zoologischen Nomenklatur verlangen sogar, dass als Grundlage für die Beschreibung einer neuen Art nur ein einziges Individuum als Typus festgelegt werden soll. Ich habe aber schon 1952 ausführlich dargelegt, dass der Copepodenforscher damit in der Fülle der Formen kaum zurecht kommt, dass es vielmehr grundsätzlich notwendig wäre, zahlreiche Individuen vergleichend zu untersuchen, um die Grenzen der Variabilität innerhalb einer Population zu erkennen. Wenn es sich aber um offenbar seltene Formen handelt wie im hier besprochenen Falle, dann gelangt auch der gewiegte Spezialist nicht zu einem klaren Determinationsergebnis, weil keine sicheren Grenzen gezogen werden können. Ich nenne daher den oben näher gekennzeichneten Cyclopen in Uebereinstimmung mit Herrn Dr. LINDBERG *Eucyclops* cf. *caparti* LINDBERG.

Als der schwedische FORSCHER 1951 seinen *Eucyclops caparti* charakterisiert hatte, schrieb er : « A ma connaissance on ne peut comparer cette espèce à aucune autre décrite ». Der gleichen Auffassung bin auch ich, vor allem seit ich selbst ein Exemplar aus eigener Anschauung kenne. Ich bin auf Grund dieser persönlichen Kenntnis der Meinung, dass die besondere Ausbildung der Furka, der inneren Wölbung am zweiten Basalglied der Schwimmbeine und auch die Verhältnisse in der Bewehrung des fünften Thoraxfüsschens Merkmale sind, denen eine subgenerelle Bedeutung zukommt, und möchte vorschlagen, die in dieser Notiz besprochenen Eucyclopen in der Untergattung *Isocyclops* (n. subg.) zusammenzufassen.

SCHRIFTENVERZEICHNIS

KIEFER, FR., 1952. — Copepoda Calanoida und Cyclopoida. — *Explor. du Parc Nat. Albert.* Mission H. DAMAS 1935-1936, fasc. 21, pp. 1-135.

LINDBERG, K., 1951. — Cyclopides (Crust. Cop.). — *Explorat. hydrobiol. du Lac Tanganika* (1946-1947), vol. III, fasc. 2, pp. 47-91.

1957

(Rev. Zool. Bot. Afr., LVI, 1-2). *(A paru le 12 octobre 1957).*

A Revision of the Genus Phyllogomphus Selys with descriptions of five new species

by Lt. Col., F. C. FRASER, I.M.S., Retd.

The genus *Phyllogomphus* was created by SELYS in 1854, with *aethiops* as the sole species; the type of the latter was a badly discoloured male from the River Gambia, West Africa, in the MCLACHLAN collection. An emended description of the same specimen was published in the Appendix to the *Monographie des Gomphines* in which the previously given measurements were corrected and the thoracic markings were said to be five greenish stripes on each side.

In 1878 the same author described what he thought to be the female of *aethiops* from the Cameroons; it also was badly discoloured from postmortem decomposition and the thoracic markings were scarcely discernible. It was said to have only three stripes on each side of the thorax, and this has since been proven by comparison with another female in my own collection also from the Cameroons. The insect was chiefly remarkable for the great length of its ovipositor, which extended practically to the end of segment 10; because of this, SELYS added the character to the definition of the genus.

In 1900, MARTIN redescribed what he thought to be specimens of *aethiops* from the Niger, but they differed in some respects from the type by being smaller and by the antehumeral stripes confluent with the broad mesothoracic collar. These specimens have been lost and all we can conjecture is that they may have been a local race of *aethiops*. LACROIX in 1920, employed MARTIN's description to separate what he considered to be a new species and which he named *helenae*; the differ-

ences which he gives however might be accounted for by the teneral condition of MARTIN's material (costa and pterostigma pale yellow) and by the discoloured face of his own specimen, so that *helenae* might actually be a female of *aethiops*, as was latter the considered opinion given by Miss LONGFIELD. This type has been lost and it is the more unfortunate that LACROIX gave no description of its ovipositor.

No further species were discovered until 1931, when KIMMINS described an insular one from Fernando Po; in many respects it resembled the Cameroon species determined as the female of *aethiops* by SELYS, but the ovipositor was considerably shorter so that there was no doubt that it belonged to another new species; the type and allotype named *coloratus* possessed only three stripes to the thorax; the female was considered to be in too poor a state for description but some of its characters have since been given by KIMMINS and are given below.

Lastly a fourth species, *selysi*, was described by Dr H. SCHOUTEDEN in 1933, which was characterized by having only three stripes on each side of the thorax and the very broad hamules of the male. The ovipositor in this species proved to be quite short so that it necessitated an alteration in the definition of the genus.

In 1936, Miss LONGFIELD in an important paper on the Odonata of Africa, pointed out for the first time that the female assigned by SELYS to *aethiops* was actually a different species but she forbore to name it probably because of the unknown male. In the same paper she expressed the opinion that *helenae* was the correct female of *aethiops* and further described a second female which resembled *helenae* and had come from the same habitat, Sierra Leone.

Since that time, two decades have passed without any further species being added to the genus although considerable material has accumulated. Thus for the present paper I have been able to examine some thirty-one specimens belonging to nine species, five of which are new. For much of this material I am indebted to the authorities of the British Museum (Natural History) and the Musée du Congo Belge, but other is in my own collection, some having been collected by the late G. HALE CARPENTER in Uganda. In the compilation of this paper I have been greatly assisted by Mr D. E. KIMMINS and Miss C. LONGFIELD, indeed it is not too much to say that the paper is the product of our combined team work.

DEFINITION OF THE GENUS

Large dragonflies belonging to the family Gomphidae, subfamily Gomphinae, that is, the forking of *RP* is symmetrical and there are not

more than 1 or 2 cross-veins between the sectors of arculus; 14 to 21 antenodals in forewings; anal border of hindwing deeply excavate, the tornus prominent; wings hyaline, enfumed only in old adults, tinted with yellow in the proximal half in some species. Occiput usually low, flat, slightly sinuous or even raised into a bifid cone, very variable in the species. General colour dark mahoghany brown to black with pea-green markings but these citron yellow in the young adults (or, in unpreserved specimens with the markings almost obliterated by post-mortem decomposition); thorax with antehumeral and two lateral stripes or, in some species, with an extra humeral and mediolateral stripe; the antehumeral stripe usually separated but in some, more or less broadly confluent with the mesothoracic collar; markings of abdomen variable but segment 7 always with a broad yellow basal annule and segments 8 to 10 often ferruginous; segment 8 with very broad lateral foliate dilatations which may extend to the apical border of segment 9 but are of variable size in the species; segment 10 elongated, more nearly the length of 8 and always longer than segment 9 (subequal in only one species); male anal appendages of a conventional pattern, usually the superiors lyrate with the basal half tumid, the apical one tapered and bevelled at the end, and with a more or less pronounced angulation on the outer border; inferiors with widely divaricate branches. Ovipositor variable, extending only to the apical border of segment 9 in some or overlapping segment 10 for part or the whole of its length, the apical portion narrowed and cylindrical and acute at apex. Legs short, robust, femora with a row of small, closely-set spines beneath. Genital hamules of the male variable, either narrow or very broad and with the apex acute, sometimes recurved or elongately tapered.

