THE ATOCONEURA PROBLEM (ODON., LIBELLULIDAE)

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SPECIMENS OF THE libellulid genus *Atoconeura* Karsch (1) were for long extremely scarce in collections from the African Continent. Karsch in 1899 described the genotype from one juvenile female from Tanganyika and it was not until 1906 that Förster described the male from one specimen from the same country (2). Up to 1919 only twelve more specimens seem to have been known, one of which had been described in 1909 by Kirby as *Accaphila eudoxia* (3). Ris placed these fourteen specimens under Karsch's *Atoconeura biordinata* (4). Three came from Ruwenzori Mountain, the rest from central east Africa (5). Even fewer specimens reached museums during the next fifteen years and as far as the British Museum (Nat. Hist.) was concerned, they possessed only the battered teneral male and female from Ruwenzori collected by Scott-Elliot in 1895 and identified by Ris; one complete male labelled 'Nairobi' taken in 1926 and the complete male type of *A. eudoxia* from the Mubuku Valley, Ruwenzori, 1906. In 1934 I took a male in the forest near Meru village on the eastern slope of Mt. Kenya. This resembled the previous specimen labelled 'Nairobi' in its slightly smaller dimensions and extreme pruinosity, and had the entire inferior appendage of *A. biordinata.* The British Museum East African Expedition of 1934-35 visited the east and south slopes of the Ruwenzori Mountain Range and in 1935 two males reached the museum, one from the Mpanga Forest, near Fort Portal, and one from Bikoni Peak above the Mobuku (Mubuku) Valley. I do not consider it strange that, on comparing these specimens with the type of *A. eudoxia* from the same locality, and finding that the only apparent difference was the deeply bifid inferior appendage of the *eudoxia* type, I thought this a structural abnormality. As I was going to Uganda in the winter of 1937, I arranged a visit to the Mobuku Valley and the forest on Bikoni Peak, and there captured another male, also with the entire inferior appendage of *A. biordinata.* On returning to the British Museum early in 1938, I found a further collection from the museum expedition to Ruwenzori, in which were two males and a female of *Atoconeura* taken by D. R. Buxton in the Nyamgasani Valley on the south, and a male from the adjacent Namwamba Valley taken by T. H. E. Jackson. All three males had the bifid inferior appendage of *A. eudoxia* Kirby.

Undoubtedly there were two distinct species of *Atoconeura* occurring in the Ruwenzori mountains, but now a further difficulty arose. Was the species with the entire inferior appendage the same as Karsch's *A. biordinata*? Was there, also, another species of *Atoconeura* in Kenya? The two males from there, besides size and pruinosity, showed slight differences in colour-pattern and considerably lighter colour on the head, and what would appear to be more important still, a slight difference in the shape of the male anal appendages. Still I could not be sure which was *biordinata,* and Karsch's type was a very immature female which was not very helpful. I obviously needed all the

