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Studies on new and poorly-known Rhachiberothidae (Insecta: Neuroptera) from subsaharan Africa

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Abstract

Three new species and one new genus of the family Rhachiberothidae are described and figured (wings, legs, ♂ and/or ♀ genitalia, partly colour photographs of living specimens). *Rhachiberotha pulchra* sp.n. was detected in the north of Namibia (W Grootfontein: ♂, ♀) and in Northern Transvaal (NW Potgietersrus: ♀); apparently it represents the sister species of *R. sheilae* U. ASPÖCK & MANSELL, 1994. *Mucroberotha copelandi* sp.n. was found in the south of Kenya (Kajiado: ♀) and in Tanzania (Mkomazi Game Reserve: ♂, ♀); its position within the genus seems isolated. *Hoelzeliella manselli* gen.n. sp.n. was discovered in the Western Cape (Groot-Swartberge: ♀). The systematic position of *Hoelzeliella* within the Rhachiberothidae is uncertain; possibly the genus is more closely related to *Mucroberotha* TJEDER, 1959, than to *Rhachiberotha* TJEDER, 1959, a better assessment may, however, be expected as soon as the ♂ has been found. Further records of *Mucroberotha vesicaria* TJEDER, 1959, in South Africa as well as Namibia are presented; the variability of the species (mainly on the basis of the vesicae) is discussed. The distribution of the family is mapped. The discovery of *H. manselli* has enlarged the known distribution considerably to the south. The distribution of the family Rhachiberothidae covers at least a large part of the Afrotropis, so far altogether thirteen species are known.

Key words: Rhachiberothidae, *Rhachiberotha pulchra*, *Mucroberotha vesicaria*, *Mucroberotha copelandi*, *Hoelzeliella manselli*, new species, new genus, South Africa, Namibia, Tanzania, Kenya, Afrotropis, variability.

Zusammenfassung

Untersuchungen an neuen und wenig bekannten Rhachiberothidae (Insecta: Neuroptera) aus dem subsaharischen Afrika. Drei neue Spezies und ein neues Genus werden beschrieben und abgebildet (Flügel, Beine, ♂ und/oder ♀ Genitalsegmente, z.T. Lebendaufnahmen). *Rhachiberotha pulchra* sp.n. wurde in Nord-Namibia (W Grootfontein: ♂, ♀) und in Northern Transvaal (NW Potgietersrus: ♀) entdeckt; sie stellt die Schwesterart von *Rhachiberotha sheilae* U. ASPÖCK & MANSELL, 1994, dar. *Mucroberotha copelandi* sp.n. wurde in Süd-Kenia (Kajiado: ♀) und Tansania (Mkomazi Game Reserve: ♂, ♀) gefunden; ihre Stellung innerhalb der Gattung *Mucroberotha* TJEDER, 1959, erscheint isoliert. *Hoelzeliella manselli* gen.n. sp.n. wurde in Western Cape (Groot-Swartberge: ♀) entdeckt. Die systematische Stellung von *Hoelzeliella* innerhalb der Familie Rhachiberothidae ist unsicher; vielleicht ist das Genus mit *Mucroberotha* näher als mit *Rhachiberotha* TJEDER, 1959, verwandt, doch kann eine bessere Beurteilung erst nach Auffindung des ♂ erwartet werden. Von *M. vesicaria* werden weitere Nachweise aus Südafrika und Namibia mitgeteilt, weiters wird die Variabilität der Art (vorwiegend auf der Basis der Vesicae von Vorder- und Hinterflügel) diskutiert. Die Verbreitung der Familie wird an Hand von Punktkarten demonstriert. Durch die Entdeckung von *Hoelzeliella manselli* in Western Cape erweitert sich die bekannte Verbreitung der Familie erheblich nach Süden. Insgesamt umfaßt die Verbreitung der Rhachiberothidae vermutlich den Großteil der Äthiopis, bisher sind dreizehn Arten bekannt.

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Introduction

The family Rhachiberothidae, originally described as a subfamily of the Berothidae (TJEDER 1959) and later transferred to the family Mantispidae (WILLMANN 1990), was elevated to family rank quite recently (U. ASPÖCK & MANSELL 1994), and is now regarded as a sister taxon of the Berothidae. In the above-mentioned paper the knowledge of the family has been comprehensively summarized. Until now two genera were known, *Rhachiberotha* TJEDER, 1959 (with four species) and *Mucroberotha* TJEDER, 1959 (with six species). The distribution of the family is restricted to subsaharan parts of Africa with records from Ethiopia, Zimbabwe, Angola, Namibia, and South Africa.

In the course of three field trips to southern Africa (1994, 1995, 1996) further material of the family was collected. Moreover, further material has been obtained from other collections for evaluation. A new genus and a new species from South Africa, a new species from South Africa and Namibia, and a new species from Kenya and Tanzania have been discovered, - besides new records of a described species. This material forms the basis of the present paper.

Acknowledgements

We wish to express our cordial and grateful thanks to various persons: to our friends and colleagues who joined us in the field trips in 1994, 1995, and 1996 for scientific stimulation and various help: H. Hölzel (Brückl, Austria), Dr. M.W. Mansell (Pretoria, South Africa), Dr. P. Ohm (Kiel, Germany), H. and R. Rausch (Scheibbs, Austria), Mag. Dr. M. Stelzl (Graz, Austria); to Mr. E. Marais (Windhoek, Namibia) for his hospitality at the State Museum of Namibia and for his help to obtain permission for collecting in Namibia in 1994; to Dr. R. Copeland for permission to study and describe the new *Mucroberotha* from Kenya; to various owners of farms and other authorities responsible for certain nature reserves for permission to carry out entomological field work: Mr. & Mrs. G. & Ch. Hellinghausen (Guestfarm Kupferberg, Namibia), Mr. & Mrs. Hellweg (Gaup Farm, Namibia), Mr. & Mrs. von Leipzig (Achalm Farm, Namibia), Mr. & Mrs. H.-P. & H. Haase (Haasenhof, Namibia), Mr. & Mrs. C. & C. Walker (Lapalala Nature Reserve, South Africa), Mr. & Mrs. A.E. & A. van der Walt (The Hell, Swartberg Mountains, Western Cape, South Africa). We are much obliged to Dr. M.W. Mansell for forwarding the specimens of *M. copelandi* sp. n. for study and evaluation. And after all very cordial thanks again to Dr. M.W. Mansell for the excellent organization of the field trips in South Africa in 1995 and 1996 during which we could get access to many private grounds as well as to nature reserves - and in particular also to him, to his wife Sheila and their children for their wonderful hospitality. The coloured photographs have been taken by H. Rausch, A. Schumacher and M. Stelzl, respectively; in addition, H. Rausch has taken some of the black-and-white photographs - many thanks again. Cordial thanks to J. Muhsil, Naturhistorisches Museum Wien, for mounting the photographs and for lettering the illustrations. We wish to express our cordial thanks to Dr. T. New, La Trobe University, Australia, for reading the manuscript and for linguistic improvement. We are much indebted to Dr. R. Pavuza, Naturhistorisches Museum Wien, for providing the computer-based distribution maps.

Material and Methods

The material dealt with in this paper was mainly collected in the course of three field trips to southern Africa, namely:

- Namibia, 2.- 26.II. 1994, participants: Horst Aspöck, Ulrike Aspöck, Peter Ohm, Hubert Rausch, Renate Rausch, and Michael Stelzl;
- South Africa (Northern Transvaal), 13.-27.II.1995, participants: Horst Aspöck, Ulrike Aspöck, Mervyn Mansell;
- South Africa (Northern Cape and Western Cape), 13.-29.II.1996, participants: Horst Aspöck, Ulrike Aspöck, Herbert Hölzel, Mervyn Mansell, Peter Ohm.

Moreover Dr. Robert Copeland (International Livestock Research Institute, Nairobi, Kenya) has sent us a new *Mucroberotha* from Kenya for study, and additional specimens of this species from Tanzania were made accessible by Dr. Mervyn Mansell.

The material is preserved as dried specimens. Genitalia were cleared in KOH, washed in distilled water and are now preserved in glycerol in small glass vials attached to the insects. Drawings were made from genitalia in glycerol using a WILD M10 microscope.