Habitat : Tropical Africa. Type species of the genus, *aethiops* SELYS.

Very little is known of the ecology and biology of these insects but from analogy with species of *Macrogomphus* which possess similarly shaped nymphs (and doubtless similar habits) and similarly shaped segments 9 and 10 (but without marked foliations on segment 8) it seems certain that they are arboreal by nature which would account for their rarety in collections. (Although in Coorg, South India I saw great numbers of exuviae of *Macrogomphus wynaadicus* FRASER on the rocks in streams, I only saw an imago on two occasions in two years collecting); this similarity is due to convergence rather than relationship as *Macrogomphus* belongs to the subfamily *Epigomphinae*.

Differentiation between species of the genus is often difficult on account of the similarity of markings or even morphology; the most useful guides are the number of pale stripes on the thorax, 3 or 5 each side, the ratio of the lengths of segments 8, 9 and 10, the extent of the overlap of the lateral foliations of segment 8 on 9, the length of the ovipositor as gauged by its overlap on to segment 10. The shape of the occiput and anal appendages are additionnal aids but of less utility, the colour and markings of face (on the rare occasions when it is not discoloured), and lastly the number of rows of cells, 2 or 3, in the discoidal field of forewing.

1. - Phyllogomphus aethiops SELYS. (Figs 2, *d*, 3, *b*, 4, *e*, 5, *d*, 7, *a*, 8, *a*)

Phyllogomphus aethiops SELYS, 1854, *Bull. Acad. Belg.*, (2) **XXI** : 43. — Id., *ibid.*, 1878, (2) **XLVI** : 439. — Id., 1857, *Mon. Gomph.*, III. 407-409. — MARTIN, 1900, (? nec SELYS), *Bull. Mus. d'Hist. Nat. Paris*, 6 : 105. — LONGFIELD, 1936, *Trans. R. ent. Soc. Lond.*, 85 : 479.

Male : Abdomen 58 mm. Hindwing 40 mm. Pterostigma 4.5 mm. Female : Abdomen 51 mm. Hindwing 40 mm. Pterostigma 5-5.5 mm.

The known specimens are badly discoloured and the yellow or green markings largely indistinct. There are five stripes on each side of thorax, viz an antehumeral, humeral and three lateral stripes; the former appear not to be confluent with the slightly interrupted mesothoracic collar. Yellow markings are discernible only on segments 2 and 7 but the greater part of segments 9 and 10 is ferruginous or ochreous. The lateral foliations on segment 8 overlap one third of the base of segment 9 in the male and not quite half in the female. The lengths of segments 8,9 and 10 (dorsal measurements) are respectively, in the male, 5 mm, 3 mm and 4 mm; in the female, 4.3 mm, 3 mm and 4.5 mm. The superior anal appendages possess basal and subbasal spines. The ovipositor is produced and overlaps the basal third of segment 10 (length 1.5 mm).

Habitat : the type male, in the British Museum (Natural History), came from the River Gambia, W. Africa; the allotype female, in the same Museum, from Njala, Sierra Leone, W. Africa, was determined as such by Miss LONGFIELD.

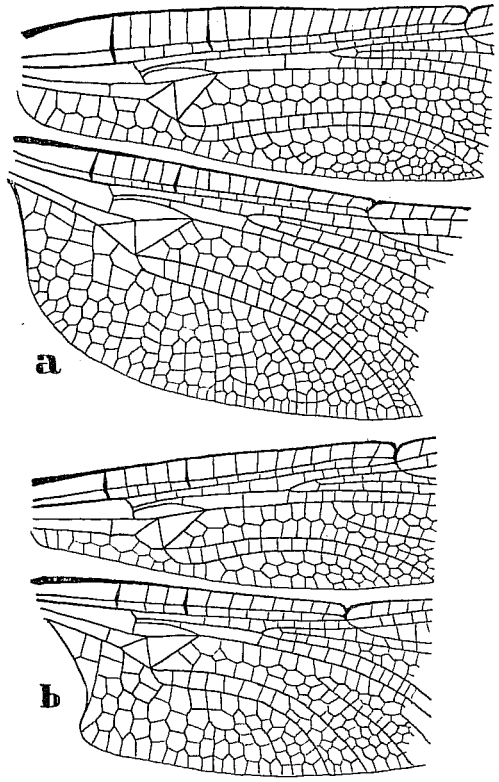

Fig. 1. — Base of wings of,- *a*, *Phyllogomphus montanus* n. sp., *b*, *Phyllogomphus schoutedeni* n. sp., to show the two different types of venation found in the genus.

2. - Phyllogomphus montanus n. sp. (Figs 1, *a*, 6, *b*, 7, *c* and 8, *b*)

Phyllogomphus aethiops SELYS (female ?) 1878, *Bull. Acad. Belg.*, (2) **XLVI** : 439.

Phyllogomphus sp. LONGFIELD, 1936, *Trans. R. ent. Soc. Lond.*, **85** : 480.

Phyllogomphus coloratus KLOTS, 1944, *Amer. Mus. Novit.*, **1259** : 5.

Female : Abdomen 56 mm. Hindwing 46 mm. Pterostigma 5-5.5 mm.

The species is at once separated from *aethiops* by there being only three green stripes to the thorax, the humeral and medio-lateral absent; the antehumeral is broad and not confluent with the slightly interrupted mesothoracic collar. The type is discoloured but the face appears to be unmarked save for the labrum which is bordered with blackish brown; vertex black, occiput citron yellow with the crest black, straight and fringed with black hair. Wings tinted with yellow basally, nodal index: 17 antenodals and 14 postnodals to forewings, 12 antenodals and 15 postnodals to hindwings; *CuP* pectinate; anal-loop 4-celled; 3 rows of cells in the discoidal field of fore-wings. Abdomen black marked with citron yellow, none visible on segment 2 (faded ?), broad basal annules on segments 3 to 7 covering nearly one third of segment 3 but rather less on the following ones; segments 8 to 10 ferruginous. Lateral foliations on segment 8 blackish brown, very broad and *extending almost to the apical end of segment 9*. The respective lengths of segments 8, 9 and 10; 5 mm, 3 mm and 5 mm. Ovipositor produced and *overlapping segment 10 almost to its end* (4 mm). Legs black, femora mahoghany red. Pterostigma blackish brown.

