

Identity and distribution of the little known *Aeshna meruensis* (Odonata: Aeshnidae)

Viola Clausnitzer¹ & Günther Peters²

¹Liebenauer Straße 180, D-06110 Halle, Germany.
<violacl@gmx.de>

²Institut für Systematische Zoologie, Museum für Naturkunde,
Invalidenstraße 43, D-10115 Berlin, Germany.
<isolde.dorandt@rz.hu-berlin.de>

Received 06 July 2002; revised and accepted 31 October 2002.

Key words: Odonata, dragonfly, *Aeshna meruensis*, montane species, East Africa, taxonomy.

Abstract

Status and records of *Aeshna meruensis* are published for the first time. This species has been confused with *A. rileyi* for a long time, although A.R. Waterston separated and labelled specimens of both species in the collection of the Natural History Museum, London, as early as 1974. *A. meruensis* is known from seven localities in East Africa so far, but the authors anticipate a wider distribution.

Introduction

Aeshna meruensis Sjöstedt, 1909 is one of the few African dragonflies listed as “endangered” by IUCN (1996) and mentioned as “critical species” for Tanzania by Stuart et al. (1990). This species disappeared for some time in the synonymy of *A. rileyi* Calvert, 1892 caused by Pinhey (1963), and some locality records have never been mentioned in the corresponding literature, e.g. Stuart et al. (1990); IUCN (1996) or Samways (2002).

A. meruensis belongs to the Rileyi-group of African *Aeshna* species of which *A. rileyi*, *A. subpupillata* MacLachlan, 1896, *A. moori* Pinhey, 1981 and *A. yemenensis* Waterston, 1985 have been described. In order to enhance further studies on *A. meruensis*, it seems desirable to re-examine the claim that it has full species status as well as to bring together the fragmentary data concerning its existence in nature and representation in collections. To achieve this, we examined the Aeshnidae in the Natural History Museum, London, the Africa Museum in Tervueren, the Zoological Museum in Berlin, the National Museum of Natural History in Leiden, the Natural History Museum in Stockholm and the Natural History Museum in Genua for the presence of *A. meruensis*. Additional specimens of the species were collected during several field trips in East Africa (see Table 1).

Taxonomic history

As early as 1904 the first specimen of *Aeshna meruensis* was collected (Table 1), but it remained unrecognized in the Berlin collection for 80 years, before being identified by the second author. The type of *A. meruensis* was caught in 1906 among small montane forest glades of Mt. Meru, Tanzania (Table 1). When describing the species, Sjöstedt (1909: 32) noted that *A. meruensis* is close to *A. rileyi*, but is larger and has different genitalia.

Table 1. All records of *Aeshna meruensis*. NRS: Naturhistoriska Riksmuseet, Stockholm; BMNH: Natural History Museum, London; ZMB: Zoologisches Museum der Humboldt Universität, Berlin; VCI: Viola Clausnitzer, private collection. Coordinates and altitude [m] for all Museum specimen are only rough calculations based on locality information given by the collectors.

coll.	date	sex	locality	coordinate	altitude	leg.
ZMB	ix 1904	♂	Lake Natron, Tanzania	02°30'S, 36°06'E	?	Uhlig
NRS*	i 1906	♂	Mt. Meru, Tanzania	03°15'S, 37°00'E	3,500	Sjöstedt
BNHM	1938/39	♂	West Kilimanjaro, Tanzania	03°05'S, 37°20'E	1,700	Cooper
BNHM	vii 1949	♂	Mt. Moroto, Uganda	02°42'N, 34°42'E	2,500	van Someren
BNHM	iv 1950	♂	Mt. Elgon, Kenya	01°20'N, 34°38'E	2,200	van Someren
BNHM	iv 1950	♀	Mt. Elgon, Kenya	01°20'N, 34°38'E	2,200	van Someren
BNHM	xii 1950	♂	Bufumijo, Mt. Elgon, Kenya	01°20'N, 34°38'E	2,200	van Someren
BNHM	iv 1967	♂	Kitale, Mt. Elgon, Kenya	01°20'N, 34°38'E	2,000	van Someren
BNHM	x 1983	♀	Kitale, Mt. Elgon, Kenya	01°20'N, 34°38'E	2,000	van Someren
VCI	vii 1990	♂	Nakuru NP, Kenya	00°22'S, 36°25'E	1,800	Clausnitzer
VCI	xi 2001	♀	Mt. Elgon NP, Kenya	01°02'N, 34°35'E	2,223	Clausnitzer
VCL	ix 2002	♀, ♂	Makalia, Nakuru NP, Kenya	00°29'S, 36°04'E	1,860	Clausnitzer
VCL	viii 2002	♂	Sambu River, Nguruman, Kenya	01°53'S, 36°02'E	1,600	Clausnitzer