specimens possible to study and I am most indebted to the Congo Museum, Tervuren, Belgium, for letting me see the two they had (6). Both were in excellent condition and belonged to the two different species, *biordinata* and *eudoxia.* The genus was not included in the de Selys collection in Brussels, but I hoped later to see the three in the Paris Museum, identified by Ris. Just then, a series of ten specimens in very good condition, arrived at the British Museum from Tanganyika, collected by B. Cooper during the winter 1937-38 on West Kilimandjaro and the neighbouring mountain of Meru. These were four males with entire inferior appendages and six females, of which four showed a greater resemblance to the Kenya specimens, than to the Ruwenzori ones; which again raised doubts as to how many species there could be. Obviously the first task was to see the type of *biordinata* in Berlin, which I hoped to do in the summer of 1938. Instead I found myself invalided for a year by an operation and soon after my return to work, the war started and I forsook dragonflies for five years. When I resumed the subject once more, I was able to examine the five specimens in the Stockholm Museum, all from Tanganyika. I was still hopeful that before long I would be able to see the type female from the Berlin Museum, but by now I have quite given up any prospect of doing so. Neither Drs. Ramme or Hering can find the specimen, so I am informed. I have therefore decided to call all Tanganyika specimens *A. b. biordinata,* and to include a few others from neighbouring countries, such as Nyasaland. My decision has been greatly strengthened by the post-war collecting of more specimens of *Atoconeura* than ever previously taken. I am exceedingly grateful to J. A. Whellan in Southern Rhodesia, for collecting and sending me eight specimens; to Dr. Van Someren for the loan of five specimens taken recently in Kenya, and to Elliot Pinhey for the gift of six more and detailed notes on several other specimens now in the Coryndon Museum, Nairobi, mostly taken by himself. Pinhey, I know, is of the opinion that the Kenya and Tanganyika-Rhodesia specimens deserve specific rank. He notes constant difference in colour-pattern and dimensions. But in the series I have examined, there have always been one or two specimens that did not exactly conform to either group and I prefer to give them only subspecific rank. Those with the entire inferior male appendages, found on Ruwenzori together with *A. eudoxia* with the bifid inferior appendages, closely resemble the latter species in size and colour-pattern. *A. extraordinata* Fraser (1950) (7), is of course *A. eudoxia* Kirby (1909). The males came from Bwamba Province, Uganda, on the N.W. slopes of Ruwenzori. I have seen one male like typical *eudoxia,* from the Congo Museum, taken in 1937 at Usumbura, which is at the northern end of Lake Tanganyika, many miles south of Ruwenzori, but still connected by the same Rift Valley formation. A few males of *eudoxia* from the Kaimosi Forest, which is a relict forest near Kakamega, N. Kavirondo, W. Kenya, are not sufficiently different to form a separate subspecies.

The typical subspecies of *A. biordinata* happens to be the most variable. The type female came from Kitope in November, 1894, in the high uplands on a tributary of the Rufigi River at about 8½° S. The first male to be known, Förster's *A. leopardina,* came from Nguelo in the east of Usumbura Province, at about 5° S. Most of those taken since have been in Arusha Province at about 3° S., but one comes from Katentania on the Katanga Plateau, Belgian Congo, north-west of Elizabethville, at about 11½° S. and 28° E. This specimen shows some of the pattern characteristics of the Ruwenzori subspecies. One male which Ris used to illustrate the genitalia and wings, was said to have come from the Cameroons. The Arusha series vary considerably and in some, the colour-pattern resembles the subspecies from the Kenya Highlands, to a slight extent. All the Kenya subspecies are from the more open forest areas between 2° N. and 2° S., and are much more uniform than *A. b. biordinata.* Another quite well-defined subspecies is to be found in the Melsetter District of Southern Rhodesia at about 20° S., but two males taken a degree further north, near Umtali, are not so easily differentiated from the typical subspecies of Tanganyika.

The genus *Atoconeura* inhabits forested regions and swift rivers from between about 4,000 and 9,000 feet altitude, and it is obvious that the dragonfly has been isolated for many generations in certain mountain and highland areas. The general appearance is of a black and yellow corduline-looking libellulid, with moderately slender abdomen usually considerably shorter than the hindwings and widening in the males from the 6th to 9th segments. The extent of this width varies with the species and subspecies, but all have an oval yellow spot of varying size on the dorsum of the 7th segment. All have the thorax, dorsally and laterally, gleaming with a dark blue-green metallic sheen and covered, mostly laterally, with a yellow pattern composed of 6 to 10 separate streaks or spots. The amount of 'spotting' is not dependent on the age of the insect, but is usually less in the females. The opposite is mostly true of the spots and patches of yellow on the abdomen. In the subspecies *A. b. kenya,* the males develop very early a pale blue pruinosity which, at maturity, entirely hides all markings except the yellow spot on the 7th abdominal segment. The eyes are a brilliant blue-green in life. The frons and vertex have, except in very teneral specimens, a certain amount of light metallic-blue above and various shades of pigment below. The labium, labrum and clypeus are a bright chrome-yellow, more or less patterned with black. It is in the extent and shape of the dark pigments of the head, that the most differentiation between the subspecies occurs. Exceedingly little difference is to be found in the secondary genitalia beneath the 2nd segment of the male, or in the shape of the vulvar scale in the female. Greater differences can be seen in the shape and length of the upper anal appendages in both sexes and the lower anal appendage in the male, but gradations can still be found between all these, throughout the range of the genus. The venation is extremely variable and a quite unreliable character. In most of the females there is some colouring at the base of the wings, greater in *A. b. biordinata* than in any other subspecies, and it takes the form of yellow or amber streaks distad to the first cross-veins. Many specimens show more or less yellow-tinged wings, not necessarily uniform in one subspecies, but usually entirely absent in the males of *A. b. kenya.* The female of *A. eudoxia* is the only one I have seen with 'smoky' wing tips. The colour of the membranule (membrane) would seem to be surprisingly constant in the different subspecies, but is also partly dependent on the age of the specimen.