Male. — I have not seen a specimen of this but ELSIE KLOTS mentions three males in the American Museum of Natural History which were collected in the Cameroons which are coloured and marked as in *coloratus* except for segment 2 which has a midorsal lanceolate pale yellow spot. These were accompanied by a female identical to the one in the MCLACHLAN collection. One of these males may be selected as the allotype of *montanus*.

Habitat : W. Africa, Cameroons. The Selysian type in the British Museum (Natural History) was determined by him as *aethiops* as, at that time, the latter was the only known species and it was not foreseen that others might be discovered. There is a second female in the FRASER collection, also from the Cameroons, which agrees in all respects with the Selysian specimen but is rather better preserved. In it the ovipositor attains its maximum length, a character which at once distinguishes it from all other species.

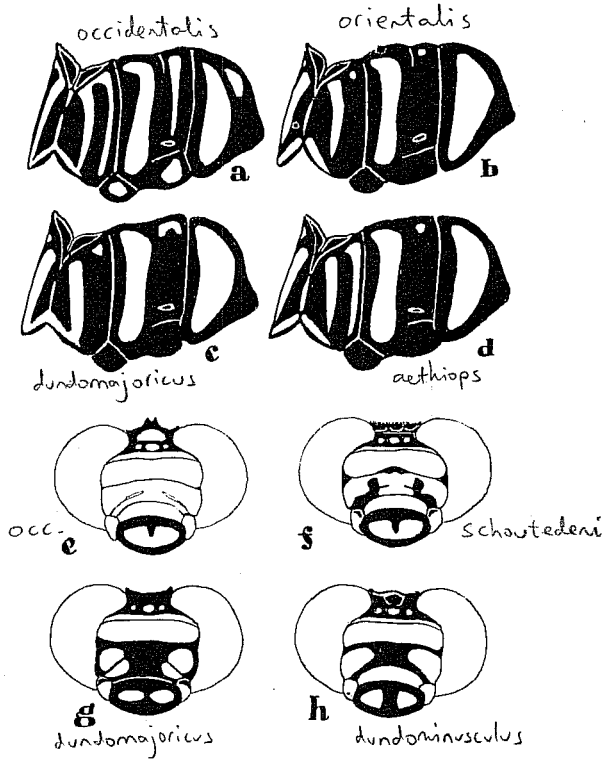

Fig. 2. — Thoracic markings of,- *a*, *Phyllogomphus occidentalis* n. sp., *b*, *P. orientalis* n. sp., *c*, *P. dundomajoricus* n. sp., *d*, *P. aethiops* SELYS (female determined by Longfield). Head markings of,- *e*, *P. occidentalis* n. sp., *f*, *P. schoutedeni* n. sp., *g*, *P. dundomajoricus* n. sp., *h*, *P. dundominusculus* n. sp.

3. - Phyllogomphus orientalis n. sp. (Figs 2, *h*, 5, *b* and 7, *d*)

Male : Abdomen 53 mm. Hindwing 42 mm. Pterostigma 5 mm.

Female : Abdomen 52 mm. Hindwing 44 mm. Pterostigma 5.5 mm.

Male. — Head yellow, labrum with a surround of blackish brown and a short tongue of black projecting from the base but not quite reaching the anterior border. Vertex black, occiput yellow. The markings rather indistinct but there appears to be a central spot of yellow on the vertex just in front of the occiput, the latter raised, convex, slightly emarginate at the middle and fringed with dark hair which forms a tuft at each end; there also appears to be a broad black base to the frons above. Prothorax black, unmarked, posterior lobe trilobate. Synthorax dark reddish brown, almost black marked with yellow (probably green in the adult but the present specimens are a little teneral), broad antehumeral stripes of even thickness, barely confluent with a complete mesothoracic collar, a small upper humeral spot, two rather broad oblique stripes on each side and a small upper spot between them. Legs black, anterior femora yellow on the inner surface. Wings tinted palely with yellow proximal to the level of nodus, deepening at base and with darker rays in the subcostal and cubital spaces; nodal index,- 18 antenodals and 12 to 13 postnodals to the forewings, 10 to 11 antenodals and 11 to 12 postnodals in the hindwings; anal triangle 3-celled; 4 cells in anal-loop; tornus markedly produced and curved to almost a right angle; anal field 6 cells deep in the hindwing; discoidal field of forewings with 3 rows of cells; pterostigma ochreous between dark veins (but certainly blackish brown in the adult); membrane very long, very narrow, white. Abdomen black to dark brown marked with yellow as follows,- segment 1 unmarked, segment 2 with a bilobate longitudinal stripe on the middorsum not extending to either end, the oreillets and a broad stripe along the ventral border, broad basal annules on segments 3 to 6 covering about one third the length of segments, broad medial annules separated from the basal by the black jugal sutures and bisected by the black middorsal carina; segment 7 with its basal two thirds yellow, the black however extending as a point along the middorsum for a short distance; segments 8 and 9 ferruginous but the dorsum broadly black; segment 10 bright ochreous. Lateral foliations on segment 8 broad, blackish brown, overlapping the basal half of segment 9; relative lengths of segments 8, 9 and 10,- 5 mm, 2.75 mm and 3 mm. Superior anal appendages as long as segment 10, seen from the dorsum they are very similar to those of *aethiops* but with the inner border more straight; seen in profile, no basal spine is visible below; inferior appendage similar to *aethiops* but with the apices of branches

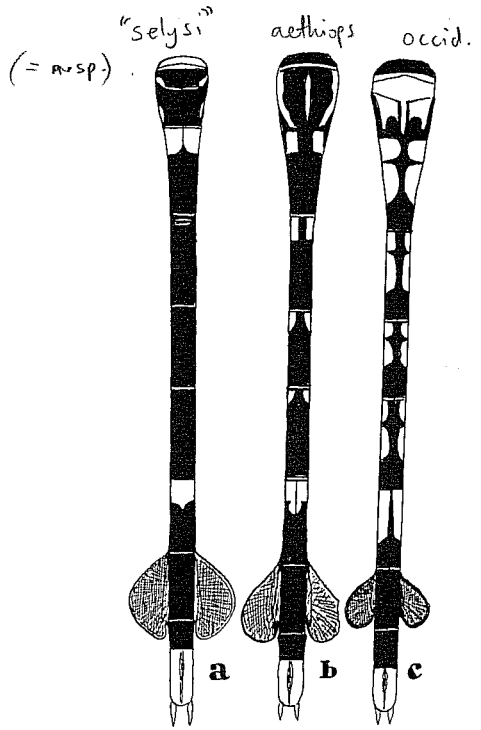

Fig. 3. — Abdominal markings of,- *a*, *P. selysi* Schouteden, *b*, *P. aethiops* Selys. *c*, *P. occidentalis* n. sp. (All females).

directed upwards and inwards. Genitalia; hamules very prominent in profile, rather broad at base but tapering rapidly, the apex short and sharply recurved towards the thorax; lamina projecting at base of hamule.

