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## COMPARATIVE NOTES ON AN AFRICAN SPECIES OF *TRITHEMIS* BRAUER (ODONATA: LIBELLULIDAE) AND ITS CONGENERS

by

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### ABSTRACT

Types of *Trithemis donaldsoni* (Calvert) and *T. erlangeri* Förster were kindly made available by the respective Institutes where they are held. Some descriptions and notes are given on these types and on the closely related taxa, particularly *T. bifida* Pinhey. It is ascertained that the dark tone of body colour recorded in literature for type *donaldsoni* is due to post-mortem changes. It is confirmed that *erlangeri* is a synonym of *donaldsoni*, as suggested by Ris, and also that the material hitherto placed in *donaldsoni* from South and East Africa was correctly assigned. Previously recorded subspecies by Ris and Longfield were raised to specific rank by Pinhey (1970) but males sent more recently by Dejoux and Lindley are found to represent a separate west equatorial African taxon, *T. donaldsoni dejouxi* subsp. nov.

### INTRODUCTION

Dr. C. Dejoux has sent several consignments of Odonata from Ivory Coast for identification and amongst them were a few males of *Trithemis donaldsoni* (Calvert) which differed in one respect from all those I have collected or seen from East and South-east Africa. This was in the development of a yellow tinge, faint or well developed, on the wings. Neither juveniles nor adults of the eastern males have any saffronation, the wings being either clear-hyaline or, in old specimens partly smoky.

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When I revised the African *Trithemis* Brauer (1970) I was unable (as explained in that paper) to borrow the type ♂ of *donaldsoni* (Calvert) but this has now been possible in the present case. It was found that the dark appearance of the mature holotype, in contrast to the blue pruinose males known from other sources, was due to greasiness, the pruinosity being obliterated. In other respects the holotype is similar to the taxon hitherto regarded as true *donaldsoni* from South and East Africa.

Both R. Lindley and R. M. Gambles assisted with information in the investigations, the former providing more material of the western taxon of this species.

At the same time it seemed advisable to check the synonymy of *Trithemis erlangeri* Förster (1906). Ris (1912: 784) placed this into synonymy with *donaldsoni* from Förster's description. Since that time other African taxa have been described in this genus, one of them, *T. bifida* Pinhey (1970) being very close to *donaldsoni*.

## DESCRIPTIONS AND COMPARISONS

### The nomino typical *donaldsoni*

The principle references and synonymy for *T. donaldsoni* (Calvert) are the following:

*Pseudomacromia donaldsoni* Calvert, 1899: 235, fig. 5

*Trithemis donaldsoni donaldsoni* Ris, 1912: 782-784, fig. 446; Ris, 1919: 198

*Trithemis donaldsoni donaldsoni* Schouteden, 1934: 31

*Trithemis donaldsoni donaldsoni* Pinhey, 1951: 266, pls. 17-19

*Trithemis donaldsoni* Pinhey, 1962: 270 (with other refs.)

*Trithemis donaldsoni* Lieftinck, 1969: 47, fig. 9

*Trithemis donaldsoni* Pinhey, 1970: 39, 131, fig. 49

*Trithemis donaldsoni* Carfi, 1974: 151

*Trithemis erlangeri* Förster, 1906: 312, 313, Pl. A fig. 5 (syn., Ris, 1912)

The holotype ♂ was collected by Dr. A. Donaldson Smith during his expedition from Somalia through Ethiopia to Lake Rudolf in northern Kenya, in 1894. Calvert, in describing this species, placed it erroneously in *Pseudomacromia* Kirby, which is now regarded as a synonym of *Zygonyx* Hagen. Ris (1912) transferred it to its correct genus, *Trithemis* Brauer.

Calvert described the type from Stony Brook, Somalia, and said the body was "dull bluish black". Ris (1912) does not describe the type but other available specimens. Lieftinck who examined it (1969) said "the type is a very dark-coloured specimen".