The material is deposited in the following collections:

HC	H. Hölzel Collection, Brückl, Austria	OC	P. Ohm Collection, Kiel, Germany
HUAC	H. & U. Aspöck Collection, Vienna, Austria	PRAT	Tropical Pesticides Research Institute, Arusha, Tanzania
ILRN	International Livestock Research Institute, Nairobi, Kenya	RC	H. & R. Rausch Collection, Scheibbs, Austria
MCT	South African Museum, Cape Town, South Africa	SANC	National Collection of Insects, Pretoria, South Africa
NMW	Naturhistorisches Museum Wien, Austria	SMNW	State Museum of Namibia, Windhoek

Abbreviations

A1 - A3, anal veins; bc, bursa copulatrix; C, costa; c, ninth gonocoxite; chor, chorology; com, comment; CuA, anterior cubitus; CuP, posterior cubitus; cua-cup, crossvein between CuA and CuP; e, ectoproct; fe, femur; Fig., figure; g, gonarcus; gl, gonapophysis lateralis; h, hypandrium internum; M, median; MA, anterior median; mon, monographical treatment; map, distribution map; MP, posterior median; m-cu, crossvein between M and cubitus; odescr, original description; ph, pseudohypocauda; pm, paramere-mediuncus complex; R, radius; Rs, radial sector; r-rs, crossvein between R and Rs; rs, receptaculum seminis; S, sternite; Sc, subcosta; scl, sclerotized claspers; sc-r, crossvein between Sc and R; sg, subgenitale; T, tergite; ta, tarsus; ti, tibia; tr, trochanter; v, vesica.

Genus *Rhachiberotha* TJEDER, 1959

Rhachiberotha TJEDER, 1959: 262 (odescr); U. ASPÖCK & MANSELL 1994 (mon); literature before 1994 summarized there.

***Rhachiberotha pulchra* sp.n. (Figs. 1 - 19, 31)**

Namibia: Holotype: ♀, "NAMIBIA, Distr. Grootfontein Tigerschlucht, NE Kombat, 94/9 19.27S/17.38E, 1600-1700 m 9.-11.2.1994, H. & U. Aspöck leg." (SMNW). **Paratypes:** 1 ♂, 1 ♀, same data (HUAC, NMW); 1 ♂, 1 ♀, same data, P. Ohm leg. (OC); 1 ♀ same data, H. & R. Rausch leg. (RC); 2 ♀♀, same data, but 94/20, 15.2.1994 (NMW, HUAC); 1 ♀, "SOUTH AFRICA, N. Tvl., Lapalala Reserve, Molope Camp, 23.53 S 28.20 E, 1050 m, 16.-17.II.1995, H. Aspöck, U. Aspöck, M.W. Mansell 95/5" (HUAC).

General appearance (Fig. 31) characterized by brownish speckled wings with conspicuous blackish vesicae. Length of forewing in ♂ 6.8 mm, in ♀♀ 8.3 - 8.5 mm.

Description of ♀ holotype: Head yellow, frons with a brown mark between tentorial pits, almost reaching base of antennae; vertex with brownish spot in front of tubercles, two brownish stripes between the lateral tubercles; postocular zone inflated, golden-brown; clypeus brown, labrum yellow.

Antenna: Scape as long as following three segments, yellow with lateral brown stripe; pedicel yellow; flagellum brownish. Vertex with two distinct lateral tubercles, median tubercle rather flat. Hairs on head predominantly brown, mixed with yellow hairs.

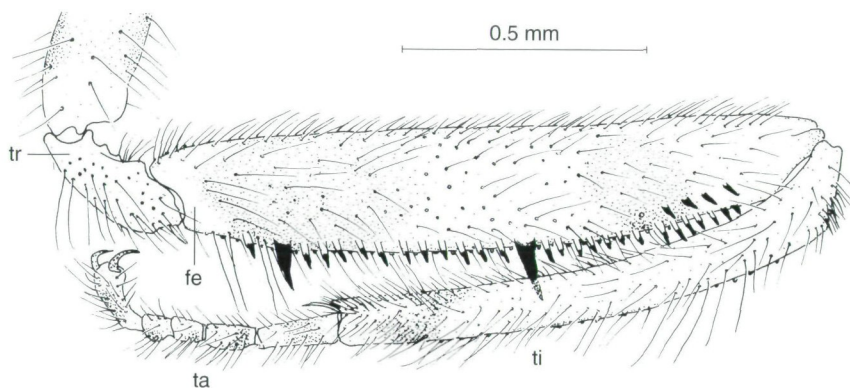


Fig. 1: *Rhachiberotha pulchra* sp.n., paratype ♀: left foreleg, inner side.

Pronotum yellow with dark brown median dots which are connected to a brown median line; meso- and metanotum brown, scutum and scutellum partly yellow.

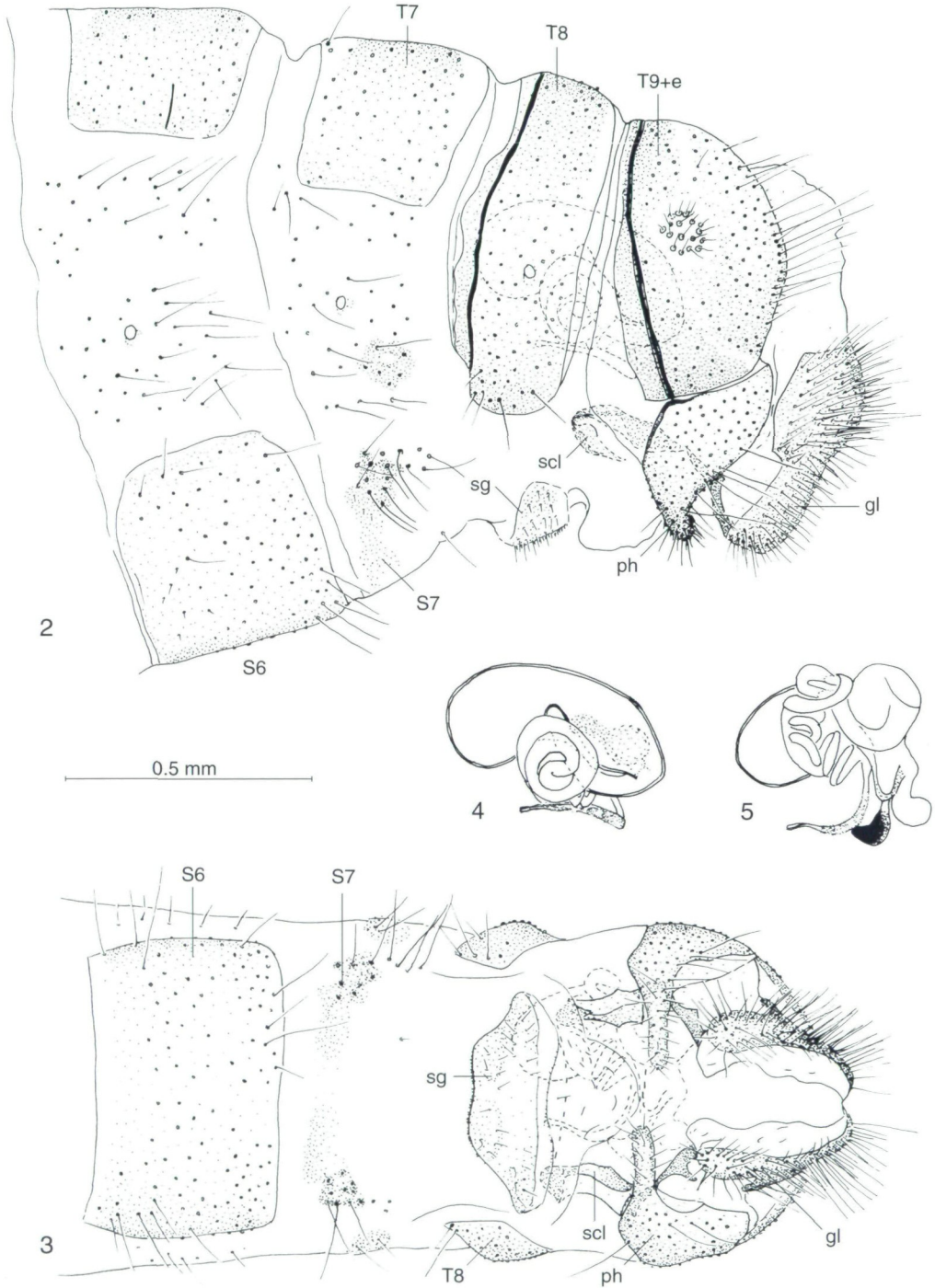
Legs: foreleg (Fig. 1): coxa brown with exception of yellow ends; femur thickened with one row of short teeth and two large teeth within this row, four short teeth at the distal end of an imaginary inner line; tibia slightly curved, with basal angle; tarsus with first tarsomere as long as second and third together. Coxae of middle and hind legs brown; femora yellow with brown stripe; tibiae yellow with brown spot proximally; tarsi yellow.

Wings (Figs. 10 - 13): forewing hyaline, with two vesicae at hind margin; dark shading mainly present along crossveins, along costals and along some of the distal branches; wing membrane somewhat fuscous between marginal branches; longitudinal veins predominantly sandy yellowish, distally brownish, with only inconspicuous granulation; crossveins predominantly brown; pterostigma with brownish membrane, brown veins and brownish granulation; three sc-r, three r-rs, and six gradate crossveins; stem of M free to wing base; A2 and A3 not forming a cell. Hind wing: hyaline with a few shadows along crossveins; veins pale or light brownish, granulation inconspicuous; pterostigma brownish; stem of M free; basal part of Ma sinuate; one sc-r, four r-rs, five gradate crossveins present; CuP crossvein-like proximally, distal part sharply flexed and weak, joining A1. Hairs on wings predominantly brown, mixed with yellow.

