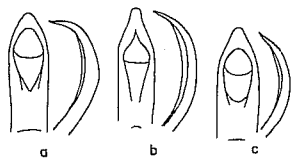


stets einfarbig schmutziggelb, auf den Flügeldecken jedoch vielfarbig hellgrau.

Der Aedoeagus ist stark gebogen und läßt sich von dem des *A. westermanni* Boh. und des *A. fasciatus* (Redt.) sicher unterscheiden (Abb. a—c).



Aedoeagus von

- a) *A. tristis* sp. n.
b) *A. westermanni* Boh.
c) *A. fasciatus* (Redt.)

A. tristis sp. n. wurde von E. Voss (1958, Decheniana, Beiheft 5, pp. 40 u. 41) in einer Bestimmungstabelle versehentlich unter dem Namen *Mecyslobus scenicus* Fst. geführt. Auf dieses Mißverständnis habe ich bereits in meiner Revision der indochinesischen *Alcidodes* aufmerksam gemacht und gezeigt, daß *Alcidodes scenicus* Fst. zwar weit verbreitet ist, jedoch weder auf Formosa noch im zentralen und östlichen China vorkommt.

Anschrift des Verfassers: Dr. E. Haaf, 6238 Hofheim (Taunus), Cimberstraße 21

Odonata of the Northwest Cameroons and particularly of the islands stretching southwards from the Guinea Gulf

By

ELLIOT PINHEY

National Museum, Bulawayo

The original object of this paper was to record a further collection of Odonata made by W. Hartwig in West Cameroons and the neighbouring Fernando Po island, and for the opportunity to examine these and the previous material (Pinhey, 1951) I am much indebted to Prof. Dr. M. Eisen-taur.

A second objective was to follow southwards from Fernando Po and discuss all the known Odonata from these islands in the Guinea Gulf. Here I must express my deep obligations to the many people who made it possible for me to visit São Tomé island. In the first place A. S. Aiken provided one of the incentives with the kindly gift of a copy of his private booklet on São Tomé. W. H. T. Tams, Dr. P. Viette, Eng. J. Passos de Carvalho, J. Gilchrist and others assisted with literature. Dr. A. J. F. Castel-branco in Lisbon, Dr. A. J. Duarte in Luanda, Eng. Aprigo Malveiro and still others kindly provided information and helped to smooth the way for my visit.

On the island itself I was welcomed by Eng. Castel Antonis of the Brigada and the ever-patient Carlos Arausso who attended my every wish. Dr. M. Augusta, Entomologist at the Brigada Laboratories, permitted me to examine and identify Odonata and Lepidoptera.

To all these I must express my profound thanks.

Preliminary notes on the territories mentioned in this paper

The mainland area where Hartwig collected Odonata is a region which has frequently changed its status and title. Between the two World Wars it was part of the mandated territory known as the British Cameroons, to the north of French Cameroons and extending as a narrow strip from the Guinea Gulf as far as Lake Tchad. The southern end of the British Cameroons was confusedly named South Cameroons and after Nigerian independence this region elected to join Cameroun, the bulk of which lies further to the south. The northern end of British Cameroons then joined the northern region of the new Nigerian Federation as a Province.

However, our concern will primarily be with the former British South Cameroons, here called West Cameroons.

Just off-shore there is the island of Fernando Po (or Fernando Poo), regarded by Oceanographers and Geologists as part of a submarine mountain ridge which reaches supramarine peaks between Fernando Po in the north to at least St. Helena in the South Atlantic and perhaps onwards to Tristan da Cunha.

I personally have only briefly visited West Cameroons (1958) and São Tomé (1971). The former is immensely rich in endemic and indigenous Odonata, but S. Tomé yielded only one possibly new species, an aeshnid I failed to capture. In Lepidoptera, however, both S. Tomé and Principe islands have many very interesting endemics, and this is probably so in other insect Orders.

This wealth of insect species is reflected not only in the Odonata recorded from Fernando Po and collected by W. Hartwig during Prof. Dr. Eisentraut's prolonged expeditions to Cameroons and Fernando Po in recent years, but also by many other expeditions to this region. This is the only island in the group which is rich in Odonata. One of the earliest collectors of insects was J. Keulemans (1873) who only made a small collection. About 1888-92 Antonio Augusto de Carvalho Monteiro and Francesco Newton made more extensive collections and both were honoured by butterflies being named after them. A. Mocquersy collected some Lepidoptera from the end of 1899 to January 1900, followed by Leonardo Fea, 1900-02, who was more interested in the Coleoptera and Lepidoptera. The botanist A. Chevalier, August-October 1905, found time to capture Lepidoptera and Charles Gravier (1906) other insects, including cockroaches.

Two German Expeditions were organized, one by the Duke of Mecklenburg, Adolf Friedrich, 1910-11. H. Navel visited the islands briefly in 1920. T. Alexander Barns was in the area (1925-26) and made the most extensive collections and Prof. H. de Saeger was there in 1925. The British Museum expedition by W. H. T. Tams in 1932 was accompanied by the botanist A. W. Exell who later wrote an important work on the flora of these islands (1944). It was from this expedition and that of Leonardo Fea that most of the Odonata fauna was recorded (Martin; Longfield).

Since the second World War entomologists have included Boris Malkin (1949); G. R. Gradwell and D. Snow, of the Oxford University Expedition (1949); Prof. F. Frade (1955); Dr. F. Simmonds (1956); Dr. P. Viette (June-July, 1956), accompanied by botanists; and Mr. Arthur Aiken, with his sons, December 1967-January 1968.

I have endeavoured to ascertain what records there are in the Hope Museum from the Oxford University Expedition of 1949, but it appears that no Odonata were collected.

For the original discovery of the single endemic dragonfly on St. Helena we are indebted to the U. S. Eclipse Expedition of 1889.

A brief history and notes on these territories may be of interest.

Cameroons

Prior to the first World War there was a single large territory, Kamerun, administered by Germany, on the eastern border of the Gulf of Guinea, in equatorial West Africa. After that War the British received a mandate on the northern section, the British Cameroons, whilst the French had a mandate on all the southern terri-

tory, Cameroun Francais. After the second World War British Cameroons became a Trusteeship under United Nations (1946).

British Cameroons was a rather narrow strip of territory extending from the port of Victoria below the great Mount Cameroon (rising to 4000 m), with many crater lakes, north eastwards along the Nigerian border as far as Lake Tchad. It was administered by Nigeria. It is a densely populated territory.

There is dense equatorial jungle, rain forests with trees reaching 60 m which include mahoganies, many leguminosae, smaller ebony trees, Kola nuts, many epiphytic orchids and lianes, ferns, Umbrella trees (called Musanga). In swampy areas there are Raphia palms, at the coast mangrove swamps. Yet the highlands from Mount Cameroon northwards are grassy slopes, the healthy climate of Bamenda region. In parts there are savannas. Rainfall below the Mountain on the western slopes may be as much as 10 200 mm, 5 100 mm near the Nigerian border and the Great Cross River. Plantations of rubber, palm and cacao were developed here; also timber and agriculture, groundnuts, bananas and hides.

On October 1st 1960 Nigeria was granted independence. The next year the northern end of British Cameroons elected to join the Nigerian Federation as a Province of the Northern Region, but South Cameroons on the Biafran border joined Cameroun Francais on October 1st to become part of the Federal Republic of the Cameroons.

The most interesting point to recall is that the Cameroons estuary and coastline was first discovered by the Portuguese navigator Fernando Po, towards the end of the 15th Century. And all and every one of the islands to be discussed below were also discovered firstly by these great Portuguese navigators, even if in those hectic times these territories frequently changed sovereignty.

Fernando Po (or Poo)

This tropical island, rich in fauna and flora, is on the continental shelf and only 32 km from the coast. It was discovered about 1470 by the Portuguese navigator Fernando Po who thought it so beautiful he called it Formosa. But it was later named in his honour.

It is the largest of the Guinea Gulf islands, 70×32 km, volcanic like all the rest of them. It has steep, rocky shores, a narrow coastal plain, with steep mountain slopes rising to Pico de Santa Isabel (2815 m) in the north-centre of the island, a crater with crater lakes, forested to the summit. There are torrential mountain streams. The forests contain mahogany, ebony, tree ferns, oil palms and a dense undergrowth; Giant Lobelias and Senecios.

The cultivated plants are sugar cane, cotton, indigo, palm oil and later cocoa was brought in.

The fauna and flora must obviously be very similar to the nearby Cameroons mainland. At the coast the temperature is cool and fairly uniform

(about 25° C), the wettest months being July to October (opposite seasons to São Tomé). The average rainfall near the coast is about 2 550 mm.

The chief town is Santa Isabel in the north. The population is not apparently dense. This island and Annobón were ceded by Portugal to Spain in 1778.

Príncipe Island (Prince Island)

This is a small island 210 km south east of Fernando Po, 17×8 km in area. It was discovered on 17th January 1471 by Portuguese navigators and was at first called Santo Antão after Prince Antão, who had been a sugar production beneficiary.

The northern half is flat and opened up by plantations and has, I believe, one remaining patch of original forest. The southern half is mountainous, rising to 948 m, with some mountain forest, 12 $\frac{1}{2}$ % of which is said to be endemic. The climate is cooler, more bracing than São Tomé. The capital is Santo António.

To the south, towards São Tomé, there are numerous rocky uninhabited islands.

São Tomé (St. Thomas Island)

A pear-shaped island, 47×27 km, 280 km west of Gabon and about 146 km south west of Príncipe. It was discovered in 1470 by the Portuguese on the Feast of St. Thomas and received the name São Tomé. It is just north of the Equator, a small island Ilha das Rolas (island of doves) to the south having the equator line running through it. When discovered it was densely forested right down to the coastal level and the only clear area at that time was considered to be around the great Crater Lake Lagoa Amelia, now a shallow swamp, fringed with tree ferns and Begonias.