There are certain points here which desire clarification. Carfi (1974) stated that Stony Brook is not now in Somalia and (in corresp., Oct. 1973) he indicated that this stream is actually a tributary of the Erer River in Ethiopia, at 42°7'S, 7°35'N. He also said that Förster's three males of *erlangeri* were not from Somalia, as at present known, but from Ethiopia. When the holotype *donaldsoni* was kindly loaned to me in July 1977 by the Philadelphia Academy of Natural Sciences it was apparent that the dark body-colour was due to the thorax being greasy. It has quite evidently lost its blue pruinosity, either through solvents or heat during preparation. The type *erlangeri*, loaned shortly afterwards, still retains a strong pruinosity.

*Remarks on holotype 'donaldsoni'.* This male is in good condition except for its greasy thorax. No pruinosity remains, the body being all brown to black and even the yellow abdominal streaks are almost obliterated, through post-mortem discoloration.

It bears the following labels:

1. a stained white label, handwritten "Stony Brook. Aug. 17, 1894" and attached to this is 2. a printed label "Dr. A. D. Smith, N.E. Africa, A. N. S. Phila."; 3. a red type label "TYPE" and, handwritten, "19268 *Pseudomacromia donaldsoni* Calvert".

*Descriptive notes.* Labium black on posterior lobe, broadly black on inner portions of lateral lobes; labrum all black; rest of face in front ochraceous, t. anteclypeus black on dorsal section; frons and vertex black with very dark violet blue reflections.

Wings somewhat brown-fumose distally, clear in basal areas. Abdominal pattern faintly showing a single row of short yellow streaks on either side. Accessory genitalia as figured by Pinhey (1970, fig. 49); anterior lamina with U-shaped apical bifurcation; genital lobe of even width until it narrows to apex. Size of specimen similar to those recorded in East and south-east Africa, which are rather uniform.

*Specimens in National Museum, Bulawayo.* All mature males from eastern Africa are coated with blue pruinosity more or less covering thorax and base of abdomen, sometimes nearly all the abdomen. In less mature males this bloom is thinner and more sparse, greyish blue. The wings are hyaline or, in old specimens, somewhat fumose, but without any yellow tinge.

Labial black usually less than in holotype but with much variation. For instance in mature Rhodesian males from Que Que and Khami the entire labium is yellow with no trace of black; in a Chiturapadzi ♂, all yellow except a trace of black on inner edges of lateral lobes; in a Lundi ♂, the posterior lobe yellow with two black dots, lateral lobes narrowly black; a Kariba ♂, posterior lobe black with two large yellow discs, lateral lobes almost as broadly black as holotype; an Umvumvumu ♂, posterior lobe all black, laterals with moderate black zones; and in a Pesu Gorge example the markings resemble the holotype.

Further north, a mature Mpatamanga Gorge ♂ with labial markings as in holotype; an Ilonga ♂, labium all yellow except a trace of an inner brown smear on each lateral lobe; another Ilonga ♂, posterior lobe yellow with brown lateral and medial fasciae moderately black on lateral lobes; and a Mombasa ♂ has yellow labium with traces of brown on posterior and lateral lobes.

From these instances it seems clear that no racial significance applies to labial pattern.

In accessory genitalia no differences are discernible in specimens between Rhodesia and East Africa. It may be remarked that both Ris (1912) and Lieftinck (1969) say that the apex of the anterior lamina is deeply notched. This is, however, only relatively so since it is by no means as deeply and widely divaricate as in *T. bifida* Pinhey.

Size range (males): abdomen 26-27,5 mm, hindwing 32-33,5 mm.

Females of both *donaldsoni* and *bifida* are described by Pinhey (1970).

### The synonymy of *erlangeri*

The holotype ♂ *Trithemis erlangeri* Förster was kindly loaned through Dr. Irving J. Cantrall, by Mrs. Leonora K. Gloyd of the University of Michigan, Ann Arbor.

*Remarks on type series of 'erlangeri'.* The holotype is in good condition and bears the two following white labels:

"*Trithemis Erlangeri* Förster — ♂ Type"; "Somaliland — Fluss Mane — 10.IV.1901 — Leg. Dr. Ellenbeck — Exp. Carlo v. Erlanger".

