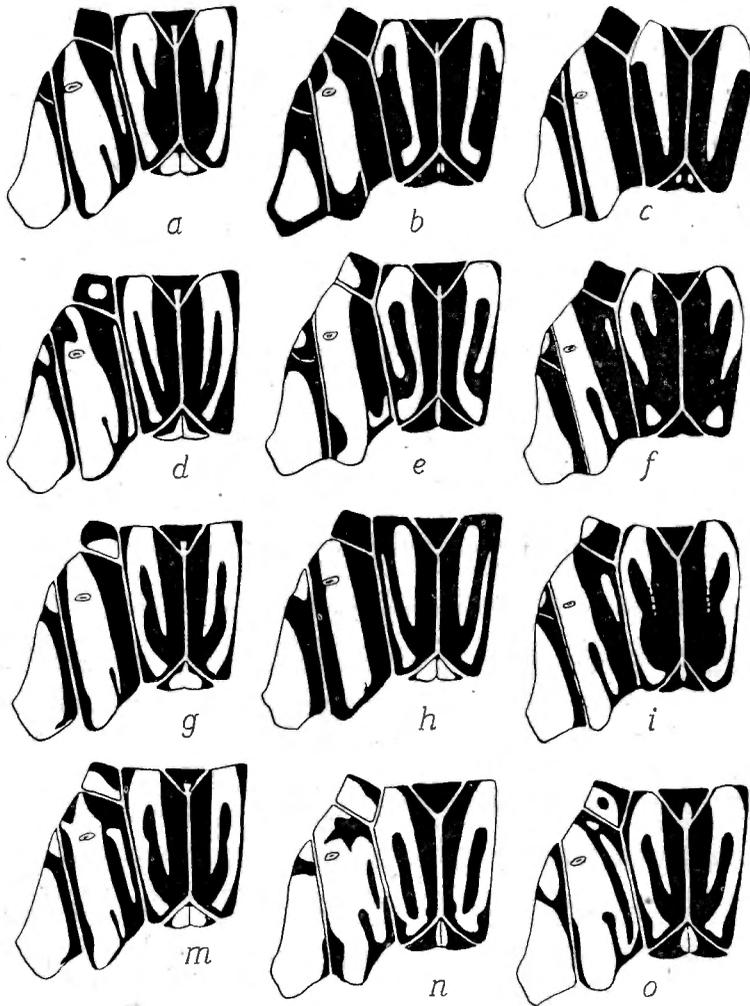


Fig. 8. — Dorsal and left lateral thoracic markings (diagrammatic) of : a, *Chlorocypha straeleni* n. sp., male, b, *C. molindica* FRASER, male, c, *C. cancellata* (SELYS), male, d, *C. curta* (SELYS), male, e, *C. molindica* FRASER, female, f, *C. neptunus* (SJÖSTEDT), female, g, *C. victoriae* (FÖRSTER), male, h, *C. glauca* (SELYS), male, i, *C. neptunus*, male, m, *C. victoriae*, female, n, *C. tenuis* LONGFIELD, female, o, *C. caligata* (SELYS), female.

greenish spot, segments 3 to 7 with thick pronged black horse-shoe like markings with base resting on apical border of segments and interlacing with greenish yellow trident-like markings with base resting on base of segments.

Habitat: Cameroons. In addition to the FÖRSTER specimens from Ann Arbor, Michigan, I have examined examples in the COWLEY collection from Dehane in the Cameroons: these do not differ from the former: a note by the collector, M. René BORELLY, says: « Petite espèce noire et verdâtre », thus confirming the green tint in the living insect.

Chlorocypha tenuis LONGFIELD, 1936).

(Figs. 7, h, i; 8, n; 9, a-f.)

Chlorocypha tenuis LONGFIELD, 1936, Trans. R. ent. Soc. Lond. 85: 468, tf. 1, a-d. Uganda, Kenya.

? *Libellago alata* MARTIN, (date ?) MS name only. Ruwenzori.