There is a north-south backbone of high mountains tailing off somewhat in the south, which is still very rugged. The highest peak, Pico S. Tomé, is 2 024 m. It is a volcanic island with very rich soil, the basaltic lava flows outcropping on the pleasant sandy beaches. The north and east have gentle slopes. There are many fast, clear mountain streams and waterfalls, mostly with gravel bottoms. However there are no freshwater fish apparently.

The higher peaks are precipitous, with many columnar summits. The western side of the island is precipitous to the sea, but there is a tarred road skirting most of the island. The higher peaks are shrouded in mist most of the time and if the island is approached from the north west it is visible from far off by the cloud cover.

Rainfall is only about 890 mm at the coast, but 2 500 mm at Salazar half-way up the mountain, and higher up 5 000 mm or more. The temperature

at sealevel is high, humid nearly all the time and even above Salazar I found it almost unbearable in April to scramble up the mountain after about 9 a. m. The driest time of the year is from June to September when the mean maximum temperature is about 30° C, but rain can fall in any month.

The early Portuguese gradually cleared the coastal forest and planted sugar cane and had a sugar-cane factory. Coffee was started in 1800 and cacao, found more profitable, in 1820. Later, palm oil, bananas, copra, pepper, cinnamon, vanilla, quinine (Chindona), bread fruit were all tried with varying success. The main plantations (called locally roças) were coffee and cocoa, owned generally by overseas combines. Local managers are extending their plantations higher and higher up the mountain, thus destroying all the indigenous and endemic forest to at least 900 m. Yet they had to import many shade trees, *Erythrina* and others, particularly for the plantations. These plantations thrive year after year on the same soil. Apparently rich volcanic soil is continually being replaced. Some fertilizers are added to help the yield. The population is nearly 70 000. Their occupation includes sea-fishing and turtles are collected for ornamental value.

At the lower elevations, even in Exell's time (1932) the original forests had disappeared except in the far south which is too rugged for planting. Luxuriant forests at the higher levels are now invaded by imported *Erythrina*, *Cassia* and other trees, as well as coffee or cocoa escapes. The main trees in the rain forests are *Thunbergia*, *Clerodendron*, *Rauwolfia*, *Conopharyngia*, *Trichilia*, some of them hung with lichen. The wealth of vegetation was recorded by Exell (1944). The higher mist forest has stunted trees, *Podocarpus* and others. It is considered that about 19.4% of the forest trees are endemic, with West African affinities. The biggest tree is the Silk Cotton tree, *Oca*, with huge buttresses, but with its wind-blown fruits it may have arrived on the island accidentally.

I visited a very small patch of forest in the north; secondary growth, but interesting in its insect fauna. Endemic Lepidoptera are well known on the island but mainly up to about 4 000 ft. Above this almost the only diurnal lepidopteran I saw was *Leptosia alcesta nuptilla* Aurivillius, a race which was described from this island.

Whereas birds may scarcely be directly effected by the destruction of original forest, the insects are diminishing and consequently insectivorous birds will suffer in time.

Annobon (Anobon)

A small island only 7×2 $\frac{1}{2}$ km, 185 km south of the equator and 350 km west of the African continent. Discovered on 1st January 1473, on New Year's day, by the Portuguese and hence called New Year or Anno Bon. It is a volcanic island with its highest peak 600 m. It is still well covered with original forest, especially around the water-filled Crater lake below Pico del Fuelgo. There is a short rainy season, from October to January but the island is exposed to tornadoes. There are steep valleys and mountains with rich vegetation. The highest peak is Pico Fogo at 900 m.

The Portuguese ceded this island and Fernando Po to the Spanish in 1778. The capital is San Antonio de Praia and the total population about 1500.

St. Helena

An isolated island in the South Atlantic, only about 17×10.5 km. It is also volcanic, with steep cliffs on the north west and east, with a semicircular ridge of mountains of which the highest is Diana's Peak rising to 832 m which has a crater. To the south there are deep valleys, basaltic rocks and caves. Sea-level temperatures are about 20° — 32° C in summer, still cooler higher up. The coastal area is barren, the middle zone has grassy slopes, planted with imported gorse and broom, bramble, pines and other exotic plants. The central zone has indigenous vegetation. Endemic plants have associations with Africa. There is Cabbage tree (*Senecio*) and imported banana and New Zealand flax. The only endemic bird is the "Wirebird", a small plover called *Charadrius sanctaehelenae*. The rivers have no fresh-water fish.

The island was discovered on the 21st May 1502 by a Portuguese navigator who called it St. Helena. At that time it was uninhabited. The Dutch occupied it about 1645 but the British East India Company settled it in 1659. After December 1676 it was permanently under British rule. When discovered it was uninhabited. The population now is roughly 5000. The crops are mostly flax, potato, lily bulbs, with fishing and sheep rearing being the main occupations, other than lacework.

Tristan da Cunha and Ascension Islands are under St. Helena jurisdiction.

Tristan da Cunha

There are really three volcanic islands in this South Atlantic group, midway between South America and South Africa. Inaccessible and Nightingale are the uninhabited islands, the highest peak being about 2080 m on Inaccessible, with high cliffs and narrow coastal beach fringes.

Tristan is almost circular with a volcanic cone at 2080 m. There are strong westerly winds and cloud. Summer temperatures average only 20° C, but the humidity is naturally high. The beach has black sand and rocks, above which there are sheer cliffs with grasses and ferns and an island tree called *Phyllica nitida*. At the north west there is an irregular plateau crossed by a stream which perhaps has dragonfly life or at least migrants may breed there.

Tristan was discovered by the Portuguese Administrator Tristao da Cunha. In 1816 it was annexed by Britain. It was uninhabited, but now has the descendants of ship-wrecked sailors. The population is barely 300, with only 7 surnames between them.

Ascension Island

1120 km north west of St. Helena in the equatorial zone and 61 sq. km in area. It is another volcanic island. The so-called Green Mountain has a large elliptical crater at 867 m. Below this there is an irregular plateau

and steep ravines. The island is vegetationally barren except on the summit of Green Mountain, but has now been planted with grasses and shrubs. The rainfall is during March and April and amounts to under 510 mm.

The island was discovered on Ascension Day 1501 and was found to be uninhabited. The capital is George Town. The slopes of the mountain have purslane, mosses, ferns and rock roses. Turtles and guano are collected.

Systematic list

Systematic list of the Odonata collected by W. Hartwig during Prof. Dr. M. Eisentraut's Expedition to West Cameroons (vicinity of Mount Cameroons, etc.) and Fernando Po, 1966—68.

These are additional to those already recorded (Pinhey, 1971).

The localities visited: —

Fernando Po

St. Isabel, Finca Frauendorff and Parador, October 1966.

West Cameroons

Lager I, 900 m. Kupe near Nyasoso, November 1966, January 1967

Manenguba-See, 1800 m. December 1966, January 1967

Oku-See, 2100 m, Bansa-Hochland, January 1967

Dikume-Balué, 1100 m, Rumpi Hills, February, March 1967

Victoria, December 1968.

Distribution of species

Fernando Po

1. St. Isabel:

Allorhizucha klingi Karsch, *Hadrothemis camarensis* (Kirby), *Orthetrum africanum* Selys, *Orthetrum julia julia* Kirby, *Palpopleura lucia* (Drury) f. *lucia* (Drury), *Trithemis turva* Karsch

2. Finca Frauendorff:

Chlorocnemis nigripes Selys, *Pseudagrion melanicterum* Selys, *Umma purpurea* Pinhey, *Allorhizucha klingi* Karsch, *Orthetrum julia julia* Kirby, *Palpopleura lucia* f. *lucia* (Drury), *Trithemis aconila* Lieftinck

3. Parador:

Umma mesostigma (Selys), *Anax imperator* Leach

West Cameroons

1. Lager I (Camp I of the Eisentraut expedition):

Neurolestes trinervis Selys, *Sapho orichalcea* McLachlan, *Pentaplebia stahli* Förster, *Onychogomphus ? styx* Pinhey, *Macromia camerunica*

spec. nov., *Orthetrum brachiale* (Beauvois), *Orthetrum guineense* Ris, *Olpogastra lugubris* Karsch, *Tramea basilare* (Beauvois)

2. Manenguba-See (Manenguba Lake):

Pseudagrion melanicterum Selys, *Enallagma bucholzi* Pinhey, *Enallagma vansomereni* Pinhey, *Orthetrum cafrum camerunense* Gambles, *Palpopleura lucia* (Drury) f. *lucia* (Drury), *Crocothemis erythraea* (Brullé), *Trithemis arteriosa* (Burmeister), *Trithemis furva* Karsch.

3. Oku-See (Lake Oku):

Nesolestes nigriensis Gambles, *Phaon iridipennis iridipennis* (Burmeister), *Anax imperator* Leach, *Trithemis furva* Karsch.

4. Dikume-Balué:

Chlorocnemis elsentrauti spec. nov., *Pseudagrion epiphonemalicum* Karsch, *Pseudagrion melanicterum* Selys, *Umma mesostigma* (Selys), *Umma saphirina* Förster, *Sapho orichalcea* McLachlan, *Pentaplebia stahli* Förster, *Helliaeschna cynthiae* (Fraser), *Macromia camerunica* spec. nov., *Allorhizucha klingi* Karsch, *Micromacromia camerunica* Karsch, *Neodythemis africana* Fraser, *Orthetrum julia julia* Kirby, *Palpopleura lucia* (Drury) f. *lucia* (Drury), *Zygonyx regisalberti* (Schouteden)

Notes on species of interest

Megapodagrionidae

This family, well represented in Madagascar, has few members on the African Continent. The known Nigerian fauna was enriched by the remarkable discovery of *Nesolestes nigriensis* by Gambles (1970). The German collection extends the range of this species to the Cameroons.

