

ODONATA OF THE AFRICAN CONTINENT

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WITH SIX TEXT-FIGURES.



THE dragonflies of Africa are less known than those of any other of the five continents; with practically the whole of the literature on the subject at my disposal, I have been able to list only some 380 species, a number which falls short of the known Indian fauna by at least 100. When comparing the respective sizes of the two areas concerned, we are compelled to come to the conclusion that a great number of dragonflies yet remain to be discovered in Africa. It is true that India is a particularly rich faunal area so far as the *Odonata* are concerned, and probably the cradle of the Order; it is also true that a very large area of the African continent consists of desert wastes, which are inimical to dragonfly life, yet, in the latter respect, India for its size has also a proportionate amount of arid lands where dragonflies are almost unknown. It is the montane districts of India which furnish such a wealth of material, and it is just such areas that, in Africa, have remained totally unexplored. It was in the hope therefore that a willing band of helpers might be found to work such districts in the dark continent that I sent out an S.O.S. in 1926 asking for Odonate material. In point of the number of letters sent out, the response was poor; most of my letters remained unanswered, a few others elicited replies that, owing to the writers being too fully occupied in working on other orders, they were unable to assist. Only three entomologists in all sent me collections, which have well repaid the trouble taken. Of these, Dr. G. Hale Carpenter collected some seventy species on the shores and in the vicinity of Lake Victoria Uganda, several of which proved to be new to science. Four collections were sent by this enthusiastic naturalist, with a promise of more to come, whilst collections were also received from Messrs. Colin Smee of Zomba, Nyasaland and H. Hargreaves of Uganda, to all of whom my thanks are due.

In this paper, which I hope to be the first of a series dealing with the African dragonfly fauna as a whole, I have described ten new species and completed the descriptions of two others. Figures of the appendages have been given where possible, being camera lucida studies drawn by the author. Types, where not otherwise mentioned, will be deposited in the British Museum.

Order *ODONATA*.Sub-order *ZYGOPTERA*.*Agriocnemis victoria*, sp. nov. (Fig. 1.)*Male*. Abdomen, 15 mm. Hind-wing, 11 mm.

Head: labium whitish-yellow; labrum glossy black, non-metallic; rest of head, including back of eyes, matt-black, except for a small round postocular azure blue spot on each side of occiput; bases of mandibles and cheeks pale yellow.

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Prothorax matt-black, the hinder part of sides, including extremities of posterior lobe, azure-blue.

Thorax black on dorsum, greenish-yellow to citron-yellow on sides; a narrow azure blue humeral stripe on both sides of dorsum broadening gradually below, and a broad black stripe on the hinder lateral suture.

Legs black, tibiae yellow on extensor surface, femora pruinosed white on flexor surface.

Wings hyaline; pterostigma greenish-grey or dirty yellow framed in black; 7 to 8 postnodals to fore-wings, 5 to 6, usually 5 in the hind; are widely distad of the distal antenodal.

Abdomen bluish-green to yellowish laterally and beneath, broadly marked with black on dorsum; segments 9 and 10, and segment 8 in teneral, rust-red; segment 1 broadly black on dorsum; segment 2 with a black dorsal marking similar to that found in *A. splendidissima*, but without the two eye-spots; 3 to 6 with narrow dorsal black stripe, which broadens at apical ends of segments; 7 with a much broader dorsal marking, whilst 8 to 10 unmarked.

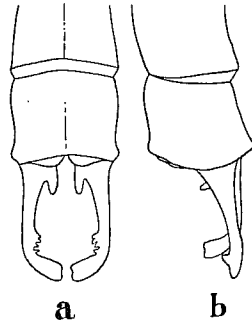


FIG. 1.—a. Dorsal view of anal appendages of *Agriocnemis victaria*, sp. nov. ♂. b. Profile view of same seen from the left side.

Anal appendages. Superiors one and a half times as long as segment 10, ferruginous changing to black at apices. Broad at base, where they are furnished with a very obtuse short pale yellow spine directed inwards and downwards, tapering thence to apex, which is slightly spatulate and turned inwards and downwards. On the inner side of appendage, quite near the apex, a small boss furnished with 4 or 5 small black teeth. Inferior appendages not visible in profile, small yellow inconspicuous tubercles curled on themselves and hidden beneath the ventral margins of segment 10.

Female. Abdomen, 16 mm. Hind-wing, 12 mm. (Heteromorphic.)

Andromorph. Head and prothorax coloured as for male, but labrum bordered with creamy yellow and postocular spots absent. Thorax with the humeral stripes and sides yellow, the former almost obsolete in full adults.

Legs with flexor surfaces and proximal ends of femora yellow.

Abdomen bluish-green at the sides, broadly black on dorsum, including the terminal segments. Segment 1 with a broad quadrate dorsal black spot; 2 with the dorsum broadly black, the margins of this marking sinuous, and an additional oval narrow diffuse black spot on sides of segment; other segments as for male, but the basal expansion of black

sending off a lateral prolongation basad exactly as in *A. splendidissima*. Segments 8 to 10 blackish brown, paler laterally.

Anal appendages short, conical, dark reddish brown.

Wings as for male, 7 to 8 postnodal nervures to fore-wings, 6 in the hind.

Heteromorph. Head similar to andromorph, but with a bright orange occipital marking shaped as an irregular pyriform lobe on each side, connected across occiput by a narrow stripe.

Prothorax as for last; thorax also similar, but markings and sides bright blood-red, paling to rose-pink low down on sides. Legs with black markings more restricted.

Abdomen blood-red, the intersegmental nodes finely ringed with black, otherwise unmarked. Anal appendages red with black tips.