This species along with *molindica* FRASER and perhaps *auripes* FÖRSTER, appear to me to form a rather distinct group characterised by their extensive greenish yellow markings of head and thorax and long attenuated abdomen with very restricted markings in the male. The character-complex of *tenuis* is: Dorsal thoracic stripes of male confluent below, the humeral one interrupted and the prong of the fish-hook marking facing outwards (contrary to what is found in the majority of the Chlorocyphas), in the female, confluent above and below, thus forming a long oval enclosing a dark stripe; abdomen of male pale red with basal yellow or green rings and fine apical black rings, only segment 1 with a dark dorsal marking. Female with horse-shoe-shaped blackish markings on segments 4-6 or 7 with arms directed basalwards and interlocking with greenish yellow inverted tridents (as in *neptunus*): segment 8 black on its basal three-fourths or this marking deeply bifid: segments 2 and 3 with subapical dorsal paired spots: head of male with paired yellowish spots on frons, outer sides of ocellar space and post-oculars, the latter triangular: female with greater part of head covered with large yellow, more or less anastomosing spots.

Rather teneral females in the British Museum collection, from Ruwenzori, labelled with the name « *alata* » by MARTIN, doubtfully belong to this species, the name however was never published and the species must be known as *tenuis* LONGFIELD.

A long series of this species was first taken in 1927 by G. HALE CARPENTER, in Uganda and are in my own collection.

Chlorocypha molindica FRASER, 1948.

(Figs. 7, m, n; 8, b, e; 9, g, h.)

Chlorocypha molindica FRASER, 1948, Proc. R. ent. Soc. Lond. B, 17: 9.

Libellago trifaria SCHOUTEDEN, (nec *trifaria* KARSCH), 1934; Ann. Mus. Congo Belge, Zool. 3. 3. (Cat. Faun. Congo Belge, 3. 1: 76). Male descr.

Closely allied to *tenuis* LONGFIELD by the narrow abdomen and restricted markings of same. The character-complex is : Dorsal thoracic stripes confluent below, the middle portion of humeral stripe missing so that *the fish-hook marking has the prong facing* outwards (as in *tenuis*): abdomen with ground-colour-red; black markings present only on segments 1 and 2 or 3: on segment 2, two longitudinal black subdorsal stripes enclosing an oval spot of the ground-colour: subapically a process runs inward from the lateral black stripes on each side to markedly constrict the dorsal red spot (the whole spot therefore resembles an egg in an egg-cup); head markings, an irregular greenish yellow transverse stripe on the vertex extending from eye to eye, and rather large triangular postocular spots. In the female, often an additional large spot on upper surface of epistome. Abdomen of female greenish yellow with, on segment 2 two longitudinal black stripes enclosing a long narrow oval of ground-colour, and on segments 3 to 7 broad two-pronged black stripes extending from apical border nearly to base of segments and interlocking with inverted greenish yellow tridents.

Habitat : Belgian Congo, Molinda river. SCHOUTEDEN'S supposed male of *trifaria* has vestigial black stripes on segment 3 which are absent in the type, his specimens probably being more adult and thus exhibiting increased melanism.

Chlorocypha caligata (SELYS, 1853). (Fig. 8, o.)

Libellago caligata SELYS, 1853, Syn. Cal.: 58 (Natal).

SELYS, 1854, Mon. Cal.: 229.

WALKER, 1853, List Neur. Ins. Br. Mus. 4: 644.

KIRBY, 1890, Cat. Odon.: 112.

Libellago ambigua GERSTÄECKER, 1891, Jahrb. Hamburg wiss. Aust. 9: 7 (sep.). (Female only.) Mbusini, Africa.

Libellago ambigua SELYS, 1873, Bull. Acad. Belg. (2) 35: 504 (*ambigua* is the female of *caligata*).

GERSTÄECKER, 1873, Decken's Reisen in Ost-Afrika, 3 (2): 51.

KARSCH, 1891, Ent. Nachr. 17: 70 (*ambigua* is the female of *caligata*).

Libellago hartmanni FÖRSTER, 1897, Ent. Nachr. 23: 216. Transvaal.

