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A revision of the assassin spiders of the *Eriauchenius* gracilicollis group, a clade of spiders endemic to Madagascar (Araneae: Archaeidae)

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An endemic group of Malagasy spiders (Araneae: Archaeidae: *Eriauchenius*) called the gracilicollis group is revised. The monophyly and phylogenetic relationships of the gracilicollis group are tested based on morphological characters. Archaeid spiders of Madagascar have evolved varying degrees of elongation in the cephalic area. Historically, it was believed that the extremely elongated cephalic area had evolved only once. These morphological data support the monophyly of the gracilicollis group and suggest that the elongated cephalic area has evolved more than once. All 14 species from the gracilicollis group are described and keyed, of which nine are new species: ***Eriauchenius ambre* sp. nov.**, ***Eriauchenius anabohazo* sp. nov.**, ***Eriauchenius borimontsina* sp. nov.**, ***Eriauchenius griswoldi* sp. nov.**, ***Eriauchenius halambohitra* sp. nov.**, ***Eriauchenius lavatenda* sp. nov.**, ***Eriauchenius namoroka* sp. nov.**, ***Eriauchenius spiceri* sp. nov.** and ***Eriauchenius voronakely* sp. nov**. The morphology of the gracilicollis group is examined in detail and figures of the male and female genitalia are presented. The distributions of the gracilicollis group species are presented and discussed and higher species group relationships within the Archaeidae are discussed. *Zoological Journal of the Linnean Society*, 2008, **152**, 255–296.

ADDITIONAL KEYWORDS: Malagasy – morphology – phylogeny – species descriptions.

INTRODUCTION

The 'assassin spiders' found in Madagascar are unique due to the extreme elongation of the cephalic area and the chelicerae, giving these spiders the appearance of a 'neck' and 'head' (Figs 1–3). The large anterior median eyes also contribute to this strange appearance. Archaeids are araneophagous hunting spiders (Millot, 1948; Legendre, 1961) that have greatly speciated on Madagascar. Their grotesque appearance, araneophagous predatory behaviour and endemism have made them the icon of Madagascar spiders (Griswold, 2003). On the island, these spiders show great diversity in the amount of elongation in the cephalic area, and in the shape of the distal portion of the cephalic area, the 'head', which can be rounded to cone shaped, and have from zero to three pairs of protrusions of various sizes. There is also a great amount of diversity in the genitalic structures. In this study a subgroup, which represents only a portion of the total diversity of the genus *Eriauchenius*, will be examined in detail. The subgroup, called the gracilicollis group, is named after the species *Eriauchenius gracilicollis* (Millot, 1948) (Fig. 1F) because this species has the most elongated cephalic area and because this is one of the first described species in this group. This study describes all the species of the gracilicollis group and also examines their phylogenetic relationships using morphological data. These data will test the monophyly of the gracilicollis group and will contribute to a better understanding of the evolutionary history of these spiders.

Archaeidae (Koch & Berendt, 1854) was first described from three species fossilized in Baltic