Distribution.—Two males and two females, collected by Dr. G. Hale Carpenter on the north-west shores of Lake Victoria, Uganda, July—September, 1927.

The species belongs to the *splendidissima* group, a group mainly confined to S. Asia.

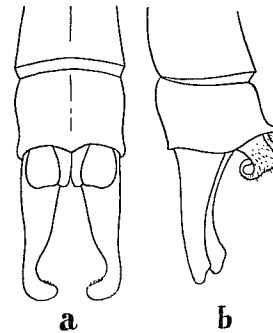


FIG. 2.—a. Dorsal view of anal appendages of *Agriocnemis maclachlani*, Selys, ♂. b. Profile view of same seen from the left side.

Agriocnemis maclachlani, Selys. (Fig. 2.)

Dr. Hale Carpenter has taken several specimens of this very rare insect, which, so far as I am aware, has not been met with since it was first described by its author in the year 1877. The type is a male in the Selysian collection, and there are paratypes in the MacLachlan collection. All the present examples are heavily pruinosed, the thorax being quite white in some. It is remarkable, in the genus, for its large size.

Distribution.—Type from Senegal. Present specimens from the west shore of Lake Victoria, Uganda, July—September, 1927.

As the anal appendages show a wide departure from any others of the genus I have given a figure of them.

LIBYAGRION, gen. nov.

Small Zygopteron of dull colouring and slender long abdomen. Venation: quadrilateral in fore-wing with costal side less than half the length of hinder, that of hind-wing with the costal side half the length of hinder, outer angle very acute; arc at the 2nd antenodal or very slightly distad; *ac* situated nearly midway between the two antenodals, the end of *ab* lying a little proximad to it—that is, petiolation begins slightly proximad of *ac*; 3 cells between the quadrilateral and the subnode; pterostigma unicolorous in all wings, that of fore-wing nearly twice the size of that of hind; arcolelets mainly four-sided; reticulation very simple and open.

No postocular spots; posterior lobe of prothorax rounded, simple; dorsum of 10th segment simple, without tubercles on carina; 8th segment of female with a ventral spine. Abdomen very long and attenuated. Anal appendages simple. Legs very short, with few spines.

Libyagrion is evidently closely allied to *Enallagma*, but the extremely long abdomen is quite foreign to the latter and seems of sufficient importance to throw it out of that top-heavy genus.

Libyagrion decoloratum, sp. nov.

Male. Abdomen, 25.5 mm. Hind-wing, 16 mm.

Head: labium palest fawn; labrum and epistome pale reddish-brown; rest of head darker reddish-brown with a black marking anterior to occiput shaped like a maltese cross with the hinder limb missing; eyes pale fawn beneath, warm brown above.

Prothorax pale fawn at the sides, reddish-brown on dorsum, including posterior lobe.

Thorax bluish-grey, the dorsum ochreous with a fine blackish-brown line on each side of, and parallel with dorsal carina; a diffuse pale reddish clouding bordering the humeral suture, which has a small black spot at its upper limit. Legs caraceous, with short black spines.

Wings hyaline; 9 postnodals in fore-wings, 8 in the hind; pterostigma pale reddish-brown.

Abdomen bluish-grey with a narrow blackish-brown stripe extending from the dorsum of segment 1 to segment 7, expanding on each segment subapical and confluent with a very narrow ring at the intersegmental nodes; segments 8 to 10 azure-blue, unmarked.

Anal appendages caraceous, the superiors as long as segment 10, small conical organs, flattened from above down, broad at base, bluntly rounded at apex; inferior appendages half the length of superiors, short pencil-like organs directed obliquely up towards the superiors and ending in a subacute point.

Female. Abdomen, 23.5. Hind-wing, 16 mm.

Exactly similar to the male, but the dorsal markings on abdomen extending as far as the middle and proximal thirds of segment 8, and somewhat broader in extent. The black on head forms an unbroken band across the ocellar space; pterostigma palest pink, of the same size in all wings; 10 postnodal nervures in fore-wings, 9 in the hind.

Distribution.—Zomba, Nyasaland Protectorate. A single pair apparently taken *in cop.*, by Mr. Colin Smee.

Aciagrion attenuatum, sp. nov.

Male. Abdomen, 35 mm. Hind-wing, 24 mm. (Female unknown.)

Head: labium white; labrum dark brown, the anterior border paler; rest of head dark purplish-brown; occiput and behind eyes pale olivaceous-brown; eyes dark brown.

Prothorax warm brown on dorsum, bluish laterally, the posterior lobe rounded, simple. Thorax pale blue on sides, dark reddish-brown on dorsum, with a small black spot at the upper limit of each lateral suture.

Legs pale yellow with a few very short black spines.

Wings hyaline, reticulation brown, arcolelets mostly four-sided; pterostigma brown in a darker brown frame, inside which is a second paler frame; the pterostigma of fore-wing rather larger than that of hind. *Ac* meets the extreme end of *ab* on wing margin; 3 cells between the quadrilateral and subnode; 12 postnodal nervures in fore-wing, 11 in the hind.

Abdomen markedly long and attenuated, expanding somewhat towards the end, pale yellow laterally, marked with dark reddish-brown on the dorsum, this colour expanding at the apex of each segment into a very broad black ring; segments 8 to 10 entirely azure blue.

Anal appendages warm dark reddish-brown. Superiors shorter than the 10th segment, small conical organs. Inferiors much more robust, equal in length to segment 10, conical and very bluntly pointed as seen in profile, laterally compressed as seen from above, convex externally, concave internally, the apex curling slightly in, so that the appendage is shaped like a boxing-glove without the thumb portion.

Segment 10 on dorsum very narrowly and very shallowly emarginate.

Distribution.—A single male from Zomba, Nyasaland Protectorate, collected by Mr. Colin Smee.