Libellago caligata FÖRSTER, 1906, Jahrb. Nassau, 59: 331 (*hartmanni* ist *caligata*).

KIRBY, 1898, Ann. Mag. N. H. (7) 2: 243. Natal.

NEEDHAM, 1903, Proc. U. S. Nat. Mus. 26, pl. 52, fig. 2. (Wing of *caligata*.)

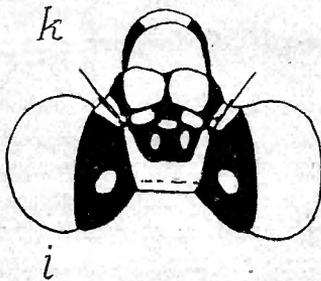
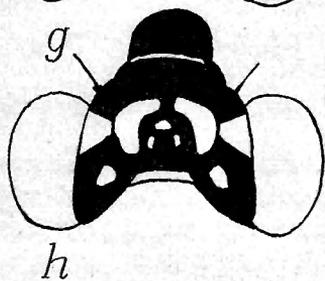
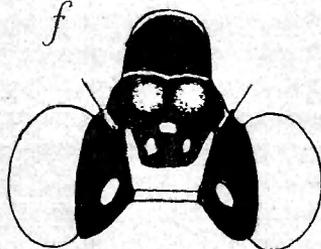
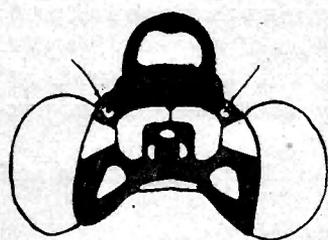
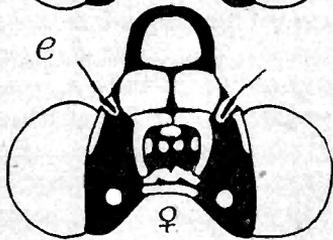
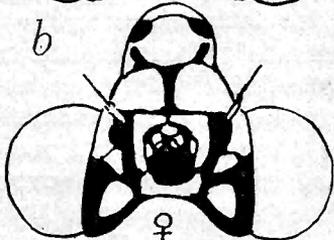
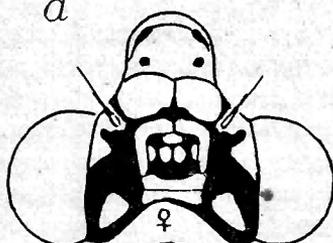
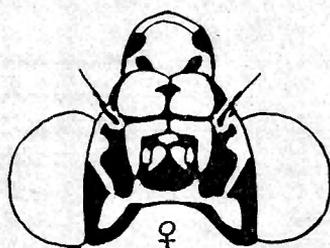
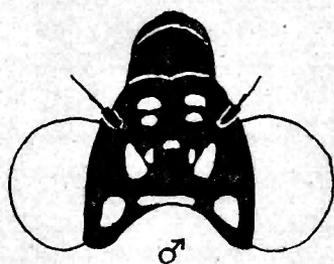
MUNZ, 1919, Mem. Amer. ent. Soc. 3: pl. 5, fig. 27. (Wing of female *caligata*.)

RIS, 1921, Ann. S. Afr. Mus. 18, 3: 261, tf. 5, 6.

This species is easily recognised by its dilated tibiae, brilliant scarlet on the extensor surface, chalky white on the flexor: it is only necessary to give the character-complex to distinguish it from *lacustris* FÖRSTER (= *armageddoni* FRASER) which also has the tibiae similarly coloured although much more dilated. The character-complex is: Tibiae of male markedly dilated, bright scarlet red on the extensor surface, chalky white on the flexor, considerably less than 1 mm in width at the widest part: dorsal marking on segment 2, two small closely apposed triangles followed by two very small apical ones: blue areas on following segments with *parallel* sides or a little dilated apically: segments 1 and 2 with the sides marked conspicuously with red. Dorsal marking on segment 2 of female an inverted black anchor: segment 10 black, unmarked.

Type in Stockholm Museum. Distributed widely throughout East and Central Africa.

