ACKNOWLEDGEMENTS

We are grateful to Dr J. A. Slater, of this University, for his interest in and discussion of the distributional aspects of this paper. We thank Dr M. H. Sweet for the additional specimens and for his kindness in letting us quote from his letter. We also thank the National Science Foundation, which supported the work of the senior author as well as the trips on which Drs Slater and Sweet discovered these bugs.

REFERENCES

ACOCKS, J. P. H. 1953. Veld types of South Africa. *Bot. Surv. S. Afr., Mem.* no. 28, 192 pp.

ASHLOCK, P. D. & LATTIN, J. D. 1963. Stridulatory mechanisms in the Lygaeidae, with a new American genus of Orsillinae (Hemiptera: Heteroptera). *Ann. Entom. Soc. Amer.* **56:** 693–703.

LESTON, D. 1957. The stridulatory mechanisms in terrestrial species of Hemiptera Heteroptera. *Proc. Zool. Soc. London* **128:** 369–386.

MONOD, T. 1963. The Late Tertiary and Pleistocene in the Sahara. Pp. 117–229 *in* African Ecology and Human Evolution, ed. F. C. Howell and F. Bourlière. Chicago, Aldine Publ. Co.

MOREAU, R. E. 1966. The Bird Faunas of Africa and its Islands. New York, Academic Press.

SCHAEFER, C. W. 1964. The morphology and higher classification of the Corcoidea (Hemiptera-Heteroptera): Parts I and II. *Ann. Entom. Soc. Amer.* **57:** 670–684.

SEIDENSTÜCKER, G. 1960. Heteropteren aus Iran 1956, III: *Thaumastella aradoides* Horv., eine Lygaeide ohne Ovipositor. *Stuttgart Beitr. Naturk.* **38:** 1–4.

———— 1964. Zur Systematik von *Bledionotus*, *Bethylimorphus* und *Thaumastella* Horvath (Heteroptera, Lygaeidae). *Reichenbachia* **3:** 269–279.

SLATER, J. A. 1964. A Catalogue of the Lygaeidae of the World. Storrs, University of Connecticut.

STYS, P. 1964. Thaumastellidae—a new family of pentatomoid Heteroptera. *Acta Soc. Entom. Cechoslov.* **61:** 238–253.

TJEDER, B. 1967. Neuroptera-Plannipennia: The lace-wings of southern Africa: 6. Family Nemopteridae. *South African Animal Life* **13:** 290–501.

Manuscript received 18 February 1971.

J. ent. Soc. sth. Afr. 1971
Vol. 34, No. 2, pp. 215–230.

1971

Odonata of Fernando Po Island and of neighbouring Cameroons Territory

by

ELLIOT PINHEY

National Museum, Bulawayo, Rhodesia

Twenty-three species from Fernando Po and six from the neighbouring mainland are reviewed. Of the former, three species and one subspecies are confined to the island. A new species, *Enallagma buchholzi*, and a new subspecies, *Chlorocypha cancellata insulana*, are described. The status of *Umma splendida* Navás is discussed, and it is suggested that a redescription from the types may show close affinity to *U. mesostigma* (Selys). Some synonymy is indicated under the species *Elattoneura pruinosa* (Selys) and *Africocypha lacuselephantum* (Karsch). This last species exhibits remarkable polychroism.

INTRODUCTION

This paper records the species of Odonata collected by Herr W. Hartwig, under the direction of Prof. Dr. M. Eisentraut, in 1957–63 on Fernando Po. Remarks are also made on a few of the species he collected on the nearby Cameroons mainland during the same period. All the material is in Museum Koenig at Bonn except for a few specimens presented to the National Museum, Bulawayo. A number of the specimens were severely damaged, with the result that two of the species, as shown in the list below, could not be specifically named with certainty. Of these, the *Diplacodes* Kirby (1889) is probably not important but *Paragomphus moka* Longfield (1936) has only been recorded from type material. One new species and one new subspecies (see below) and some synonymy are recorded in the present paper. Most of the known species were originally described from the Cameroons.

The following is a list of species from Fernando Po collected by Hartwig:—*Ceriagrion glabrum longispinum* Pinhey: *Pseudagrion angelicum* Fraser; *P. melanicterum* Selys; *P. sjostedti* Förster; *Enallagma buchholzi* spec. nov.; *Agriocnemis maclachlani* Selys; *Chlorocypha cancellata insulana* subsp. nov.; *Africocypha lacuselephantum* (Karsch); *Sapho orichalcea* Mclachlan; *Umma mesostigma* (Selys); *Paragomphus* spec.. probably *moka* Longfield; *Allorhizucha klingi* Karsch; *Orthetrum julia* Kirby; *O. austeni* (Kirby); *Palpopleura lucia* (Drury); *Acisoma trifidum* Kirby; *Diplacodes* spec., probably *lefebvrei* (Rambur); *Trithemis aconita* Lieftinck; *T. dichroa* Karsch; *T. hartwigi* (Pinhey); *Pantala flavescens* (Fabricius).

Longfield (1936: 496) listed the following species collected by W. H. T. Tams on Fernando Po in 1933:—*Pseudagrion melanicterum* Selys; *Umma longistigma* (Selys); *Paragomphus moka* Longfield; *Macromia sophia* Selys; "*Orthetrum stemmale capense* Calvert" (see *O. julia* Kirby).