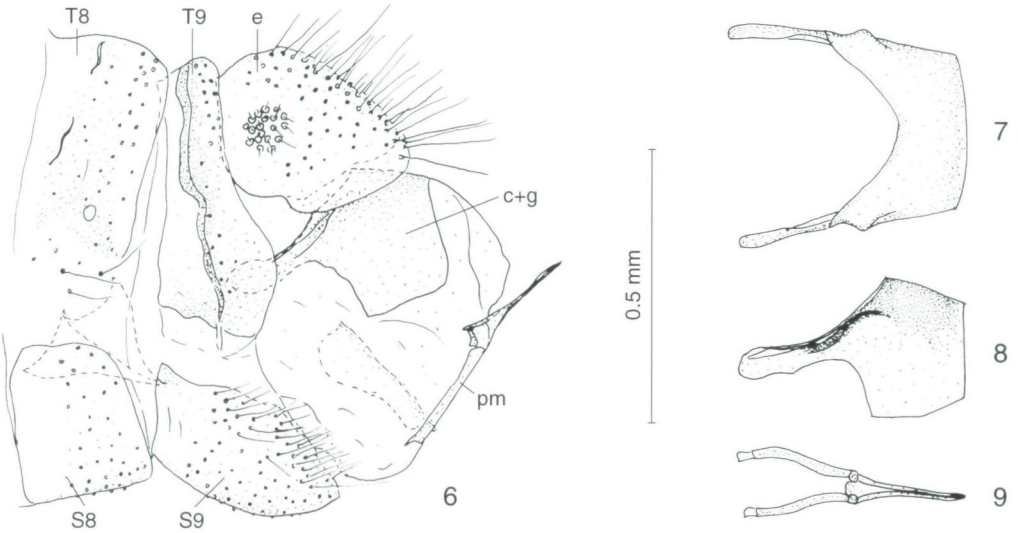
Abdomen: tergites 1 and 2 with weak transverse apodemes; sternite 1 reduced to a pleural apodeme and a caudal apodeme; sternites 2 - 4 with strong transverse apodeme.

Female genitalia (Figs. 2 - 5): sternite 7 reduced to small laterally placed sclerites, bearing long hairs, and sclerite stripes without hairs, bending down ventrally. Tergite 8 with strong apodeme along anterior margin. Subgenitale reduced to a midventral sclerite which extends laterally. Tergite 9 and ectoprocts with a strong apodeme along anterior margin. Pseudohypocaudae clearly separated from tergite 9, forming long proximally directed processus, which are shorter than the main part of this sclerite. Gonapophyses laterales long, without hypocaudae, connected to sclerotized claspers. Bursa copulatrix inconspicuous; receptaculum seminis coiled with voluminous horn-shaped element.

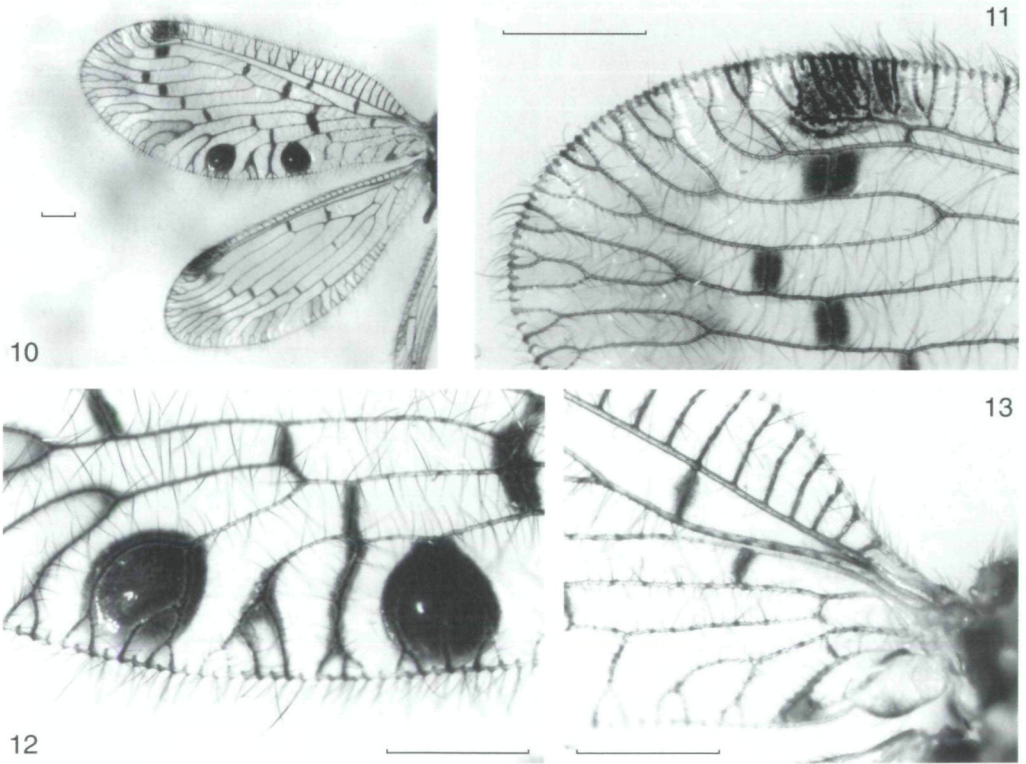
Male similar in general appearance, but differing in several characters.



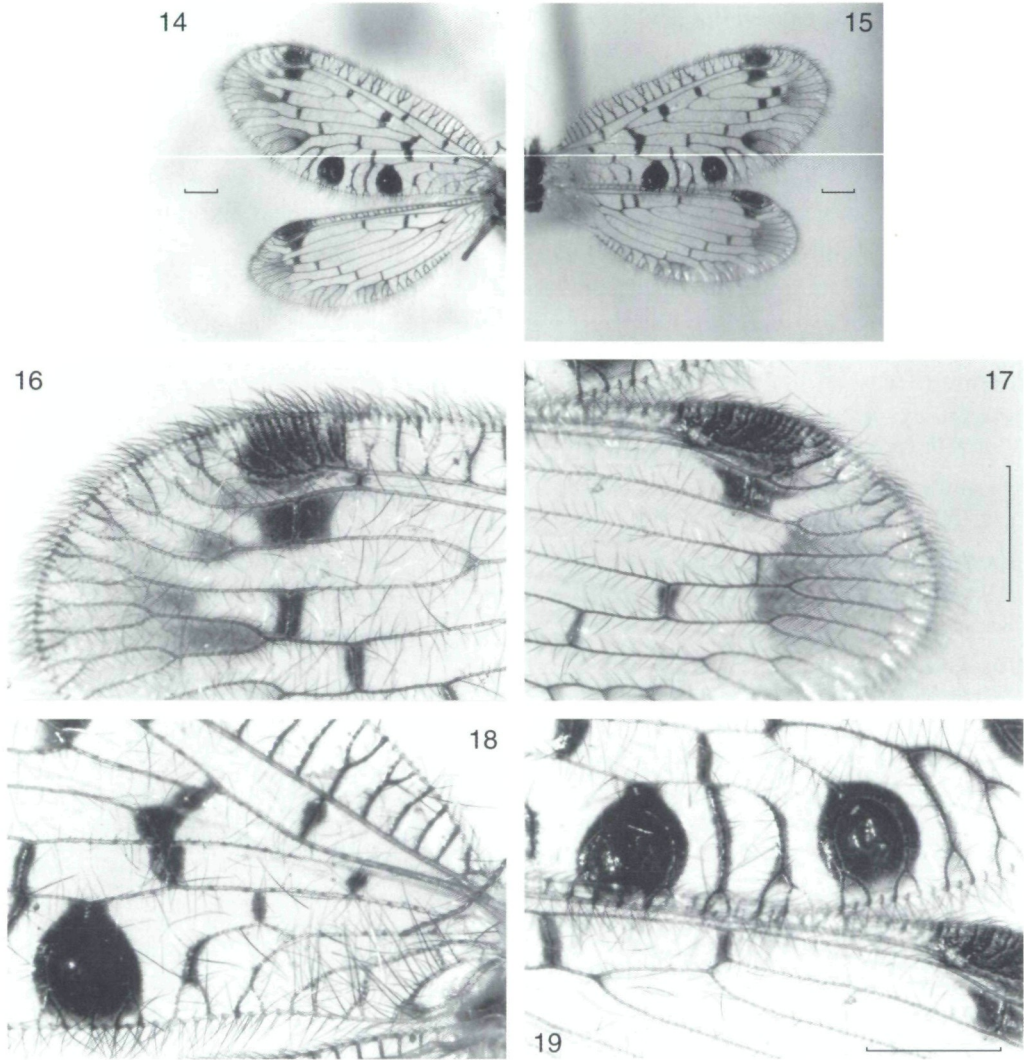
Figs. 2 - 5: *Rhachiberotha pulchra* sp.n., holotype ♀: (2) genital segments, lateral, (3) same, ventral, (4) bursa copulatrix-receptaculum seminis complex, lateral, (5) same, ventral.