Fig. 9. — Head markings of: *a-f*, *Chlorocypha tenuis* LONGFIELD, showing great variation and, in the case of the females, the close similarity to those of *C. caligata* (SELYS), *g* and *h*, *C. molindica* FRASER, female and male, *i* and *k*, *C. victoriae* (FÖRSTER), female and male.



Chlorocypha lacustris (FÖRSTER, 1914).

Libellago caligata lacustris FÖRSTER, 1914, Arch. f. Naturges.
A. 2: 61 (Entebbe).

Chlorocypha armageddoni FRASER, 1940, Ann. Ent. Soc. Amer.
33: 551 (Buganda).

Mr COWLEY thinks that my species *armageddoni* is actually FÖRSTER'S *lacustris* which he, FÖRSTER, considered as a subspecies of *caligata*, and after full consideration I am inclined to agree with him. I have not seen FÖRSTER'S type, which is presumably in the Michigan University (Williamson) collection and have had to rely on the scanty details given in FÖRSTER'S description. Only the character of the blue markings on segments 2 to 6 or 7 are compared with those of true *caligata* and no mention is made of the absence of red on the sides of segments 1 and 2 in *lacustris*, nor is there any comment on the greater dilatation of the tibiae. This latter might easily be missed unless the two species be confronted, when the difference is at once seen to be very striking, the tibiae of *lacustris* being roughly double the width of those of *caligata*. The character-complex is: Tibiae of male greatly dilated, at least 1 mm in width at the widest part, scarlet red on the extensor surface, chalky white on the flexor: dorsal marking on segment 2, two large quadrate blue spots followed or not (more often not) by two tiny points of blue: blue areas on the following segments with sides *converging* apically, the bases much the widest part: no red conspicuous marking on the sides of segments 1 and 2. Dorsal marking on segment 2 of female similar to the male but yellow instead of blue and completely enclosed by black: segment 10 largely yellow.

Distributed less widely than *caligata*: Uganda, Entebbe and Buganda.

Chlorocypha aphrodite (LE ROI, 1915).

Libellago aphrodite LE ROI, 1915, Zentr. Afrika Exp. Zool.: 331,
pl. 19, fig. 4 (Belgian Congo).

I have not seen this species which is unknown to me save from the description. The restricted black markings of the head and thorax and correspondingly broad areas of greenish yellow suggest a quite teneral condition which however is contrain-

licated by the black markings on the cobalt-blue abdomen. If not a teneral *glauca* the species is a good one and not easily confused with any other. Save for *caligata* and *lacustris*, it is the only species possessing an entirely blue abdomen: the undilated tibiae at once distinguishing it from these two species.

INCERTAE SEDIS.

Libellago trifaria KARSCH, 1899; Ent. Nachr. 25: 378.

Described from a single teneral female with thorax so crushed that it was difficult to make out the markings. The markings given are very similar to several females of other species, the teneral condition of the type contributing to this. I have been unable to fit this to anyone known species but it seems quite possible that it belongs to one of several described males of which the females are as yet unknown. Under the impossible conditions surrounding the determination of this insect, one wonders if KARSCH was animated by the desire to create new species or confusion for future generations?

Libellago collarti NAVAS, 1929; Rev. Zool. Bot. Afr. 18. 1: 20.

Described from a single female, the description so generalised that it might fit several known females: on the other hand it may belong to any of the described males of which the females are not yet known. Stress, in determination, is made of the formation of the end of the abdomen, cerci and ovipositor but the shape of this clearly shows that it is a deformity probably due to dryage, shrinkage and telescoping of the segments: a deformity is certainly not a character on which to found a new species.

Libellago camerunensis SJÖSTEDT, 1899; Bih. t. K. Svensk. Vet. Akad. Handlingar, 25. 4. 2 : 56. Cameroons, W. Africa.