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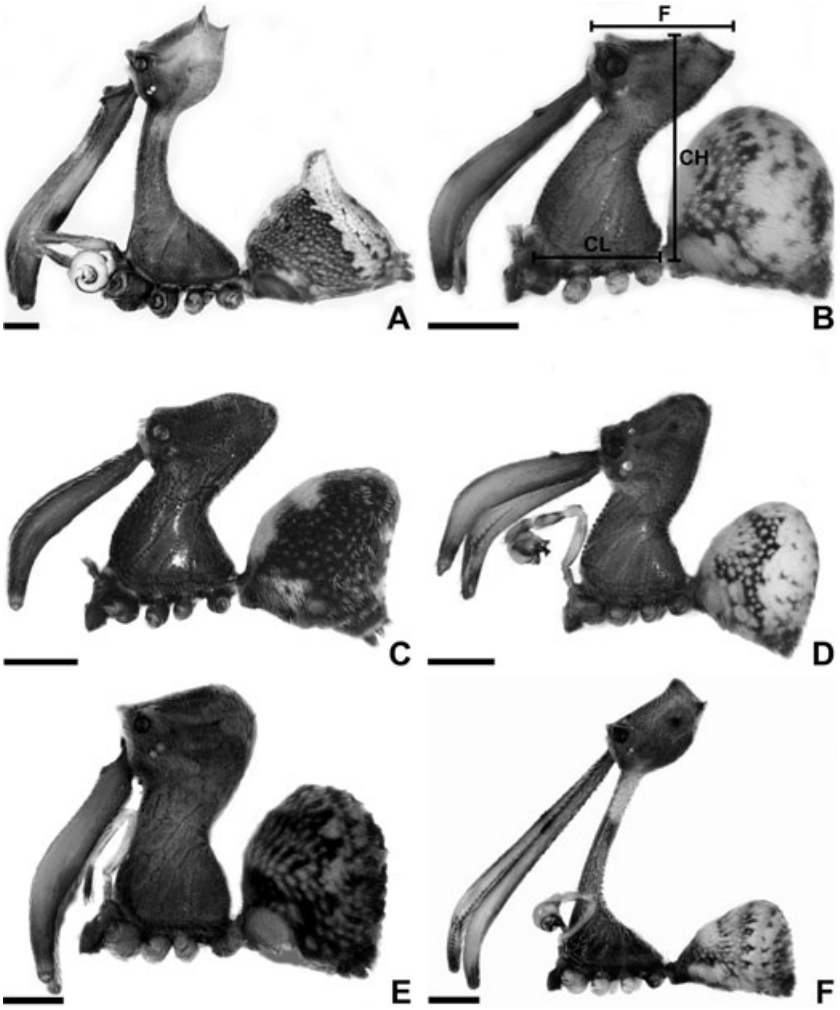

Figure 1. *Eriauchenius* species, lateral view, legs removed. A, ♂ *E. workmani* (O. P.-Cambridge). B, ♂ *E. vadoni* (Millot), showing carapace height (CH), carapace length (CL) and 'forehead' length (F). C, ♂ ***E. ambre* sp. nov.** D, ♂ ***E. anabohazo* sp. nov.** E, ♀ ***E. borimontsina* sp. nov.** F, ♂ *E. gracilicollis* (Millot). Scale bars = 0.5 mm.

amber, which is of Eocene age (Eskov, 1992; Krzeminska & Krzeminski, 1992). In 1881, O. P.-Cambridge discovered a living archaeid in Madagascar with an extremely long 'neck', *E. workmani* (Fig. 1A). More living species were later described only from areas in the southern hemisphere. Forster & Platnick (1984) relimited Archaeidae, consisting of three extant genera: *Austrarchaea* (Forster & Platnick, 1984) is from Australia; *Afrarchaea* (Forster & Platnick, 1984) is from South Africa; and *Eriauchenius* (removed from synonymy with *Archaea* by Wunderlich in 2004) is mainly from Madagascar, with one South African species. The sister family to the archaeids (Forster & Platnick, 1984), Mecysmaucheniidae (Simon, 1895), is also found only in the southern hemisphere. Although extant archaeids have a southern hemisphere distribution, it could be misleading to consider this group Gondwanan because of the Baltic amber fossil record. Wunderlich (2004) recognized distinct northern (extinct) and austral (extant) faunas of Archaeidae (called Archaeinae by Wunderlich) and considered this group to be widespread rather than Gondwanan. More data are needed to understand better and to establish the phylogenetic and biogeographical relationships among the fossil and extant Archaeidae. Regardless, it is remarkable that this diversity now only remains in Madagascar, South Africa and Australia, considering this group was once more widespread.