I have hesitated before placing this species in *Aciagrion*, as no other species have so far been reported from the continent of Africa. This argument, however, loses force when we consider how many others of the smaller Asiatic Odonate genera are represented in Africa. The species is not unlike *olympicum* from the Himalayas belonging to the same genus. For lack of material, and in order not to spoil the only known specimen, I have forborne to dissect out the penis, which might tell us much.

Copera subaequistyla, sp. nov.

Male. Abdomen, 20 mm. Hind-wing, 16 mm.

Head: labium pale yellow; labrum dull olivaceous; anteclypeus pale greenish; post-clypeus, frons and vertex black crossed by a narrow pale olivaceous stripe running from eye to eye; behind eyes and occiput a similar narrower stripe, whilst a narrow reddish-brown border intervenes between the black and the eyes on dorsum of head; eyes dark brown, paler below.

Prothorax dark ochreous enfumed with black.

Thorax blackish-brown on dorsum, bright yellow on the sides. The humeral suture marked rather broadly with bright yellow; the sides with the central portions of mesepimeron and metepimeron irregularly black. Legs reddish-orange, tibiae not dilated.

Wings hyaline; pterostigma dark reddish-brown framed first in pale ochreous and then in black; postnodals 11 in fore-wings, 9 in the hind.

Abdomen: segments 1 and 2 dark ochreous, the latter with a subapical obscure blackish annule narrowly interrupted on the dorsal carina; segments 3 to 7 with a narrow basal white annule, which is nearly interrupted on the dorsal carina, and laterally is continued apical to near apical end of segments; the dorsal carina very finely yellow from segment 3 to middle of segment 6; segment 8 and 9 black, unmarked, segment 10 yellow on dorsum with a fine black line at base and apical border.

Anal appendages: superiors yellow, half as long again as segment 10, conical, broad at base, tapering to a subacute point at apex; inferiors more robust, one-fourth longer than superiors, black, conical, tapering to a sharp point, very broad at base as seen from below.

presenting a rounded projection on the inner side at a little more than half-way from base to apex. (Both pairs of appendages are narrowly separated, parallel, and project straight back as in *C. marginipes*, which insect this species greatly resembles.)

Female. Abdomen, 26 mm. Hind-wing, 18 mm.

Head: lips, anteclypeus and front of head similar to the male, the black of vertex arrested before the level of the anterior ocellus, the surface posterior to it, including occiput, ochreous, as also the basal segments of antennae. The occiput with a diffuse obscure clouding of black; the cheeks greenish-yellow, this colour continued as an equatorial band round the eyes.

Prothorax and thorax very similar to the male, but the black on sides forming a very broken fascia and the whole surface splashed with small yellow spots.

Legs yellow, hinder surfaces of femora black.

Wings with 11 postnodals in fore-wings, 10 in the hind, pterostigma as in male.

Abdomen less broadly marked with black on dorsum, this forming broad apical rings, the surface basad to which is dark reddish-brown, except at extreme base, where are narrow white annules. The dorsal carina finely yellow as far as end of segment 7; segment 10 and apical half of 9 paler, probably yellow during life.

Anal appendages dark, short, conical.

Distribution.—Shores of Lake Victoria, Entebbe, Uganda. Two pairs, *in cop.*, collected by Dr. Hale Carpenter, July—August 1927.

The resemblance to the two Asiatic species, *C. marginipes* and *vittata*, is surprising when one considers the vast barrier of sea which intervenes between the two faunal areas. No connecting links are known, nor is it at all likely that any species will be found in the area connecting up the two continents. With so little variation and mutation, it is impossible to believe that the species can have been for long separated. These small Zygopteron when emerging, rise straight into the air. I have watched them ascend to vast heights, until finally lost to sight. No doubt, in spite of the enormous distance to be covered, these insects rely on air currents for distribution, their very weakness, their gossamer-like lightness, being their strength. The minute species of *Agriocnemis*, *Disparoneura* and *Pseudagrion*, etc., are parallel examples of wind-borne distribution, so far as Africa is concerned.

Chlorocnemis marshalli, Ris.

The female of this species has not been described, the type, a male in the British Museum, and one other in Mr. E. B. Williamson's collection, being the only specimens known. Mr. Colin Smce has rediscovered this beautiful insect at Zomba, Nyasaland, and has kindly sent me several males and two females, from which the following descriptions have been made.

Female. Abdomen, 38 mm. Hind-wing, 24 mm.

Closely similar to the male; differs as follows: antehumeral lines much narrower; wings coloured greenish-yellow in the middle three-fifths only, the apices and bases being quite uncoloured; 18 to 20 postnodal nervures in fore-wings, 15 in the hind; segment 1 with a black quadrate dorsal spot, segment 2 with a narrow middorsal longitudinal carinal stripe of blue limited to the basal half of segment, the rest of segment unmarked, segments 3 to 7 with small paired blue basal spots, segment 8 azure-blue with a longitudinal lateral thick black stripe, the blue beneath which very pale, almost white, segment 9 with a dorsal bell-shaped blue spot, the broad end of the spot not extending quite to apical border of segment; segment 10 unmarked.

Anal appendages black, short, conical.

The males agree entirely with the description by Dr. Ris, but one example, fully adult, has the colouring of the wings very poorly marked, and limited to a space lying between the node and half-way from that structure to the pterostigma.

Fore-wings with 17 postnodal nervures, hind with 14; length of abdomen varying from 37 to 40 mm. Legs of both sexes bluish-white, the tibiae and tarsi black, as also the extensor surfaces of the middle and hinder pair of femora and the whole of anterior pair except the proximal end. Claw-hooks situated at extreme end of claws, so that the latter appear to be bifid.