This specimen is in the Förster collection together with a second ♂ (not seen), of which the original labels were apparently discarded. This ♂ was from Darolifluss, 6 March 1901, of the same expedition. Förster recorded a third ♂, again from Darolifluss, which completed the series but this no longer exists. It was apparently lost through dermestid damage to the Förster Odonata collection prior to its arrival at Ann Arbor. These localities are now in Ethiopia, not Somalia, as already explained.

Förster (1906) described the mature holotype from "Webbi Mane", Webbi evidently being a district. The two Darolifluss examples were stated to be semi-adult.

He compared *erlangeri* with *Stoechia distanti* Kirby, now a synonym of *Trithemis dorsalis* (Rambur). In fact, as shown in the *Trithemis* revision (Pinhey 1970) the elongated hamular hooks and the orientation of the genital lobes place the *donaldsoni* group (group 8, p. 131) separate from *dorsalis* and other blue species (group 6, p. 93). Ris (1912) considered *erlangeri* was probably a synonym of *donaldsoni*, judging from Förster's description. Examination of type *erlangeri* confirms the synonymy. The anterior lamina has the U-shaped apical bifurcation and the genital lobe is even-sided, unlike *bifida*.

*Descriptive notes on 'erlangeri'*. Labium with posterior lobe light brown, darker post-laterally and with black median line; lateral lobes yellow, partially and moderately blackish brown at inner margins. The right lobe has lost a square anterior inner section, but the right-angled break is edged finely with black further out than on left lobe. This, perhaps, suggests that the injury may have occurred in life. Labrum black but yellow at lateral corners. Rest of face typical. Frons above and vertex black with strong violet sheen.

Body ferruginous-brown, the thorax coated with thin dark blue pruinosity, overlaid with a bluish white bloom on most of the mesepisterna; this pale colour extending along the abdominal dorsum, lessening abruptly on segment 8; 9-10 being free of pruinosity. The bloom is whiter than in average males from other parts of Africa but occasional specimens from Rhodesia have it similarly developed. It is possibly an ageing criterion.

Anal appendages typical; also the pterostigma and venation, the wings a little fumose, hyaline near base. Forewings with  $11\frac{1}{2}$  (left) and  $12\frac{1}{2}$  Ax, 8 Px; hindwings with 8 Ax, 10 Px. Abdomen 27,5 mm, hindwing 32 mm (as given by Förster).

#### Material examined

Philadelphia Acad. nat. Sci.: Holotype ♂ *donaldsoni* Stony Brook, Ethiopia.

Univ. of Michigan: Holotype ♂ *erlangeri* Mane Fluss, Ethiopia.

National Museum, Bulawayo: *Rhodesia*. Chiturapadzi, Limpopo River; Pesu Gorge, Sengwe, S.E. Manicaland; Umvumvumvu River, West Melsetter; Nuanetsi River, S.E. Manicaland; Lundi (Runde), south of Fort Victoria; Umsweswe River, Gatooma; Que Que; Khami, near Bulawayo; Bulawayo; Dekka River, Wankie; Tindi Vlei, Kamativi; Mwenda Estate, Kariba. *Malawi*. Shiré River, Mpatamanga Gorge, S.W. Malawi. *Tanzania*. Matarawe River, Ilonga. *Kenya*. Shimba Hills, south of Mombasa. *Uganda*. Jinja.

#### Previously seen

Pinhey, 1951: 267:—

Transvaal Museum: *Rhodesia*. Changadze River; Salisbury; Shawanoya River, Mtoko Road; Sinoia.

Durban Museum: *Natal*. Amanzimtoti.

Pinhey, 1961: 169:—

National Museum of Kenya (Coryndon): *Tanzania*. Kimboza Forest. *Kenya*. Shimba Hills, Mombasa; Magadi; Rusinga Island, Kavirondo Gulf. *Uganda*. Jinja. van Someren Colln. (Brit. Mus.): *Kenya*. Kithini Ridge.

#### Records not examined

Balinsky (1967: 20): Magalakwin, Limpopo River; Kariba.