The genus *Eriauchenius* is traditionally separated from *Afrarchaea* based on the presence of a grossly extended and constricted cephalic area, the 'neck', and from *Austrarchaea* due to the differing female genitalia. Legendre (1970) believed that the ancestor of *Eriauchenius* resembled an *Afrarchaea*, which have shorter, thicker 'necks'. Forster & Platnick (1984) agreed that *Afrarchaea* approximated the primitive

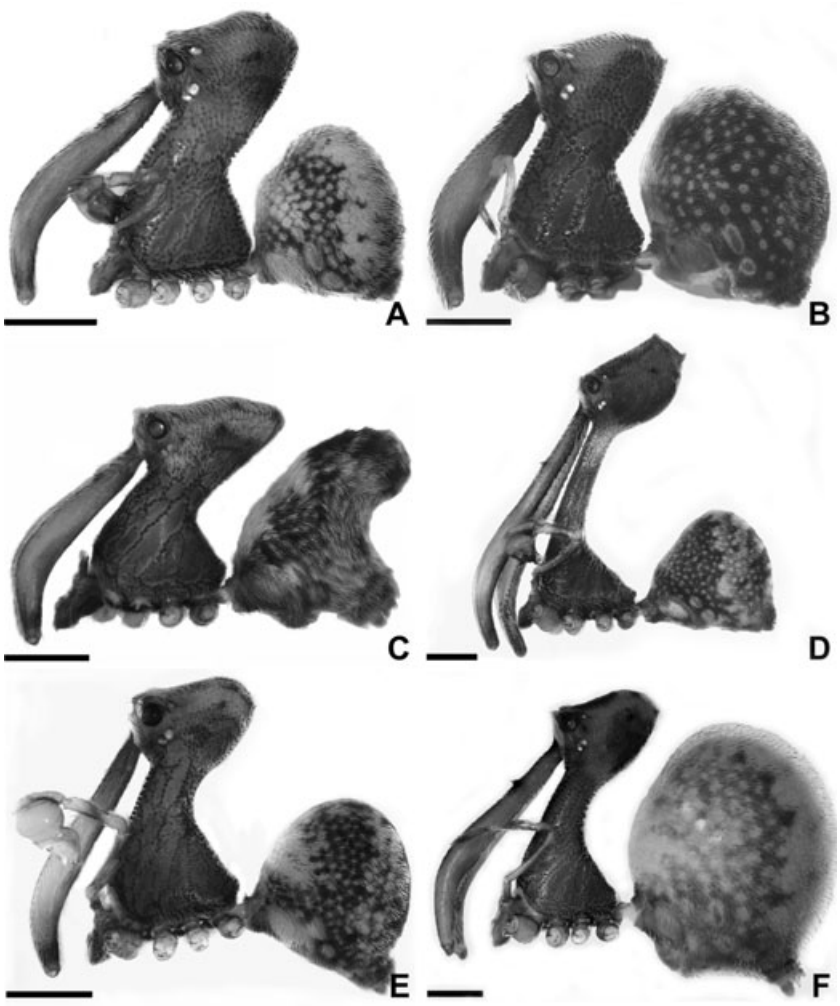

Figure 2. *Eriauchenius* species, lateral view, legs removed. A, ♂ ***E. griswoldi* sp. nov.** B, ♀ ***E. halambohitra* sp. nov.** C, ♀ *E. jeanneli* (Millot). D, ♂ ***E. lavatenda* sp. nov.** E, ♂ *E. legendrei* (Platnick). F, ♀ ***E. namoroka* sp. nov.** Scale bars = 0.5 mm.

form, and that *Eriauchenius* (which they treated as *Archaea*) and *Austrarchaea* are more closely related due to the shared trait of a long, slender 'neck'. Platnick also later suggested, in agreement with Legendre, that *E. gracilicollis* and *E. workmani* are sister taxa due to a 'uniquely elongated and narrowed pars cephalica' (Platnick, 1991: 135). In addition to describing all the species of the gracilicollis group and examining their phylogenetic relationships, this study will also examine the evolution of the long 'neck' by testing whether *E. gracilicollis* and *E. workmani* are indeed sister taxa.