Figs. 6 - 9: *Rhachiberotha pulchra* sp.n., paratype ♂: (6) genital segments, lateral, (7) ninth gonocoxites and gonarcus, dorsal, (8) same, lateral, (9) part of paramere-mediuncus complex, ventral.



Figs. 10 - 13: *Rhachiberotha pulchra* sp.n., paratype ♀ (Namibia, Tiger Valley): (10) left fore- and hind wing, (11) left forewing, apical region, (12) left forewing, vesicae, (13) left forewing, basal part.



Figs. 14 - 19: *Rhachiberotha pulchra* sp.n., paratype ♀ (South Africa, Northern Transvaal): (14) left fore- and hind wing, (15) right fore- and hind wing, (16) left forewing, apical part, (17) right hind wing, apical part, (18) left forewing, basal part, (19) right forewing, vesicae. Scale: 1mm.

Wings: forewing with a small and inconspicuous vesica at pterostigma, hind wing with a large vesica which covers most of the pterostigma, leaving a few veins free. Foreleg with outer tooth-row on femur having three large additional teeth, inner row with two large teeth, but lacking the small ones distally. Foretarsus with first tarsomere very large with a long spine, third tarsomere being the shortest.

Male genitalia (Figs. 6 - 9): tergite 9 narrow, bent ventrocaudally, with strong irregularly running apodeme; sternite 9 flat, shovel-like. Ectoprocts separated from tergite 9, with blunt apex. Ninth gonocoxites and gonarcus amalgamated, forming a bow, which is handle-

like basally, but broadening ventro-caudally, with two small protuberances laterally. Paramere-mediuncus complex comprising paired sclerotized claspers, which unite into an arrow-like sclerite apically and an unpaired loosely attached sclerite between them. Hypandrium internum tiny.

Variability: There is an additional small vesica between the larger ones at the margin of the forewing in one ♀ specimen from Namibia. The ♀ specimen from South Africa (Figs. 14 - 19) does not show any notable differences compared to the population from Namibia.

Systematic position: Closely related to, and apparently the sister-taxon to *R. sheilae*. Differentiation from this species by the laterally dark brown pronotum of *R. sheilae* and the tiny teeth along the fore femur of this species, which are much smaller than one third of the length of the large teeth within this row. The ♂ genitalia differ in the larger seventh sternite of *R. sheilae*, and the still discernible gonarcus in this species, and the ninth gonocoxites are not broadened ventro-caudally. The pseudohypocaudae of the ♀ have longer processus in *R. sheilae*.

Etymology: From the Latin *pulcher*, -a, -um = beautiful. The name is an adjective, first case, female gender (lat. pulchra).

Comments: We have hesitated to describe this species as new, the considerable differences as well as its occurrence in two localities far distant from each other lead us to the conclusion that these specimens do not represent *R. sheilae* but a genetically isolated taxon.

Distribution: Namibia, South Africa (Fig. 43).

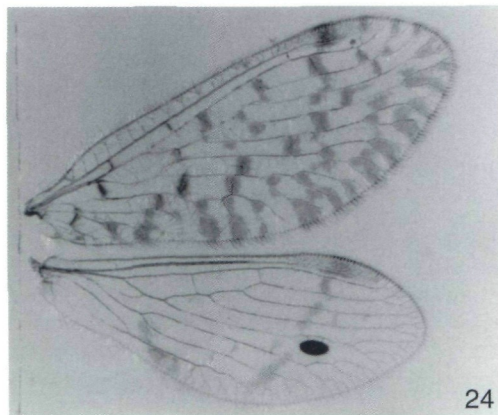
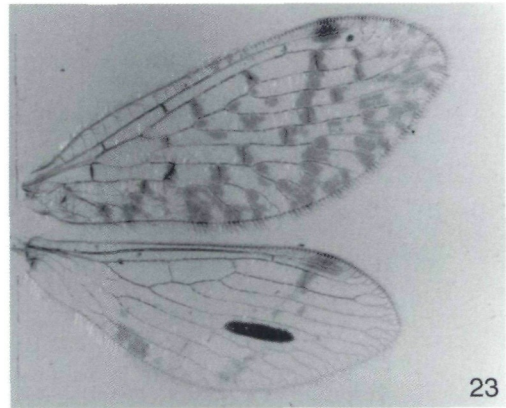
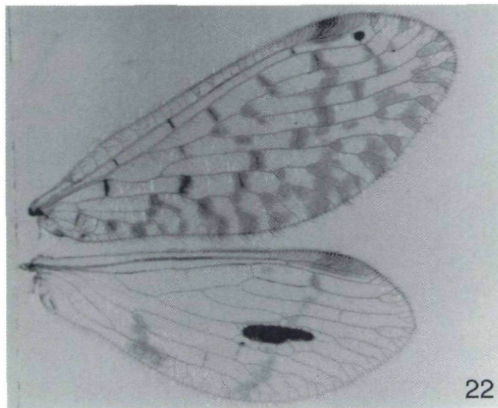
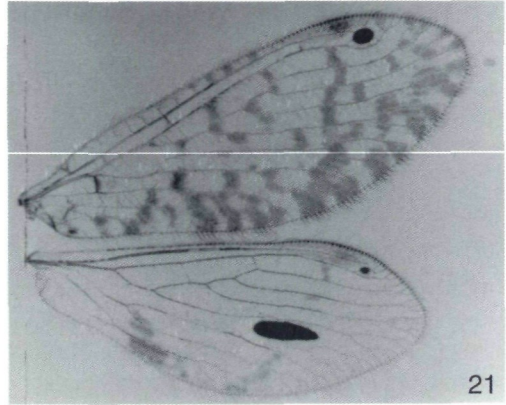
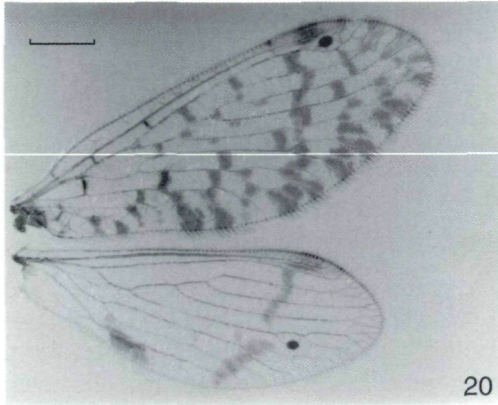
Genus *Mucroberotha* TJEDER, 1959

Mucroberotha TJEDER, 1959: 276 (odescr); U. ASPÖCK & MANSELL 1994 (mon); literature before 1994 summarized there.

Mucroberotha vesicaria TJEDER, 1968 (Figs. 20 - 24, 32)

Mucroberotha vesicaria TJEDER, 1968: 6 (odescr); U. ASPÖCK & MANSELL 1994 (chor, com); literature before 1994 summarized there.

Material examined: Namibia: 1 ♀, "Namibia, Distr. Windhoek, E Kapps Farm, 20 km E Windhoek, 22°32'00" S / 17°16'04" E GPS, 1800-1900 m, 3.II.1994, H. & U. Aspöck leg." (NMW); 1 ♀, same data, H. & R. Rausch leg. (RC); 3 ♂♂, Namibia, 10 km N Windhoek, 23.2.88, 88/18, H. Rausch leg. (RC); 1 ♂, same data, P. Ohm leg. (OC); 1 ♂, Namibia, Distr. Karibib. Erongo Berge, 21.47S/15.38E, 1100 - 1200 m, Ameib Ranch, 88/18, 22.2.88, H. Rausch leg. (RC); 1 ♀, same data, but 22.02.1996, P. Ohm & M. Stelzl leg. (OC); 1 ♂, 3 ♀♀, "Namibia, Distr. Outjo, Hügel SW Outjo Camp, W Outjo, 20°08'01" S / 16°10'10" E GPS, 1300-1400 m, 07.02.1994, leg. H. & R. Rausch LF 94/09" (RC); 7 ♂♂, 3 ♀♀, "NAMIBIA, Distr. Grootfontein Kupferberg-Farm, 25 km E Otavi 19.39S/17.34E, 1600-1700 m, 94/8 8.2.1994, H. & U. Aspöck leg." (NMW); 18 ♂♂, 3 ♀♀, same data (HUAC); 43 ♂♂, 8 ♀♀, same data, P. Ohm & M. Stelzl leg. (OC and SNMW); 50 ♂♂, 15 ♀♀, same data, H. & R. Rausch leg. (RC); 50 ♂♂, 10 ♀♀, "NAMIBIA, Distr. Grootfontein Tigerschlucht, NE Kombat, 94/9 (94/11, 94/12) 19.27S/17.38E, 1600-1700 m 9. -11.2.1994, H. & U. Aspöck leg." (NMW); 48 ♂♂, 11 ♀♀, same data (HUAC); 50 ♂♂, 16 ♀♀, same data, H. & R. Rausch leg. (RC); 21 ♂♂, 16 ♀♀, same data, P. Ohm & M. Stelzl leg. (OC and SNMW); 17 ♂♂, 8 ♀♀, same data, but 94/20, 15.2.1994 (NMW); 17 ♂♂, 7 ♀♀, same data (HUAC); 26 ♂♂, 5 ♀♀, same data, H. & R. Rausch leg. (RC); 14 ♂♂, 9 ♀♀, same data, P. Ohm & M. Stelzl leg. (OC and SNMW); 1 ♀, Namibia, Distr. Kavango, 20 km SW Rundu, 18.03S 19.39 E, 14.2.94, H. & R. Rausch leg. (RC); 1 ♂, 2 ♀♀, "Namibia, D. Otjiwarongo, Otjiwa Ranch, S Otjiwarongo, 20°45'24" S / 16°47'30" E GPS, 1600 m, 18.02.1994, leg. H. & R. Rausch, LF 94/30" (RC); 1 ♂, 1 ♀, same data, P. Ohm & M. Stelzl leg. (OC and SNMW); 3 ♂♂, "NAMIBIA, Distr. Grootfontein Achalm Farm, 9 km SW Otavi 19.43S/17.20E, 1500 m, 94/24 20.2.1994,