* holotype

While discussing the similarity, status and distribution of *A. rileyi* and *A. subpupillata*, Longfield (1936) did not hint at the existence of the similar *A. meruensis*, which she should at least have mentioned. Pinhey (1961) did not mention *meruensis* either, but listed the species without further comment later (Pinhey 1962: 192). In the following year Pinhey synonymised *A. meruensis* and *A. rileyi* (Pinhey 1963: 157). *A. rileyi* was described from a similar locality at Mt. Kilimanjaro “Cooper leg.; Kilimanjaro West, 4000-5000 feet, Feb.-March 1937” (label).

In 1974 A.R. Waterston separated, determined and labelled specimens of *A. rileyi* and *A. meruensis* in the Natural History Museum, London, but unfortunately never published his findings. Despite this Pinhey, who met Waterston in England in 1978, still insisted on

his synonymy and wrote: "Possibly, *meruensis* Sjöstedt, ... is a separate race of *A. rileyi*." (Pinhey 1981a: 581) and neither the status nor wider distribution range of the species has been acknowledged until now.

Species distinctive features

The Rileyi-group is remarkable for the prolonged, posteriorly and more or less downwardly directed, paired posteroventral lobes, bordering the rear of the fossa genitalis in males. These 'genital lobes' differ in shape and texture between the more southerly distributed species (*moori*, *rileyi*, *subpupillata*) and the more northerly situated ones (*meruensis*, *yemenensis*). The males of the former subgroup possess somewhat broadened, downcurved and superficially creased lobes, whereas these projections are smooth and tapered backwards in the *Aeshna meruensis* males and back- and downwards in the males of *A. yemenensis* (Fig. 1; see also Sjöstedt 1909: pl. 2, fig. 11; Pinhey 1981b: fig. 2; Waterston 1985: fig. 3). Thus, treating the genital lobes as a main diagnostic difference between the species in question, *meruensis* shows greater similarity with *yemenensis* than with *rileyi*.

The morphological differences between *meruensis* and *rileyi* are slight. The anal triangle of the *rileyi* males is three-celled (possibly with very rare two-celled exceptions), but two-celled in *meruensis* males. Specimens of *meruensis* are somewhat bigger on average than *rileyi* specimens and their body pigmentation is richer in melanine, giving them a more contrasting appearance. For instance, the dark borders of the laterothoracic yellow stripes are more pronounced in *meruensis* and the pterostigmata and anal appendices are darker too. The abdomen is relatively shorter than in *rileyi* (95-103% of Hw length vs 105-107% in males; 96-98% vs 97-103% in females). The pterostigmata in *meruensis* are also shorter than in *rileyi* (7.5-7.8% of Hw length vs 8.1-9.2%).

The examination of one *meruensis* female from Mt. Elgon (V. Clausnitzer leg.) led us to conclude that there are no qualitative differences between *meruensis* and *rileyi* females. -The identification of the female of *A. meruensis* results from the correspondence of characters known to be differently expressed in the males of *meruensis* and *rileyi*: e.g. larger size (abdomen without appendices 49.6 mm vs 45.0-47.5 mm in *rileyi*, Hw 51.3 mm; relative length of abdomen 99.6%; relative Pt length 7.75%; dark pigmentation.)

Populations of aeshnids, bearing similarities in the aforementioned characters to *A. meruensis* as well as to *A. yemenensis*, exist in the mountains of Ethiopia and in the Sudanese region of Darfur (Longfield 1936). The few specimens from these places still remain to be studied in order to ascertain whether these populations belong to *A. meruensis* or to *A. yemenensis* or whether they constitute a third species. In any case, the outcome of such a study would not affect the specific status of *A. meruensis*.