Atoconeura eudoxia (Kirby)

Accaphila eudoxia Kirby 1909 (Type ♂ B.M. coll.)

Atoconeura extraordinata Fraser 1950 (2 ♂ ♂ Fraser coll.)

MATERIAL.—Uganda: 1 ♂ Mubuku Valley (Type 1906), Allotype ♀ and 2 ♂ ♂ Nyamgasani Valley, December, 1934, 1 ♀ Wawamba Co. 1895, 1 ♂ Namwamba Valley, January, 1935 (B.M. coll.); 2 ♂ ♂ Bwamba Pro. (Fraser coll.); a series of males and females Kigezi Dist. (Coryndon Mus.). Belgian Congo: 1 ♂ Usumbura, January, 1933 (Congo Mus. Tervuren). Kenya: 2 ♂ ♂ Kaimosi Forest, January, 1951 (B.M. coll.); a series of males, Kaimosi Forest, 1951 (Coryndon Mus.).

For a very full description and illustrations of the male anal appendages, see Fraser's paper on *A. extraordinata,* Fig. 1 a, b, c (7).

The following are the differences between *eudoxia* type male and the Bwamba specimens taken the opposite side of the Ruwenzori mountain range. Type male: Abd. 32 mm., Hw. 34 mm., Pt. 4 mm. Blue-green metallic reflex also laterally on thorax. Yellow spot above mid coxa oblong. Third lateral stripe not so narrow as the previous two and joined to spot above post coxa. Rather less than half metepimeron yellow. Legs a deep black, inner surface of anterior coxa and trochanter, as well as two-thirds of femur yellow. Membrane uniform grey. Pt. covers one large cell in centre and portions of those on either side. Nodal index $\frac{7\text{–}11 \mid 11\text{–}7}{8\text{–}9 \mid 9\text{–}8}$; cells of discoidal

field in left fw. 3 then 2. Anal loop with no split cells. Yellow on dorsum of abdomen considerably more on 1 and 2 and on sides of 1 to 3 and 6, also an elongate mark laterally on 7 and 9 and a roundish spot on 8 beneath the lateral longitudinal carina. Segments 4 to 6 are narrow and cylindrical, but the lateral carinae are beginning on them and by seg. 7 have become very prominent. Kirby's description was extremely sparse and somewhat misleading. He mentions that the 2nd and 3rd segments are carinated, but fails to add 'transversally', while he omits all mention of the progressively prominent longitudinal lateral carination from the 3rd segment. From the description, no one would ever have known that the inferior anal appendage was widely bifid. It is this feature, so deeply cleft and widely splayed apart, that distinguishes this species from all others. Pl. I.F. Viewed from this side the superior appendages are very thick through the 'instep' of the 'foot' and the inferior appendage just reaches to the 'heel'. Pl. I.D. The black on the labium is cone-shaped and reaches to the labrum, which is all black. Pl. I.i. The males from Kaimosi Forest, show no difference in structure, except being a little smaller: Abd. 30, Hw. 33 mm. There are slight differences in colour, but possibly only due to the higher temperature in which they live. The yellow streaks on the thorax laterally are somewhat more pronounced; the frons is entirely metallic-blue above; the wings are entirely tinged yellow and show a trace of saffron in the cubital space of the headwings; the membranule is light-brown instead of grey. There is a slight trace of pruinescence beneath the body.

The female closely resembles the male type, but has even less metallic-blue on the frons. There is some saffron-colour at the base of all wings, covering two-thirds of all spaces, except the median, and one-quarter of the median space in the hindwings. Faint smoky tips to all the wings, not extending further distad than the pterostigma. The discoidal cells are crossed in the forewings and the discoidal field varies from 3 to 2 rows. Nodal index $\frac{8\text{–}12 \mid 10\text{–}8}{8\text{–}8 \mid 9\text{–}9}$; Abd. 31 mm., Hw. 34 mm., Pt. 3.5 mm. The cerci and paraprocts are as in Pl. I.6., the latter being almost smooth.