Figs. 20 - 24: *Mucroberotha vesicaria* TJEDER, five ♂ specimens from Namibia, Tiger Valley, demonstrating the variability of sizes and shapes of vesicae (phot. H. Rausch). Scale: 1 mm.

H. & U. Aspöck leg." (NMW); 3 ♂♂, 1 ♀, same data (HUAC); 15 ♂♂, 3 ♀♀, same data, H. & R. Rausch leg. (RC); 3 ♂♂, 1 ♀, same data, P. Ohm & M. Stelzl leg. (OC and SNMW); 1 ♂, "NAMIBIA, Distr. Okahandja Jägerhöhe, N Haasenhof Farm 21.34S/16.29E, 1500-1600 m 23.-24.2.1994, 94/31 H. & U. Aspöck leg." (NMW); 7 ♂♂, 3 ♀♀, same data, H. & R. Rausch leg. (RC); 5 ♂♂, 1 ♀, same data, P. Ohm & M. Stelzl leg. (OC and SNMW); 1 ♂, "NAMIBIA, Distr. Okahandja River S Haasenhof Farm, 1400m 21.43S/16.27E, 24.2.1994 H. & U. Aspöck leg., 94/32" (HUAC); 1 ♂, 1 ♀, same data (NMW); 12 ♂♂, 7 ♀♀, same data, H. & R. Rausch leg. (RC); 4 ♂♂, 2 ♀♀, same data, P. Ohm & M. Stelzl leg. (OC and SNMW). **South Africa:** 1 ♀, "SOUTH AFRICA,

N. Tvl., Lapalala Reserve, Molohe Camp, 23.53 S 28.20 E, 1050 m, 16.-17.II.1995, H. Aspöck, U. Aspöck, M. Mansell leg., 95/5" (HUAC); 1 specimen, N. Tvl., Lapalala Reserve, Mosetse Camp, 23.53S/28.20E, 9.12.1995, Hölzel & Mansell leg. (HC); 1 specimen, N. Tvl., Ingwe Motel, 22.58S/29.57E, 24.11.1992, Hölzel & Ohm & Mansell leg. (HC); 4 ♂♂, 1 ♀, "SOUTH AFRICA, N. Tvl Fiesta Motel 20 km S Potgietersrus, 24.17S 28.51E, 1100 m 26.ii.1995 H. Aspöck, U. Aspöck, M.W. Mansell" (HUAC); 1 ♂, same locality, but 16.11.1992, P. Ohm leg. (OC); 35 specimens, South Africa, Cape Prov. Olifantshoek, 27.56S 22.45E, 1150 m, 27.2.1996, 96/20 (HUAC); 1 ♀, same data but 26.2.1988, P. Ohm leg. (OC).

Systematic position: Closely related to or identical with *M. fasciata* TJEDER, 1959, see arguments in U. ASPÖCK & MANSELL (1994: 190).

Comments: The phenomenon of the enormous variability of *M. vesicaria* - within one population as well as geographically correlated - has already been discussed (TJEDER 1968, U. ASPÖCK & MANSELL 1994). It mainly involves the intensity of coloration with an orange touch in the eastern populations and a paler coloration in the west, overlapped by individual variability in the vesicae of the ♂ wings. The specimens examined in this study show a hitherto unknown polyphenism in the vesicae of the hind wings. In the Namibian localities - 94/8 (Kupferberg), 94/9, 94/11, 94/12, 94/20 (Tiger Valley), 94/24 (Achalm Farm) - many ♂♂ specimens (at least about one third in each locality) have extremely elongated oval vesicae in their hind wings (Figs. 20 - 24), all other ♂♂ are within the known variability, transitional stages are rare. No correlations to other criteria - in particular characters of the genitalia - could be found. The variability of the genitalia is apparently rather inconspicuous, at least as far as can be concluded from the random samples examined.

Distribution: Zimbabwe, Namibia, South Africa (Fig. 44).

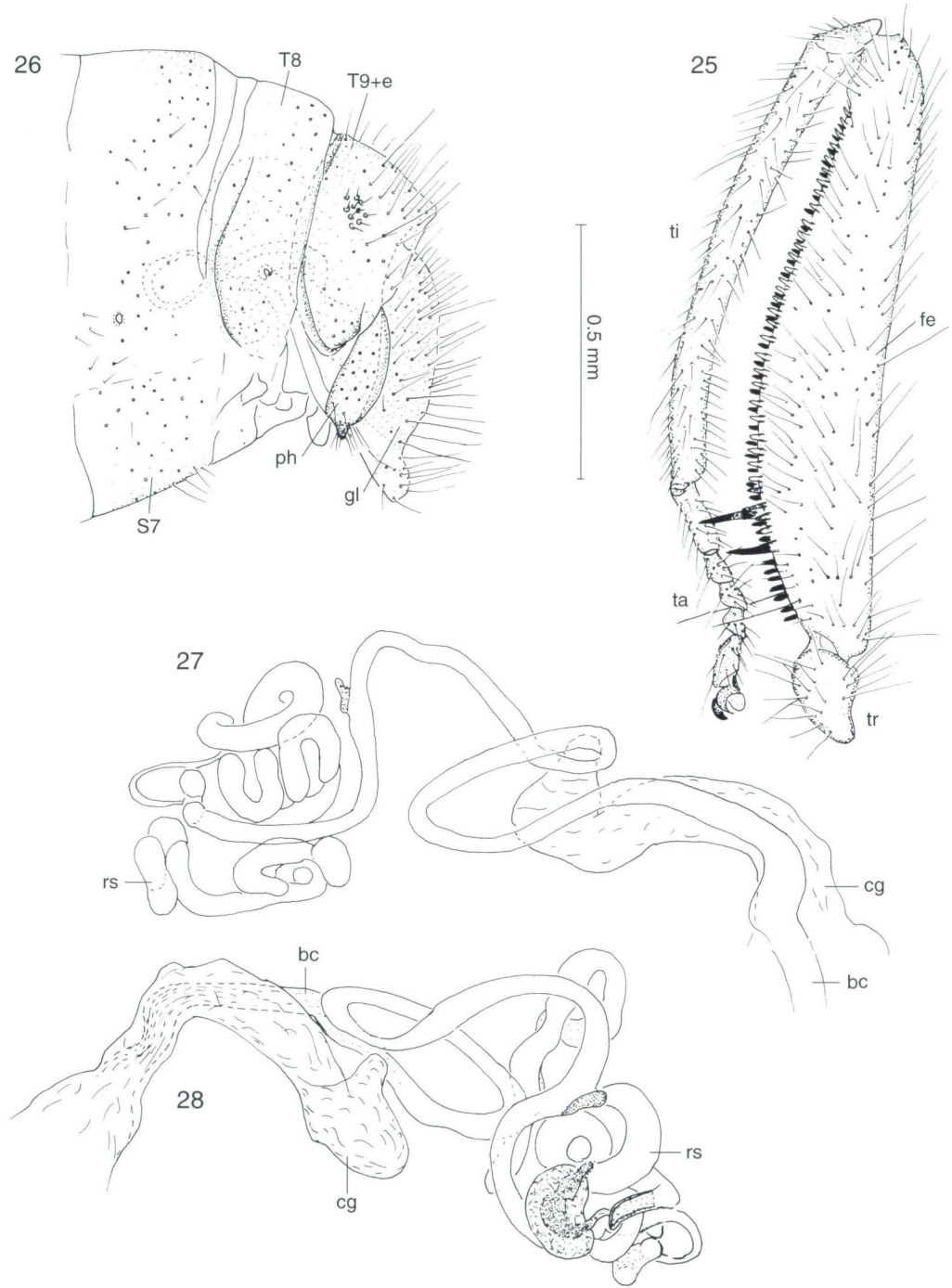
Mucroberotha copelandi sp.n. (Figs. 25 - 30)

Kenya: Holotype: ♀, "Kajiado Dist., Kenya. Along Magadi Rd. 8-IV-96. R. Copeland" (ILRN). **Paratypes: Tanzania:** 1 ♀, "TANZANIA, Mkomazi Game Reserve, Kamakota Hill, 4.14S 38.24E, 4 Dec 1995 S. van Noort, Inselberg in bushveld" (MCT), 2 ♂♂, "Tanzania, Mkomazi Game Reserve, Kikolo Plot. 04°07'S 38°01'E, 25 November 1995 / S. van Noort, Sweep, *Cordia*, *Solanum* shrubs, and mixed grasses in Commiphora woodland" (PRAT, SANC).