MATERIAL AND METHODS

PHYLOGENETIC ANALYSIS

A species from the sister family to the archaeids, Mecysmaucheniidae, was used as the outgroup. All 14 species from the gracilicollis group were included in the phylogenetic analysis. A species each from both *Afrarchaea* and *Austrarchaea* was used to test which genus is more closely related to the gracilicollis group. In addition, *E. workmani*, *E. bourgini* (Millot, 1948) and a species from both *Afrarchaea* and *Austrarchaea* were included to test for monophyly of the gracilicollis group, and to help understand family relationships and the evolution of the long 'neck'. *E. workmani* is traditionally placed as the sister taxon to *E. gracilicollis*, based on the shared presence of a long 'neck'.

Data were gathered from the following taxa using this material: Mecysmaucheniidae (*Mecysmauchenius segmentatus* Simon, 1884) ♀♂ voucher: Argentina, Tierra del Fuego, Parque Nacional Tierra del Fuego, Area Lapataia, 9.i.2003, M.J. Ramirez & C. D'Haese, MACN10284, MACN; Austrarchaea [*A. nodosa* Forster, 1956 (this species identification may be incor-

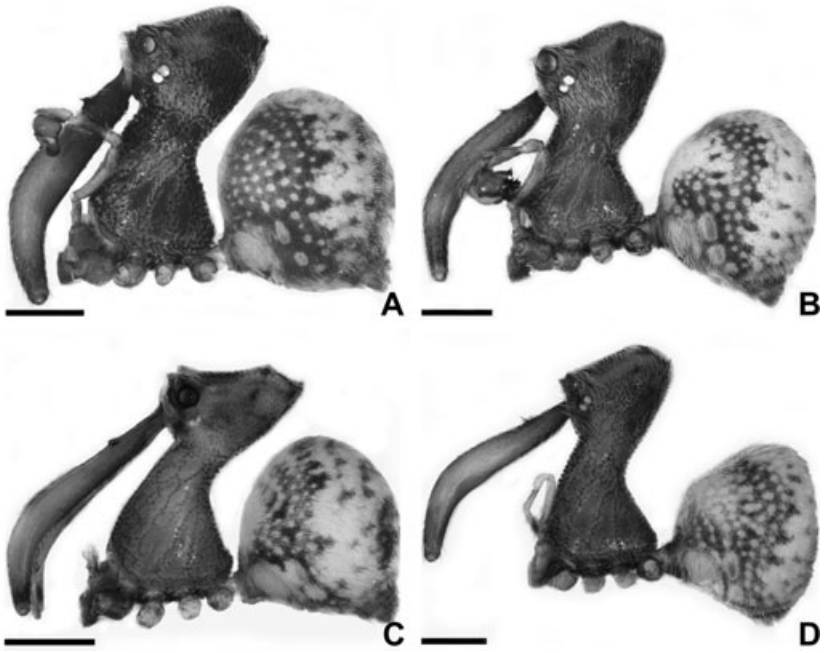

Figure 3. *Eriauchenius* species, lateral view, legs removed. A, ♂ ***E. spiceri* sp. nov.** B, ♂ *E. tsingyensis* (Lotz). C, ♂ *E. vadoni* (Millot). D, ♀ ***E. voronakely* sp. nov.** Scale bars = 0.5 mm.