Female. — Very similar to the male (the sole specimen is a little more teneral than the male), ground-colour paler, that of thorax and abdomen being dark reddish brown but the yellow markings distinct. Face bright yellow including labrum, vertex ferruginous as also border of occiput, the latter nearly straight but with outer ends slightly raised. Yellow markings of thorax and abdomen throughout similar to those of the male but the basal markings on segments 3 to 6 broader, segments 8 and 9 ferruginous; 10 ochreous as also the conical anal appendages. Lateral foliations on segment 8 broad and overlapping rather more than half of segment 9; relative lengths of segments 8, 9 and 10,- 5 mm, 3 mm and 3 mm. Ovipositor *not produced*, short and foliate, the apex obtusely conical, minutely notched as in other species of the genus and *only just overlapping the extreme base of segment 10*. Venational details similar to those of the male.

Habitat : East Africa, Entebbe, a single pair in the FRASER collection collected by the late G. HALE CARPENTER. There is a teneral female in the British Museum (Natural History) collection, also from Entebbe. A note from Miss LONGFIELD states that there are five stripes on each side of this specimen but as it is a teneral specimen, the upper humeral and lateral spots were probably taken to be vestigial stripes. Mr PINHEY has taken a single male on the Kenya-Uganda border, which is now in the Coryndon Museum, Nairobi, Kenya.

4. - Phyllogomphus occidentalis n. sp. (Figs 2, *a*, *e*, 3, *c*, 6, *a*, 7, *b*)

? *Phyllogomphus aethiops* MARTIN (nec SELYS), 1900, *Bull. Mus. d'Hist. Nat. Paris*, 6 : 105.

Female. : Abdomen 50 mm. Hindwing 42 mm. Pterostigma 4.5 mm.

(Male : possibly the species described as *aethiops* by MARTIN ?)

Head bright chrome yellow, the only black marking on the face being a black surround of the labrum, with a small tongue-like projection form its base projecting into the yellow; vertex black scarcely encroaching on the yellow frons, and posteriorly including a large yellow spot in front of the yellow occiput. The latter raised into a sinuous border, the central part of which is elevated into a small cone notched at its summit.

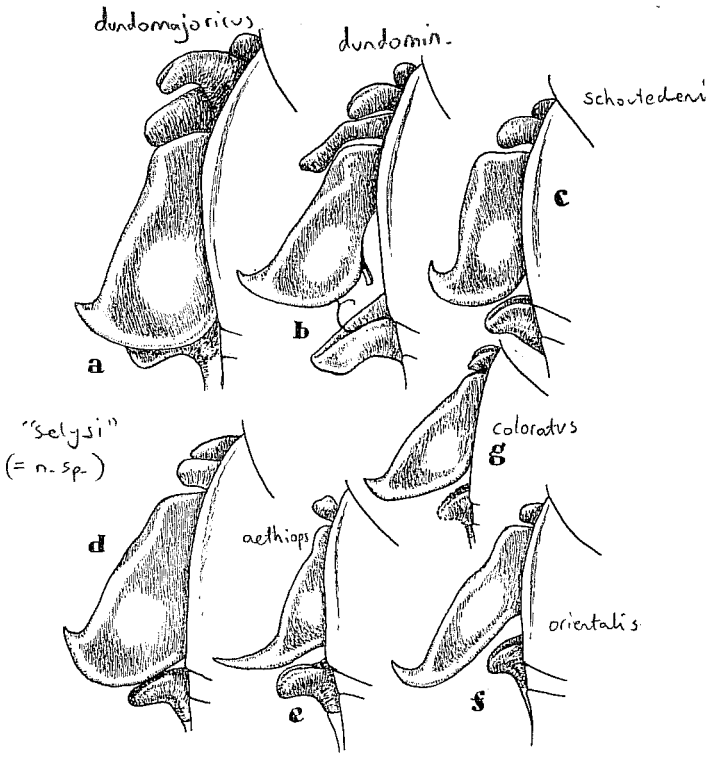

Fig. 4. — Male genitalia of,- *a*, *P. dundomajoricus* n. sp., *b*, *P. dundominusculus* n. sp., *c*, *P. schoutedeni* n. sp., *d*, *P. selysi* SCHOUTEDEN, *e*, *P. aethiops* SELYS, *f*, *P. orientalis* n. sp., *g*, *P. coloratus* KIMMINS.

Behind head black save for the rather tumid yellow occiput which has a tuft of black hairs at each end. Prothorax entirely black, the posterior lobe fringed with long black hairs. Synthorax very dark reddish brown, almost black marked with bright citron yellow as follows;- the middorsal crest (but the raised medial point black), a complete mesothoracic collar confluent with the yellow carina and the lower ends of oblique antehumeral stripes which taper below but broaden above where they are narrowly confluent to a humeral stripe which is narrow below but with a triangular expansion above; laterally three oblique stripes, the anterior one prolonged forwards at its upper end, a medial stripe at the level of the spiracle which is expanded triangularly above and below; lastly the metepimeral stripe covers the greater part of the metepimeron. Legs black save for the inner surface of the anterior pair of femora which is greenish yellow. Wings untinted with yellow but *the costa bright citron yellow* to as far as the proximal end of the pterostigma which is blackish brown bordered with black veins; venation black save for the ante- and postnodals *which are bright yellow;* nodal index,- 18 antenodals and 11-12 postnodals to forewings, 12 ante- and postnodals to hindwings; anal-loop 4-celled; anal triangle 3-celled; 3 rows of cells in discoidal field of forewings; *CuP* pectinate. Abdomen swollen at base, then cylindrical and of even thickness to the end, segment 10 alone being slightly narrower; relative lengths of segments 8, 9 and 10,- 4 mm, 2.75 mm and 3 mm respectively; lateral foliations on segment 8 brownish black, overlapping the basal third of segment 9; ovipositor broad, leaf-like with an undulated surface and rounded obtuse apical border; a narrow ridge runs along its middle becoming more prominent towards the apical end where it is minutely notched *but does not overlap segment 10.* Abdomen with black ground-colour marked broadly with citron yellow, and in the case of the sides of segments 8 and 9 and the whole of segment 10 bright ochreous including the long conical anal appendages; segment 1 black, segment 2 almost entirely yellow, with a linear black stripe at its base, a linear transverse stripe on the jugal suture interrupted at its middle and confluent along each side of the median carina with large quadrate apical black spots, from the outer ends of which runs on each side a very oblique broad black stripe to as far as the base of the segment; segments 3 to 6 with large basal and median yellow spots separated by the black middorsal carina and jugal sutures and bordered laterally with a broad black stripe; the apical ends of these segments broadly black; segment 7 with its apical third black, this colour extending along the middorsal carina and bisecting the basal yellow ring almost to base of segment; segments 8