Nesolestes nigriensis Gambles (1970)

Gambles, 1970, *Entomologist* 103: 53—61, figs.

Gambles collected two males and one female of this species on the Obudu Plateau, near the eastern border of Nigeria. By coincidence Hartwig also collected two males and one female in the Cameroons. These only differ slightly from Gambles' description and figures.

In both males the two spots on the vertex are more angular, they are pentagonal, not rectangular. The greenish yellow antehumeral stripe is also bifid at the dorsal end but the upper branch of the bifurcation extends narrowly almost to the yellow macula at the dorsal end of the mesepisternum. In the female the spots on the vertex are also not rectangular but have curved edges narrowing gradually outwards and near the eyes they turn forwards to small rounded ends. On the thorax the dorsal spot at the humeral suture is equally long as in the allotype but much thicker.

I do not think these differences warrant subspecific separation, at least at this stage. If more material should be collected in both localities some variation may be found, either intrinsic or ageing criteria.

Material examined: W. Cameroons, Oku-See 2 males 31. 1. 1967, 1 female 28. 1. 1967.

Distribution: Eastern Nigeria, (North) West Cameroons.

Neurolestes trinervis Selys (1884)

Selys, 1884, C. R. Soc. ent. Belg. 29: 144

As Gambles remarks (1970) this genus and species are very similar in anal appendages to his *Nesolestes nigriensis* and generically only differ significantly by the peculiar increase in the number of antenodal cross-veins.

In size this species is larger than *nigriensis*, but in habits, judging from my own experience (1958), it must be very similar. I collected *trinervis* at Mamfe; and Mr. A. R. Mbarga sent one female from Mbalmayo in the Cameroons.

Material examined: W. Cameroons, Lager I, 900 m, Kupe near Nyasoso, 1 female 17. 11. 1966.

Distribution: From the Calabar region of Eastern Nigeria to the Cameroons, at least as far as Mbalmayo.

Protoneuridae

Chlorocnemis nigripes Selys (1886)

Selys, 1886, Mem. Cour. Acad. Belg. 38: 141; Pinhey, 1969: 248

Chlorocnemis gestroi Martin, 1908, *Annali Mus. civ. Stor. Giacomo Doria* 43: 653

C. gestroi Martin is one of several synonyms of *nigripes*, but it is mentioned here, since it was described from Fernando Po. The type male was juvenile. The face and dorsal surface of the head were all yellow, the frontal stripe of a deeper shade. Prothorax yellow with brown bands. Femora yellow. Wings hyaline. Pterostigma brown, finely edged with yellow. Forewing with 16—17 Px. Abdomen greenish yellow with a brown annulus at end of each segment. Segments 3—5 with blue markings as in *nigripes*; segments 8—9 black with traces of dorsal yellow; segment 10 yellow. The female is then described.

Despite the differences Schmidt (1951) who examined the types considered them merely juvenile *nigripes*, with teneral colours as well as postmortem discoloration. The types are said to be in Paris Museum.

Material examined: Fernando Po, Finca Frauendorf, 4 males 21. 10. 1966

Distribution: Nigeria through Cameroons to Zaire, with other forms or subspecies in Uganda and Angola.

Chlorocnemis eisentrauti spec. nov. (fig. 1)

I am honoured in naming this species after Prof. Dr. M. Eisentraut who directed the expedition to Cameroons and Fernando Po. It is one of the dark species, nearest *C. pauli* Longfield and *C. abbotti* Calvert (see Pinhey, 1969) and in lesser degree to *C. willei* Fraser and *C. elongata* Hagen.

Holotype ♂. Labium black, creamy white posteriorly. All face and head black otherwise except a pale blue-green frontal band stretching from eye to eye.

Prothorax black, with pale blue collar, a small posterior blue spot on the middle lobe and a sub-lateral greenish yellow margin. Synthorax black. A slender pale blue-green antehumeral stripe, slightly inflated at ventral end; a continuous broad blue band covering most of the metepisternum

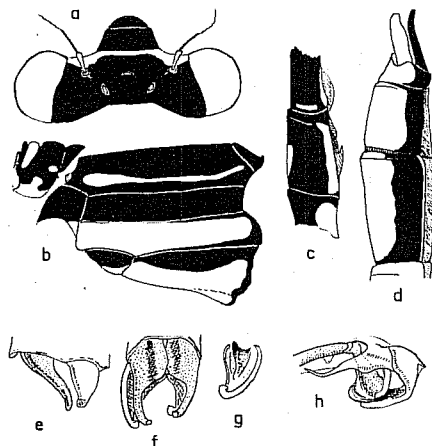


Fig. 1: *Chlorocnemis eisentrauti* spec. nov.
Holotype ♂: a. head b. thorax from left c. abdomen, segments 1 to base of 3 d. segments 8-10 and anal appendages, from left e-f anal appendages from left and ventrally g. left superior appendage, ventrally.
Paratype ♂: h. prothallus.

and an irregular broad band on the lower half of the metepimeron. Legs black, the femora pale blue-green anteriorly.

Wings yellow with slight greenish tinge, as in several other species. Venation black. Pterostigma black, of the usual rhomboidal shape. Forewing with 16-17 P_x. Anal vein leaves margin well distal to Ac.

Abdomen black with sparse coloured areas. Segment 1 with yellowish green sublateral macula; segment 2 with a narrow blue fusiform dorsal spot and a yellowish green sublateral stripe; segment 3 with a broken green basal annulus and a narrow yellow sublateral stripe, these markings continued more narrowly on segments 4-5; 6-7 unmarked. Segments 8-10 broadly cream yellow dorsally. Anal appendages of the usual shape. Superior appendage creamy yellow, slightly brown apically, partly black centrally; inferior appendage black. Superior with a robust ventral tooth directed slightly anteriorly, into segment 10.

Prophallus with long tapering terminal filament more like *marshalli* Ris and *abbotti* than the other known species.

Abdomen 38 mm, hindwing 23.5 mm.

Paratype ♂ differs only slightly, the prothorax lacking the small blue spot on the middle lobe.

This new species differs from *pauli* in its much narrower antehumeral stripe, the broad and continuous pale band on segment 8 and the slender terminal filament on the prothallus which is clubbed in *pauli*. From *willei* it also differs in the narrower antehumeral stripe and the abdominal markings are very different (see Pinhey, 1969: 237), as well as the prothallus. From *elongata*, which has a similar narrow antehumeral, but the end segments of the abdomen are much more broadly pale coloured in the new species; the prothalline filament is also different. In *abbotti* the markings on the thorax are similar but the end segments of the abdomen have much less markings on 9 and none on segment 8; but the prothalline filament is rather similar. The species *marshalli* is very different in markings on head and thorax and the abdominal segments are differently marked except segments 8-10 which are, however, blue instead of creamy yellow; but the filament of the prothallus is markedly similar to the new species. Female not yet known.

Material examined: W. Cameroons, 2 males, Dikume-Balué, 5. 3. 1967 (leg. W. Hartwig).

Holotype in Museum Koenig, Bonn; paratype male kindly presented to the National Museum, Bulawayo.

Distribution: Only known from (North) West Cameroons.

Coenagrionidae

Enallagma buchholzi Pinhey (1971)

Pinhey, 1971, J. ent. Soc. sth. Afr. 34 (2): 218—219 (Moca, Fernando Po)

More material of this species has been collected by Hartwig on the mainland.

Material examined: W. Cameroons, Manenguba-See, 12 ♂ 1. 1. 1967, 2 ♂, 2 ♀ 17. 12. 1966.

Distribution: Fernando Po and West Cameroons.

Enallagma vansomereni Pinhey (1956)

Pinhey, 1956, Occ. Pap. Coryndon Mus. 4: 26, figs (♂, ♀ Acholi)

Described originally from Uganda, this species is now known from several other localities.

Material examined: W. Cameroons, Manenguba-See, 1 ♂, 1. 1. 1967

Distribution: N. Senegal (♂, Kayer, in Paris Mus., det. Pinhey, 1971); also N. Nigeria, N. Uganda, Angola.

Agrionidae

Umma purpurea Pinhey (1961)

Pinhey, 1961, Entomologist's mon. Mag. 96: 264

Described from the Cameroons near the border of Eastern Nigeria, it has now been found on Fernando Po.

Material examined: Fernando Po, Finca Frauendorff, 1 ♂ (teneral), 21. 10. 1966

Distribution: Fernando Po and West Cameroons.

Amphipterygidae

Pentaplebia stahli Förster (1909)

Förster, 1909, Jb. Nassau Ver. Naturk. 62: 211

A remarkable species, the only one of its family in Africa, but fairly well known in the Cameroons and almost certainly occurring just over the border into Eastern Nigeria.

Material examined: W. Cameroons, Lager I, 2 ♂, 13. 11. 1966, 1 ♀, 16. 11. 1966; Dikume-Balué, Cameroons, 2 ♂, 1 ♀, 5. 3. 1967

Distribution: Widespread in Cameroon forests and up to the Nigerian border.

Gomphidae

Onychogomphus ? supinus Selys (1854)

Selys, 1854, Bull. Acad. r. Belg. Cl. Sci. 21 (2): 34

Typical *supinus* was described from South Africa (Caffraria), with other subspecies from East and West Africa. The single female in the present collection is not definitely this species, but since it has a trace of an anal loop on the hindwing it is more likely this genus than *Paragomphus* Cowley. If it is a form or race of *supinus*, it is unusually large, the abdomen 36 mm, hindwing 32 mm.

Material examined: W. Cameroons, Lager I, 1 ♀, 21. 11. 1966.