It would appear from Hartwig's extensive collection from the island that the most abundant species are *Pseudagrion melanicterum*, also very prevalent in mainland Cameroons forests; *Africocypha lacuselephantum; Umma mesostigma; Orthetrum julia*, also a

dominant in forests on the mainland; *O. austeni*; and the ubiquitous African species *Palpopleura lucia*.

Hartwig's collection had no Lestidae, Aeshnidae or Corduliidae and lacked *Zygonyx* Hagen of family Libellulidae. Most of the forest aeshnids are elusive and crepuscular; the corduliids often difficult to capture. Species of *Lestes* are not very prevalent in tropical forest, except in pools or swamps on the outskirts or in clearings.

The most outstanding species is *Africocypha lacuselephantum*, which evidently exists in several distinct colour forms or phases in each sex. Careful examination indicates that the different forms are all conspecific, so that it is a remarkably polychroic species.

Most Odonata exhibit sexual or developmental dimorphism. Sometimes the maturation colour changes are quite considerable. *Ischnura senegalensis* (Rambur) is a distinctly polymorphic species, but not nearly so diversified as is *A. lacuselephantum*.

SYSTEMATIC REVIEW

PROTONEURIDAE

None of the species collected by Hartwig was taken on the island but in one species from the mainland there is evidence of synonymy.

Elattoneura pruinosa (Selys, 1886)

Elattoneura aethiopica Fraser, 1941, **syn. nov.**
? Elattoneura josemorai Sart, 1964

Elattoneura pruinosa is widespread in forests on the mainland from the Northern Congo, northwards via Cameroons and Nigeria and westwards to Sierra Leone.

Fraser's type male of *aethiopica* is an average-sized example of this species (abdomen 37 mm, hind wing 23 mm). The Cameroons specimens in the series of *pruinosa* in the National Museum, Bulawayo, show a considerable range of size (abdomen 33–40 mm). From the original description of *josemorai* and the oblique figure of the anal appendages it appears most likely that Sart's insect is only a large *pruinosa* (abdomen 40 mm).

MATERIAL EXAMINED. North CAMEROONS: Diebo-Efote (130 m), 20.i.1958; Kotoh-Barombi See (150 m), 21–24.i.1958; Mueli (550 m), 9–28.ii.1958.

PLATYCNEMIDIDAE

I have seen no specimens from Fernando Po, but one species collected by Hartwig is of interest.

Stenocnemis pachystigma (Selys, 1886)

This species ranges from north Cameroons to Sierra Leone. The single male collected by Hartwig at Malende has a much blacker postclypeus (black with a broad orange border) than in the specimens which I collected at Mamfe in the same territory, North Cameroons. In these the males have either a black basal line or a narrowish band on the postclypeus.

MATERIAL EXAMINED. North CAMEROONS: Malende (125 m), 8.xii.1957.

COENAGRIONIDAE

Six species have been collected on Fernando Po.

Ceriagrion glabrum longispinum Pinhey, 1963

This is the large western race of this abundant species.

MATERIAL EXAMINED. FERNANDO PO: Moca, 21.xi.1962, 1.xii.1962, 7.iii.1963; Rio Fladyi, 5–8.xii.1962, 16.ii.1963; Conception, 5.iii.1963.

Pseudagrion sjostedti Förster, 1906

Widespread in the Ethiopian Region.

MATERIAL EXAMINED. FERNANDO PO: Conception, 5.iii.1963.

Pseudagrion melanicterum Selys, 1876

This is widely distributed in forests of Central and tropical Africa; in fact it is frequently the dominant forest member of its genus. From the very long series collected by Hartwig on Fernando Po it is evidently abundant on the island. Longfield (1936) recorded it from Moca.

The antehumeral thoracic stripe in the male may be variable. It is normally slender, complete, green in life, changing in preserved specimens to a yellow or ochreous tint. Staining may occasionally produce orange or violet hues. In the Fernando Po material one specimen from Moca and another from San Carlos have the antehumeral stripe fractured (incomplete) on both sides, subdorsally. In one from Moca it is broken on one side, almost complete on the other; in still another it is complete on one side, broken on the other.

MATERIAL EXAMINED. FERNANDO PO: San Carlos, 30.ix.1962, 9–24.x.1962; Moca (1 200 m), 26–31.x.1962, 1–17.xi.1962, 7–11.iii.1963; Loreto See, 19.xi.1962; Rio Fladyi, 5–7.xii.1962, 16.ii.1963.

Pseudagrion serrulatum martorelli Sart, 1967

This taxon, described by Sart from Spanish Guinea and only known from the mainland, scarcely differs from typical *serrulatum* Karsch, 1894. In particular the black stripe on the second lateral thoracic suture is more complete in *martorelli*. Yet examples collected by me at Bertoua, Cameroons, show this band to be complete or incomplete. It is obvious that *martorelli* is only a minor aberration, not a subspecies.

Pseudagrion angelicum Fraser

This is a little-known forest species recorded from Nigeria and Ivory Coast. The Fernando Po record is therefore significant.

MATERIAL EXAMINED. FERNANDO PO: Conception, 5.iii.1963.