rect, M. Harvey pers. comm.)] ♀ voucher: Australia, Queensland**,** Kroombit Tops (Beauty Spot 98), 45 km SSW Calliope, 9–10.xii.1983, V.E. Davies & J. Gallon, S30803, QM; Austrarchaea (*A. nodosa*) ♂ voucher: Australia, Queensland, Tullawallal, S of Binna Burra, Lamington N.P., S28.21073°, E153.19219°, elevation 900 m, 21.iii.2006, C. Griswold, D. Silva, R. Raven, B. Baehr & M. Ramírez, CASENT 9018966, CAS; Afrarchaea (*A. woodae* Lotz, 2006) ♀♂ voucher: South Africa, Eastern Cape Province, Kai Mouth, 58 km NE East London, S32°41.207′, E28°22.627′, elevation 15 m, 11–13.ii.2006, J. Miller, H. Wood, & L. Lotz, CASENT 9018956; *E. workmani* ♀♂ voucher: Madagascar, Fianarantsoa Province, Parc Nationale Ranomafana, Vohiparara, Piste Touristique, 21°13.6′S, 47°24.0′E, elevation 1000 m, 23.iv.1998, Fisher/Griswold Arthropod survey team, CASENT 9018993, CAS; *E. bourgini* ♀♂ voucher: Madagascar, Antananarivo Province, Réserve Spéciale d'Ambohitantely, Forêt d'Ambohitantely, 20.9 km 72° NE Ankazobe, 18°13′31′S, 47°17′13′E, elevation 1410 m, 17–22.iv.2001, Fisher/Griswold Arthropod survey team, CASENT 9001207, CAS. Institution abbreviations used in the text are listed in Table 1.

The 12 morphological characters used in this analysis are described in Appendix 1. The data matrix (Appendix 2) was constructed using MacClade 4.03 (Maddison & Maddison, 2001). Parsimony analysis of the 12 unordered characters was conducted using PAUP*4.0b10 (Swofford, 2001), performing a branch and bound search. The analysis resulted in 732 trees of 15 steps, with a CI of 1.0 and an RI of 1.0. Bremer support was tested using Tree Rot.v2b (Sorenson, 1999). A strict consensus tree is reported here with Bremer values shown on the tree (Fig. 4). A second branch-and-bound search was performed with *E. borimontsina* sp. nov., *E. spiceri* sp. nov. and *E. halambohitra* sp. nov. eliminated from the data matrix, because in these species only one sex is known. This analysis resulted in 42 trees of 15 steps, from which one strict consensus tree was made (not shown) and tested for Bremer support (reported on Fig. 4).

Table 1. List of institution abbreviations used in the text

AMNH	American Museum of Natural History, New York
CAS	California Academy of Sciences, San Francisco
MACN	Museo Argentine de Ciencias Naturals 'Bernardino Rivadavia'
MNHN	Muséum National D'Histoire Naturelle, Paris
QM	Queensland Museum
USNM	National Museum of Natural History, Smithsonian Institution
ZMUC	Zoological Museum, University of Copenhagen

MONOPHYLY OF THE GRACILICOLLIS GROUP

The analysis shows the gracilicollis group as monophyletic. The gracilicollis group contains two clades,

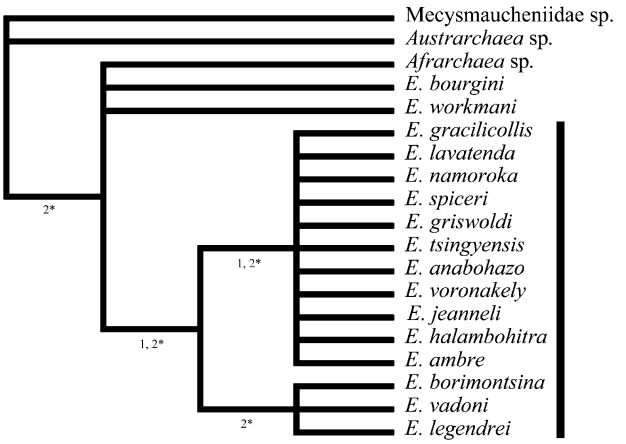

Figure 4. Strict consensus tree showing the relationships among members of the gracilicollis group and other archaeids. Vertical bar indicates members of gracilicollis group. Bremer support values are in parentheses under each branch; the values with an asterisk are the Bremer support for the analysis done with three taxa eliminated.

one containing *E. vadoni* (Millot, 1948), *E. legendrei* (Platnick, 1991) and *E. borimontsina* sp. nov., and the other containing the remaining members of the gracilicollis group. In the analysis in which three species were eliminated, the topology of the tree is the same (minus three taxa) except that *E. griswoldi* sp. nov., *E. tsingyensis* sp. nov. and *E. anabohazo* sp. nov. form a clade with Bremer support of 1. The members of the gracilicollis group, *E. workmani*, *E. bourgini* and *Afrarchaea* sp. form a larger clade with *Austrarchaea* sp. falling on the outside. This study is not sufficiently comprehensive to establish the relationships between the archaeid genera.