Atoconeura biordinata biordinata Karsch

Atoconeura biordinata Karsch 1899 (Type ♀ Berlin Mus.).

Atoconeura leopardina Förster 1906 (1 ♂ Ann Arbor coll.)

MATERIAL:— Tanganyika (German East Africa): 1 ♀ Kitope, November, 1894 (type species 1899); 1 ♂ East Usumbura (type *A. leopardina*); 1 ♀ Bulongwe, September, 1899 (Grünberg coll.); 1 ♀ Central Africa (Paris Mus.); 1 ♂ Kilimandjaro, Kibonoto, May, 1906, 2 ♀ ♀ lower Mt. Meru, December, 1905, 1 ♂ and 1 ♀ Manow, near Lake Nyasa (Stockholm Mus.); 2 ♂ ♂ and 3 ♀ ♀ W-Kilimandjaro, 2 ♂ ♂ and 3 ♀ ♀ Mt. Meru, December, 1937-February, 1938 (B.M. coll.); 1 ♂ Arusha, February, 1950, 1 ♂ Amani, March, 1950 (Coryndon Mus.); 1 ♂ and 2 ♀ ♀ Ugano, January-April, 1936 (Vienna Mus.) (8). Nyasaland: 1 ♂ Nyasa (Paris Mus.); 2 ♀ ♀ Mzimba (Coryndon Mus.). Belgian Congo: 1 ♂ Katentania (Congo Mus., Tervuren).

A rather large insect, varying in measurements: ♂ Abd. 28-29 mm., Hw. 30-34 mm., Pt. 3 mm.; ♀ Ab. 30-31 mm., Hw. 32-34 mm., Pt. 3-3.5 mm. Hard to distinguish from *A. eudoxia* except by the male inferior appendage being entire; the wings in both sexes and all subspecies being a little narrower and the 'toe' of the anal loop slightly more pointed. Both sexes have the black on the labium usually of the form as in Pl. I.4., but a few specimens more nearly resemble Pl. I.3., and others Pl. I.5. The male superior anal appendage viewed from the side, is as in Pl. I.A., with the inferior appendage reaching well below the 'heel'. The inferior appendage is almost straight across the tip, but curls upwards slightly and is furnished at either corner with a small knob, Pl. I.G. The female cerci are as in Pl. I.7., and the paraprocts are very hairy. The membranule is white in immature specimens, but is uniform pale-grey in adults.

Atoconeura biordinata pseudeudoxia ssp.n.

MATERIAL:— Uganda: Type ♂ Bikoni Peak, Mobuku Valley, 7,000ft., 30th December, 1937, 1 ♂ Bikoni Peak, Mobuku Valley, 7,500ft., 31st December, 1934, 1 ♂ Mpanga (Kibale) Forest, 25th January, 1935, 1 ♂ 'Ruwenzori', December, 1895 (B.M. coll.); ? ♂ ♂ Bwamba Prov. (Fraser coll.); 4 ♂ ♂ Bwamba Forest, April, 1951 (Coryndon Mus.).

The males from Bwamba on the N.W. of the Ruwenzori Range must belong to this subspecies from the exact illustration of the anal appendages by Fraser in his paper on *A. extraordinata,* Pl. I.d. and e. This subspecies is even closer to *A. eudoxia* in general appearance, than the previous one. No female is known, but when found, will be extremely difficult to determine. The nodal index of the type male is: $\frac{8–11\frac{1}{2} \mid 12\frac{1}{2}–8}{9–10 \mid 10–10}$; discoidal cells in fw. crossed. The membranule is white at the top and brownish-grey on the lower half.

Atoconeura biordinata chirinda ssp.n.

MATERIAL:— S. Rhodesia: Melsetter District: Type ♂ 27th December, 1948, and 4 paratype ♂ ♂ 18th November to 27th December, 1948 Chirinda Forest. Allotype ♀ 26th December, 1948 Chibudzana River, 1 ♀ 24th December, 1948 Chiriga River; Umtali District: 1 ♂ 4th December, 1947 (B.M. coll.), 1 ♂ February, 1948 (Coryndon Mus.).