Enallagma buchholzi spec. nov., fig. 1

This species is only known from Fernando Po and is named after the late Dr. Karl Buchholz who first examined Hartwig's collection of Odonata. It is most closely allied to *E. nigridorsum* Selys, 1876, and *E. vansomereni* Pinhey, 1956, and like these has short but complex anal appendages.

ADULT ♂-HOLOTYPE. Labium whitish. Labrum, genae, front of orbits, a broad frontal band, long postocular spots (almost joined to a narrow occipital stripe) all blue-green; a basal black band on labrum. Vertex otherwise black. Orbits ventrally whitish.

Prothorax black; collar, sides of middle lobe and a lateral spot on posterior lobe blue-green. Synthorax black to below humeral suture, with narrow, continuous blue-green antehumeral band. Sides pale blue; with short dorsal streak on first lateral suture, a dorsal spot on second suture. Ventral surface all creamy white. Legs ochreous with thin dusting of white pruinosity. All femora with broad black outer stripe; tibiae mainly black except an inner stripe.

Wings hyaline, the venation black. Pterostigmata brown parallelograms between dark brown veins. Forewing with 13Px and 15Px; Ac well distal to separation of anal vein, but nearer to first than to second Ax. Wing apices normal, not broadly rounded.

Abdomen pale blue with an almost continuous black dorsal band except on

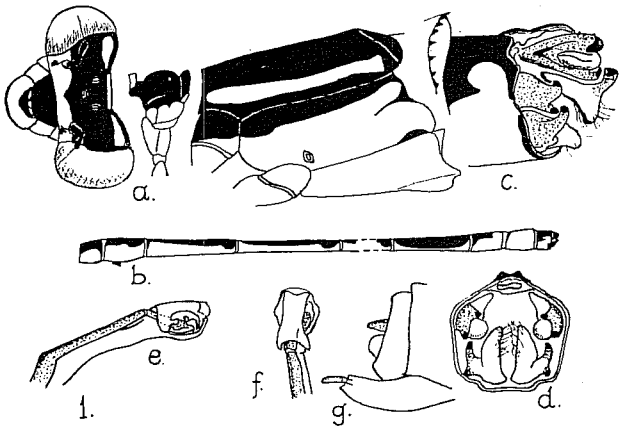

Fig. 1. *Enallagma buchholzi* spec. nov. a. head, pro- and synthorax of holotype ♂. b. abdomen of holotype (less enlarged). c–d. anal appendages, obliquely from left and posteriorly, respectively. e–f. prophallus. g. terminal segment of ♀ abdomen.

segment 8 which has a band on two-thirds, segment 9 with only a narrow basal dorsal line, as in fig. 1b. Segment 10 excised dorsally at distal end.

Anal appendages shorter than segment 10 (seen obliquely in fig. 1c), black externally. Superior appendage at base broad in lateral (external) view, narrow but expanding on inner aspect; with two apical teeth separated (as in *vansomereni*) by a soft tumour between them; the upper tooth larger, incurved, and preceded by a few minute denticles; the lower tooth more upturned. On inner surface there is a slight depression between base and the soft tumour. Inferior appendage rather triangular in outer aspect with an upturned branch ending in a single incurved tooth. On inner surface the inferior has a very broad soft triangular base; and near the base on outer surface (posterior view) there is a small root-tooth (not concerned directly with tandem linkage). Prophallus simple, as in fig. 1e, f.

Abdomen 23 mm, hindwing 17.8 mm.

Paratype males essentially similar. The black spot on second lateral suture may be slightly larger; the black on segment 10 may be more complete, less excised.

TENERAL ♀-ALLOTYPE. Pale colours on head patterned as in the male, but the facial markings are ochreous, labrum with only a basal dot; postocular spots paler greenish than in male. Postclypeus brown, the black not yet developed.

Pro- and synthorax as in male but the pale areas more ochreous. Legs all pale brownish yellow, no black visible, possibly because of the immature condition.

Venation brown, pterostigma almost whitish. Forewing with only 11–12 Px. Ac as in male.

Abdomen ochreous with blackish brown dorsal band broader and continuous on all segments. Cerci brown. Gonapophyses extending slightly beyond segment 10. Bursa not examined.

Abdomen 24 mm, hindwing 19 mm.

E. nigridorsum Selys is very similar in colour and markings on head, thorax, abdomen and legs. The anal appendages are slightly shorter, the superiors more downturned, the upper branch thicker at base, with a reduced apical portion but with a stout subapical hook. The mature female has black external stripes on femora and tibiae. *E. vansomereni* is a much smaller species, abdomen 12–13 mm. Postclypeus of male with some green spots. Anal appendages also similar but with the upper branch of the superior longer and straighter and more hirsute.

E. buchholzi is probably derived from *E. nigridorsum* and might be considered either as an insular subspecies or, as suggested here, a distinct species.

MATERIAL EXAMINED. FERNANDO PO: Near Moca, 1.xii.1963, holotype, allotype, 2 paratype ♂; 11.iii.1963, 2 paratype ♂. These are all in Museum Koenig except 1 paratype ♂ which is in the National Museum, Bulawayo.

Agriocnemis maclachlani Selys, 1877

Widespread in tropical Africa.

MATERIAL EXAMINED. FERNANDO PO: Rio Muscola, 4.iii.1963.