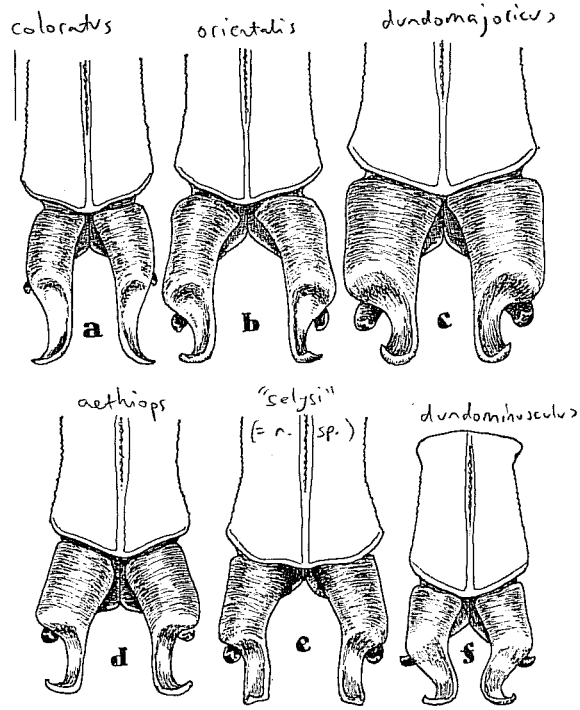

Fig. 5. — Male anal appendages of,- *a, P. coloratus* KIMMINS, *b, P. orientalis* n. sp., *c, P. dundomajoricus* n. sp., *d, P. aethiops* SELYS, *e, P. selysi* SCHOUTEDEN, *f, P. dundominusculus* n. sp. (Dorsal view).

and 9 black on dorsum changing to ferruginous on the sides.

It is possible that the male described by MARTIN as the male of *aethiops* SELYS may actually be the male of this new species as there are several points of resemblance; the yellow costa and the pale pterostigma of his specimens are more probably due to a teneral condition, for in *occidentalis* the bright yellow costa goes with a black pterostigma and is strongly reminescent of a similar contrast in species of *Crenigomphus*. The description of the thoracic and abdominal markings given by R. MARTIN tally closely to those of *occidentalis*.

Habitat : an adult female from the Ivory Coast, West Africa, in my own collection at present but will be transferred to the British Museum (Natural History) collection ultimately. It may be recognized at sight by its bright yellow costa and antenodal cross-veins, which are to be found in no other species.

5. - Phyllogomphus selysi SCHOUTEDEN (Figs 3, *a*, 4, *d*, 5, *e*, 6, *c*, *e* and 7, *f*)

Pyllogomphus selysi SCHOUTEDEN, 1933, *Rev. Zool. Bot. Afr.*, **23** : 340. — Id., 1934, *Ann. Mus. Cong. Belg.*, (3) **2** : (3) **1** : 67. — LONGFIELD, 1936, *Trans. Roy. ent. Soc. Lond.*, **85** : 180. — FRASER, 1949, *Rev. Zool. Bot. Afr.*, **42** : 127.

Phyllogomphus annulus KLOTS, 1944, *Amer. Mus. Novit.*, **1259** : 4.

Male : Abdomen 54-56.5 mm. Hindwing 42-45 mm. Pterostigma 5 mm.

Female : Abdomen 53-57.5 mm. Hindwing 44-47 mm. Pterostigma 5.5 mm.

The species was described by the author from a pair taken at Lemfu (Bas-Congo) and others collected at Lodima, Eala and Kambaye. Further examples were taken at Bambesa, 1 female and 8 males, 1934-38 ; 1 male Lulua : Riv. Luiza, 1933 and 7 males, Eala, 1934-35, and more recently, a female from Lualaba : Kabongo, X.53 by CH. SEYDEL.

The species is distinguished by having only 3 stripes on each side of the thorax, by the great breadth and shortened apex o the genital hamule, by the ovipositor greatly shortened so that it overlaps segment 10 by not more than one third; the superior anal appendages are without the acute basal ventral spine found in *aethiops*; the lateral foliations of segment 8 overlap the basal two-thirds to three-fourths of segment 9; the relative lengths of segments 8, 9 and 10 are 9, 4 and 5 mm respectively in the male and 5, 3.5 and 5 mm in the female. The costa and pterostigma are black. Nodal index,- 17 antenodals and 15-16 postnodals in forewings, and 12-13 antenodals and 15-16 postnodals in the

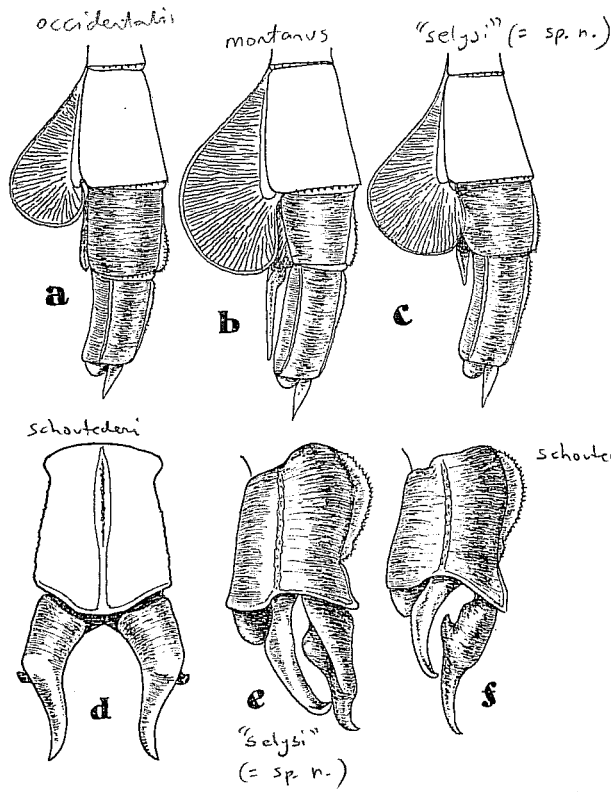

Fig. 6. — Terminal abdominal segments and genitalia of females of,- *a*, *P. occidentalis* n. sp., *b*, *P. montanus* n. sp., *c*, *P. selysi* SCHOUTEDEN. Male anal appendages of,- *d*, *P. schoutedeni* n. sp., dorsal view, *f*. The same, left lateral view, *e*, *P. selysi* SCHOUTEDEN.

hindwings of male; female with 20-21 antenodals and 15-16 postnodals in forewings, and 14-15 antenodals and 17 postnodals in the hind. The anal-loop is 4-celled as in other species but rarely may consist of 5 cells; the discoidal field of forewing has 3 rows of cells but in some specimens there may be occasional spaces of 2 cells in one or both forewings.

The type, allotype and paratypes are in the Musée du Congo Belge.

6. - Phyllogomphus coloratus KIMMINS (Figs, 4, *g*, 5, *a*)

Phyllogomphus coloratus KIMMINS, 1931, *Ann. Mag. N. H.*, (10) **7** : 217. — SCHOUTEDEN, 1933, *Rev. Zool. Bot. Afr.*, **23**, 3-4 : 342. — LONGFIELD, 1936, *Trans. R. ent. Soc. Lond.*, **85** : 480.