Metaenemis pruinosa, sp. nov. (Fig. 3.)

Male. Abdomen, 33 mm. Hind-wing, 25 mm.

Head: labium caraceous, pruinosed at centre of middle lobe; labrum and cheeks olivaceous; rest of head matt-black, the vertex and occiput heavily pruinosed white; eyes blackish-brown.

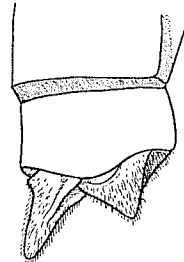


FIG. 3.—Lateral view of anal appendages of *Metaenemis pruinosa*, sp. nov. ♂ seen from the left side.

Prothorax black heavily pruinosed white.

Thorax black on dorsum, pale yellow on sides posterior to first lateral suture, the black parts heavily pruinosed, including a narrow black stripe on the second lateral suture.

Legs black, flexor surface of hind femora and the proximal portions of the middle and anterior pairs yellow, all thinly pruinosed.

Wings hyaline; pterostigma palest brown framed in black; 18 postnodal nervures to fore-wings, 15 to 16 to the hind; venation similar to but rather closer than in *M. valida* or *robusta*; 5 cells between quadrilateral and subnode in fore-wings, 4 in the hind, as for *valida*.

Abdomen black, unmarked, dorsum of segments 1 and 2 and an apical spot on dorsum of segments 3 to 5 thinly pruinosed, segments 8 and 9 pruinosed white.

Anal appendages black. Superiors as long as segment 10, broad at base, where they show an angulated broadening above and, on the inner and underside, each a spatulate-like process prolonged inward to overlap one another; tapering to an acute point, and directed straight back parallel to one another. Inferior appendages much smaller, about half the length of superiors, tapering to an acute point as seen in profile, excavate within and curled on themselves as seen from behind, very broad at base, directed straight back parallel to one another and to superiors.

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Female. Abdomen, 29 mm. Hind-wing, 25 mm.

Head: labium as in male; labrum olivaceous-yellow; rest of head plumbeous or violaceous-brown without markings.

Prothorax pale brown, the middle lobe raised into two rounded bosses, the posterior lobe reduced to two small lateral lobes, between which projects a rounded lappet on anterior surface of thorax.

Thorax olivaceous-brown, the middorsal carina and the postero-lateral suture finely black.

Legs black, the flexor surfaces of femora olivaceous, the extensor surfaces of tibiae yellowish.

Wings uncoloured; pterostigma very pale brown, finely framed in black nervures; 17 or 18 postnodal nervures in fore-wings, 15 in the hind; other details of venation as in male.

Abdomen dark reddish-brown with the joints ringed with black, and segments 2 to 6 with subapical black dorsal spots, between which and the black joints are obscure yellow rings. In females the ground-colour ochreous, the black rings and spots very conspicuous; segment 8 has a medial subdorsal black spot on either side the dorsal carina, 9 has a subdorsal stripe running from the base nearly to apical border of segment, whilst 10 is unmarked. In adults, these three last segments entirely blackish-brown. Anal appendages very short, conical, brown.

Distribution. Eastern Province, Budama, and Bunyuli Districts, Uganda. Three males and two females collected by Dr. Hale Carpenter, October, 1927.

Closely allied to *M. valida*, Selys, differing by the colour of wings and pterostigma, etc.

Sub-order ANISOPTERA.

Echinoptergomphus africanus, Fras. (Fig. 4.)

I described this species in the *Trans. Ent. Soc. Lond.*, Dec. 21, 1926, from an imperfect male, teneral in condition and lacking the last seven segments of the abdomen. This specimen, the type, now in the B.M. collection, was taken at Port Lokko, and formed, as I have since discovered, part of the collection made by Dr. James Simpson.

By a happy coincidence, its author has now come into the temporary possession of three adult males and a single adult female, all in excellent condition, collected by Dr. G. Hale Carpenter in the Gulu District, Uganda, June—July, 1927, and is thus in a position to give not only the full colouring and markings, but also to complete the description of the missing abdomen and genitalia of both sexes of this remarkable species.

Male. Abdomen, 28 mm. Hind-wing, 19–20 mm.

Head: Labium pale yellow, bases of all lobes brownish; labrum creamy-yellow, the anterior border finely, the base very broadly black, a median point of black projecting from the base, but arrested well short of the anterior border of lip; bases of mandibles and anteclypeus creamy-yellow; postclypeus similarly coloured, but its base broadly black save for a small median point of yellow; frons pale greenish-white, its base and the lower margin of anterior surface narrowly black; vesicle black; occiput pale greenish-white in a narrow frame of black, its hinder border notched and showing two convexities.

Prothorax black, the whole of the posterior lobe, a large spot on each side of the median lobe, a broad anterior collar and a tiny geminate spot on middorsum of median lobe citron-yellow.

Thorax black, marked with citron-yellow as follows: a median spot on antealar sinus confluent with the middorsal carina, which is finely yellow above and then broadens into an even median carinal stripe confluent with a short complete mesothoracic collar below; an antehumeral short fusiform oblique spot on either side of middorsum; a narrow complete humeral stripe with sinuous, bayonet-like bend above; laterally and beneath entirely yellow save for a fine black line on the first lateral suture interrupted at its middle, and a second similar line on the second suture interrupted below.

Legs bright yellow; tibiae, tarsi and a stripe on the outer side of femora black, broadest on the anterior pair, nearly obsolete on the hinder.