CHLOROCYPHIDAE

Africocypha lacuselephantum (Karsch, 1899), figs 2, 5

Africocypha ntaali Pinhey, 1961
Africocypha greyi Pinhey, 1961, **syn. nov.**

A magnificent series of 67 examples of *Africocypha* Pinhey (1961) was collected by Hartwig on Fernando Po (1962–63). In 1958 I collected two males with red-banded

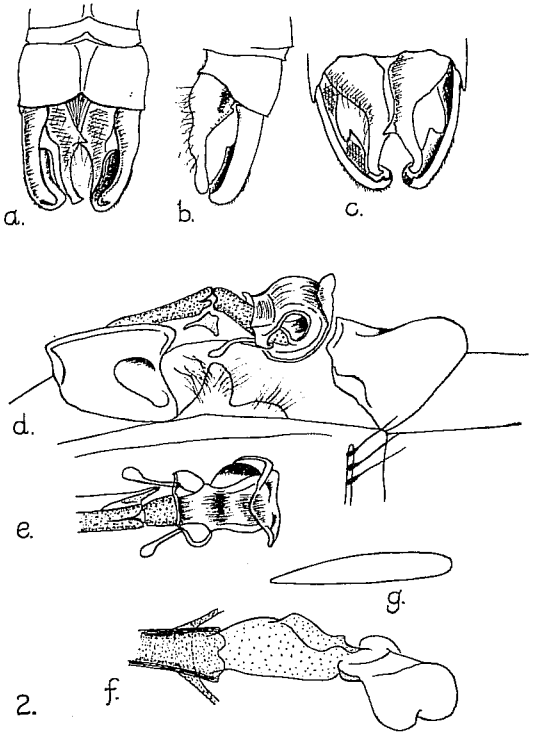

Fig. 2. *Africocypha lacuselephantum* (Karsch, 1899). a–c. anal appendages of ♂ forma greyi, dorsally; laterally; ventrally, respectively. d–e. prophallus of forma *greyi*, *in situ*; from below. f. bursa of ♀. g. ovum.

abdomen on the summit of Ntaali (Gorilla) Mountain near Mamfe (Cameroons) and named the taxon *A. greyi* Pinhey, 1961. Close to and at the foot of this mountain a male with blue-banded abdomen and a short series of females with blue-spotted abdomens were also taken, and this taxon was named *A. ntaali* Pinhey, 1961. It was subsequently discovered (Pinhey, 1967) that the females were identical with the type of *Libellago lacuselephantum* Karsch. It was assumed that the blue male *ntaali* was the hitherto unknown male of Karsch's species but that the very differently coloured *greyi* was a distinct species.

A comparative study of the long Fernando Po series now indicates that there are four differently coloured males, which are described below. The collection includes a series of juvenile and teneral females which are quite differently coloured to the mature females. At the outset it might appear that there are at least four, not two, species. In fact, however, they are all one remarkably polychroic species.

Although intermediate colour patterns are not at first obvious it may be considered that the male form with segments 4–6 blue, 7–8 red, on dorsum is an intermediate between the blue and the red males. No difference is detectable in the anal appendages or the prophalli of the males, nor in the bursae of the two female colour forms. Moreover 61 of the 67 examples, covering *all* the colour patterns, were collected at Moca on the same day, 11 March. It thus seems obvious that they are all conspecific. The insular specimens are on average slightly larger than the few specimens I collected in the Mamfe Region.

MALES

1. Male form *greyi* (fig. 5; a, b, e, j)

In life the labrum, front of epistome and the dorsal head spots are blue-green or green; the face colour may become all yellow or greenish yellow in preserved specimens, like the genae.

The blue-green antehumeral stripe fades to green. In some of the examples this stripe is not a solid band but may be partially fractured in the ventral half, even shaped like the branched or "fish-hook" pattern as in many other African Chlorocyphidae. The lateral bands of the thorax are greenish yellow or they may fade to a more yellow tone.

On the abdomen the lateral markings on segments 1–3 are green or greenish yellow, the more ventral stripes yellow. Unlike the other forms segment 3 lacks the pair of small dorsal red spots. Segments 4–8 have broad red dorsal bands; but in life the red on segment 6 in type *greyi* was masked by thin white pruinosity. In preserved specimens this bloom is lost and segment 6 is red dorsally.

2. Orange form (fig. 5; d)

This has the red dorsal spots on segment 3; segments 4–6 are orange instead of red; 7–8 are red.

3. Forma *ntaali* (fig. 5; c, f)

Segment 3 with red spots; segments 4–8 with blue dorsal bands, sky-blue in life, paler in preserved specimens.

A juvenile male of this form from Moca has no red spot on segment 3, but 4–8 are blue dorsally. The antehumeral band on the thorax is indicated by a diffuse green band on a yellowish ground colour (like the immature females) and more or less linked to the yellow lateral surface. Laterally the black is a continuation of the immature female condition, with the black ventral macula on the mesepimeron continuing dorsad as a narrow band; black on second lateral suture similar but broader. On the vertex there is a broad orange area and large orange spots on frons and postclypeus.

4. Blue-red form (fig. 5; g) (S4-6 BLUE, S7-8 RED)

Segment 3 with red dorsal spots; 4–6 with pale blue bands (violet or pinkish blue in others); segments 7–8 red above.