Field observations

Next to nothing is known about the life history and ecology of *Aeshna meruensis*. Labels of museum specimens, where some notes on the localities and date were given, indicate

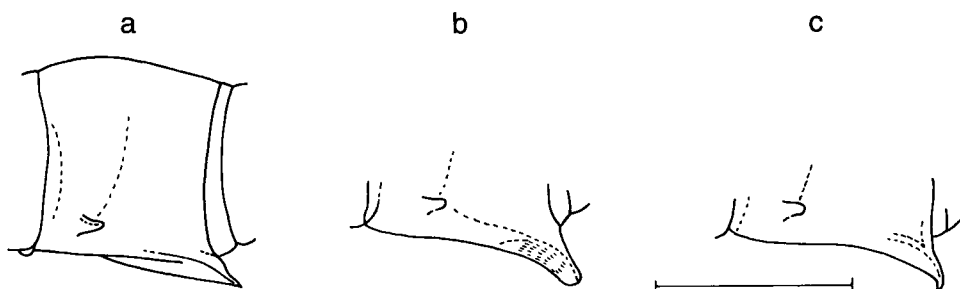


Figure 1. Male genital lobe of (a) *Aeshna meruensis*; (b) *A. rileyi*; (c) *A. yemenensis*, all seen from left. Scale: 5 mm.

a preference for forest glades and a presence of adults throughout the year (Table 1). We assume that the specimen labelled “Lake Natron” (Table 1) was either caught at, or had dispersed from, nearby mountains and escarpments, e.g. Ol Doinyo Lengai, Gelai, Nguruman, Loliondo, Loita.

On Mt. Elgon individuals of *A. meruensis* were observed by the first author hunting only in full sunshine along forest margins at a height of 2–4 m in November 2001. No adults were found along the montane streams. In September 2002 *A. meruensis* was observed patrolling above Makalia River, Nakuru NP, and large numbers of exuviae (assigned by us to this species) were found. In August 2002 individuals tentatively assigned to *A. meruensis* were observed at Sambu River, Nguruman Escarpment, but the first author failed to obtain adults and only exuviae were collected, these being identical to those from Makalia River. Exuviae were found in both rivers at densities of up to 15 along a 5-m stretch of river. Both rivers are 1–2 m wide and fast-running, have rapids and feature waterfalls. Both lack aquatic vegetation; and their substrates consist mainly of stones and boulders.

Adults were present throughout the year (Table 1), but were absent from the reproductive sites for most of the year. The first author has visited Mt. Elgon, Nakuru NP and the Nguruman Escarpment during different seasons in recent years. Only in August and September were exuviae and adults encountered at water.

Oviposition has never been witnessed, but we anticipate that the behaviour of *A. meruensis* will resemble that observed for *A. rileyi*, which oviposited into waterlogged dead wood in clear, fast-running streams in montane forest (V. Clausnitzer unpubl.).

The very similar *A. rileyi* has been found at several localities in Tanzania, Uganda and Kenya. Its habitats were usually forest streams between 1,000 and 1,800 m elevation (Pinhey 1961; V. Clausnitzer unpubl.). In September 2002 several *A. rileyi* were found at the Thego River, Mt. Kenya (00°20'S, 37°02'E, 1,800 m a.s.l.). Habitat, behaviour and hatching time were identical to that described for *A. meruensis* from the Makalia and Sambu Rivers. Exuviae of *A. rileyi* can be easily distinguished from the *A. meruensis* exuviae (Barnard 1937; Chelmick 2001; V. Clausnitzer unpubl.).

Distribution

The localities at which *Aeshna meruensis* has been recorded, are distributed patchy, as in many Afrotropical taxa. The known distribution pattern (Fig. 2) allows speculation that the actual distribution may be much wider than anticipated in Stuart et al. (1990) and IUCN (1996). We predict that populations of *A. meruensis* exist at the Ngorongoro Crater and escarpments and mountains along the Rift Valley from northern Tanzania to central Kenya. Populations are likely to exist also at more northern mountains in Kenya, e.g. Mt. Kulal, Mt. Marsabit, Mathew Ranges. Whether *A. meruensis* occurs in mountains of the western arc of the Rift Valley (Virunga volcanoes, Mount Karisimbi, Mount Stanley etc.), cannot be anticipated. The overall picture which emerges from the known distribution of *meruensis* populations is that of an island pattern of distribution, mainly along the Rift Valley, resulting from the restriction of the species to higher elevations.