This is yet another female described from a single specimen and with so generalised description that it is impossible to determine to which of the known described males it may belong. Unfortunately the author has compared this *female* with the *males* of other species: this is quite clear, for he states that it

differs from *rubida*, *cyanifrons* and *glauca* by the *humeral stripes confluent*. In all the females of these three species the *humeral stripes are invariably confluent* and in *cyanifrons*, they are confluent in both sexes. The comparison with *dispar*, which it is said to lie close to, is equally unfortunate as the difference in the length of the abdomen is only 1 mm, the labrum of *dispar* may be uninterruptedly yellow at its centre, with 2 separated spots (as in *camerunensis*) or entirely black, the oblique longitudinal stripe on the outer side of the ocellar space may also be greatly reduced and finally segment 9 may be quite unmarked: thus all the differences given to separate it from *dispar* vanish save the rather longer hindwing and the longer pterostigma. The 3 yellow lines on the tibiae are given without indication of their location: these may be a specific character, but it must be said that in all those species with much yellow on the legs (and they are few), the colour is distributed in two lines viz on the flexor and extensor surfaces. The length of the pterostigma, 3 mm, is only equalled in the dubious *trifaria* KARSCH.

Libellago grandis SJÖSTEDT, 1899 Bih. t. K. Svensk. Vet. Akad. Handlingar, 25. 4. 2: 58. Cameroons, W. Africa.

This is a fourth female described from a single specimen. It is a large species with hindwing 27 mm in length, almost the largest known length of wing in the genus. The yellow markings are much reduced even to the extent of blotting out the mid-dorsal carina of the thorax. I am unable to couple it with any known species which have been described from both sexes and more material is necessary to assess its specific value.

Libellago lacus-elephantum KARSCH, 1899; Ent. Nachr. 25: 165. Cameroons, W. Africa.

Described from 2 females, one adult, the other teneral, both of very large size, abdomen 21 mm, hindwing 30 mm, quite the longest wing of any species in the genus, *grandis* SJÖSTEDT coming next with a wing measurement of only 27 mm. The dorsal stripes of thorax appear to be confluent throughout their length and with no interposed dark stripe. The head markings are similar to those of *cyanifrons* and the markings of the abdomen are what might be expected in a well preserved female

of that species. Segments 2 to 7 bear long oval yellow dorsal spots finely bisected by the dark midcarinal crest, whilst 8 and 9 have small apical dorsal yellow spots. The allotype of *cyanifrons* has the abdomen compressed and discoloured: it is smaller than *lacus-elephantum*, especially as regards the wing measurement, otherwise I should feel inclined to regard the two as conspecific.

Libellago auripes FÖRSTER, 1906; Jahresber. Mannheim,
71/72 : 58.

Enquiries made to Ann Arbor. Michigan Museum elicited the fact that the type of *auripes* FÖRSTER was in the FÖRSTER'S collection there. The species is closely related to *neptunus* SJÖSTEDT and may be even a teneral specimen of that species in which the horse-shoe markings on the dorsum of the abdomen have not yet developed. More material is needed to settle this point. The thoracic markings and that on segment 2 of the abdomen are similar to *neptunus*, as also is the character of the head marking.

Libellago amboniensis MARTIN, 1915; Voy. Alluaud et Jeannel
Afrique Orient., Odonata : 42.

I have not seen this species which MARTIN said much resembled *neptunus* SJÖSTEDT, and which might be the eastern form of that species. From the restricted markings of the abdomen I am inclined to think that it is more probably a teneral specimen of *neptunus*: although I think there is little doubt about the identification, I refrain for the present from including the name among the synonyms of *neptunus*. It is obvious from the specimens that I have examined of this latter species that it is subject to much variation, both in ground colour of the abdomen and in the presence of the black horse-shoe shaped markings on segments 3 to 7 or 8, these being absent in some of the more basal segments of some teneral or local forms.

Chlorocypha croceus LONGFIELD, 1947; Arg. Mus. Bocage,
T. 16 : 17.

This, the last but one described species of the genus appears to be a good species but the possibility of it being an adult specimen of *aphrodite* MARTIN must not be lost sight of as the latter was described from a subadult specimen. I do not agree that the thoracic markings in this species may be *scarlet-red* during life: they most certainly would be greenish as in all other species of the genus: the name therefore seems to be a misnomer.