This form seems to be more or less juvenile and may perhaps develop into other forms, depending on the original colour on segments 7–8. It seems possible that from this stage segments 4–6 will perhaps eventually change from pale blue to red if 7–8 are red, or if they are blue (as in form *ntaali* juvenile) they will all become blue. If this is a correct hypothesis, segments 7–8 are determinant segments, perhaps conditioned by ecological factors.

FEMALES

5. Mature female, forma *lacuselephantum*

Labrum blue or blue-green, fades to green. Dorsal spots on frons as well as vertex green. Thorax as in mature males. Abdominal segments 2–7 with blue dorsal paired spots. Often minute traces on segments 8–9 but these may be absent. The holotype ♀ *ntaali* is quite similar to this.

6. Immature female (fig. 5; h, i)

At first sight this seems totally different. The head above is almost entirely yellow to yellowish green; but this is merely a more extreme condition than the juvenile male described above. Similarly the brownish yellow thorax, with sparse black markings, is an extension from the juvenile male.

The yellow abdomen is more difficult to correlate. Evidently the black pattern starts developing on the basal and terminal segments and then spreads in between. The black dorsal fasciae will eventually become replaced by the blue pattern of the adult.

ANAL APPENDAGES

Unlike other African Chlorocyphidae the superior appendages have an inner ventral fold on the apical half, this fold ending just before the apex, and the broad basal half of the inferior appendages subtends a slender apical portion which reaches almost as far as the apex of the superior. The apex of the inferior is slightly obtuse and curved, and at the distal end of the swollen basal half there is an acute, flat inner tooth. In lateral view there is a slight ventral tooth on the superior which, at rest, lies in a socket on the dorsum of the inferior.

These appendages were compared for all forms of the male, *greyi*, *ntaali*, orange-red and blue-red. No appreciable differences were found.

TANDEM LINKAGE

The much longer inferior appendages of species of *Africocypha* Pinhey indicate that these, in tandem linkage, must grasp the female's prothorax further anteriad than in *Chlorocypha* Fraser, 1934, and *Platycypha* Fraser, 1949, the superiors presumably having to be extended to a greater distance under the prothoracic hindlobe. The dorsal ridge on the prothorax is more prominent than in *Chlorocypha*, affording more support for these long inferiors.

PROPHALLUS (fig. 2; d, e)

This is depicted *in situ* and in lower ("ventral") aspects for forma *greyi*, but it is identical for *ntaali* and the other forms. The inner ("ventral") branch of the apex is very short, unlike *Chlorocypha*, but the external ("dorsal") arm is long and slender and widened at its apex.

BURSA (fig. 2; f)

The female bursa copulatrix is depicted attached to the gonapophyses. The basal half of the bursa is thinly chitinised, the outer half membranous, without sterigmata. No appreciable difference is found in immature or mature females, except in the extent of chitinisation of the basal envelope.

OVUM

As extracted from the ovary the egg is elongated, fusiform.

It is concluded that all forms are conspecific. The female shows remarkable changes in colour and pattern from immature to mature condition. The juvenile male shows a rather similar thoracic pattern to the young female, but the abdominal markings reflect the adult state. The mature male is essentially dimorphic, the abdomen having either mainly blue or mainly red bands (the partly orange variety being unusual). The eventual colour form of the adult is probably determined by segments 7–8 of the immature condition. If these are blue the abdominal band is eventually blue, if red, this colour will later spread anteriad and predominate.

MATERIAL EXAMINED. FERNANDO PO: Moca. 1.xi.1962 (1 Juvenile ♂), 26.xi.1962 (1 juvenile ♂), 11.iii.1963 (63 ♂♂); Rio Fladyi. 5.xii.1962 (1 juvenile ♀), 8.xii.1962 (1 juvenile ♀).

Chlorocypha cancellata insulana subspec. nov., fig. 3

Seven males of a subspecies of *cancellata* (Selys, 1879) confined to Fernando Po were collected on the island. This subspecies differs essentially from typical *cancellata* in reduction of the pale fasciae on the vertex and synthorax. The prothoracic and abdominal markings resemble *cancellata*, the anal appendages and prophallus are identical. It has evidently mutated in insular isolation and, for some ecological reason, has become darker.

♂-HOLOTYPE. Labium ochreous at base, black otherwise. Entire face and frons black, slightly paler at lateral margins of epistome in front. Vertex black except a pair

of lateral yellow triangles outside the ocelli, minute postocular dots and a small fascia on the occiput.

Prothorax black with yellow stripe, lateral fasciae on median lobe and a yellow transverse band on posterior lobe. Synthorax with narrow, irregular yellow antehumeral stripe, a metepimeral band almost severed in the middle and a metepisternal stripe. Metasternal bands typical. Legs black, thinly white pruinosed on inner surfaces.

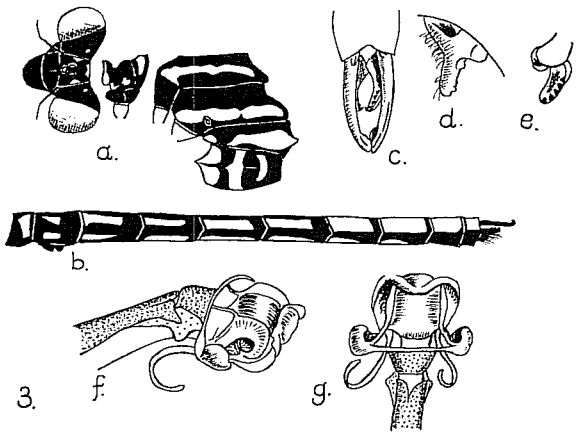

Fig. 3. *Chlorocypha cancellata insulana* subspec. nov. ♂-holotype. a. head and thorax. b. abdomen seen from left (less enlarged). c. anal appendages, dorsally. d–e. left inferior appendage, ventrally; dorsally. f–g. prophallus, obliquely and from below.