The presence of six protrusions on the 'head' (character/state: 12/2) and the male palp patella apophysis (character/state: 1/1) are synapomorphies for the gracilicollis group. *E. workmani* does not fall inside the gracilicollis group and is not sister taxa to *E. gracilicollis*, although both of these taxa share the trait of an extremely long and slender 'neck'. This suggests that the extremely elongated cephalic area, the 'neck', has evolved independently at least twice. This study casts doubt on the utility of solely using 'neck length' for understanding archaeid evolution. The constricted, elongated 'neck' is the synapomorphy Forster & Platnick (1984) used to conclude that *Eriauchenius* (considered by them as *Archaea*) and *Austrarchaea* are sister taxa. In this study, *Afrarchaea* and *Eriauchenius* are grouped together based on the lack of epiandrous spigots (character/state: 6/0), the lack of receptaculum (character/state: 9/1) and the presence of a female sclerotized genital plate (FSGP) with appendages, called 'wings' (character/state: 8/1, 10/1). Both Mecysmaucheniidae, the outgroup, and *Austrarchaea* have epiandrous spigots and receptaculae and lack a FSGP. It is important to note that this cladogram does not suggest that *Austrarchaea* and mecycsmaucheniids are sister taxa. Instead it shows the ambiguity in current archaeid classification.

Although rejected by Platnick (2006), in 1992 Eskov synonymized the genera *Afrarchaea* and *Eriauchenius*, then called *Archaea*. These genera were originally separated by Forster & Platnick (1984) based on *Archaea* having an extremely elevated and constricted 'neck' and *Afrarchaea* having a shorter, stouter 'neck'. Although this study suggests that the long 'neck' may not be a good diagnostic character to separate the genera, I still believe that the genera should remain separated. There is a spine on the chelicerae of many *Afrarchaea* that is long and thin and projects outward at a 90° angle, while in *Eriauchenius* the cheliceral spine is downward pointing, short and thick, and often on a tubercle. Furthermore the female genitalia of many *Afrarchaea* have a keel-like structure on the FSGP (Forster & Platnick, 1984) that is not shared by *Eriauchenius*. Future studies based on phylogenetically informative morphological and molecular characters will show whether these groups are monophyletic clades, or whether a different grouping altogether will emerge. Future research needs to include more characters and more taxa from non-gracilicollis group archaeids, which were underrepresented in this study. Furthermore, there are still several undescribed species from the CAS collection that, once described, should be included in future studies. The genus *Eriauchenius* appears to be very diverse and possibly contains more clades of as yet unknown phylogenetic structure.

The morphological tree can be compared with the molecular trees found using maximum likelihood and parsimony (Wood, Griswold & Spicer, 2007). Although these molecular trees focus only on phylogenetic relationships within the gracilicollis group, the results are still comparable. In both the morphological and the molecular tree the gracilicollis group is monophyletic, with *E. workmani* falling on the outside. Also, in both trees the members of the gracilicollis group are divided into two main clades. The molecular trees are compatible with the morphological tree in every way except in the placement of *E. jeanneli* (Millot, 1948), which falls in the clade containing *E. borimontsina* sp. nov., *E. legendrei* and *E. vadoni* in the molecular trees.