Wings hyaline, very pale suffused with greenish, reticulation yellow including costa; pterostigma yellow between thick black nervures; details of venation as for genus; base of hind-wing and tornus (in all males examined) with the characteristic spines, the tornal one

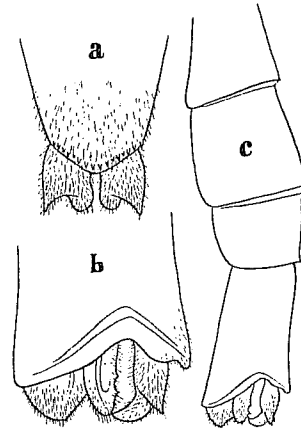


FIG. 4.—a. Dorsal view of anal appendages of *Echinoptergomphus africanus*, Fras. ♂. b. Profile view of same seen from the right side. c. Terminal segments of abdomen of same to show the curious relative lengths.

yellow with a black tip; 12 to 14 antenodal nervures and 10 to 12 postnodals to fore-wing; 10 to 12 antenodal nervures and 9 to 11 postnodals to hind.

Abdomen ochreous marked with black on segments 2 to 7, reddish ochreous on segments 8 to 10. Segment 1 greenish-yellow with a subdorsal basal black spot on either side; segment 2 with a subdorsal clouding of blackish-brown on each side; 3 to 7 with apical black rings with which is confluent a broad black lateral stripe not quite extending to base of segments. Segments 1 and 2 tumid, 3 to 6 narrow and cylindrical, 7 to 9 dilated somewhat, 10 cylindrical. Segment 9 about two-thirds the length of segment 8, segment 10 nearly as long as these two last segments taken together, its dorsum prolonged into a blunt point and with a very deep incision on each side.

Anal appendages reddish-brown, only about one-fourth the length of segment 10; superiors subcylindrical, seen from above very broad and cleft into an outer short robust spine and an inner rounded tubercle, seen from the side the outer part showing the

same robust spine, whilst the inner is seen to be strongly curved down and shaped like a parrot's beak. Inferior appendage slightly shorter than superior, with blunt rounded apex, deeply cleft and presenting two small points above, one median, the second midway between it and apex. Dorsum of segment 10 with many robust apical spines.

Genitalia. Lamina depressed; anterior hamules robust spines, broad at base, tapering gradually to apex; posterior hamules very broad, foliate and somewhat quadrate, bearing two or three small black spines on anterior corner; lobe spout-shaped, projecting markedly, emarginate.

Female. Abdomen, 31 mm. Hind-wing, 23 mm.

Similar to male, except for a few minor and sexual details. The hind femora with spines more robust, less numerous, black; the anterior pair of femora alone marked outwardly with blackish-brown, the other pairs with an almost imperceptible clouding. Abdominal segment 2 unmarked save for an obscure basal clouding of dark brown on each side.

Wings more deeply suffused with greenish-yellow; pterostigma golden-yellow between thick black nervures, surmounting 5 to 6 cells, strongly braced; base of hind-wings 1 to 2 cells deep, without marginal spines, very oblique, almost as in *Pseudophaca*; nodal index: 12 to 13 antenodals to fore-wings, 9 to 11 postnodals; 10 to 11 antenodals in hind-wings, 9 to 11 postnodals.

Relative lengths of abdominal segments as in male; anal appendages very short, conical; vulvar scale triangular, deeply bifid so as to form two minute triangular scales, about half the length of segment 9.

Distribution.—Type from Sierra Leone, the present specimens from Uganda.

It is quite impossible to determine the relationships of this remarkable *Gomphus*; its anal appendages are unique; the contracted, oblique base of hind-wing suggests an archaic species lying somewhere near the base of the family GOMPHIDÆ, but this is not borne out by other features in the venation. I am inclined to think that undue importance has been placed on the basal reduction of the hind-wing in the Anisoptera, and that we should in many cases rather regard it as a modern reduction in the surface of the wing to satisfy the modest requirements of small insects—thus we find a similar, although not quite so marked, reduction in most of the smaller Gomphines, such as *Progomphus*, *Microgomphus*, etc.

The relative lengths of the terminal abdominal segments are not unlike those of *Macrogomphus* of S. Asia, but there the resemblance begins and ends.

Nilogomphus, gen. nov.

Medium-sized Gomphines coloured black with yellow markings; head moderately large; frons pronounced, slightly rounded; occiput in the male straight, flat, a little tumid at its centre behind; in the female with a prominent transverse ridge at its middle, the hinder border raised and markedly convex.

Thorax comparatively small. Legs long, the hind femora extending as far as the hinder border of segment 2, armed with 2 rows of short, evenly-sized, closely-set spines on rather more than the proximal half of limb, and with four pairs of long, robust, widely-spaced, evenly-sized spines on the distal end; mid-femora with rows of closely-set minute spines; claw-hooks robust, situated at centres of claws.

Abdomen tumid at base, slim and cylindrical from segment 3 to 7, dilated at 8 and 9, almost winged; segments 7 to 10 decreasing gradually in length. Anal appendages closely similar to those of *Anisogomphus*, the superiors parallel and armed with a robust ventral spine, the inferior with widely divaricate branches projecting widely laterally beyond superiors.

Wings comparatively long and broad for size of insect; reticulation moderately open; pterostigma very short and broad, strongly braced; membrane absent; sectors of arc parallel for a short distance, especially in the hind-wings; triangles entire, that of hind-wing subequilateral, but distal side slightly longer than the others, that of hind-wing elongate, distal side twice as long as basal and slightly longer than costal; *1A* in fore-wing short, markedly pectinate; *Cu₂* and *1A* parallel nearly as far as wing-margin in the hind-wing; 2 transverse nervures between *Rs* and *M₁* in fore-wing, only 1 in the hind; 4 rows of postanal cells in hind-wing, only 1 or occasional double cells in fore-wing; 1st postanal cell of hind-wing divided, extending proximad to a point on the base of subtriangle slightly proximad of its middle; anal triangle 3-celled; an incomplete basal antenodal nervure in all wings.