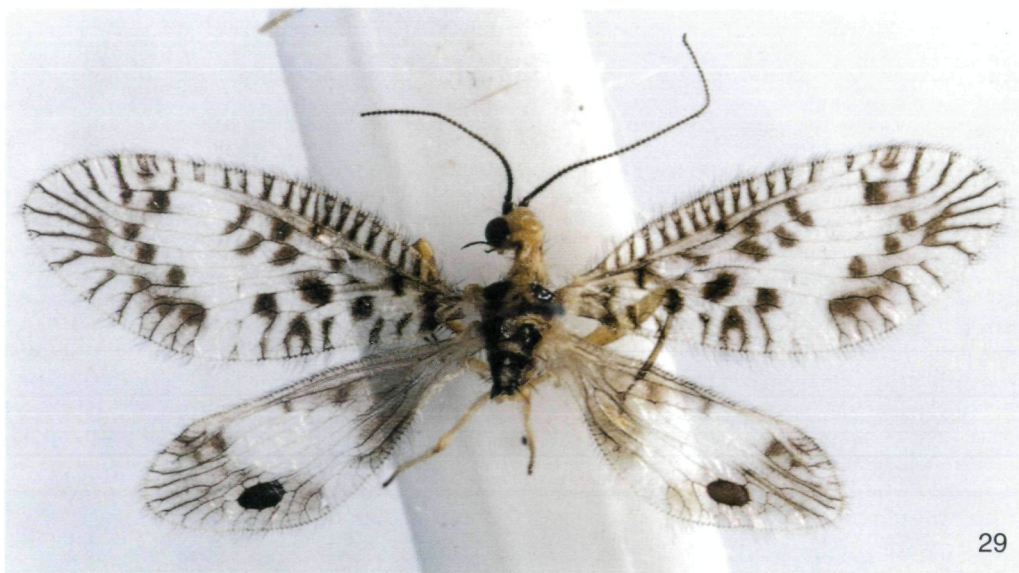
General appearance dominated by heavily maculated forewings with brown spots, in the ♂ additionally by a large vesica at the distal part of the MP in the hind wings, and an intensely yellow head and prothorax.

Description of ♀ holotype: Size: length of forewing 6.5 mm.

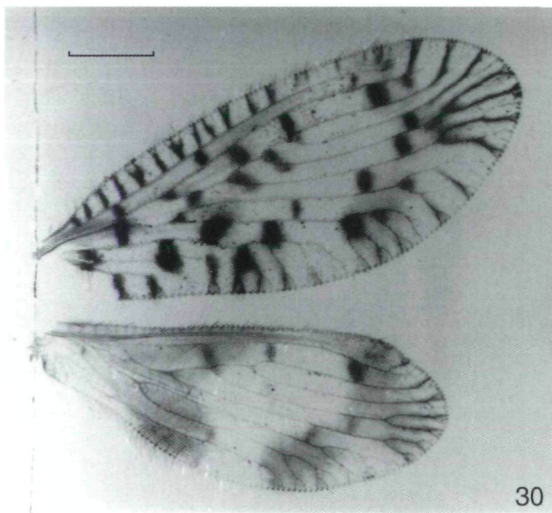
Head intensely yellow, mandibular apex, maxillary and labial palpi brown; stipes with a brown dot laterally. Antennal scape yellow anteriorly, blackish-brown posteriorly, pedicel and flagellum blackish-brown, pedicel with dark yellow ring distally. Vestiture predominantly dark-brown with single yellow hairs. Pronotum trapezoidal, intensive yellow, with small brownish stripes anterolaterally. Mesonotum intensely yellow, laterally dark-brown and with a brownish ♀ along meso-scutellar suture. Metanotum predominantly dark-brown, metascutellum posteriorly yellow. Vestiture of thorax dark-brown and golden-yellow. Legs: Forelegs (Fig. 25) yellow; coxae with a brown line along outer surface; femora with a double row of teeth on the ventral surface, with one large tooth at outer and inner row; tibiae with a proximally interrupted brown line along outer surface; tarsus brownish, first tarsomere almost as long as second and third together, 4th tarsomere the shortest; middle and hind legs predominantly yellow, only coxae brown, tarsae brownish.



Figs. 25 - 28: *Mucroberotha copelandi* sp.n., holotype, ♀: (25) right foreleg, inner side, (26) genital segments, lateral, (27) bursa copulatrix-receptaculum seminis complex, lateral, from left side, (28) same, from right side, (27) and (28) with larger scale.



29



30

Fig. 29 - 30: *Mucroberotha copelandi* sp.n., (29) paratype, ♂, Tanzania, Mkomazi Game Reserve (phot. A. Schumacher), (30) holotype, ♀, right fore- and hind wing (phot. H. Rausch). Scale: 1mm.

Wings (Fig. 30): forewing hyaline with brown spots on crossveins and branches. Longitudinal veins pale yellowish, brown within the spots, crossveins brown, costals predominantly brown. Membrane of pterostigma intensely yellow, brownish along some of the central veinlets. Three sc-r and three r-rs crossveins present. Stem of M unites with R at wing base. Hind wing with membrane

somewhat smoky, with hyaline regions proximally and centrally, brown shadows along several crossveins; membrane of pterostigma bright yellow proximally, brownish with a reddish touch distally. Veins similarly coloured. One/two sc-r, three r-rs crossveins and five/four gradates (in two rows) present. Vestiture of wings corresponding to colours of membrane and veins brown and yellowish respectively.

Abdomen: tergites dorsally yellowish, laterally blackish-brown, sternites intensive yellow.

Female genitalia (Figs. 26 - 28): sternite 7 not distinctly paired. Tergite 8 with apodeme along anterior margin. A membranous folded structure, but no sclerotized subgenitale present. Tergite 9 + ectoprocts with apodeme along anterior margin. Pseudohypocaudae



Figs. 31 - 32: (31) *Rhachiberotha pulchra* sp.n., holotype ♀ (phot. M. Stelzl), (32) *Mucroberotha vesicaria* TJEDER (Namibia) (phot. H. Rausch).

clearly separated, terminating in a little knob but lacking a defined processus. Gonapophyses laterales with short hypocaustae. Genital opening not associated with sclerotized loop; at present it is uncertain if it is really missing or only due to an artefact. Bursa copulatrix inconspicuous, receptaculum seminis long, hose-shaped, irregularly coiled. Base of colleterial gland not discernible.

Male similar in general appearance, but differing in several characters.

Wings (Fig. 29): length of forewing 5.8 mm; hind wing with a large vesica covering the distal part of the upper branch of MP. The pterostigma lacks the bright yellowish coloration, although this might be an artefact of preservation. Forelegs: first tarsomere as long as the following three tarsomers together and with a long spine.

Male genitalia: tergite 9 rather long, surrounding the spiracle, which is situated pleurally. Sternite 8 reduced, laterally triangular, ventrally ribbon-like, almost obliterated. Tergite 9 narrow dorsally, triangular laterally, with an apodeme parallel to the anterior margin, and with strong, long bristles at the caudal apex. Sternite 9 huge, shovel-like. Ectoprocts separate from tergite 9, tapering ventrally. Ninth gonocoxites and gonarcus fused to a large sclerite. Paramere-mediuncus complex with a basal sclerite and a long penisfilum. Hypandrium internum tiny.

Variability: The ♀ paratype from Tanzania is smaller (length of forewing 6.2 mm), seems to be somewhat teneral, but does not show any significant differences eidonomically; the genital segments look identical, the hypocaustae proceed from the gonapophyses laterales almost without any angle; in the holotype this angle may, however, be an artefact or due to copulation. With the exception of the vesicae, the ♂ specimens from Tanzania do not show major differences. A certain amount of variability of the shape of the vesicae is to be expected.

Systematic position: An isolated species. Superficially similar to *M. minteri* U. ASPÖCK & MANSELL, 1994, in the ♀, keying out at this species in U. ASPÖCK & MANSELL (1994: 183). Can be identified by its dark brown costals, which are yellow in *M. minteri*. In the ♂ the large vesicae, covering the outer part of the MP, are an additional character for identification. In *M. vesicaria* the corresponding vesicae are between MP and MA and not covering MP.