SPECIES DESCRIPTIONS

Specimens used in this study were primarily from the collection at the California Academy of Sciences. Addi-

tional material was borrowed from the museums referred to in the acknowledgements and in Table 1, which lists the museum abbreviations used directly in the text. A male and female, if both are known, is described for each species. Individuals of species where one sex was unknown were associated based on their collection locality and the fact that they were collected at the same time as the known sex. Molecular methods helped to associate males and females found in different locations for *E. voronakely* sp. nov. (Fig. 3D), and also helped to distinguish the male of *E. spiceri* sp. nov. (Fig. 3A) and the female of *E. halambohitra* sp. nov. (Fig. 2B), although these individuals were found in the same general location. Full details of the molecular methods employed are available in Wood *et al*. (2007).

SEM images were taken using a Leo 1450VP scanning electron microscope; prior to photographing, specimens were critically point dried and sputter coated. Spinnerets were prepared by squeezing the abdomen with forceps to separate the spinnerets (Coddington, 1989). Specimens were also examined and interpretively drawn using an Olympus SZH10 dissecting microscope and a Nikon Alphaphot-2 YS2 compound microscope that had a drawing tube attached. The vulva, after extraction, was either placed in KOH under a heat lamp for 3–8 h to digest tissue, or placed in lactic acid and then examined using temporary mounts described by Coddington (1983). Photographs were taken using a Nikon DXM1200 digital camera mounted on a Leica MZ16 microscope using Auto Montage Pro version 5.01.0005. Lindsay Upshaw of the Center for Biodiversity Research and Information (CBRI), California Academy of Sciences (CAS), mapped the distributions using ArcView 3.3.

All measurements are in millimetres (mm). Morphological abbreviations used in the text are listed in Table 2. The pars cephalica in Archaeidae is elongated and the term 'head' represents the most distal portion of the elongation, and the term 'neck' represents the constricted portion of the elongation. The measurement F is the length from the most anterior point of the clypeus to the most posterior pair of protrusions on the tip of the elongated cephalic area (Fig. 1B). This measurement shows the relative posterior elongation of the 'head'. The CH/CL ratio (Fig. 1B) quantifies the elongation of the cephalic area by dividing the carapace height by the carapace length. Individuals of the same species show variation in the tilt of the 'neck', particularly in species with a large CH/CL ratio, and also variation in the roundness of the 'head'. This variation often affects the CH/CL ratio, because if the neck is greatly tilted back, the CH measurement, which is taken from the base of the carapace at a 90° angle, does not represent the true extension of the 'neck'. The female genitalia have a sclerotic structure called the FSGP that is attached dorsally to the bursa, of unknown use. The term 'wings' (w) represents the flat, fan-like projection extending to each lateral side of the FSGP. The male pedipalps have three homologous sclerotized structures, of unknown purpose, that are located on the dorsal (bulb dorsal sclerite, BDS) and lateral (bulb lateral sclerite, BLS) face of the bulb, and on the apical ventral side, connected to and extending from the bulb, often pointing prolaterally (bulb proapical process, BPAP); the embolus is immediately anterior to the BPAP, and appears to connect with the BLS deep inside the bulb. Note that this terminology differs from that in Griswold *et al*. (2005), who referred to a conductor and median apophysis on the archaeid palp. I believe that the homology of archaeid palpal parts is unclear and I prefer the specialized terminology justified here. The size variation reported in each description represents the smallest and largest individuals.

Table 2. List of anatomical abbreviations used in the text and figures

AC	aciniform gland spigot
ALS	anterior lateral spinnerets
AME	anterior median eye
BDS	bulb dorsal sclerite
BLS	bulb lateral sclerite
BPAP	bulb proapical process
CH	carapace height
ChL	chelicerae length
ChS	chelicera base to cheliceral seta length ratio
CL	carapace length, excluding endites
CY	cylindrical gland spigot
E	embolus
F	clypeus to posterior pair of 'head' protrusions distance
FL	femur I length
FSGP	female sclerotized genital plate
LE	lateral eye
MAP	major ampullate gland spigot
mAP	minor ampullate gland spigot
MOQ	median ocular quadrangle
N	nubbin
PA	male palp patella apophysis
PER	posterior eye row
PI	piriform gland spigot
PLS	posterior lateral spinnerets
PME	posterior median eye
PMS	posterior median spinnerets
PP	pore plates
s	sclerotized structure on anterior of bursa
w	wings, lateral projections on FSGP