A smaller subspecies. Males: Abd. 25-27 mm., Hw. 26-30 mm., Pt. 3 mm. Females: Abd. 27-29 mm., Hw. 28-30 mm., Pt. 3-3.5 mm. A very large percentage of the specimens have either one or both the discoidal cells in the forewings uncrossed (free). In having an all black labrum, no dorsal thoracic transverse yellow line, a dark front to frons when mature and no pruinescence, *A. b. chirinda* resembles *A. b. pseudeudoxia.* In having the clypeus all pale yellowish-white, very restricted metallic-blue on frons and absolutely no saffron on wing bases in the males, this subspecies resembles *A. b. kenya.* In the shape of the male anal appendages, in the extensive saffron at the base of the female wings and the pure white membranule when immature, the subspecies resembles *A. b. biordinata.* In the shape of the black on the labrum, Pl. I.3., and the brown edge to the white membranule in the adults, the subspecies is distinct. The female has the cerci about one-fourth shorter than *A. b. biordinata,* but the paraprocts are just as hairy, Pl. I.8. The Umtali males in size, lighter coloured front to frons and colour of membranule, more nearly resemble *A. b. biordinata.* Nodal Index of type male $\frac{7–10 \mid 10–7}{8–8 \mid 8–9}$; discoidal cells in forewing uncrossed. Nodal Index of type female $\frac{8–11 \mid 11–7}{9–9 \mid 9–8}$; discoidal cells in forewing uncrossed.

Atoconeura biordinata kenya ssp.n.

MATERIAL:—Kenya: Mt. Kenya: Type ♂ Mt. Kenya, Meru Village, 6,000ft., 29th January, 1934, 3 ♂ ♂ Nyeri, June, 1949. Allotype ♀ Thomson's Falls, April, 1950 (B.M. coll.); 8 ♂ ♂ Nyeri, June, 1949, 1 ♀ Burguret River, November, 1942, 1 ♀ Sagana River, December, 1948 (Coryndon Mus.); 3 ♂ ♂ Meru Village, 6,000ft., 1947 (Van Someren coll.). Aberdare Mts.: 1 ♂ Ruiru, 1 ♂ Katamayu River, March, 1942 (Van Someren coll.). Kenya Escarpment: 1 ♂ Rurunga, January, 1912 (Paris Mus.); 1 ♂ 'Nairobi', November, 1926 (B.M. coll.), 1 ♂ Elburgon, December, 1949, 2 ♂ ♂ Limuru, April, 1950, 1 ♀ Thomson's Falls, April, 1950 (Coryndon Mus.).

This is a fairly large subspecies, the males with always completely clear wings and very pruinose when mature. In both sexes the oval yellow spot on the dorsum of the 7th abdominal segment, is large and the abdomen in the male is rather more swollen between 6-10 segments, than in the type species. Type male nodal index $\frac{8–10 \mid 10–8}{9–8 \mid 8–9}$; discoidal cells in forewings crossed.

Measurements: Males: Abd. 28-29 mm, Hw. 34 mm., Pt. 3 mm; females: Abd. 30-32 mm, Hw. 32-33 mm, Pt. 3-3.5 mm.