All hitherto discovered populations of *A. meruensis* overlap on a large scale with the northern part of the distribution area of *A. rileyi*, disregarding the populations in Ethiopia

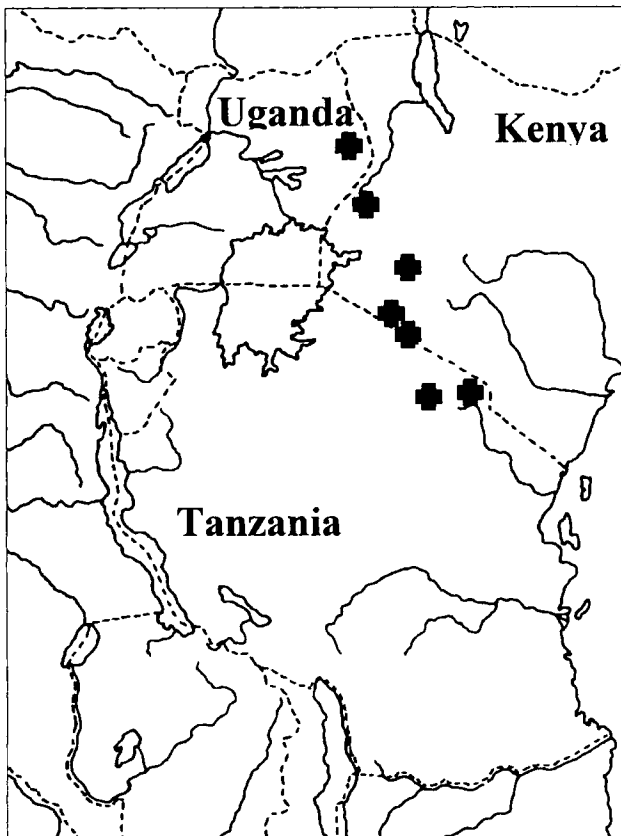


Figure 2. Map of eastern Africa, showing records of *Aeshna meruensis*.

and Darfur, where *rileyi* is absent. *A. meruensis* follows in its distribution range the arms of the Rift Valley, from which *A. rileyi* is absent. The only geographical point of coexistence seems to be the volcanic system of Kilimanjaro, where one *A. meruensis* specimen was caught at “Western Kilimanjaro” at 1,700 m altitude (Table 1). During several visits by the first author to the western and southern slopes of Mt. Kilimanjaro only *A. rileyi* was found at altitudes of 1,500 m and above. The *A. meruensis* specimen might have travelled from Mt. Meru or other western mountains.

Conclusions

Aeshna meruensis inhabits fast-running streams at mid to high altitude in the Rift Valley system of northern Tanzania and Kenya. Adults are present throughout the year, but emergence seems to be restricted to the end of the long dry season.

The scarcity of *A. meruensis* in collections seems to reflect the difficulty of reaching habitats and catching adults, which spend most of the time away from the water. The populations found in August and September 2002 were large and did not indicate the need for special habitat requirements. The Makalia River in Nakuru NP for example runs through densely populated and intensively used farmland and thus is rich in organic waste and always carries a large load of fine soil particles. Therefore the “endangered” status of *meruensis* cannot be accepted as a meaningful conclusion.

The reluctance of some odonatologists (Longfield 1936; Pinhey 1961, 1962, 1963, 1981a) to accept the full specific status of *A. meruensis* is founded in the traditional interpretation of the species. In order to meet each other for successful reproduction, the members (males and females) of a “closed propagating community” (Ax 1988) have evolved their “specific recognition system” (Paterson 1993). It cannot be assumed that such a system offers traits of diagnostic value to the taxonomist. Elements of the “recognition system” are usually manifest in morphological characters of the secondary sexual organs, as in the males of *meruensis*, compared with *rileyi*; but they may be missing or so far undetected, as in the females of *meruensis*, compared with *rileyi*. The members of a “closed propagating community” recognize each other. They do not necessarily present diagnostic signals to the systematist. Thus, the difficulty of distinguishing *A. meruensis* from *A. rileyi* and *A. yemenensis*, as well as the discrimination of *A. rileyi* from *A. subpupillata*, may not imply that these taxa are not distinct.