Aeshnidae

Heliaeschna cynthiae Fraser (1939)

Fraser, Proc. R. ent. Soc. Lond. (B) 8: 89

Described from Uganda (types in the Brit. Mus., Nat. Hist.), the distribution of this species is very poorly known. It occurs in N. W. Zambia and the present material contains one Cameroons male, which indicates a wide tropical range.

Material examined: W. Cameroons, Dikume-Balué, 1 ♂, 1. 3. 1967.

Distribution: Uganda, Zambia, Cameroons.

Corduliidae

Macromia camerunica spec. nov. (Fig. 2)

This is a large dark species nearest *M. lieftincki* Fraser (1954).

Holotype ♂. Labium orange with a broad black band on the interior border with three posterior branches, a median tongue down the groove as far as the posterior lobe and two broad lateral branches extending to the posterior end of the lateral lobes but leaving orange lateral spots. Labrum reddish brown, black laterally and over the basal tubercle. Anteclypeus clay-brown; postclypeus dark reddish brown with a greenish yellow lateral spot. Frons dark brown anteriorly, deep metallic blue dorsally and laterally but with a greenish yellow spot at the lateral angle. Vertex deep metallic blue. Occiput and the orbits posteriorly black.

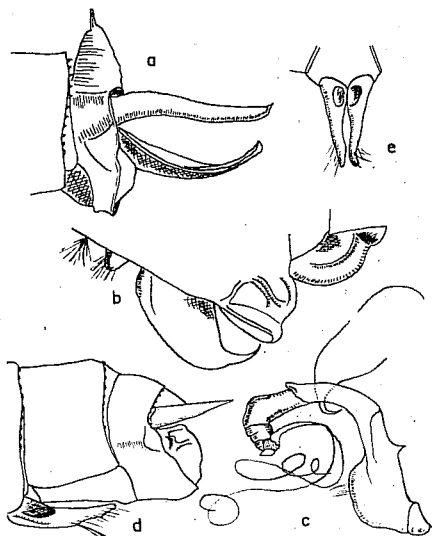


Fig. 2: *Macromia camerunica* spec. nov.
Holotype ♂: a. anal appendages, from left b. accessory
appendages, segment 2 and base of 3, from left. Para-
type ♂: c. prothorax. Allotype ♀: d. abdomen, segments
9—10, with cercus and ovipositor, from left e. ovipositor,
ventrally

Prothorax black. Synthorax dark brown, black ventrally, the ventral sutures broadly margined with cream. Sides and dorsum with a strong steely blue reflection. A narrow greenish yellow antehumeral stripe on lower four-fifths of mesepisternum; antealar sinus pale green; a narrow yellow band, faintly greenish, on metepisternum and another narrow yellow stripe along the lower part of the metepimeron. Legs black, the tibial carina yellow.

Venation and pterostigma black. 18 and 17 Ax in left and right forewings respectively, 10 and 11 Px. Forewing with two rows in discoidal field. 5—6 Cuq in all wings. 8—9 cells in anal loop.

Abdomen black with sparse yellow markings. Segment 2 with a narrow yellow central annulus almost broken dorsally reaching the oreillets; segment 3 with a narrow yellow basal annulus and a narrow yellow lateral spot on the jugal suture; segment 4 with very small lateral jugal spots; a yellow annulus covering basal quarter of segment 7. Anal appendages black and normal in shape, without any basal tumour on the superior appendage. Accessory appendages black; the hamules ending in claw-like hooks. Genital lobe slightly cup-shaped. Prothorax as in figure.

Abdomen (from base to dorsal end of segment 10) 46 mm, hindwing 44.5 mm, pterostigma 2 mm in all wings. Paratype males essentially the same.

Allotype ♀: Face and head marked as in male except the sheen on the frons is more greenish blue and restricted.

Thorax and legs marked as in male, without the carina.

Venation and pterostigma also black, the pterostigma slightly longer. Wing bases slightly amber. Forewings both with 19 Ax, the left with 10 Px, the right with 11. 5—7 Cuq. 13—14 cells in anal loop.

Abdomen broader, black with markings as in male. Cerci short. Ovipositor narrowly tapering, divided from base.

Abdomen 48.5 mm, hindwing 48.5 mm, pterostigma 2.5 mm.

Paratype ♀. Essentially similar but wings fumose, darkening at all apices to brown.

This is very similar to *liettincki*, described from Fernando Po, but it is slightly smaller (the hindwing in male *liettincki* was given as 46 mm, the pterostigma 2.75 mm; abdomen 52 mm, but probably measured to the end of the anal appendages). The essential difference is in the lack of the basal tumour on the superior appendage. It is possibly a subspecies of *liettincki*.

Holotype, allotype and two paratype ♂ in Museum Koenig; one paratype of each sex in the National Museum, Bulawayo.

Material examined: W. Cameroons, Dikume-Balué, 2 ♂, 18. 2. 1967, 1 ♂, 19. 2. 1967, 1 ♂, 25. 2. 1967; Lager I, 1 ♀, 15. 11. 1966, 1 ♀, 21. 11. 1966.

Distribution: So far only known from (North) West Cameroons.

Libellulidae

Neodythemis africana Fraser (1954)

Fraser, 1954, Revue Zool. Bot. afr. 50: 257

Originally described from Zaïre and recorded since then also from Central African Republic, it is known now from the Cameroons where Hartwig collected the species.

Material examined: W. Cameroons, Dikume-Balué, 1 ♂, ♀, 7. 3. 1967

Distribution: Zaïre to Cameroons.

Orthetrum africanum (Selys, 1887)

Lepthemis sabina var. *africana* Selys, 1887, Ann. Soc. ent. Belg. 31: 21

Described originally from Cameroons this species has now been collected on Fernando Po.

Material examined: Fernando Po, St. Isabel, 1 ♂, 2. 10. 1966.

Distribution: Cameroons, Nigeria, westwards to Sierra Leone, as well as the islands of Fernando Po, Príncipe and S. Tomé.

Orthetrum calfrum camerunense Gambles (1959)

Orthetrum camerunense Gambles, 1959, Entomologists' mon. Mag. 95: 44.

Described from this part of the Cameroons, a series was collected by Hartwig.

Material examined: W. Cameroons, Manenguba-See, 1 ♂, 7. 12. 1966, 4 ♂, 3 ♀, 3. 1. 1967, 1 ♀, 4. 1. 1967.

Distribution: Mount Ruwenzori, Central African Republic, Cameroons.

Zygonyx regisalberti (Schouteden, 1934)

Pseudomacromia regis-alberti Schouteden, 1934, Ann. Mus. r. Congo Belge, Zool. Sér. 3 (1): 33

Described from Zaïre. Perhaps known from Angola but this requires verification. Otherwise it is known in Uganda and now in the Cameroons.

Material examined: W. Cameroons, Dikume-Balué, 1 ♂, 7. 3. 1967.

Distribution: Zaïre to Uganda and westwards to Cameroons.

Insular records

Most of the records I have obtained from the islands Fernando Po, Príncipe, São Tomé and Annobon are from René Martin's account of the Leonardo Fea Voyage (1908), Longinos Navás on Fernando Po (1922), Campion concerning species collected by Scabra and Snell (1923), Cynthia Longfield on Tams' records (1936); also the collections of the Centro de

Zoologia, Lisbon, of the Brigada do Fomento Agro-Pecuário on São Tomé, and of the National Museum, Bulawayo, these records being determined by the author. There are a few others from incidental collecting. From Fernando Po there are the records from the Eisentraut Expedition in the present paper and from my previous paper (1971).

Fernando Po

Protoneuridae

Chlorocnemis nigripes Selys (1886)

Chlorocnemis gestroi Martin (1908)

Records: Martin (1908) (Leonardo Fea) recorded both *nigripes* and *gestroi* from the island, but (as pointed out above) they are conspecific; Navás (1922); and in the present paper, from Finca Frauendorf (Hartwig).

Distribution: Nigeria to Angola (see above).

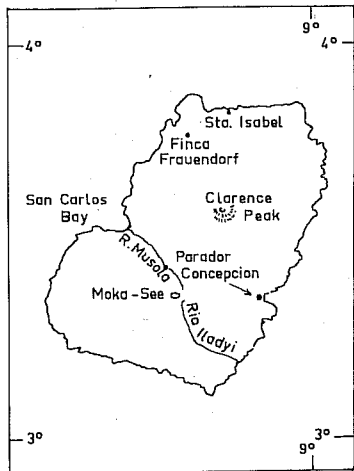


Fig. 3: Fernando Po

Coenagrionidae

Ceriagrion glabrum (Burmeister, 1839)

The insular race is probably *C. g. longispinum* Pinhey (1963)

Records: Martin (1908) (L. Fèa); Navás (1922); Longfield (1936): Moca, 28. 1. 1933, 3. 2. 1933 (Tams); Pinhey (1971): Moca, 21. 11. 1962, 1. 12. 1962, 7. 3. 1963 (Hartwig); Rio Iladyi, 5—8. 12. 1962, 16. 2. 1963 (Hartwig); Concepcion, 5. 3. 1963 (Hartwig).

Distribution: Throughout the Ethiopian region.

Pseudagrion angelicum Fraser (1947)

Records: Pinhey (1971): Concepcion, 5. 3. 1963.
Distribution: Ivory Coast to Nigeria, Fernando Po.

Pseudagrion epiphonematicum Karsch (1891)

Records: Martin (1908) (L. Fea).
Distribution: Widespread in West equatorial Africa, eastward to Uganda, southwards to Zaïre.

Pseudagrion kersteni (Gerstaecker, 1869)

Pseudagrion praetextatum Selys (1876)
Records: Martin (1908), as *praetextatum* (L. Fea).
Distribution: Most of the Ethiopian Region.