The species is known from a single pair but only the male was described as the female was in too poor a condition. Some details omitted from the description have been supplied by Mr KIMMINS.

Male : Abdomen 58 mm. Hindwing 44 mm. Female : Abdomen 56 mm. Hindwing 46 mm. Pterostigma 5 to 5.5 mm in the male, 4.5 to 5 mm in the female. Relative lengths of segments 8, 9 and 10 in the male,- 5, 3 and 3.5; in the female, 5, 2.9 and 4.5. The lateral foliations on segment 8 overlap about half the length of segment 9 in the male and about three-fourths in the female; the ovipositor is greatly produced but is only about half the length of that in *montanus*. The genitalia is best compared to other males in fig. 4, *g*.

Habitat : Fernando-Po. It is the only insular species known and appears most closely related to *montanus*, resembling that species in its markings but differing in the genitalia of the female. Type and allotype in the British Museum (Natural History).

7. - Phyllogomphus dundomajoricus n. sp. (Figs 2, *c*, *g*, 4, *a*, 5, *c*, 7, *c*)

Male : Abdomen 62.5 mm. Hindwing 46 mm. Pterostigma 5 mm.

Head : labrum black marked with two transversely oval green spots widely separated by the black from each other and from the circumference; anteclypeus black with a small green spot at each end; postclypeus also black and with its lower external angles green; frons green, its base rather broadly black, this colour prolonged downwards on each side to become confluent with the black on the epistome; bases of mandibles citron yellow. Vertex and occiput black, the latter raised, broadly and shallowly concave, fringed with black hairs. Prothorax black. Synthorax black marked with grass-green as follows,- oblique antehumeral stripes broad and truncate above, tapering to a point

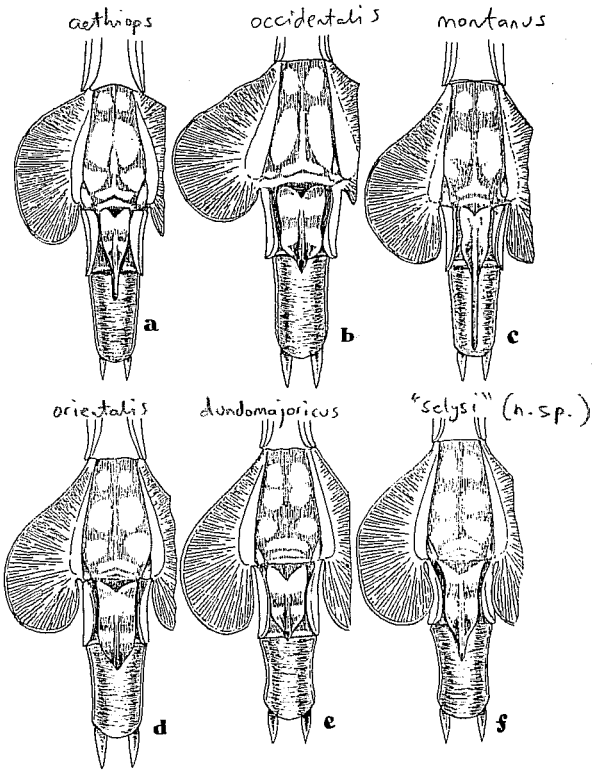

Fig. 7. — Female genitalia of,- *a*, *P. aethiops* SELYS (determination by Longfield), *b*, *P. occidentalis* n. sp., *c*, *P. montanus* n. sp., *d*, *P. orientalis* n. sp., *e*, *P. dundomajoricus* n. sp., *f*, *P. selysi* SCHOUTEDEN.

below which does not make contact with the mesothoracic collar; the latter extending well out beyond the ends of the antehumeral stripes and barely interrupted at its middle; the lower part of the median crest; small triangular humeral spots above; laterally two broad stripes, the anterior one slightly angulated above, the metepimeral one a broad narrow triangle; between these stripes a small upper green spot. Wings enfumed, tinted faintly with yellow in the basal half, pterostigma blackish brown; 2 to 3 rows of cells in the anal field of forewing, 7 rows at the level of the 4-celled anal-loop in the hindwing. Nodal index,- 20-21 antenodals and 16-18 postnodals in the forewings, 14 antenodals and 18 postnodals in the hindwing; 3 rows of cells in the dicoidal field of forewings. Abdomen black, the three terminal segments ferruginous but segment 8 and 9 clouded with black on the dorsum; yellow markings as follows,- the ventro-lateral border of segment 2, this broadening apically where it becomes confluent with a similar bordering on segment 3 which extends upwards to form a broad basal annule covering about the basal third of segment; a small spot on the oreillets. Segments 4 to 6 unmarked, segment 7 with a broad basal annule covering about one third the segment but prolonged for a short distance along the dorsal ridge. The relative lengths of segments 8, 9 and 10,- 6.5 mm, 4 mm and 4.5 mm; lateral foliations on segment 8 very broad, extending nearly to the apical border of segment 9. Segment 10 with its dorsal crest finely spined and very prominent. Anal appendages of the conventional type common to the genus but the superiors shorter and broader than in other species and the apices not curled out and but slightly upwards. Hamules very broad, perhaps broader than in *selysi* and the apices not recurved.

Female : Abdomen 54 mm. Hindwing 46 mm. Pterostigma 4.75 mm.

Closely similar to the male; the face is almost entirely olivaceous green, the anteclypeus alone appears to be dark and the labrum is without the dark border (the specimen is rather teneral and the actual colours indistinct): the ventrum and ventral border of segment 2 is creamy white, as also is the base of segment 3 (but it seems clear that this is a teneral colouration which would subsequently become bright yellow; a similar condition is seen in some specimens of *selysi* of teneral age), basal yellow rings on all segments from 3 to 7 cover less than one third the length of segments save 7 which is two thirds yellow; the rings on segments 4 to 6 do not extend beyond the subdorsum as on 3 where the colour is confluent with that on the sides of segment 2; segments 8 to 10 ferruginous. The relative lengths of segments 8, 9 and 10 are 5, 3.5 and 3.5 mm respectively; the lateral foliations on segment 8 extend