Genitalia. (See under species.)

Female with similar armature to femora, but the robust spines more numerous and extending to middle or proximad of middle of femora; abdomen cylindrical throughout, dilation of end segments less marked than in male; vulvar scale short, triangular, projecting slightly as seen in profile, notched at its apex; pterostigma more broadened and more heavily bordered than in the male.

Genotype: *Nilogomphus carpenteri*, sp. nov.

Distribution.—Central Africa.

Its apparent relation to *Anisogomphus* is probably due to convergence, the highly characteristic shape of pterostigma serving to separate the two genera.

Nilogomphus carpenteri, sp. nov. (Fig. 5.)

Male. Abdomen, 27 mm. Hind-wing, 25 mm.

Head: labium with midlobe black, lateral lobes citron-yellow; labrum glossy black with a large oval citron-yellow spot at each outer end; ante- and post-clypeus black, the latter with a small outer spot of yellow; frons pale greenish-yellow, its base above and its anterior surface below margined with black; vertex black with a transverse stripe of greenish-yellow just posterior to the ocelli; occiput greenish-yellow, fringed with long fine black hairs and finely bordered with black.

Prothorax black with a broad oval spot on dorsum of posterior lobe, a small bilobed spot on dorsum of midlobe and a broad anterior collar all citron-yellow.

Thorax black marked with bright citron-yellow as follows: the median suture and upper border of the antealar sinus finely, a very broad middorsal carinal stripe which extends upwards on either side of antealar sinus and is constricted abruptly below just before it becomes confluent with a complete mesothoracic collar; a narrow humeral stripe, sinuous outwardly above, confluent with a large irregular spot below; laterally entirely yellow save for a narrow black stripe on the first lateral suture. Beneath yellow.

Legs black, anterior femora paler on inner sides, trochanters and coxae citron-yellow.

Wings hyaline, palely and diffusely tinted with yellow basad to level of triangles; pterostigma brown, its outer end paler, very heavily bordered with black, especially the costal border, which is remarkably thickened; 2 rows of discoidal cells as far as level of node in fore-wing; nodal index— $\begin{array}{c} 9-12 \quad | \quad 12-8 \\ 8-8 \quad | \quad 8-8 \end{array}$; other details as for genus.

Abdomen black marked with citron-yellow as follows: the sides and dorsum of segment 1 broadly, these areas separated by a subdorsal black stripe which is continued on to segment 2. The latter with a large trilobed middorsal spot and its sides broadly yellow; oreillets yellow at base, bordered heavily with black, very prominent; segment 3 almost entirely yellow, with a subdorsal black stripe partially indenting the dorsal yellow so as to convert it into a dorsal stripe with erenate borders; segments 4 to 6 similar, but the subdorsal black extending over whole of sides, save for a small triangular latero-basal yellow

spot on each side; segment 7 with the middorsum narrowly yellow and the sides broadly so; segments 8 to 10 yellow on sides only.

Anal appendages black tinged with brownish-yellow above. Superiors cylindrical, as long as segment 10; viewed from above, separated by less than their own width, with concave inner border, parallel, apex tumid and blunt, but furnished with a keel, above which it is prolonged into a long sharp spine; viewed in profile, broad at base, furnished with a very robust spine at about the middle of appendage and ending in an acutely pointed, slightly upwardly inclined apex. Inferior appendage deeply cleft into two widely divaricate branches, which are abruptly curled up at apex and furnished each with a short sharp spine. The combined appendages strikingly similar to those of *Anisogomphus occipitalis* from N. India.

Genitalia. Lamina depressed, cleft to its base; anterior hamules robust stylet-shaped organs directed rather obliquely inward, and with rather blunt apices; posterior

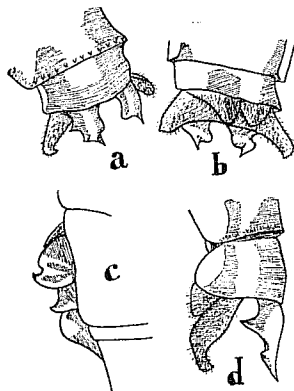


FIG. 5.—a. Dorsal view of anal appendages of *Nilogomphus carpenteri*, sp. nov. ♂. b. Ventral view of same. c. Genitalia of same seen from the left side. d. Anal appendages of same seen in profile from the left side.

hamules very broad, longer than the anterior, ending in short, stout, forwardly directed hooks; lobe prominent, corrugated, slightly truncate and markedly emarginate.

Female. Abdomen, 30 to 31 mm. Hind-wing, 28 to 29 mm.

Colouring and markings as in the male, except that the lateral thoracic stripe is broken and the lateral yellow spots on segments 3 to 6 extend as a stripe the whole length of segments; segment 10 has the apical border narrowly yellow, as also the basal halves of anal appendages and the conical protuberance between them. All femora dull yellow on flexor surfaces.

Wings with only the extreme bases tinted yellow; nodal index $\frac{10-12}{10-8} \mid \frac{13-10}{8-8}$; discoidal field of fore-wing with 2 rows of cells to a level well proximal of node.

Distribution. A single pair, apparently taken *in cop.*, from Uganda, collected by Dr. G. Hale Carpenter, August–September, 1927. These appear to have been taken on one of the tributaries of the White Nile, Gulu District.

Mesogomphus rusticatus, sp. nov.

Male. Abdomen, 32 mm. Hind-wing, 24 mm.

Head: labium, labrum and anteclypeus pale greenish-grey; postclypeus, frons, vertex and occiput bright grass-green without markings. Occiput with concave hinder border fringed with fine brown hairs and bearing a small tubercle at the centre of its upper surface.