Venation black, wings hyaline, with amber basal tint as far as nodus. Forewing with 11Ax, 21–22 Px, hindwing with 10 Ax, 21 Px. Pterostigma blackish brown.

Abdomen with short broadly triquetral segments, with pale fasciae very like *cancellata*; segment 1 with yellow lateral band; segment 2 with a pair of dull greenish dorsal triangles; 3 with broad pale ochreous bands; 4–6 with similar red bands; 7–10 purple dorsally, 7 broadly black at distal end. Sublateral yellowish stripes on segments 2–8. Anal appendages black. Superior appendage slender, with very slight inner basal ridge; apex with short inner ventral flange. Inferior appendage broad at base, with the usual short process. In dorsal view this process is depressed and slightly curved; on its outer margin there is a series of about five prominent teeth to assist in gripping the female prothorax during tandem linkage.

Prophallus with the "inner" branch in the form of short vertical cups, the "outer" branch long, slender and curved. Below the hinge of the stem there is a semi-chitinised flap which is partially thickened at the margin.

Abdomen 16,5 mm, hindwing 22 mm, pterostigma 1,8 mm.

Paratype males similar, except that the thoracic markings are greener in one.

♀ not known.

Typical *cancellata* has the triangles on the vertex linked up to the band on the occiput, thus forming a large yellow fascia with two branches. The antehumeral stripe is very broad in the ventral two-thirds, fusiform. The metepimeral band almost completely covers the metepimeral plate.

MATERIAL EXAMINED. FERNANDO PO: Moca, 21–23.i.1963 (holotype and 6 paratypes). All are in Museum Koenig except 1 paratype which is in the National Museum, Bulawayo.

AGRIONIDAE

Phaon occidentalis (Förster, 1906), fig. 4

In distribution this species overlaps with and is probably specifically distinct from *P. iridipennis* (Burmeister, 1839). The late J. Cowley suggested this possibility to me in 1953. It is more extensively metallic green on the head and thorax.

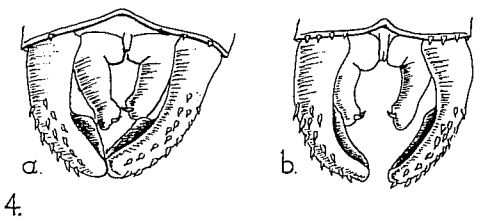

Fig. 4. *Phaon* Selys, 1853. Anal appendages, dorsal view. a. *P. occidentalis* (Förster, 1906) (Etoumbi Forest, Congo Brazzaville). b. *P. iridipennis* (Burmeister, 1839) (Nkata Bay).

The labrum usually has a black T, or a central line, and the distal marginal border black; postclypeus metallic green and the vertex more extensively and vividly metallic green than in *iridipennis*. Thorax metallic green with black mid-dorsal band and narrow brown lateral sutural stripes. Pterostigma, when present in male, is narrow as in *iridipennis*. Abdomen darker. Superior appendage with broader and shorter flange, as in fig. 4. Both have a small inner tooth on the swollen apical region of the inferior appendage.

The dorso-lateral spines on the end of segment 10 are variable in both species, sometimes almost obsolete.

The distribution of *occidentalis* appears to be from equatorial Congo westwards to Sierra Leone.

MATERIAL EXAMINED. North CAMEROONS: Kotoh-Barombi See, 24.i.1958; Diebo-Efote (130 m), 20.i.1959.

Sapho orichalcea Mclachlan (1869)

The Cameroons-Nigerian border is the chief zone of distribution of this species, but it occurs from the Congo to Nigeria. There is the usual variation in size and in ageing characters on the wings, particularly the females.

MATERIAL EXAMINED. FERNANDO PO: Rio Muscola (650 m), 10.i.1963; Rio Fladyi, 16.ii.1963; Moca, 26.i.1963.

Umma longistigma (Selys, 1869)

Widespread in West African tropical forests. No examples collected by Hartwig, but Longfield (1936) records the species from Fernando Po collected by Tams at Mioko Mineral Spring, February 1933.

Umma mesostigma (Selys, 1879)

? Umma splendida Navás, 1922

Umma mesostigma is distributed from the equatorial Congo (Kinshasa) to Nigeria and westwards to Dahomey. In the collection under review there is a series from the Cameroons-Nigerian border, and these specimens are typical of the species. The species is readily recognised in the male by having most of the peripheral cells of each wing filled with brown, giving a dark marginal appearance. In the female this infuscation is more or less confined to the apex.

There is also a long series of 96 specimens of this species from Fernando Po. In these the males often show a strong tendency to be densely fumose or infuscated over most of the wing-surface. Perhaps this indicates an insular subspecies.

The enigmatical *U. splendida* Navás, 1922, described from this island, is not represented in its typical form as originally described despite the large number of specimens from two localities on the island. A brief extract from the original description shows certain peculiar features.