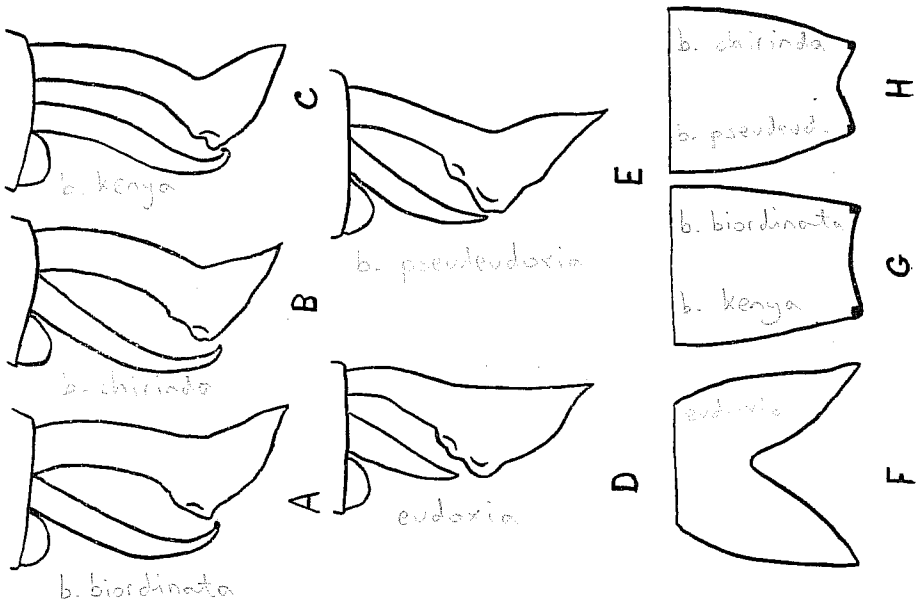
The allotype female has the smallest of the dimensions given above. Nodal index $\frac{8–11 \mid 10–8}{9–7 \mid 8–10}$; discoidal cells in forewing crossed. The insect is a dark brown with no pruinosity. There is a blue-green metallic reflex dorsally and laterally on the thorax, which is also marked with yellow dots and very small patches to the number of 10 each side. Dorsally only the following occur on the mesepisternum: a very fine centre line, a very fine transverse line anterior to the alar sinus and a short, narrow zig-zag stripe at the humeral suture. On the terga there are two small rectangular patches, one between each pair of wings. Thorax beneath pale yellowish-grey. Legs dark brown, with each coxa, trochanter and inner surface of femur, yellow. Wings hyaline with yellow saffroning only in the costal, subcostal and cubital spaces of all wings as far as the first cross-veins. Venation black, pterostigma greyish-yellow between thick black veins. The abdomen shows the yellow patches very clearly and disposed as follows: 1st segment, most of sides covered. 2nd, an oval patch ventrally, an elongated patch laterally, and a narrow dorsal longitudinal stripe. 3rd, a very narrow continuation of the dorsal stripe, a very fine anterior edging to the supplementary transverse carina, joined to a wider U mark at ventral end of the anterior half of segment and a horizontal oval patch laterally on the posterior half. 4th, an almost straight band round the anterior third and an elongated streak laterally along the remainder of the segment. 5th, the same band round the anterior fifth and a narrower and longer streak. 6th, with a very small anterior band not meeting dorsally and a very reduced streak. 7th, largely covered by the oval patch of the genus. 8th, 9th, 10th, edged ventrally with yellow, which forms a broad border to the sternites. Cerci short and blunt, and the paraprocts large, shiny black and not very hairy, Pl. I.9.

This seems to be the most distinct of the subspecies, but largely because of its generally lighter colour-pattern. It has, however, the largest amount of black on the labium and rather shorter and 'fatter' superior male anal appendages, which seem to be a fairly constant feature, Pl. I.C. Also the male inferior appendage is rather more furrowed at the tip, with the knobs at either corner more pointed and the whole is rather more curled upwards towards the superiors. The membranule is half white and half brownish, as in *A. b. pseudeudoxia.*

KEY

A. Black on labium (median and lateral lobes) in the form of a pointed cone (Pl. I. 1 and 2). Labrum all black. Postclypeus all black in centre. Frons reddish-brown above and dark brownish-grey on vertical front. No transverse yellow line on thorax dorsum anterior to alar sinus. No blue pruinosity on adult males. Male inferior appendage just reaching the 'heel' of superior appendage. Large insects.....A. (1) and (2).

A.(1) Male inferior appendage deeply bifid and splayed apart (Pl. I.F.). Male superior appendage very swollen across 'instep' (Pl. I.D.). Frons slight metallic-blue above. Yellow laterally on male 2nd abdominal segment in one continuous patch.....*A. eudoxia* Kirby.