Prothorax pale brownish-yellow; posterior lobe large, grass-green.

Thorax bright grass-green, unmarked save for the postero-lateral suture and sutures forking from it below, which are violaceous brown.

Legs coloured like the thorax, the hind pair of femora and tibiae with obscure brown markings. Spines black.

Wings hyaline, costa pale; pterostigma bright yellow between heavy black nervures, covering 4 cells, strongly braeed; 4 cells in anal triangle; nodal index $\frac{7-12}{7-10} \mid \frac{13-6}{9-7}$;

rest of venation as for genus.

Abdomen grass-green on segments 1 to base of 3, rest of abdomen reddish-brown. Segment 1 with an obscure clouding of warm brown on dorsum, 2 with a diffuse brownish dorsal spot apical to jugal suture, a similar brown clouding at the base on each side, and a third apical to oreillets, which are bright green; segment 3 with the jugal suture mapped out in dark brown and its apical half gradually turning dark brown; segments 4 to 7 unmarked; segments 8 to 10 darker, but the expanded sides of 8 and 9 bright ochreous, narrowly bordered with brown.

Anal appendages. Superiors rather longer than the two last abdominal segments taken together, yellow with a greenish tinge, separated in their basal halves by a narrow oval gap, closely apposed in their apical halves, which curve regularly downward to end each in a bifid apex showing two distinct but minute points. The appendages are laterally compressed in the basal half and strongly keeled below. Inferior appendage rather longer than half the superiors, bifid for half its length, its branches parallel and overlapping at apices so as to enclose a small oval space; outer border concave and with a large tubercle at apex. Seen from the side this appendage is strongly curled, at first down, then up, and finally straight back, to end in a blunt apex coated with long coarse white hairs.

Genitalia. Lamina depressed, not visible in profile, broadly and rather deeply concave; anterior hamules broad at base, tapering rapidly, converging and ending each in a minute, outwardly directed spine; posterior hamules much more robust, quadrate plates curling in towards each other and each with a small stout spine at anterior angle; lobe prominent, massive, broad, deeply and broadly concave at tip.

Female. Abdomen, 32 mm. Hind-wing, 27 mm.

Coloured similarly to the male; occiput fringed with brown hairs, furnished with about 12 minute black teeth along the hinder border, which is slightly concave.

Hind femora and tibiae with a well-defined reddish-brown stripe on extensor surfaces.

Wings hyaline; pterostigma similar, but the black borders deeper, so as to reduce the included yellow to a longitudinal narrow stripe, covers 3 to 5 cells; nodal index $\frac{5-13}{7-9} \mid \frac{12-6}{9-7}$.

Abdomen marked and coloured as in male; oreillets well defined, green. Anal appendages long, fine, pointed, yellow with black apices. Vulvar scale small but broad, triangular, deeply but narrowly notched.

Distribution.—Two males and one female from the shores of Lake Victoria, Uganda, collected by Dr. G. Hale Carpenter, July–September, 1927.

The bright grass-green immaculate colouring of the head, thorax and base

of abdomen is sufficient to distinguish it from any other species of the genus. It resembles strikingly in colouring and general facies *Onychogomphus walli*, Fras., from Upper Burma, and to a less extent, *Ophiogomphus reductus*, Calv., from Kashmir.

Gynacantha libyana, sp. nov. (Fig. 6.)

Male. Abdomen, including anal appendages, 60 mm. Hind-wing, 52 mm.

Head: labium, labrum and face olivaceous-brown, labrum paler and with a slight yellowish tinge; frons darker brown with two small yellow basal spots above converting the dark brown into a thick capital T; eyes enormous, dark green; occiput very small, black.

Prothorax dark brown.

Thorax olivaceous brown, enfumed with darker brown on dorsum and with a sharply defined black stripe mapping out the 2nd lateral suture. Legs bright reddish brown, knees and tibiae black.

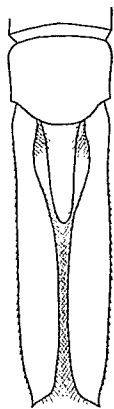


FIG. 6.—Dorsal view of anal appendages of *Gynacantha libyana*, sp. nov. ♂.

Wings very broad, reticulation very close, apices faintly enfumed, bases with a dark brownish ray extending out in subcostal space as far as the 3rd antenodal nerve; membrane black; pterostigma over 6 to 7 cells, yellow between black nerves; 8 to 9 cells in all triangles, the bases of which are reticulate; 11 to 12 hypertrigonals in fore-wings, 8 to 9 in the hind; 11 cubital nerves in fore-wings, 8 to 9 in the hind; 5 to 7 median nerves in all wings; anal loop with 13 to 15 cells; nodal index — $\frac{25-32}{27-26} \frac{31-25}{24-23}$; only a single row of cells between the origins of Cu_2 and $1A$; 3 cells in anal triangle.

Abdomen uniform dark reddish-brown, segments 1 and sides of 2 paler olivaceous-brown. Orellets large, bordered finely with black and with 5 to 7 robust black teeth.

Anal appendages blackish brown, very long, about 7 mm., tumid at base, where are seen some minute spines on the inner surface, then sharply constricted, again dilating, and of about even width as far as apex, where the outer border ends in a small spine, which

is situate at the end of a robust keel running the full length of appendage. Inferior appendage slightly more than one-third the length of superiors, triangular, narrow, curled up at apex, which ends in a short upturned spine.

Distribution.—Shores of Lake Victoria, Entebbe, Uganda. A single male of this fine insect taken by Dr. G. Hale Carpenter.