"*Male*. Body metallic coeruleous. Head with black *labrum* ("caput labro nigro"). Thorax with glittering green pleura, except the sutural lines. Ventral surface black, dusted with coeruleous. Wings mainly hyaline, the venation black. Pterostigma narrow, 2 mm long in forewing, 2·5 in hindwing.

Abdomen ventrally and the appendages black.

In the female the pterostigma is 2·3–2·4 mm. Abdomen, ♂ 40 mm., ♀ 32·5 mm. hindwing ♂ 30·5 mm. ♀ 33 mm."

The pterostigma is illustrated (Navás, 1922) and shows the lower proximal angle distinctly acute, as it is in *mesostigma*. But the pterostigma of *mesostigma* is normally about 2 mm in length. If measured diagonally it could be as much as 2,5 mm. The hyaline wings of the male possibly suggest an immature condition. In the female *splendida* the wings are tinted with dark yellowish, which is the same in mature females of *mesostigma*. The anal appendages are figured (Navás, 1922) in dorsal aspect but the armature of the superiors is not clear. It may be similar to *mesostigma* in which there is a subapical groove and an apical inner expansion. The black labrum is peculiar. The labium in *mesostigma* and related species is black but the labrum is metallic purple.

The true status of *splendida* must remain an enigma. Yet Hartwig collected nearly 100 examples of *mesostigma* on Fernando Po island. This suggests that a more complete and accurate description of the types of *splendida* might show a closer relationship to *mesostigma*, i.e. that the labium, not the labrum, is black.

MATERIAL EXAMINED. FERNANDO PO: Moca (1 000 m), 21–26.xi.1962, 28.i.1963, 11.iii.1963; Rio Fladyi, 5–8.xii.1962, 16.ii.1963.

GOMPHIDAE

Some species of *Paragomphus* Cowley, 1934, were collected on Fernando Po but all were unidentifiable and in very poor condition. The island is topotypical for *Paragomphus moka* Longfield, 1936, the type and paratype males of which are in the British Museum (Natural History) and were collected at Moca (Moka) by Tams.

MATERIAL EXAMINED. FERNANDO PO: Moca (100 m), 4.xi.1962, 8.xii.1962.

CORDULIIDAE

Macromia sophia Selys, 1871

Tropical African forests. Recorded by Longfield (1936) from Fernando Po at Moca, January and February 1933 where they were collected by Tams.

LIBELLULIDAE

Allorhizucha klingi Karsch, 1890

Widespread in Central and equatorial Africa.

MATERIAL EXAMINED. FERNANDO PO: Rio Fladyi, 16.ii.1963; Moca, 11.iii.1963. Some examples were from North CAMEROONS: Diebo-Efote, Kotoh-Barombi See and Mueli.

Orthetrum julia Kirby, 1900

This species is, in my opinion, a dominant anisopteran in forests ranging from the Congo to the Ivory Coast. Judging by the large number collected on Fernando Po it is abundant on this island as well as on the mainland. There is just one noticeable feature. In the insular material there appears to be a stronger tendency to wing fumosity than in the mainland collections. This was also noticeable in the case of *Umma mesostigma* from this island.

This taxon was recorded from the island by Longfield (1936) under the name *Orthetrum stemmale capense* Calvert, now in synonymy with *O. julia* Kirby (Pinhey, 1970b).

MATERIAL EXAMINED. FERNANDO PO: Rio Fladyi, 5–8.xii.1962, 16.ii.1963; near Moca, 30.x.1962, 1–26.xi.1962, 1.xii.1962.

Orthetrum austeni (Kirby, 1900)

This is the largest known species of this cosmopolitan genus. It is distributed in forests from Zambia and Angola northwards to Nigeria, then westwards to Sierra Leone.

MATERIAL EXAMINED. FERNANDO PO: Moca, 26.xi.1962, 7–11.iii.1963; San Carlos, 21–23.x.1962.

Palpopleura lucia (Drury, 1773)

This species is abundant in most parts of the Ethiopian region in swamps, reedy pools or slow streams. All the specimens in this collection were the typical form *lucia* and they showed the normal range of variation in size and wing fasciae.

MATERIAL EXAMINED. FERNANDO PO: San Carlos, 1–24.x.1962; Rio Fladyi, 5–8.xii.1962; Rio Muscola, 4.iii.1963; Conception, 5.iii.1963.

Thermochoria equivocata Kirby, 1889

Thermochoria equivocata var. **picta** Sjöstedt, 1899

The prophalli of *picta* and *equivocata* were compared and found to be identical. This confirms the conspecificity, but it is not certain whether the very local equatorial *picta* is a true subspecies or an ecological form. This taxon is more heavily marked, especially in the female. It is recorded over a wide range, as far west as the Ivory Coast, perhaps further. In the more southerly limits of its range (Zambia, Malawi and Katanga), *equivocata* varies in the opposite manner, the black stripes on the wings often being reduced or absent. Here, however, the development of these fasciae is largely or entirely a question of ageing criteria, whilst in the more heavily marked equatorial *picta* it seems to be inherent rather than developmental. The older males and females of typical *equivocata* do not acquire the heavy fasciae of *picta*. I have seen long series of *equivocata* in Uganda, Zambia, Malawi and elsewhere, from teneral to mature conditions.

MATERIAL EXAMINED. North CAMEROONS: Malende, 18.xii.1957. No specimens were collected on Fernando Po.