Ris (1912: 782): Nyassa; Sudan; Abyssinia (Ethiopia); (and Zungeru, Northern Nigeria — see later).

Schouteden (1934): Zaire (Shaba).

*Known distribution of nominotypical donaldsoni*. Natal, Transvaal, Mozambique, Rhodesia, Malawi, Tanzania, Kenya, Uganda, Zaire (Shaba), Ethiopia, Eritrea.

Ris (1912) mentioned Northern Nigeria as a locality, but this would refer to the new west African subspecies described below. His Kapiri record (1919: 1198, ♂, ♀) was most likely typical *donaldsoni*.

#### Closely associated taxa in this genus

Five of the African *Trithemis* belong to the same group (group 8) as *donaldsoni*. Two of them, *basitincta* Ris and *nigra* Longfield, were originally described as subspecies of *donaldsoni* but Pinhey (1970) accorded them specific rank. All have an elongated hamular hook, the genital lobe directed posteriad and a black body with yellow streaks on the abdomen, which are at least visible in the immature condition.

*T. bifida* Pinhey, 1970: 136-138

This is the nearest specific relative. Like *donaldsoni* it has the apex of the anterior lamina bifid, but with a deeper, more V-shaped cleft than the U-shaped incision of *donaldsoni*. Pruinosity of the mature male is of the same rather palish blue tone, not dark like the other species. It also differs in having the abdominal yellow streaks biseriate or partially fused into a thicker band; and the genital lobe is broad near base, gradually tapering to an apical point, whereas in *donaldsoni* this lobe is of even width, narrowing shortly before a more rounded apex.

Lindley included a single male of this little known species, providing a new distributional record: ♂ Plantation, Korhago, Ivory Coast, 25 Oct. 1969 (R. Lindley).

The holotype was described from north Mwinilunga, N.W. Zambia.

*T. nigra* Longfield, 1936: 491, 496

A dark species with a distinctive thoracic pattern (Pinhey, 1970: 132 text fig. 52a). Unlike the other species the frontal reflection is blue, not violet. The apex of the anterior lamina is slightly notched and turned anteriorly. Abdominal fasciae are sparse, uniseriate. Only known from Principe island, Guinea Gulf.

*T. basitincta* Ris, 1912: 784

Apex of anterior lamina undivided and not turned anteriorly. Abdominal streaks biseriate, as in *bifida*. It is known from eastern Tanzania, Uganda, northern Zaire and Cameroun.

*T. aconita* Lieftinck, 1969: 40 (*T. caruncula* Pinhey, 1970: 141)

Generally smaller than *basitincta*, but with a larger form known from Fernando Po (Pinhey, 1970: 144). Apex of anterior lamina with pale double lobe turned anteriorly (Pinhey, 1970: text fig. 53e). Abdominal streaks uniseriate. Widely distributed from Natal to northern Zaire, westwards to Ghana. Apart from *donaldsoni* this is the only well known species of the group.

*T. congolica* Pinhey, 1970: 144

Similar to *aconita* but darker, with a more slender abdomen. Only recorded so far from the type series, Zaire and Congo (Brazzaville) Republic.

### West equatorial subspecies

As stated in the introduction, typical *donaldsoni* from the eastern regions of Africa has hyaline wings untinted with yellow. In older specimens a certain amount of browning or fumosity develops, as in the holotype from Ethiopia, but this is a rather general ageing criterion in Odonata.

Also, as stated in the introduction, a male sent from Ivory Coast (February 1976) differed in having yellow wing fasciae. This example, denoted AX, was from Danangoro, Iv. Coast, 21 May 1975, collected by Dejoux to whom it was returned, with the suggestion that it might represent a new subspecies. A later consignment in May 1976 included two more males, from Bouaké, Iv. Coast, 16 March 1976. All three had this saffronation mainly on the hindwing. These two were retained for further examination and I wrote to R. M. Gambles, about his Nigerian material.