In size it is comparable to *G. membranalis* from S. America or *G. hyalina* from S. Asia. Its reticulation is closer than in any of the large number of species of the genus I have been able to examine, and even the triangles are reticulated at the base. Its large size and the last mentioned character will suffice to distinguish it from other African species.

Macromia halei, sp. nov.

Female. Abdomen, 50 mm. Hindwing, 48 mm.

Head: labium, labrum and whole of face dark blackish-brown, the frons poorly metallic-green by reflected light; a small yellow spot in each side of the frontal sulcus above, a larger on the sides of frons against the eyes, and a smaller one on the outer side of postclypeus. (In one specimen all these markings very obscure, especially the two small spots on upper surface of frons.) Eyes probably blue or bottle-green during life, as in most of the species. Occiput small, black.

Prothorax blackish-brown.

Thorax very dark uniform reddish-brown, with a bluish metallic reflex, entirely without the usual yellow markings. Legs black.

Wings hyaline, the apices of fore-wings as far proximad as 2 to 3 cells from node a rich golden-yellow, the middles of the areolets being clearer. Bases of all wings with a dark blackish-brown marking lying in a ground-colouring of golden-yellow, as far out as the 2nd antenodal in fore-wings and the 3rd in the hind, the outer border of markings very rugged and serrate, and extending for but a few cells into anal triangle. (In one specimen, the hinder wing irregularly enfumed along the hinder border between M_4 and the triangle.)

Nodal index — $\frac{6-17}{9-11} \frac{16-7}{12-11}$; $\frac{7-15}{10-11} \frac{17-7}{11-11}$; 4 to 5 hypertrigonals in fore-wings, 2 in the hind; 5 to 6 cubital nerves in fore-wings, 2 to 3 in the hind; anal loop with 11 to 12 cells; 2 to 3 cells between origins of Cu_2 and $1A$; pterostigma dark brown framed in black, 3 mm. long in fore-wings; membrane very long, black with a white apex; 2 rows of discoidal cells in fore-wings.

Abdomen black marked with citron-yellow, markedly laterally compressed, tumid at base, narrowed from apical end of segment 3 to basal end of 6, segments 7 and 8 not markedly dilated. Segments 1 and 2 unmarked, segment 3 citron-yellow for the whole of its basal three-fourths, the jugal suture outlined in black; segments 4, 5 and 6 with small dorsal triangular yellow spots basad to jugal suture; segment 7 with its dorsum bright citron-yellow for the basal three-fourths, the black of dorsal carina extending into it apicad; remaining segments unmarked. Vulvar scale very short, cleft to its base into two small triangular leaflets. Anal appendages short, conical, black.

Distribution.—Shores of Lake Victoria, Entebbe, Uganda. Two females collected by Dr. G. Hale Carpenter, November, 1927.

This species belongs to the *trifasciata* group. Differs from *M. tropicalis* by its much larger size, by the thorax without markings, etc.; from *M. africana* by its still larger size and by its extreme melanism; and from *M. trifasciata* by the basal black markings of all wings and by the much more restricted abdominal markings. Male unknown.

Phyllacromia leoni, sp. nov.

Female. Abdomen, 47 mm. Hind-wing, 40 mm. (Male unknown.)

Head: labium, labrum, and anteclypeus reddish-brown, unmarked; frons in front and postclypeus dull coppery-red with coppery reflex; above frons and descending on each side along the front of eyes bright citron-yellow. A small triangle of coppery red at the base of frons above, lying deeply in the sulcus; vesicle metallic-blue, its apex coppery-red; occiput black; eyes probably bluish during life.

Prothorax ferruginous.

Thorax uniform dark reddish-brown with a bluish-green metallic reflex, antenar sinus bright citron-yellow, otherwise no thoracic markings. Legs entirely black.

Wings hyaline, the fore-wings palely saffronated from apex to 2 to 3 cells from node, the base of fore-wing with a mere vestige of dark brown at the root of subcosta, a much larger basal blackish-brown marking in the hind, extending out as far as the 1st antenodal nervure in subcostal space and as far as the first cubital nervure in cubital space. Nodal index—

7-14	14-6
8-10	10-8

5 to 6 cubital nervures in fore-wings, 3 in the hind; 10 to 13 cells in the anal loop; 3 to 4 hypertrigonals in fore-wings, 2 in the hind; 2 rows, or occasionally a single row of discoidal cells in fore-wing; pterostigma ochreous, bordered posteriorly with black; costa yellow throughout; membrane dark brown with white tip; Cu_2 and $1A$ separated at origin by a single row of two cells, by 1 row thereafter.

Abdomen very dark reddish-brown marked with citron-yellow as follows: segments 1 and 2 unmarked save for a short linear transverse medial lateral stripe on the latter; segment 3 almost entirely yellow, its apex narrowly dark brown; segments 4, 5 and 6 with the basal pupillate pattern of *P. picta*, this pattern formed by two pairs of lunules facing one another, one with its base to base of segment, the other pair with base on jugal suture, thus enclosing a diamond-shaped spot of the ground-colour; segment 7 with practically the whole of dorsum yellow, the ground-colour restricted to the sides and extreme apex of segment; segment 8 with its extreme base yellow, 9 and 10 unmarked.

Anal appendages very small, conical, dark brown. Vulvar scale very small, equal in length to one-third of segment 9, cleft to its base into two small triangular leaflets.

Distribution.—Gold Coast, West Africa, Yegi, Volta river, 13-14.xi.26. A single female collected by Mr. Hargreaves.

This insect, by the characteristic abdominal pattern, is clearly closely related to *P. picta*, but the total absence of thoracic markings will easily suffice to separate it. The occasional single cell in the discoidal space of fore-wings and the obvious dilation of the terminal segments of abdomen serve to place it in *Phyllacromia* rather than *Macromia*.

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