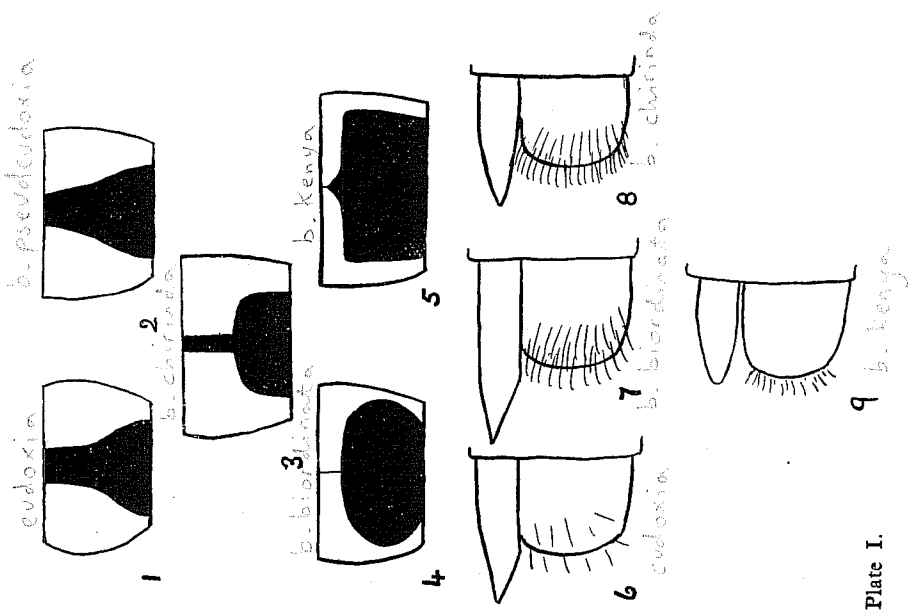


Plate I.

A.(2) Male inferior appendage entire, but with a dip in the centre tip (Pl. I.H.). Male superior appendage long and tapering (Pl. I.E.). Frons very metallic-blue above. Yellow laterally on male 2nd abdominal segment, one round and one wedge-shaped patch.
.....**A. biordinata pseudeudoxia ssp.n.**

B. Black on labium (median and lateral lobes) in the form of a large oval (with exceptions) (Pl. I.4.). Labrum yellow with a broad black edge Postclypeus with two black spots. Frons whitish or yellowish, brownish-grey on lower half of vertical front. Frons metallic-blue above reaching to forward edge in centre. A minute yellow transverse line or 'tick' on thorax dorsum anterior to alar sinus. No blue pruinosity in adult males. Yellow laterally on male 2nd abdominal segment, one round and one wedge-shaped patch. Male inferior appendage well below 'heel' of superior appendage (Pl. I.A.) Largish insects....*A. b. biordinata Karsch*

C. Black on the labium (median and lateral lobes) in the form of a pestle (Pl. I.3.). Labrum all black. Postclypeus all pale yellowish-white. Frons whitish or yellowish, brownish-grey on lower half of vertical front. Frons slightly metallic-blue above, but just reaching to forward edge in centre. No transverse yellow line on thorax dorsum anterior to alar sinus. No blue pruinosity on adult males. Yellow laterally on male 2nd abdominal segment, one round and one wedge-shaped patch. Male inferior appendage well below 'heel' of superior appendage (Pl. I.B.). Small insects.....**A. biordinata chirinda ssp.n.**

D. Black on labium (median and lateral lobes) more or less in the form of a pentagon (Pl. I.5.). Labrum all yellow. Postclypeus all pale yellowish-white. Frons bluish-white on vertical front and bluish-white or yellowish antero-dorsally above. Metallic-blue on frons above, never reaching to forward edge. A fine transverse yellow line on thorax dorsum, anterior to alar sinus. Pale blue pruinosity on adult males. Yellow laterally on male 2nd abdominal segment, one round and one wedge-shaped patch. Male inferior appendage well below 'heel' of superior appendage (Pl. I.C.). Largish insects.
.....**A. biordinata kenya ssp.n.**

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Plate I.—Labial patterns: 1, *A. eudoxia*; 2, *A. b. pseudeudoxia*; 3, *A. b. chirinda*; 4, *A. b. biordinata*; 5, *A. b. kenya*. Female anal appendages: 6, *A. eudoxia*; 7, *A. b. biordinata*; 8, *A. b. chirinda*; 9, *A. b. kenya*. Male anal appendages, lateral view: A, *A. b. biordinata*; B, *A. b. chirinda*; C, *A. b. kenya*; D, *A. eudoxia*; E, *A. b. pseudeudoxia*. Inferior appendage, ventral view: F, *A. eudoxia*; G, *A. b. biordinata* and *kenya*; H, *A. b. pseudeudoxia* and *chirinda*.