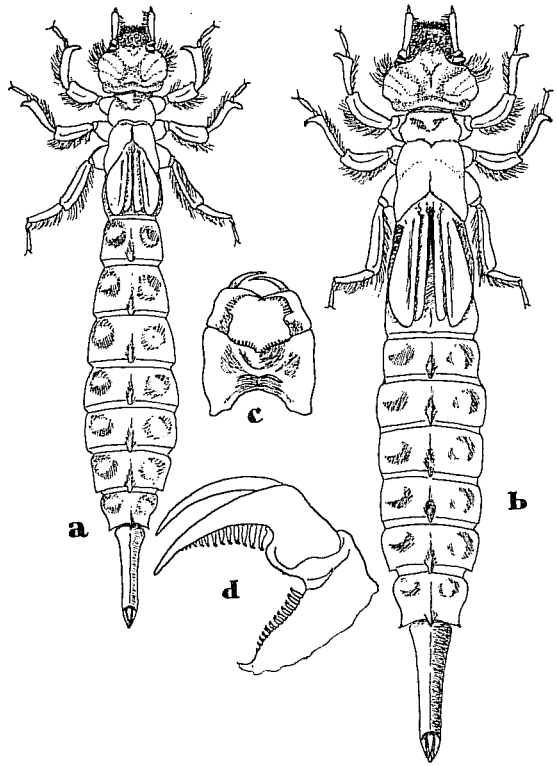

Fig. 8. — Nymphs of,- *a*, *Phyllogomphus aethiops* SELYS, *b*, *Phyllogomphus montanus* n. sp., *c* and *d*, Labial mask of both species.

to the end of segment 9. The ovipositor is extremely short, very much as in *orientalis* and does not overlap segment 10. One striking difference in the markings of the thorax, which does not appear to be due to the teneral condition, is the broad character of the antehumeral stripes and the equally broad confluence of these with the mesothoracic collar. Venation is very similar to that of the male, nodal index,- 16-17 antenodals and 15 postnodals to forewings, 12-13 antenodals and 16 postnodals in the hind; the anal field of hindwing is 6 cells deep at the level of the anal-loop; occiput sinuous, the centre slightly raised.

Habitat : Dundo, Angola, Portugese West Africa, 10.XII.47 and XI.48.

8. - Phyllogomphus dundominusculus n. sp. (Figs 2, *h*, 4, *b* and 5, *f*)

Male : Abdomen 56 mm. Hindwing 43 mm. Pterostigma 4.5 mm.

Head : labrum black marked with two triangular green spots which are widely separated from each other and from the circumference of labrum; rest of face, frons and bases of mandibles green, the base of the frons above, a medial quadrate spot on the postclypeus confluent with a narrow black line on the lower face of the frons black; vertex and occiput black, the latter with border raised and very shallowly concave. Prothorax black. Synthorax black marked with very bright pea-green as follows,- oblique antehumeral stripes broadly truncate above but with the inner angle prolonged hook-like, tapered rather abruptly below and separated by a short space from a broadly interrupted mesothoracic collar which ends at the level of the antehumeral stripe; a very small upper humeral point and the lower part of the middorsal carina. Laterally very similar to the large male from Dundo described above but the stripes narrower and the spot between them reduced to a point. Wings palely enfumed and tinted with pale yellow in the basal fourth; pterostigma black to dark brown; nodal index,- 16-17 antenodals and 12-14 postnodals in forewings, 12-13 antenodals and 16-17 postnodals in the hindwings; *only 2 rows of cells* in the discoidal field of forewings to as far as the level of Bridge. Anal-field of hindwing only 6 cells deep at level of the 4-celled anal-loop. Abdomen black marked with yellow as follows,- segment 2 with the ventral border broadly towards the apical end, and a spot on the oreillets, segment 3 with a broad basal annule covering about its basal third, segments 4 to 6 unmarked (or faded), segment 7 with rather more than its basal third yellow, this colour extending for a short distance along the middorsal carina, the rest of the segments more or less dark ferruginous, especially the 10th which is furnished with the usual spined ridge on its baso-dorsal two thirds. Genitalia on

segment 2 very similar to that of *selysi* SCHOUTEDEN but narrower and the apex of the hamules rather more prolonged and not at all recurved (perhaps more similar to that of *coloratus*). Anal appendages of the conventional shape peculiar to the genus, the apices of the superiors truncated and curled squarely upwards and outwards and with the external angle spinous. Female unknown.

Habitat : Dundo, Angola, Portugese West Africa.

9. - Phyllogomphus schoutedeni n. sp. (Figs 1, *b*, 2, *f*, 4, *c*, 6, *d*)

Male (Female unknown) : Abdomen 40 mm. Hindwing 30 mm.

Head : labium chrome yellow, labrum greenish yellow with a surrounding sharply-defined border of black and a median tongue of the same colour not quite bisecting the yellow; face and frons bright yellow to green, with a narrow black transverse line along the lower border of the frons confluent anteriorly with two large black submedian spots on the epistome which are prolonged outwardly along its lower border; above, base of frons broadly black, this continued narrowly downwards along both sides. Vertex black marked by a small green spot shaped like the head of an arrow, in front of the occiput; the latter pale greenish yellow anteriorly and posteriorly, the crest finely black, fringed with black hairs, raised and notched at its middle. Prothorax uniformly black; posterior lobe shallowly concave. Thorax black or very dark reddish brown marked with bright greenish yellow as follows,- the lower part of the median carina, an interrupted mesothoracic collar, oblique antehumeral stripes with the extremities, above and below, rounded and well separated from the mesothoracic collar, a very small superior humeral spot (the sole vestige of a humeral stripe), two broad complete oblique lateral stripes, the posterior covering the greater part of the metepimeron, and lastly a small superior spot between these stripes. Legs black, anterior femora greenish yellow on the inner surface, hind femora extending only to apical end of segment 1 and beset with two rows of numerous closely-set spines; tibial spines numerous, short and robust. Wings uncoloured; nodal index,- 14 antenodals and 11 postnodals to forewings; 10-11 antenodals and 11-12 postnodals to hindwings; anal triangle 3-celled; anal-loop 4-celled; *only 2 rows of discoidal-field cells* in forewings; membrane long, narrow, white. Abdomen slightly swollen at base, then cylindrical to the end, segment 8 with the lateral foliations smaller than in other species, overlapping only the basal fourth of segment 9; relative lengths of segments 8, 9 and 10,- 5 mm, 3 mm and 3 mm, segments 9 and 10 being equal in length contrary to what is found in other species. Anal superior appendages 2 mm

in length, yellow but apices piceous; seen from the dorsum they are strongly concave along the inner border, the apical portion gradually straightening out and the extreme pointed apex slightly everted; the outer border less strongly angulated than in *selysi* and the angle situated just short of the middle of appendage. In profile view they are broad at base and with a single very robust subbasal ventral spine with its point directed basally; the appendage tapering rapidly to a fine upcurved acute apex. Inferior appendage with branches as divaricate as superiors, the apices of which are acute, curved inwards and upwards; slightly longer than half the superiors. Colour of abdomen coal-black marked with citron yellow,- the lower parts of the sides of segments 1 to 3, a linear spot on the middorsal carina of segment 2 not extending to its apex, the oreillets, broad basal annules on segments 3 to 7 covering slightly less than their basal thirds and prolonged as a point along the mid dorsum, especially on segment 7 where it extends for over two thirds of its length. Dorsum of segments 8 and 9 and the base of segment 10 black, the lower parts of sides of segments 8 and 9 and the rest of 10 ferruginous but in some specimens, the latter segment is greenish yellow with only its apical border edged with black. The lateral foliations of segment 8 black. Genitalia on segment 2 not as prominent as in most species, the hamule short, stout and with its apex short and sharply hooked basalwards (Fig. 4, *c*).