Acknowledgements

The authors thank the following people and institutions for help and support: David Goodger (Natural History Museum, London), Isolde Dorandt (Museum für Naturkunde, Berlin), Richard Bagine (Kenya Wildlife Service, Nairobi), Lucie Rogo (International Centre for Insect Physiology and Ecology, Nairobi), Wanja Kinuthia (National Museum of Kenya, Nairobi), and the Wardens in Charge and the staff of Mt. Elgon National Park (Kenya Wildlife Service). The German Scientific Research Foundation (DFG), the A.F.W. Schimper-Stiftung and the German Federal Ministry of Science (BMBF,

BIOLOG Programme) are thanked for funding part of the work. Hans-Joachim and Christa Clausnitzer are thanked for company in the field. We thank especially Vera Heinrich for preparing the drawings. Finally, thanks are due to Philip Corbet, Andreas Martens and Frank Suhling for their helpful comments on an earlier version of the manuscript.

References

- Ax, P., 1988. Systematik in der Biologie. UTB für Wissenschaft. G. Fischer, Stuttgart.
- Barnard, K.H., 1937. Notes on dragonflies (Odonata) of the S.W. Cape with descriptions of the nymphs, and of new species. *Annals of the South Africa Museum* 32: 169-260.
- Chelmick, D.G., 2001. Larvae of the genus *Aeshna* Fabricius in Africa south of the Sahara (Anisoptera: Aeshnidae). *Odonatologica* 30: 39-47.
- IUCN, 1996. 1996 IUCN Red List of threatened animals. IUCN, Gland/Switzerland.
- Longfield, C., 1936. Studies on African Odonata, with synonymy and descriptions of new species and subspecies. *Transactions of the Royal Entomological Society of London* 85: 467-498.
- Paterson, H.E.H., 1993. Evolution and the recognition concept of species. In: McEvey, S.F. (ed.) "Collected writings of H.E.H. Paterson", John Hopkins University Press, Baltimore/Maryland, pp. 136-157.
- Pinhey, E., 1961. A survey of the dragonflies of Eastern Africa. *British Museum (Natural History)*, London.
- Pinhey, E., 1962. A descriptive catalogue of the Odonata of the African continent (up to December 1959) (part II). *Publicacoes Culturais Companhia de Diamantes de Angola* 59: 163-322.
- Pinhey, E., 1963. Some anomalous types of African Odonata and the description of a new species. *Journal of the Entomological Society of South Africa* 26: 146-160.
- Pinhey, E., 1981a. Checklist of the Odonata of Moçambique. *Occasional Papers of the National Museum of Southern Rhodesia (B)*6: 557-631.
- Pinhey, E., 1981b. Two interesting species of *Aeshna* Fabricius from Zambia (Odonata: Aeshnidae). *Arnoldia Zimbabwe* 9: 61-68.
- Samways, M.J., 2002. Red-listed Odonata of Africa. *Odonatologica* 31: 151-170.
- Sjöstedt, Y., 1909. *Wissenschaftliche Ergebnisse der Schwedischen Zoologischen Expedition nach dem Kilimandjaro, dem Meru und den umgebenden Massaisteppeen Deutsch-Ostafrikas 1905-1906*. Herausgegeben mit Unterstützung von der Königlichen Schwedischen Akademie der Wissenschaften, Palmquists Aktiebolag, Stockholm.
- Stuart, S.N., R.J. Adams & M.S. Jenkins, 1990. Biodiversity in sub-Saharan Africa and its islands – conservation, management and sustainable use. IUCN, Gland & Cambridge.
- Waterston, A.R., 1985. Insects of southern Arabia. Odonata from the Yemens and Saudi Arabia. *Fauna of Saudi Arabia* [1984] 6: 451-472.