Pseudagrion melanicterum Selys (1876)

Records: Martin (1908) (L. Fea); Navás (1922); Longfield (1936): Moca, 28. 1. 1933, 3. 2. 1933 (Tams); Pinhey (1971): San Carlos, 30. 9. 1962, 9—24. 10. 1962 (Hartwig), Moca, 26—31. 10. 1962, 1—17. 11. 1962, 7—11. 3. 1963 (Hartwig), Loreto-See, 19. 11. 1962 (Hartwig), Rio Iladyi, 5—7. 12. 1962, 16. 2. 1963 (Hartwig); and in the present paper, Finca Frauendorff, 2 ♂, 21. 10. 1966 (Hartwig).

Distribution: Widespread in equatorial Africa and as far south as Zambia.

Pseudagrion sjostedti Förster (1906)

Records: Pinhey (1971): Concepcion, 5. 3. 1963 (Hartwig).
Distribution: Widespread in equatorial Africa and as far south as Rhodesia and Moçambique.

Enallagma buchholzi Pinhey (1971)

Records: Pinhey (1971): Type series, Moca, 2 ♂, 11. 3. 1963, 3 ♂, 1 ♀, 1. 12. 1963 (Hartwig).

Distribution: Fernando Po, Cameroons.

Agriocnemis maclachlani Selys (1877)

Records: Pinhey (1971): Rio Musola, 4. 3. 1963 (Hartwig).
Distribution: Widespread in equatorial Africa.

Agrionidae

Umma longistigma (Selys, 1869)

Records: Martin (1908) (L. Fea); Longfield (1936): Mioka, Mineral Spring, 1. 2. 1933 (Hartwig).
Distribution: Widespread in West equatorial African forests.

Umma mesostigma (Selys, 1879)

Umma fuscomarginis Sjöstedt (1899)
?Umma splendida Navás (1922)
For the possible synonymy of *splendida* see Pinhey (1971: 226).

Records: Martin (1908), as *fuscomarginis* (L. Fea); *splendida* Navás (1922); Pinhey (1971): Moca, 21—26. 11. 1962, 28. 1. 1963, 11. 3. 1963 (Hartwig), Rio Iladyi, 5—8. 12. 1962, 16. 2. 1963 (Hartwig); and in the present paper from Finca Frauendorff.

Distribution: It is probably the commonest species of this genus on the island. Uganda and Zaïre to Cameroons and West equatorial Africa.

Umma purpurea Pinhey (1961)

Records: Pinhey, in the present paper, from Finca Frauendorff (Hartwig).
Distribution: Fernando Po and West Cameroons.

Sapho orichalcea McLachlan (1869)

Records: Martin (1908) (L. Fea); Pinhey (1971): Rio Musola, 10. 1. 1963 (Hartwig), Rio Iladyi, 16. 2. 1963 (Hartwig), Moca, 26. 1. 1963 (Hartwig).
Distribution: Cameroons to Nigeria; possibly Zaïre.

Sapho bicolor Selys (1853)

Records: Navás (1922). It is known from the Cameroons and is therefore a possibility, yet the Eisentraut Expedition did not find it.
Distribution: Cameroons to Ghana.

does Pinhey
consider
Saphirina
= mesostigma

Sapho ciliata (Fabricius, 1781)

Records: Navás (1922) also records this species, but I am dubious about the identification or the locality.

Distribution: Nigeria westwards to Sierra Leone.

Chlorocyphidae

Atricocypha lacusephantum (Karsch, 1899)

Records: Pinhey (1971): Moca, 1. 11. 1962, 26. 11. 1962, 11. 3. 1963 (Hartwig), Rio Iladyi, 5. 12. 1962, 8. 12. 1962 (Hartwig).

Distribution: West Cameroons and Fernando Po.

Chlorocypha cancellata (Selys, 1879)

Chlorocypha cancellata insulana Pinhey (1971)

Records: Pinhey (1971): Type series, Moca, 21—23. 1. 1963 (Hartwig).

Distribution: Widespread in equatorial Africa and southwards to Zaïre.

Chlorocypha curta (Hagen, 1853)

Libellago decorata Karsch (1893)

Records: Martin (1908), as *decorata* (L. Fea)

Gomphidae

Paragomphus moka Longfield (1936)

Records: Longfield (1936): Type series, in British Mus. (Nat. Hist.) Moca, 28. 1. 1933, 3. 2. 1933 (Tams); Pinhey (1971) (in poor condition): Moca, 4. 11. 1962, 8. 12. 1962 (Hartwig).

Distribution: Only known from Fernando Po.

Aeshnidae

Aeshna spec. indet.

Records: Buchholz (in correspondence, 27 May 1964) informed me that he had a specimen from Fernando Po. It was probably collected by Hartwig, but I have not seen the specimen. Buchholz considered it to be near *A. scotias* Pinhey (1952) and sent a figure of the anal appendages. The species *scotias* is only known from Uganda.

Anax imperator Leach (1815)

Records: Present collection: Parador, 2 ♂, 27. 10. 1966.

Distribution: Nearly all Africa, Southern Europe, Western Asia.

Hemianax ephippiger (Burmeister, 1839)

Aeschna ephippigera Burmeister, Handb. Ent. 2: 840

Records: Navás (1922)

Distribution: Parts of the Ethiopian and Palaearctic Regions.

Gynacantha cylindrata Karsch (1891)

Records: Navás (1922): The species may need verification.

Distribution: Widespread in equatorial Africa.

Heliaeschna spec. indet.

Records: Buchholz (in correspondence, 27 May 1964, diagram of appendages enclosed). I have not seen the specimen.

= longfieldae S.

Corduliidae

Macromia liettincki Fraser (1954)

Macromia sophia Longfield (1936, nec Selys, 1871)

Records: Longfield (1936, as *sophia*). Type in British Mus. (Nat. Hist.): Moca, 28. 1. 1933, 3. 2. 1933 (Tams).

Distribution: Fernando Po.

Libellulidae

Allorhizucha klingi Karsch (1890)

Pseudophlebia occidentalis (Selys MS) Martin (1908)

Records: Martin (1908), as *occidentalis* (L. Fea); Navás (1922); Pinhey (1971): Rio Iladyi, 16. 2. 1963 (Hartwig), Moca, 11. 3. 1963 (Hartwig).

Distribution: Very widespread in equatorial Africa and as far south as Zambia.

Hadrothemis camarensis (Kirby, 1889)

Records: Martin (1908) (L. Fea); In the present collection: Sta. Isabel, 1 ♀, 2. 10. 1966 (Hartwig).

Distribution: Widespread in equatorial Africa and as far south as Angola.

Orthetrum africanum (Selys, 1887)

Records: In the present paper from Sta. Isabel (Hartwig).

Navás (1922) recorded *O. sabina* (Drury, 1770), a species found in the more arid zones of North and N. E. Africa and Asia. Selys originally described *africanum* as a variety of *sabina* and in its long slender abdomen, swollen at base, it is somewhat similar in shape. I consider Navás' material to have been *africanum*.

Distribution: Equatorial West Africa and southwards as far as Angola.

Orthetrum austeni (Kirby, 1900)

Records: Pinhey (1971): Moca, 26. 11. 1962, 7—11. 3. 1963 (Hartwig); San Carlos, 21—23. 10. 1962 (Hartwig).

Distribution: Equatorial West Africa and as far south as N. W. Zambia.

Orthetrum chrysostigma (Burmeister, 1839)

Records: Martin (1908) (L. Fea). Probably a correct identification although I did not find this species in the Hartwig material.

Distribution: Widespread over the African Continent.

Orthetrum guineense Ris (1909)

Records: Campion (1923) (Scabra & Snell). This may be considered an uncertain identification since at the time of discovery *guineense* was confused with *chrysostigma*.

Distribution: Widespread from tropical Africa southwards to Natal.

Orthetrum julia julia Kirby (1900)

Orthetrum capense falsum Longfield (1955)

The western race is *julia* (Pinhey, 1970 b), the easterly and southern race *falsum*, and the S. W. Cape Province race is *capicola* Kimmins (1957) (= *capense* auct., nec Calvert). At one time it has been confused with *stemmale* (Burmeister, 1839).

Records: Navás (1922, as *stemmale capense*); Longfield (1936, as *stemmale capense*); Moca, 28. 1. 1933, 3. 2. 1933 (Tams); Pinhey (1971): Rio Iladyi, 5—8. 12. 1962, 16. 2. 1963 (Hartwig), Moca, 30. 10. 1962, 1.—26. 11. 1962, 1. 12. 1962 (Hartwig).

Distribution: Various races covering most of the continental Ethiopian Region.

Palpopleura lucia (Drury, 1773)

Libellula marginata Fabricius (1781)

I think only the typical form *lucia* has been recorded here.

Records: Martin (1908, as *marginata*) (L. Fea); Navás (1922); Pinhey (1971): San Carlos, 1—24. 10. 1962, Rio Iladyi, 5—8. 12. 1962, Rio Musola,

4. 3. 1963, Conception, 5. 3. 1963 (all Hartwig); and in the present paper from Sta. Isabel and Finca Frauendorff (Hartwig).

Distribution: Widespread in the Continental Ethiopian Region.

Chalcostephia flavifrons Kirby (1889)

Records: Martin (1908) (L. Fea).

Distribution: Widespread but local from equatorial to subtropical Southern Africa.

Thermochoria equivocata Kirby (1889)

Thermochoria equivocata var. *picta* Sjöstedt (1899)

Records: Martin (1908), both f. *equivocata* and f. *picta* (L. Fea).

Distribution: Locally widespread in equatorial West Africa and as far south as Zambia and Malawi.

Acisoma tritidum Kirby (1889)

Records: Pinhey (1971): Rio Musola, 4. 3. 1963, Conception 5. 3. 1963 (Hartwig).

Diplacodes lefebvrei (Rambur, 1842)

Records: Pinhey (1971), incomplete specimens of this genus but almost certainly this species): Conception, 5. 3. 1963 (Hartwig).