Habitat : Belgian Congo : Elizabethville, 5 males collected by Cte. Seydel, III.1953. This species is the smallest so far known and is the only one (save *dundominusculus)* to possess invariably two rows of cells in the discoidal field of the forewing (*selysi*, male, often has 2 rows for a short distance but it is not constant and may be present in one forewing and absent in the other). It is also distinguished by the character of the facial markings, the upper humeral spot instead of a stripe (but *orientalis* also has this character), the black colouring of segments 8 and 9, and lastly by the highly specialized shape of the hamule. The type and cotypes in the Musée du Congo Belge.

NYMPHS OF GENUS *PHYLLOGOMPHUS* Selys (Figs 8, *a* to *d*)

The nymph of *Phyllogomphus æthiops* Selys has been described by Dr J. Needham (1904, *Proc. U.S. Nat. Mus.*, **27** : 688, pl. 37, figs 2 and 3), from a specimen from the Congo; as the venation of the nymph could be clearly seen, there is no doubt about the determination but as regards the species, this is very doubtful from the habitat, and it is more probably the nymph of *P. selysi* Schouteden. I have seen a nymph collected

by Mr Pinhey in Kenya, and Dr Corbett has collected a similar one in Uganda which I understand he is describing and shortly publishing; this nymph almost certainly belongs to the species *orientalis* described above; it is closely similar to the two nymphs described below. Further to these, I have two nymphs from the West Coast of Africa, one of which I take to be that of *aethiops* from the similarity of the habitat, and the other, which is much larger, to be that of *montanus* described above, as it was collected in the same habitat, Cameroons.

1) Nymph of *Phyllogomphus aethiops* Selys (on supposition).

Total length 41 mm. Greatest breadth, at abdominal segment 6, 8.5 mm. Breadth of head 5 mm. Head somewhat quadrate but wider than long, the labrum produced to about half the length of the antennae and fringed densely with short stiff hairs; eyes not at all prominent, with pseudosutural lines running obliquely across them and with a long fringe of hair spreading out from beneath their foreborder; antennae with short scape, very long penultimate segment which is longer than all the others together, the apical segment minutely conical. Labial mask quadrate, lateral lobes short and very robust, right-angulated, the distal portion prolonged into a long robust tusk, the medial border of which is furnished with a row of 10 to 12 teeth, the proximal ones very long, the remainder gradually decreasing in length, all with apices inverted inwards; lastly a very long movable (arthrodial) hook at apex of about the same length as the tusk-like tooth. Medial lobe shallowly concave, with concavely angulated border which, on each side, is furnished with a row of some 10 teeth similar to those lining the lateral lobes. Pronotum and thorax comparatively small and narrow; wing-cases extending only to the apical border of segment 2 and slightly divergent. Legs short and robust, adapted for burrowing in mud or sand, for which purpose, the tibiae of the anterior two pairs terminate on the outer side with a stout scythe-shaped spine; femora and tibiae of the same length, broad and curved and all thickly fringed with coarse hairs on the outer borders. Abdomen long, narrow, markedly fusiform in shape, the basal segments very narrow and waist-like, the medial ones broadening and then narrowing rapidly again to the end segment which is tubular, cylindrical, very narrow and elongated, with the cerci forming an acute apex. This organ is similar to that found in the nymphs of genus *Macrogomphus* and I have observed these latter, when buried in sand, keep the apex of this segment projecting from the sand or mud as if to facilitate respiration; it is curiously like a periscope when employed in this manner. Segments 3 to 9 have obtuse middorsal spines

at their apical borders, more acute on the last, segments 8 and 9 have sharp lateral spines.

Described from a single nymph from the Ivory Coast.

2) Nymph of *Phyllogomphus montanus* n. sp.

Total length 48 mm. Greatest breadth, at segment 5, 10 mm. Breadth of head 7 mm. Head pentagonal in shape with the labrum produced (probably acting as a shovel when burrowing in mud) and fringed thickly with coarse hair; eyes more prominent than in the last described nymph and with the pseudosutural lines more pronounced so that the outline in profile is somewhat sinuous; fringed beneath with long dense hairs. Thorax more robust, wing-cases extending to the apical border of segment 3. Legs as in the last, very hairy; abdomen more nearly fusiform, broadening as far as the middle segments, then narrowing to the end with the terminal segment cylindrical, narrow and greatly prolonged as in that of *aethiops*; lateral spines on segments 8 and 9 but acute only on 8; middorsal apical spines on segments 3 to 9 but obtuse on all save 9. Labial mask and its armature entirely similar to that of *aethiops*.

Described from a single nymph from the Cameroons. The two nymphs are closely similar in detail but dissimilar in shape and colouring, that of *montanus* being a blackish grey, whilst the other in more sandy coloured, probably due to a difference in environment. The atrophic condition of the dorsal spines is of interest and is probably coordinated with the fact that only the extreme end of the abdomen is surfaced and so vulnerable to attack from predators.

(Rev. Zool. Bot. Afr., LVI, 1-2). *(A paru le 12 octobre 1957).*

Coléoptères *Carabidae* africains nouveaux

VIII

par P. BASILEWSKY

(Musée Royal du Congo Belge, Tervuren)

Les espèces nouvelles décrites ci-dessous proviennent des collections du Musée Royal du Congo Belge à Tervuren, du Museo Civico di Storia Naturale à Gênes et de la collection S. L. Straneo à Gallarate.

Je remercie très vivement le Dr. F. Capra du Musée de Gênes, et mon excellent ami le Dr. S. L. Straneo, de Gallarate, d'avoir bien voulu me confier l'étude de divers Carabides particulièrement intéressants.

PARALIAGONUM gen. nov. *Anchomeninarum*

Corps allongé, fin, très élancé.

Tête très allongée. Mandibules longues et droites, recourbées seulement au sommet. Bord antérieur du labre droit. Tempes très longues et obliques, le cou légèrement rétréci, la constriction collaire s'étendant légèrement sur la face dorsale du vertex. Dent labiale présente. Palpes longs et grêles. Antennes longues, pubescentes à partir du 4e article, le 3e un peu plus long que le suivant.

Pronotum allongé, rebordé latéralement, la base non ponctuée. Striole scutellaire de l'élytre présente sur le premier intervalle.

Pattes longues, les protarses largement dilatés chez le mâle, le 4e article très faiblement bilobé à toutes les pattes, le premier très long, le 5e non sétulé en dessous, les deux premiers bisillonnés et carénés à la face dorsale aux pattes intermédiaires et postérieures. Prosternum glabre; métépisternes courts.