Note: Initially only the ♀ holotype was available for the description, the manuscript was ready for print, when the males and the female from Tanzania became available. These specimens could only be integrated without drawings, however, a photograph is presented (Fig. 29).

Etymology: Dedicated to Dr. Robert Copeland, Nairobi, Kenya, who discovered this species.

Distribution: Kenya, Tanzania (Fig. 44).

Genus *Hoelzeliella* gen.n.

Type species (by present designation): *Hoelzeliella manselli* sp.n.

Diagnosis: Head short, vertex raised, with one median and two lateral bristled zones, post-ocular zone inconspicuous. Antennal scape twice as long as broad. Pronotum approximately rectangular; basal sclerite behind the coxae very small dorsally, but extending into a ventral plate. Femora of forelegs with two rows of robust teeth, each ending with a toothed comb. Wings slender, stem of M discernible up to wing base. Abdomen with sternite 7 large and paired, pseudohypocaustae with large processus, caudally linked to gonapophyses laterales, genital opening associated with sclerotized loop.

Description: With the characters of the type species.

Systematics: The systematic position of *Hoelzeliella* gen.n. within the Rhachiberothidae remains uncertain as long as the ♂ is unknown. The sclerotized loop associated with the genital opening of the ♀ may, however, be interpreted as a synapomorphy of *Hoelzeliella* and *Mucroberotha*.

The toothed combs on the forefemora, the distal hook on the foretibiae, the slightly falcate, slender forewings, and the enormously enlarged processus of the pseudohypocaudae are autapomorphies of *Hoelzeliella*. One or the other of these characters may, however, turn out to be species-specific if further congeneric species will be discovered.

Etymology: This very remarkable new genus is cordially dedicated to our friend and colleague Herbert Hölzel who collected the only known specimen during our field studies in the Western Cape in South Africa.

Distribution: South Africa.

Hoelzeliella manselli sp.n. (Figs. 33 - 42)

South Africa: Holotype: ♀, " South Africa, Western Cape, Swartberg Mountains, Gamkas kloof, The Hell, 33°21' S / 21°35' E, 400 m, 20. Feb.1996, H. HÖLZEL leg." (SANC).

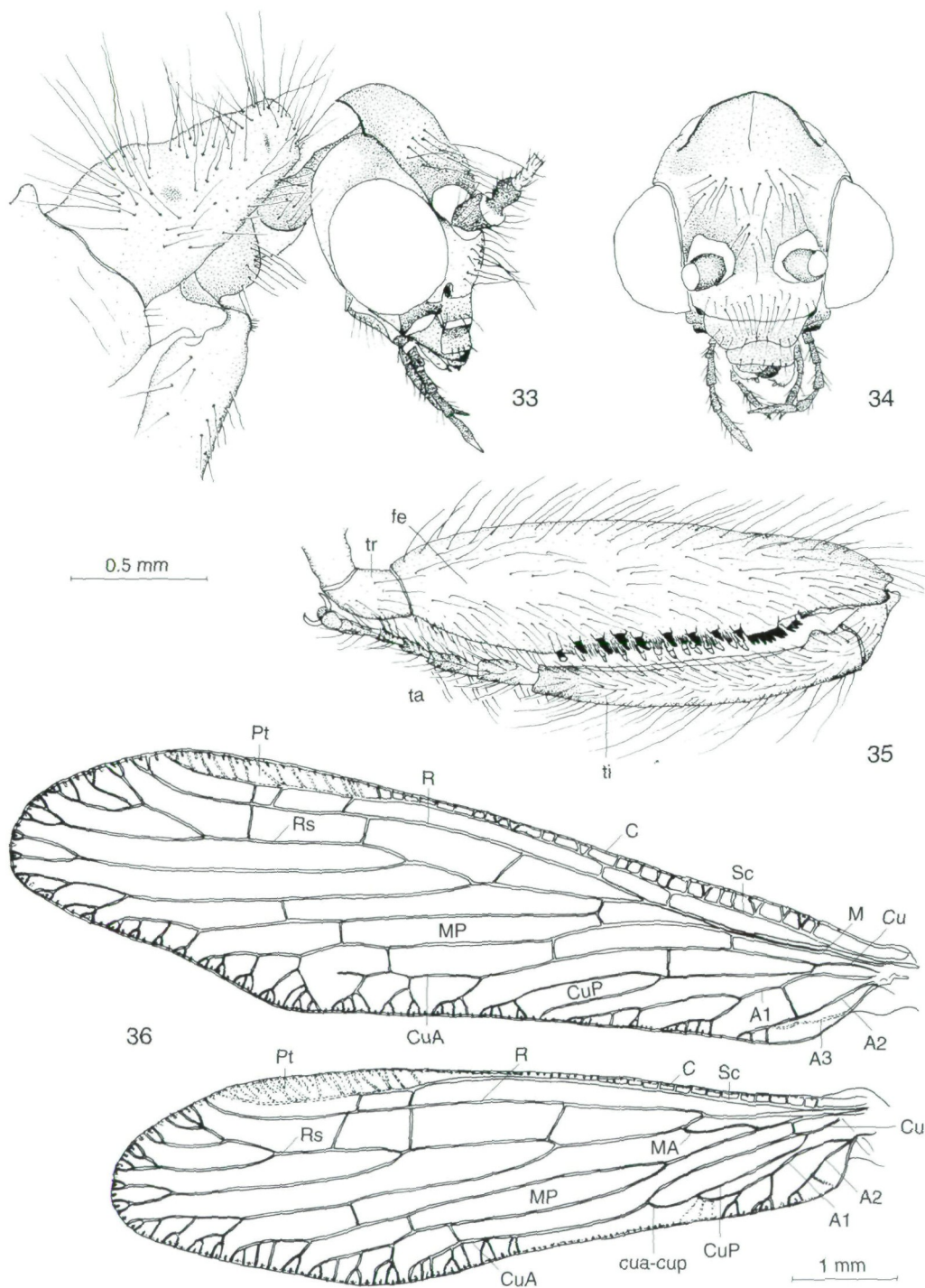
General appearance characterized by conspicuous hairiness and slender, heavily marked wings, looking falcate due to white colouration.

Description of ♀ holotype: Size: Length of forewing 8.8 mm.

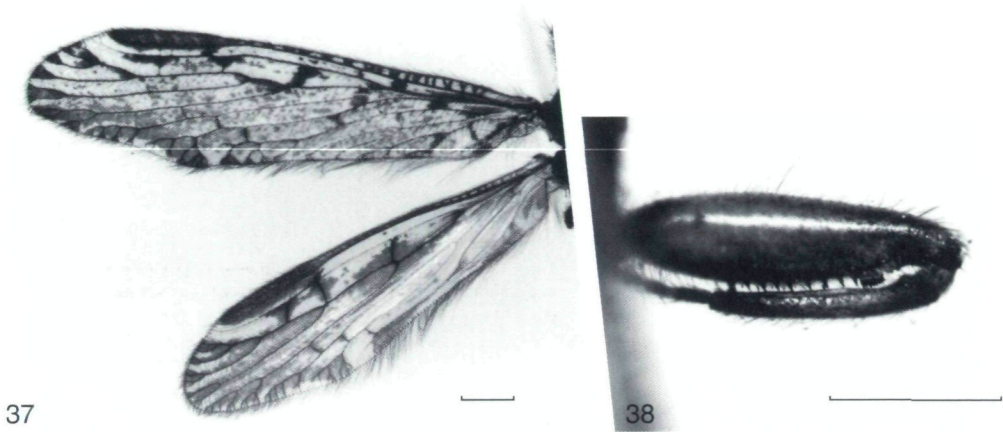
Head (Figs. 33, 34): frons yellowish with a bristled zone centrally; vertex raised, brownish, greyish-yellowish centrally, comprising three bristled zones which apparently represent very inconspicuous tubercles. Postocular zone inconspicuous. Clypeus and labrum brown; Maxillary and labial palpi brown. Scape and pedicel blackish-brown; scape twice as long as broad; flagellum brownish, only basal flagellomeres yellowish. Pubescence predominantly brownish, on basal flagellomeres sandy coloured.

Pronotum (Fig. 33) sandy-coloured with black bristles, approximately rectangular; basal sclerite behind the coxae extending ventrally into ventral plate, but forming a small sclerite dorsally. Mesonotum sandy-yellowish, brown laterally, scutellum brownish. Metanotum sandy-yellowish with a brown line medially, brown laterally. Forelegs (Figs. 35, 38) predominantly sandy-yellow; trochanter, distal part of tibia and tarsomers brownish; femora rounded with two rows of robust teeth, distally each row ending with a small toothed comb; five tarsomeres. Middle and hind legs dark-brown, only tibiae sandy-yellow with brown ends.