Distribution: Most of the Ethiopian Region and Southern Palaearctic.

Crocotthemis erythraea (Brullé, 1832)

Records: Martin (1908) (L. Fea).

Distribution: Throughout Africa and neighbouring territories.

Brachythemis leucosticta (Burmeister, 1839)

Records: Martin (1908) (L. Fea).

Distribution: Widespread in Africa and the Mediterranean Region.

Trithemis aconita Lieftinck (1969)

Records: Pinhey (1971): San Carlos, 23. 10. 1962 (Hartwig); and in the present collection from Finca Frauendorff, 21. 10. 1966 (Hartwig).

Distribution: Equatorial Africa to the southern subtropical zone of Africa.

Trithemis arteriosa (Burmeister, 1839)

Records: Martin (1908) (L. Fea).

Distribution: All Africa and some of the neighbouring territories.

Trithemis dichroa Karsch (1893)

Records: Navás (1922); Pinhey (1971): Rio Iladyi, 8. 12. 1962, Rio Musola, 4. 3. 1963 (Hartwig).

Distribution: Widespread in West equatorial Africa and southwards to Zambia.

Trithemis lurva Karsch (1899)

Records: In the present collection from St Isabel, 1 ♀, 2. 10. 1966.

Distribution: Widespread in the Ethiopian Region.

Trithemis hartwigi Pinhey (1971)

Pinhey, 1971, Mém. ent. Soc. sth. Afr. 11: 229, figs.

Records: Pinhey (1970 b): Holotype ♂ in Museum Koenig, Moca-See, 4. 11. 1962 (Hartwig). A specimen in the British Museum (Nat. Hist.), labelled

Trithemis longistigma Fraser (ined.), also from Moca, is probably the same species.

Distribution: Fernando Po.

Trithemis nuptialis Karsch (1894)

Records: Navás (1922), quite a possible record although not collected by Hartwig.

Distribution: Widespread in West equatorial Africa and southwards to Angola.

Pantala flavescens (Fabricius, 1798)

Records: Martin (1908) (L. Fea); Pinhey (1971): San Carlos, 31. 10. 1962, Concepcion, 5. 3. 1963 (Hartwig).

Distribution: Almost throughout the tropics of the World.

The number of species certainly recorded from Fernando Po are 16 Zygoptera, together with the uncertain Agrionidae *Umma splendida* Navás, *Sapho bicolor* Selys and *S. ciliata* (Fabricius); and 26 Anisoptera, including the unnamed *Aeshna* spec. and *Heliaeschna* spec., as well as *Trithemis nuptialis* Karsch, but excluding *Orthetrum guineense* Ris as an uncertainty.

The total Odonata recorded here from the island is 42 species, with 4 uncertain records. It is very probable that further species will be found on the island since its affinities are so close to the much richer West Cameroons fauna.

It is quite possible that the families Megapodagrionidae and Amphipterygidae occur there as well as the genera *Elatoneura* Cowley (1935) of the

Protoneuridae; other Gomphidae; and Libellulidae such as *Micromacromia* Karsch (1890), *Tholymis* Hagen (1867) and *Tramea* Hagen (1861).

Endemics on Fernando Po, described from the island, are *Enallagma buchholzi* Pinhey, *Umma splendida* Navás, *Chlorocypha cancellata insulana* Pinhey, *Paragomphus moka* Longfield, *Macromia liettincki* Fraser and *Trithemis hartwigi* Pinhey. *Enallagma buchholzi* has now been found on the mainland and *Umma splendida* is probably only a synonym of the widespread *U. mesostigma* (Selys).

No comparison can be made between the fauna of Fernando Po and the other islands which we are to consider. There is affinity between the Odonata of Principe, São Tomé and Annobon.

Principe

I found no Principe records of Odonata in the Brigada do Fomento Agro-Pecuário in São Tomé.

Ceragrion glabrum (Burmeister, 1839)

Records: Martin (1908) (L. Fea).

Orthetrum africanum (Selys, 1887)

Records: Longfield (1936): 31. 12. 1932 (Tams).

Orthetrum brachiale kalai Longfield (1936)

Records: National Museum, Bulawayo: 5. 1. 1968 (A. S. Aiken).

Distribution: Widespread in the Continental Ethiopian Region, except in the colder parts of Southern Africa.

Orthetrum julia julia Kirby (1900)

Records: Longfield (1936, as *stemmale capense*), 19. 12. 1932 (Tams); National Museum, Bulawayo, 5. 1. 1968 (A. S. Aiken).

Palpopleura lucia (Drury, 1773)

as f. *lucia* only

Records: Longfield (1936): 14. 12. 1932, 1. 1. 1933 (Tams); National Museum, Bulawayo: 5. 1956 (F. Simmonds), 3. 1. 1968, 5. 1. 1968 (A. S. Aiken).

Trithemis nigra Longfield (1936)

Trithemis donaldsoni nigra Longfield, 1936, Trans. R. ent. Soc. Lond. 85: 491, figs.

Described as a race of *T. donaldsoni* (Calvert, 1899), this can now be regarded as a distinct species (vide Pinhey, 1970 a: 139), nearer to *aconita* Liefstinck (1971) than to *donaldsoni*.

Records: Longfield (1936): Holotype and paratype ♂ in British Mus. (Nat. Hist.), Ogui Pipi, 1. 1. 1933, 7. 12. 1932 (Tams).

Distribution: Only known from Principe.

Pantala flavescens (Fabricius, 1798)

Records: Martin (1908) (L. Fea).

Principe has the single interesting endemic species, *Trithemis nigra* Longfield.

São Tomé

The collections from São Tomé are more extensive than for Principe or Annobon, in the same faunistic zone. Only two are recorded by Martin (1908) from the Leonardo Fea visit to the island. Some are reported by Campion (1923) from collections made by A. F. de Scabra and H. J. Snell in 1921—22. These are in the British Museum (Nat. Hist.). A few species were identified (1964) by the present author in the Centro de Zoologia, in Lisbon. Arthur Aiken presented a few specimens to the National Museum, Bulawayo (N. M. B.), which also has the material I collected on the island in April—May 1971, and on that visit I was able to identify the collection of Odonata in the Brigada do Fomento Agro-Pecuário at S. Tomé (Brigada).

Ceragrion glabrum (Burmeister, 1839)

Records: Campion (1923) (Scabra & Snell); N. M. B.: in swamp, S. W. of São Tomé town, 5. 1971 (Pinhey).

Anax imperator Leach (1815)

Records: N. M. B.: near São Tomé town, 4. 1971 (Pinhey).

Hemianax ephippiger (Burmeister, 1839)

Records: N. M. B.: swamp near São Tomé town, 4. 1971 (Pinhey).

Gynacantha spec. or *Helliaeschna* spec.

Examples of at least one species were seen by Pinhey near the town of S. Tomé and in Morro Peixe forest on four occasions altogether but they eluded capture. Forest species of these genera on an isolated island might be expected to be distinctive.

Orthetrum africanum (Selys, 1887)

Records: N. M. B.: Coé River, S. E. of the island, 30. 4. 1971 (Pinhey); also a probable sight record (Pinhey) at Boa Entrada.

Orthetrum brachiale (Beauvois, 1805)

Records: Longfield (1936): 22. 11. 1932 (Tams); Brigada: Bom Retiro, 14. 6. 1966; N. M. B.: São Tomé island, 12. 1969 (Aiken), Coé River, 30. 4. 1971 (Pinhey).

Orthetrum ? guineense Ris (1909)

Records: Campion (1923) (Scabra & Snell): a dubious record since at that date there was much confusion in this and other species of the genus. I suspect it may have been *julia*.

Orthetrum julia Kirby (1900)

All the many specimens I saw both alive and in the Brigada collection were the nominotypical race *julia*. This was the commonest species of

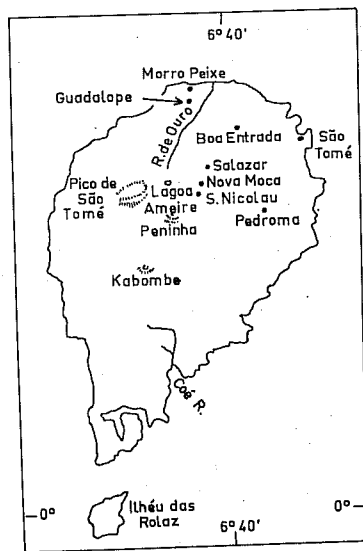


Fig. 4: São Tomé

Odonata on the island. Martin (1908) recorded an *Orthetrum* spec. indet., which may have been this species.

Records: Campion (1923) (Scabra & Snell); Longfield (1936), as *stem-male capense*: 31. 10. 1932, 19. 11. 1933 (Tams); Brigada (long series): São Tomé Experiment Station, 16. 5. 1966, 8. 6. 1966, Moinho, 12. 7. 1966, Pedroma, 26. 5. 1967; N. M. B.: São Tomé island, 31. 12. 1969 (A. S. Aiken), São Tomé town, 20. 4. 1971 (Pinhey), Roça Saudade, 20. 4. 1971, 21. 4. 1971 (Pinhey), Pousada Salazar, 21. 4. 1971 (Pinhey), Roça Saudade, 22. 4. 1971 (Pinhey), above Nova Moca, 23. 4. 1971 (Pinhey), near Boa Entrada, 27. 4. 1971 (Pinhey), Coé River, 30. 4. 1971 (Pinhey), Morro Peixe, 1—2. 5. 1971 (Pinhey).

Palpopleura lucia (Drury, 1773)

All material seen on the island is f. *lucia*.