Acisoma trifidum Kirby, 1889

Widespread in tropical Africa.

MATERIAL EXAMINED. FERNANDO PO: Rio Muscola, 4.iii.1963; Conception, 5.iii.1963.

Diplacodes ?lefebvrei (Rambur, 1842)

Some very damaged specimens of this genus from Fernando Po were almost certainly this ubiquitous species.

MATERIAL EXAMINED. FERNANDO PO: Conception, 5.iii.1963.

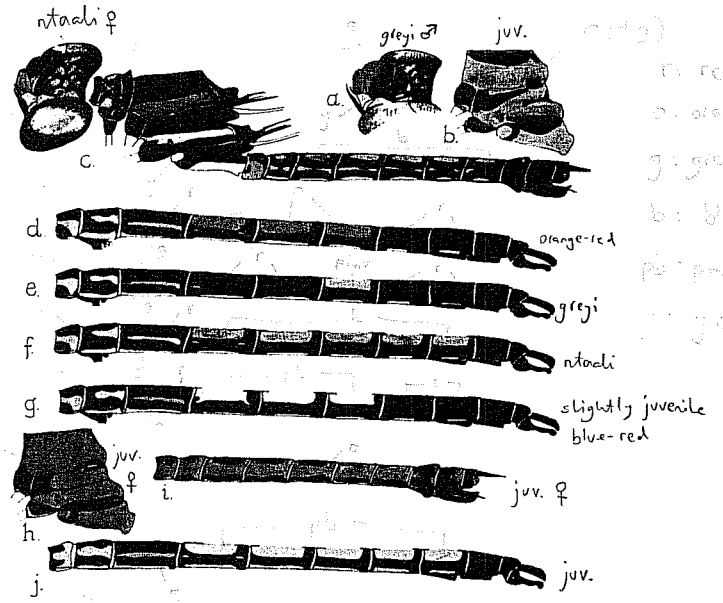

Fig. 5. *Africocypha lacuselephantum* (Karsch, 1899). a, c. head and abdomen of holotype ♂ form *greyi* (as in life segment 6 with whitish bloom) b, j. thorax and abdomen of juvenile ♂. c. head, thorax and abdomen of holotype ♀ forma *ntaali*. d. abdomen of orange-red form ♂. f. abdomen of allotype ♂ forma *ntaali*. g. abdomen of slightly juvenile blue-red form ♂. h, i. thorax and abdomen of juvenile ♀.

Trithemis aconita Lieftinck, 1969

Trithemis caruncula Pinhey, 1970a

This species has been found locally in forest or thick bush in many parts of Africa. Two large males were collected at San Carlos.

MATERIAL EXAMINED. FERNANDO PO: San Carlos, 23.x.1962.

Trithemis dichroa Karsch, 1893

Widespread in tropical African forests.

MATERIAL EXAMINED. FERNANDO PO: Rio Fladyi, 8.xii.1962; Rio Muscola, 4.iii.1963.

Trithemis hartwigi Pinhey, 1970a

Named after its collector, W. Hartwig, from Fernando Po island. The holotype ♂ is in Museum Koenig.

MATERIAL EXAMINED. FERNANDO PO: Moca See (1 900 m), 4.xi.1962 (♂-holotype).

Pantala flavescens (Fabricius, 1798)

Throughout Africa and in most parts of the tropics in other continents.

MATERIAL EXAMINED. FERNANDO PO: San Carlos, 31.x.1962; Conception, 5.iii. 1963.

REFERENCES

All references up to December 1959 which are cited in the text are recorded in my Catalogue (Pinhey, 1962).

LIEFTINCK, M. A. 1969. Odonata Anisoptera, in Symoen's (J.J.) *Explor. Hydrobiol. Bassin Lac Bangweolo-Luapula* **14** (4): 1–64.

NAVÁS, L. 1922. Insectos de Fernando Poo. Odonata. *Treb. Mus. civ., Nat. Barcelona* **4:** 109–116.

PINHEY, E. C. G. 1961. Dragonflies collected on an Expedition from Rhodesia to Nigeria in 1958. Part 1. *Entomologist's mon. Mag.* **96:** 256–271 (1960).

———— 1962. A Descriptive Catalogue of the Odonata of the African Continent (up to Dec. 1959). *Publicões cult. Co. Diam. Angola* **59:** 1–323

———— 1964. A revision of the African members of the genus *Pseudagrion* Selys (Odonata). *Revta. Ent. Mocamb.* **7** (1): 5–196.

———— 1967. African *Chloracyphidae* (Odon.) *J. ent. Soc. Sth. Afr.* **29:** 161–197.

———— 1968. A revision of the genus *Chlorocnemis* Selys (Odonata). *Occ. Pap. Nat. Mus. S. Rhod.* **4** (29B): 209–260.

———— 1969. On the genus *Umma* Kirby (Odonata). *Arnoldia* (*Rhodesia*) **4** (17): 1–11.

———— 1970a. Monographic study of the genus *Trithemis* Brauer (Odonata: Libellulidae). *Mem. ent. Soc. Sth Afr.* **11:** 1–159.

———— 1970b. A new approach to African *Orthetrum* (Odonata). *Occ. Pap. nat. M Rhod.* **4:** 1–9.

Manuscript received 4 February 1971.