Gambles replied (25 May 1977) that his Nigerian *donaldsoni* had only faint patches on the hindwings. The patch regularly extended "from the discoidal field (excluding cells in Msp1) backwards to — but excluding the anal loop, the boundary running straight along the "sole" of the loop, not turning round at the "heel" but continuing straight upwards to meet Cu P and the discoidal field above it. Between the "calf" of the loop and the basal part of Cu P the wing membrane is quite hyaline" and, again, "its distribution is so regular, always contrasted with the anal loop and Msp1 which are free of it". This careful observation seems worth recording in detail.

The regularity of this hindwing suffusion is somewhat differently presented in males sent by Roger Lindley from Ivory Coast (1 ♂) and Central African Republic (2 ♂), in which there is saffronation on the entire areas of forewing and hindwing distal (by about 2 cells) to both discoidal triangles. In his letter of 14th May 1977 Lindley says the wings are tinted distally, "starting from the distal edge of the anal loop in the hindwing, and from the distal side of the triangle or even further out in the forewing. This tinting is darkest in the hindwing discoidal field, where it is noticeably yellow. Some specimens have more tinting than others". He considered that this suffusion might be just due to ageing. A second Korhago, Ivory Coast *Trithemis* with hyaline wings proved to be *bifida*, as recorded above.

Ris (1912: 782) in his description of *donaldsoni* recorded specimens from Sudan, Nyassa, Abyssinia and Zungeru, Northern Nigeria. He describes the Sudan and Nyassa specimens as having hyaline wings and he says (p. 783) "Flügel des einem Exemplares vom proximalen Ende des Pterostigma an, des andern von t an graugelblich getrübt", indicating that this area between triangle (t) and pterostigma is clouded with yellowish grey in other specimens. Here, he may probably have been referring to the Northern Nigerian material.

### Characters of subspecies

From all these remarks and from the specimens to hand, it seems reasonable to consider west tropical *donaldsoni* to be a separate subspecies on the development of saffronation of variable extent, which is lacking in all the eastern material examined. In describing this race I acknowledge the cooperation of Dr. Charles Dejoux of O.R.S.T.O.M., Bouaké, Ivory Coast.

### *Trithemis donaldsoni dejouxi* subsp. nov.

**Holotype**, mature ♂. Labium all black on posterior lobe, lateral lobes yellow with almost half the inner portions black; labrum black; anteclypeus greenish ochreous, black dorsally; rest of face in front ochraceous; frons above and vertex all black with strong violet and blue reflection.

Thorax and base of abdomen coated with thin grey-blue pruinosity. Legs nearly all black; fore-femora with some sparse white dusting.

Venation brown, longitudinal veins black; pterostigma ferruginous, framed in black veins. Both wings hyaline at base to 2-3 cells beyond the triangles, the distal areas all saffronated.

Abdomen black, with slight ventral white dusting; the uniseriate row of yellow streaks on either side only visible on segments 6, 7 and a small triangle on 8. Anal appendages and accessory genitalia on segment 2 typical of the species.

Abdomen (without appendages) 26,5 mm, hindwing 31 mm.

Paratype males essentially similar. The labial black is distinctly narrower than the holotype in one Bouaké example. The yellow area on the wings is similar in extent in all, but in most of them, unlike the holotype, it is stronger on the hindwing than on the forewing.

### Material

Holotype, from Ouham River, Bohina, Bouar, Cent. Afr. Rep. 22 Dec. 1974 (R. Lindley). Paratypes: 2 ♂ Bouaké, 16 March 1976 (C. Dejoux), 1 ♂ Bandama River, Ferkessedougou, (? Jan. 1969) (R. Lindley), these all Ivory Coast; 1 ♂ Niem, Nana River, 84 km from Bouar, Cent. Afr. Rep. 19 Dec. 1973 (R. Lindley). These are in the National Museum, Bulawayo, except 1 ♂ Bouaké paratype returned to Dr. Dejoux for Paris Museum.

**Ecological note.** Both Lindley and Gambles consider this taxon to be rather uncommon in areas where they have collected in West Africa. Lindley observes that it tends to occur only along the larger rivers. The nominotypical race *donaldsoni*, in my own experience, prefers rather fast waters but is found on both small streams and large rivers.

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