Records: Martin (1908, as *marginata*) (L. Fea); Campion (1923) (Scabra & Snell); Longfield, 22. 11. 1932 (Tams); Brigada: Pedroma, 26. 5. 1967, Castelinha, 16. 2. 1969; N. M. B.: São Tomé island, 31. 12. 1967 (A. S. Aiken), near swamp, S. W. of São Tomé town, 20. 4. 1971 (Pinhey), Morro Peixe, 28. 4. 1971 (Pinhey), Coé River, 30. 4. 1971 (Pinhey).

Crocothemis erythraea (Brullé, 1832)

Records: Longfield (1936): 22 & 24. 11. 1932 (Tams); Brigada: Rio de Ouro, 20. 6. 1966; N. M. B.: near São Tomé town, 20. 4. 1971 (Pinhey).

Crocothemis sanguinolenta (Burmeister, 1839)

Libellula sanguinolenta Burmeister, 1839, Handb. Ent. 2: 859

Records: N. M. B.: S. of S. Tomé town, 20. 4. 1971 (Pinhey).

Distribution: Widespread in the Ethiopian Region.

Diplacodes lefebvrei (Rambur, 1842)

Records: Campion (1923) (Scabra & Snell); N. M. B.: near São Tomé town, 4. 1971 (Pinhey).

Pantala flavescens (Fabricius, 1798)

Records: Campion (1923) (Scabra & Snell); N. M. B.: São Tomé town, 28. 4. 1971 (Pinhey).

Tholymis tillarga (Fabricius, 1798)

Libellula tillarga Fabricius, 1798, Syst. Ent., Suppl.: 285

A crepuscular species. It was flying over swamp below trees where there was much shade but some beams of sunlight.

Records: N. M. B.: swamp S. W. of São Tomé town, 26. 4. 1971 (Pinhey).

Distribution: Widespread in the Ethiopian and Oriental Regions.

Tamea basilaris (Beauvois, 1805)

Libellula basilaris Beauvois, 1805, Ins. Afr. Amér.: 171

For years now I have adhered to *Trapezostigma* Hagen as the generic title having priority. Gloyd (1972) has convinced me that *Tamea* Hagen is the correct generic name, since *Trapezostigma* was never clearly defined.

Records: N. M. B.: Morro Peixe (outside forest), 2. 5. 1971 (Pinhey).

Distribution: Most parts of the Ethiopian and Oriental Regions.

If *Orthetrum guineense* Ris is regarded as an incorrect identification the number of species known to occur on São Tomé is 15, if we consider there to be only one species of Gynacanthinae. No endemic species is known, but there is a strong possibility that the *Gynacantha* or *Heliaeschna* I saw is an unnamed species.

Ichnura senegalensis (Rambur) has been recorded from Annobon island and it is possible that it does occur or has occurred on São Tomé, but I did not see it even near the swamp. Nor did I see any *Zygonyx* Hagen (1867) near any of the waterfalls or swift-flowing streams.

Annobon

Only a few records are available since very little collecting has been carried out on this distant island.

Ichnura senegalensis (Rambur, 1842)

Agrion senegalense Rambur, 1842, Névroptères 17: 276

Records: Martin (1908) (L. Fea).

Distribution: Most of Africa and many parts of Asia.

Anax imperator Leach (1815)

Aeschna formosa van der Linden, 1823, Opusc. Sci. 4: 158

Records: Martin (1908), as *Anax formosus* (L. Fea).

Orthetrum brachiale (Beauvois, 1805)

Records: N. M. B.: Annobon, 3. 3. 1964 (F. Cohic).

Palpopleura lucia (Drury, 1773)

Records: Martin (1908), as *marginatum* (L. Fea).

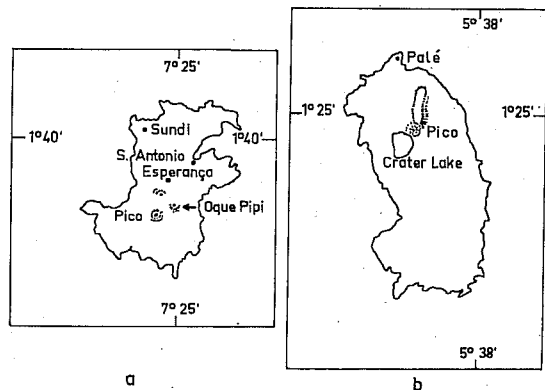


Fig. 5: a. Principe. b. Annobon

Zygonyx spec. indet.

This discovery on the island of a species whose genus breeds in fast running waters is of interest as the only waterfall species found so far in all these mountainous islands.

Records: Longfield (1936), as *Pseudomacromia* spec., Annobon, 16. 2. 1933 (Tams).

Tramea basilaris (Beauvois, 1805)

Records: Martin (1908) (L. Fea).

The records on Annobon cover 6 species with no known endemics. The species of *Zygonyx* may possibly be distinctive, since the island is so far from the mainland. Odonata breeding in fast clear waters are not likely to stray far from their habitats.

Correlation of the Odonata fauna of Principe, São Tomé and Annobon

In the above records the only species common to all three islands are *Orthetrum brachiale* (Beauvois) and *Palpopleura lucia* (Drury). It is probable that *Ceriatrion glabrum* (Burmeister) and *Orthetrum julia* Kirby exist on all three. *Anax imperator* Leach, *Pantala flavescens* (Fabricius) and *Tramea basilaris* (Beauvois) are probably visiting migrants.

Compared to other Orders, particularly Lepidoptera, rich in species or subspecies only known from these islands, the few endemics are remarkable for their paucity. The prevalence of widespread species in restricted territories may inhibit further competition.

St. Helena

Free freshwater is apparently very limited on this cool island. I have records of only one species, but it is a very interesting one.

Sympetrum dilatatum (Calvert, 1892)

Diplax dilatata Calvert, 1892, Trans. Amer. ent. Soc. 19: 161. Calvert also gave an original description in 1893 (Proc. U. S. Nat. Mus. 16: 582), in C. V. Riley's paper. The specimens were collected on the U. S. Eclipse Expedition to West African, 1889—90.

Records: Types in U. S. Nat. Museum, paratype ♂ in Philadelphia Academy of Sciences, and there are specimens also in the British Museum (Nat. Hist.).

N. M. B.: Green Hill, 1 ♀, 13. 10. 1963 (S. D. Peters; submitted by A. Loveridge).

The ♀ has a hindwing 36 mm. It must be one of the largest species of this widespread genus.

Distribution: Only known from St. Helena. Loveridge, in correspondence, considered it scarce, possibly dying out.

A single species which is also endemic.

Ascension Island

Although an equatorial island I have seen no records of Odonata. The sparse vegetation and low rainfall may account for the lack of predatory insects.

Tristan da Cunha

Although there is freshwater on this island, I can find no Odonata records. Its latitude, however, is very far south, and the waters may be too cold for most Odonata, even migrants.

Summary

This is the second paper (see Pinhey, 1971) on the Odonata of this part of Cameroons and of Fernando Po collected by W. Hartwig, under the leadership of Prof. Dr. M. Eisentraut. In addition, the Guinea Gulf islands southwards from

Fernando Po are briefly described, historically and from a general topographical and vegetational aspect.

The Cameroons coastal area has long been known to be rich in insect fauna, including Odonata, but only a survey of the entire Cameroons would satisfactorily delimit the more interesting species and the endemics. Fernando Po is so close to the Mainland at Victoria that its Odonata fauna would not be considered distinct. Yet a few endemics are known there.

Príncipe, São Tomé and Annobon are much more distant from the mainland and have been so well forested and isolated so long that there are many endemic insects known there. However, in Odonata, only *Trithemis nigra* Longfield of Príncipe is a definite endemic. An Aeshnid I failed to catch on São Tomé may prove to be endemic when captured, since it is a forest species.

St. Helena, Tristan da Cunha and Ascension islands are even more distant and isolated but rather bleak and with poor vegetation, little fresh water. Only *Sympetrum dilatatum* (Calvert) is a known endemic from these islands.

The more interesting species and the endemics and the lack of others are discussed here. Two new species from the Cameroons mainland are described: *Chlorocnemis eisentrauti* spec. nov. and *Macromia camerunica* spec. nov.

Zusammenfassung

Die vorstehende Arbeit ist eine zweite Mitteilung (erste: Pinhey, 1971) über die Odonata, die während einer von Prof. Dr. M. Eisenraut geleiteten Expedition nach Kamerun und Fernando Po dort von Herrn W. Hartwig gesammelt wurden. Außerdem werden die auf den südlich von Fernando Po im Golf von Guinea und im südlichen Atlantik gelegenen Inseln gefundenen Odonaten-Arten zusammengestellt, und es wird eine kurze Beschreibung dieser Inseln, vor allem von topographischen und vegetationskundlichen Gesichtspunkten, gegeben.

Es ist lange bekannt, daß das Küstengebiet von Kamerun eine reiche Insektenfauna, einschließlich vieler Odonata, besitzt, aber nur eine auf ganz Kamerun ausgedehnte Untersuchung könnte die Zahl der endemischen oder sonstwie bemerkenswerten Arten feststellen.

Fernando Po liegt dem Festland so nahe, daß seine Odonatenfauna nicht sehr von der Kameruns verschieden ist; dennoch sind von dieser Insel einige Endemiten bekannt.

Die Inseln Príncipe, São Tomé und Annobon sind viel weiter vom Festland entfernt, waren dicht bewaldet und so lange isoliert, daß es nicht verwunderlich ist, daß von ihnen viele endemische Insekten bekannt sind. Unter den Odonata ist aber nur *Trithemis nigra* Longfield von Príncipe ein sicherer Endemit. Eine auf São Tomé gehörende, aber nicht erbeutete waldbewohnende Aeshnide dürfte sich aber, wenn ihr Fang einmal gelingt, ebenfalls als endemisch erweisen.