Wings slender (Figs. 36, 37): forewing slightly falcate, membrane somewhat milky with brownish markings, as speckles and mottles. Pterostigma brown. Veins corresponding to membrane brownish or sandy-coloured; five sc-r; three (left) / four (right) r-rs crossveins; stem of M free to wing base, with basal part closely parallel under R; three gradate crossveins; A2 and A3 forming a cell; A3 partly reduced in left forewing. Hind wing not really falcate, membrane somewhat milky with brownish markings, speckles and mottles. Pterostigma brown. Veins brownish or sandy-coloured; C and Sc almost joining at about half length of wing; basal Ma sinuate; two sc-r; three r-rs; three gradate crossveins; CuA forming



Figs. 33 - 36: *Hoelzeliella manselli* sp.n., holotype ♀: (33) head and prothorax, lateral, (34) head, frontal, (35) left foreleg, inner side, (36) left fore- and hind wing.



Figs. 37 - 38: *Hoelzeliella manselli* sp.n., holotype, ♀: (37) left fore- and hind wing, (38) right foreleg, outer side. Scale: 1mm.

a cell with basal CuP and cua-cup; CuP obliterated distally; A1 forming a narrow cell with CuP. Vestiture of wings predominantly brownish, marginal fringes sandy to dark brown.

Abdomen: tergites brownish-yellowish speckled, sternites brownish with grey-yellowish dots forming a ribbon along the abdomen; pleurally greyish-yellowish speckled; terminalia dorsally yellowish; pubescence with greyish-brownish hairs.

Female genitalia (Figs. 39 - 42): sternite 7 paired, relatively large, well sclerotized. Tergite 8 with apodeme anteriorly. No distinct subgenitale. Tergite 9 fused with ectoprocts, with distinct apodemes anteriorly and an oblique one ventrally. Pseudohypocaudae clearly separate from tergite 9, but caudally linked to the gonapophyses laterales, mainly consisting of large finger-shaped processus. Gonapophyses laterales heavily sclerotized with short yellow hypocaudae. Genital opening associated with sclerotized loop. Bursa copulatrix slender, receptaculum seminis heavily sclerotized and complexly coiled.

Male unknown.

Systematic position: The species is completely isolated within the family. Whether it is more closely related to species of the genus *Mucroberotha* (see comment above under systematic position of *Hoelzeliella*) than to *Rhachiberotha* remains uncertain at present.

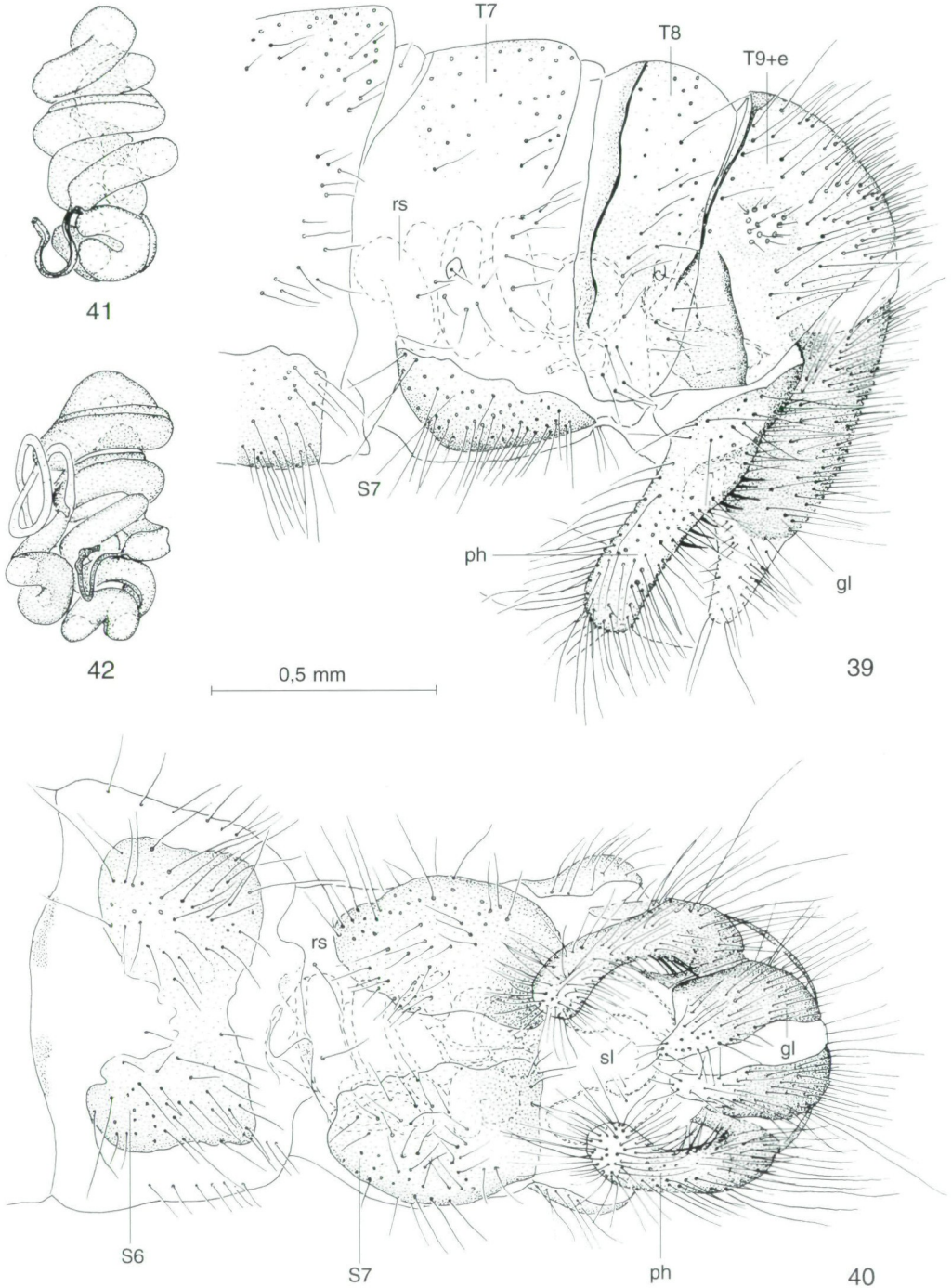
Etymology: The detection of this new species is the result of joint field studies with our friend and colleague Dr. Mervyn Mansell who had the idea to investigate the remote area of "The Hell" in the Western Cape. The species is cordially and gratefully dedicated to him.

Ecology: The only specimen so far known has been collected at a mv light trap a few metres above the Gamka River in a small open area surrounded by dense vegetation.

Distribution: South Africa (Fig. 44).

Discussion

The following aspects - triggered by the specimens under study - are to be discussed: 1) the distribution of the family Rhachiberothidae, 2) geographically correlated intraspecific variability and its systematic consequences, 3) the phylogenetic position of the Rhachiberothidae.



Figs. 39 - 42: *Hoelzeliella manselli* sp.n., holotype ♀: (39) genital segments, lateral, (40) same, ventral, (41) bursa copulatrix-receptaculum seminis complex, lateral, (42) same, ventral.



Fig. 43 - 44: Distribution of the species of the Rhachiberothidae.

1) The finding of a rhachiberothid in Kenya and Tanzania leads to the conclusion that the family will be found also in other parts of Africa between the northernmost record in Ethiopia and the southern parts of the known distribution in Zimbabwe, South Africa, Namibia and Angola. The known distribution of all described species of the family is shown in Figs. 43 - 44. It will be of considerable interest to determine whether the family also occurs in Western Africa.

The discovery of a rhachiberothid in Western Cape was a particularly great surprise and enlarges the known distribution considerably. The distribution area of the Rhachiberothidae previously known lay within the distribution of the much better-known Berothidae, which are represented in the Afrotropics mainly by the genus *Podallea* NAVÁS, 1936. Possibly they have similar ecological requirements. The general considerations on the formation of the distribution of *Podallea* (U. ASPÖCK & H. ASPÖCK 1996, and references therein) may be principally valid also for the Rhachiberothidae. With respect to the lack of *Podallea* in the Cape Province the record of a rhachiberothid within this region merits particular attention.

2) The phenomenon of geographically correlated variability is particularly conspicuous in *M. vesicaria*. Only a more or less complete documentation of the distribution of *M. vesicaria* may clarify whether there exists an east-west cline. At any rate, the species is widely distributed. Also in the case of *R. pulchra* sp.n. the existence of clinal variability cannot be excluded, although the number of specimens available is much too low to determine this. Moreover clinal or geographically correlated variability might also be found in *M. minteri*, which has also been detected in localities far away from each other (Zimbabwe and Namibia, U. ASPÖCK & MANSELL 1994). Vicariance events, which may have led to shifts of distribution areas, to persistent disjunctions or to reunions of separated distribution areas, have certainly been of great influence on the present distribution patterns of Rhachiberothidae although, so far, concrete data are hardly available.

3) The discovery of *Hoelzeliella manselli* - which represents a distinctly different rhachiberothid type compared to the other two genera - has not led to change in the present concept of the family. It has yielded no contradictions to the arguments for monophyly of the Rhachiberothidae or to those supporting the concept of Rhachiberothidae as a sister group of the Berothidae (U. ASPÖCK & MANSELL 1994).

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