St. Helena, Tristan da Cunha und Ascension liegen noch weiter vom Festland entfernt und haben eine verhältnismäßig ärmliche Vegetation und wenig Süßwasser. Die einzige endemische Odonatenform dieser Inseln ist *Sympetrum dilatatum* (Calvert) von St. Helena.

Die Endemiten oder aus anderen Gründen interessante Arten der in der vorstehenden Arbeit behandelten Gebiete werden diskutiert. Zwei neue Arten werden aus Kamerun beschrieben: *Chlorocnemis eisentrauti* spec. nov. und *Macromia camerunica* spec. nov.

References

- References excluded may be found in the Descriptive Catalogue of the Odonata of the African Continent (Pinhey, 1962).
- Calvert, P. (1892): Preliminary Notes on some African Odonata. Amer. ent. Soc. 19: 161-4
- (1893): Pseudoneuroptera, in: Scientific Results of the U. S. Eclipse Expedition to West Africa, 1889-90. Proc. U. S. natn. Mus. 16 (951): 582-583
- Campion, H. (1923): Notes on Dragonflies from the Old World Islands of São Tomé, Rodriguez, Cocos-Keeling and Loo Choo. Ann. Mag. nat. Hist. (9) 11: 22-27
- Carvalho, J. de (1968): Notas sobre a Reunião de Entomologistas Realizada em São Tomé e Príncipe de 8 a 22 de Agosto de 1967. Inst. Invest. agron., Angola, Sér. Techn. 1: 1-16
- Exell, A. W. (1944): The Vascular Plants of S. Tomé. London (British Museum, Nat. Hist.)
- Fraser, F. C. (1954, May): New species of *Macromia* from Tropical Africa. Revue Zool.-Bot. afr. 49 (1-2): 41-76
- Gambles, R. M. (1970, March): A new species of *Megapodagrion* from Continental Africa. Entomologist 103: 53-61
- Gloyd, L. K. (1972, Sept.): *Tranea*, *Trapezostigma* and *Time* (Anis: Libell.). A nomenclatural problem. Odonatologica 1 (3): 131-136
- Lieftinck, M. A. (1969): Odonata Anisoptera, in Symoen's J. J. Explor. Hydrobiol. Bassin Lac Bangweolo-Luapula 14 (4): 1-64
- Longfield, C. (1936, Dec.): Studies on African Odonata, with synonymy, and descriptions of new species and subspecies. Trans. R. ent. Soc. Lond. 85 (20): 467-498
- (1955): The Odonata of N. Angola, 1. Publicações. cult. Co. Diam., Angola 27: 11-64
- Loveridge, A. (1963): St. Helena's Last Dragonfly? St. Helena Wirebird 3: 777-778
- Martin, R. (1908): Voyage de Feu Leonardo Fea dans l'Afrique Occidentale. Odonates. Annali Mus. civ. Stor. Giacomo Doria, Genova 3 (43): 649-667
- Navás, L. (1922): Insectos de Fernando Poo (Odonata). Treb. Mus. civ. Nat. Barcelona 4: 109-16
- Pinhey, E. C. G. (1961): Dragonflies collected on an expedition from Rhodesia to Nigeria in 1958. Part I. Entomologists' mon. Mag. 96: 256-71; pt. 2, l. c. 97: 101-114
- (1962): A Descriptive Catalogue of the Odonata of the African Continent (up to Dec. 1959), pls. 1-2. Publicações. cult. Co. Diam. Angola 59: 1-323
- (1963): Notes on both sexes of some tropical species of *Ceragrion* Selys (Odon.) Ann. Mag. nat. Hist. (13) 6: 17-28
- (1964, March): The St. Helena Dragonfly (Odon: Libell.). *Arnoldia* (Rhodesia) 1 (2): 1-3
- (1967, March): African Chlorocyphidae (Odon.). J. ent. Soc. sth. Afr. 29: 161-97
- (1969, April): On the genus *Umma* Kirby (Odon.). *Arnoldia* (Rhod.) 4 (17): 1-11
- (1970 a, March): A Monographic Study of the genus *Trithemis* Brauer (Odon: Libell.). Mem. ent. Soc. sth. Afr. 11: 1-159
- (1970 b, July): A new approach to African *Orthetrum* (Odon.). Occ. Pap. nat. Mus. Rhod. 4 (B) (30): 260-321
- (1971, Sept.): Odonata of Fernando Po Island and of neighbouring Cameroons Territory. J. ent. Soc. sth. Afr. 34 (2): 215-230

- Ris, F. (1911): Libellulinen monographisch bearbeitet. Cat. Coll. zool. Selys 13: 529—700
- Schmidt, E. (1951): Über neue und weniger bekannte afrikanische Platycnemididen (Odon.). Mitt. Münch. ent. Ges. 41: 217—240
- Tams, W. H. T. (1933, Oct.): A visit to the islands in the Gulf of Guinea. Nat. Hist. Mag. 4 (28): 126—137
- (1934, Jan.): Idem, ibid. 4 (29): 161—176
- (1934, April): Idem, ibid. 4 (30): 198—218
- (1934, Aug.): The Percy Sladen and Godman Trusts Expedition to the islands in the Guinea Gulf, Oct. 1932 — March 1933. 1. Introduction. Ann. Mag. nat. Hist. (10) 14: 213—219
- Viette, P. (1956, Dec.): Mission entomologique dans les îles du Golfe de Guinée (Principe, São Tomé, Annobon). Bull. Soc. ent. Fr. 61: 200—208

Address of the author: Dr. Elliot Pinhey, National Museum, P. O. Box 240, Bulawayo, Rhodesia.

Buchbesprechungen

Ewald, G. (1973): Führer zur biologischen Fachliteratur. Uni-Taschenbücher 211. Mit 173 S., 6 Abb. Stuttgart (Gustav Fischer Verlag).

Mit der geometrischen Progression des Schrifttums wird es immer vordringlicher, rationale Verfahren der Literatursuche, Erfassung und des Zitierens anzuwenden und zu beherrschen. Die vorliegende Zusammenstellung ist hier sicherlich eine wertvolle Hilfe. Nach Darlegung von Wegen, möglichst schnell die Literatur eines Themenbereichs zu erfassen, wird die Arbeitsweise an einem speziellen Fall erläutert. Es folgen Hinweise zur Anlage und Erschließung einer Literaturkartei und eine Besprechung der wichtigsten Referateorgane in Zoologie und Botanik. Besonders wertvoll und beherzigenswert sind die Überlegungen zur Anlage von Schriftenverzeichnissen in Publikationen wie auch eine Liste gängiger Abkürzungen bei Titelaufnahmen. Ein knapp und klar gefaßter, sehr nützlicher Ratgeber.

J. Niethammer

Grau, H. (1974): Vergleichende Darstellung des Lymphgefäßsystems der Säugetiere. Fortschritte der Veterinärmedizin, Beihefte zum Zentralblatt für Veterinärmedizin 19. Mit 82 S. und 31 Abb. Hamburg und Berlin (Paul Parey).

Ausgehend von einem allgemeinen Schema werden, geordnet nach Körperregionen (Kopf, Hals, Vorderextremitäten etc.), die Verteilung der Lymphknoten und Lymphknotengruppen (Lymphozentren) sowie der Lymphbahnen beschrieben und durch Abbildungen illustriert. Der Versuch einer Homologisierung und Vereinheitlichung der Terminologie ist als besonderes Verdienst dieser gediegenen Übersicht hervorzuheben. Da in der Hauptsache umfassende Befunde vor allem für Mensch und Haustiere vorliegen, ist ein vollständiges Bild der Evolution und funktionellen Abwandlung des Lymphsystems ein Fernziel, in dessen Richtung die vorliegende Arbeit einen großen Schritt getan hat. Ursprüngliche Säuger scheinen danach weniger Lymphozentren (nicht weniger Lymphknoten) zu besitzen als evolvierte. Vor allem in der Peripherie können sie fehlen, wie bei den Faultieren, bei denen der Mangel an Lymphknoten im Kopf aber auch funktionelle Bedeutung haben mag.

Zu bemängeln sind manche, veraltete Säugetiernamen (so *Troglyodytes niger* S. 6, *Arctomys marmota*, *Mioxis glis* S. 7). Das Zitat von den Brink S. 6 ist im vorliegenden Zusammenhang nicht sinnvoll. Tabellarische Zusammenfassungen und ein enger Bezug zum natürlichen System der Säugetiere würden den Wert der an sich guten Arbeit steigern.

J. Niethammer

Kaestner, A. (1973): Lehrbuch der Speziellen Zoologie. Bd. 1: Wirbellose, 3. Teil: Insecta B. Spezieller Teil. Mit 631 S. und 405 Abb. VEB Gustav Fischer Verlag Jena.

Pünktlich wie im allgemeinen Insektenteil angekündigt (Besprechung hier 24: 160) liegt nun der weitaus umfangreichere, spezielle Band vor, in dem die 33 Ordnungen der Insekten der Reihe nach abgehandelt werden. Die Gliederung und Anordnung des Stoffes entspricht der früher bearbeiteter Gruppen, insbesondere der der übrigen Arthropoden. Eine Wiedergabe der allgemeinen Merkmale in Anatomie, Physiologie und Lebensweise, aberranter Erscheinungen, das Herausstellen neuer Befunde und die Formenübersicht gestalten den so formen- und problemreichen Insektenteil zu einer ungemein fesselnden Lektüre. Gerade hier äußert sich auch wieder die Meisterschaft in der treffenden Auswahl wissenschaftlicher Fakten, ihrer klaren und doch gründlichen Darlegung.

Das in mancher Hinsicht vom Gewohnten abweichende System folgt bewußt phylogenetischen Gesichtspunkten. Die „herkömmlicherweise als Ordnungen bezeichneten taxonomischen Einheiten (sind) keineswegs genealogisch gleichwertig“. Der schwierige Kompromiß zwischen den widerstreitenden Erfordernissen, in einem