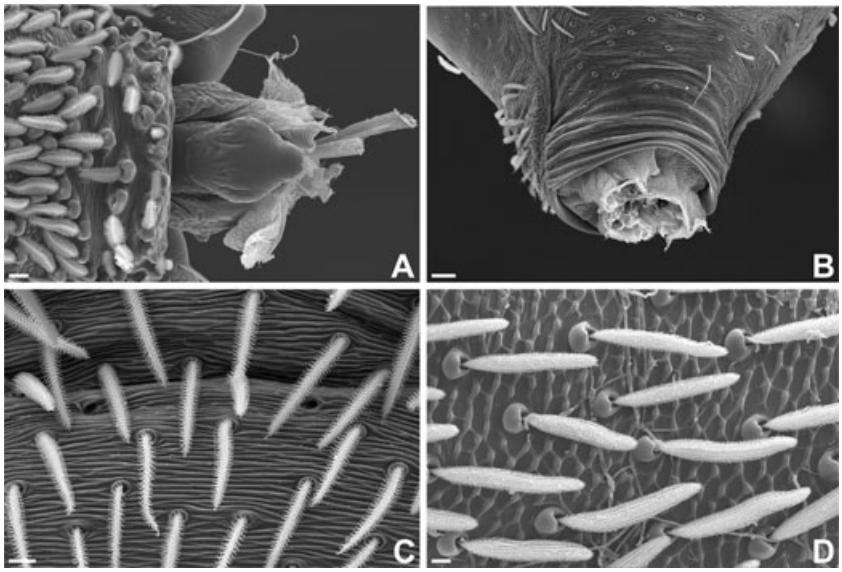

Figure 5. ***Eriauchenius lavatenda*** **sp. nov.** A, ♀, pedicel, dorsal. B, ♂, abdomen, anterior–dorsal, showing ridges on the petiole. C, ♀, posterior spiricles. D, ♀, carapace hair and texture. Scale bars: A = 20 μm, B = 30 μm, C, D = 10 μm.

TAXONOMY

ARCHAEIDAE KOCH & BERENDT, 1854

Archaeidae Koch & Berendt, 1854: pp. 5, 19, based on *Archaea* Koch & Berendt.
Archaeidae Forster & Platnick, 1984: pp. 6. Wunderlich, 2004: pp. 768–797. Platnick, 2006.

Diagnosis: Ecribellate, haplogyne, araneomorph spiders, with peg teeth, and cheliceral and petiole stridulatory systems; extant genera with set of anterior booklungs and pair of posterior spiracles. For complete description see Forster & Platnick (1984).

GENUS *ERIAUCHENIUS* O. P. CAMBRIDGE, 1881

Eriauchenius O. P. Cambridge, 1881: pp. 767, based on *Eriauchenis workmani* O. P. Cambridge. Simon, 1895: pp. 935. Wunderlich, 2004: 778, 791. Platnick, 2006.

Type species: E. workmani O. P. Cambridge, 1881.

Diagnosis: Distinguished from *Afrarchaea* (Forster & Platnick, 1984) by the presence of a longer, more slender 'neck' and from *Austrarchaea* (Forster & Platnick, 1984) by the bursa lacking receptacula, and by the embolus being short and blunt rather than long and wiry. Distinguished from fossil genera by having stridulatory ridges on the distal half of the chelicerae, by lacking proventral stridulating picks on the palp femur, by having a short petiole, by lacking furrows in the abdomen, and by having a long 'neck' (Wunderlich, 2004).

Distribution: South Africa and Madagascar.

GRACILICOLLIS GROUP

Diagnosis: Distinguished from other *Eriauchenius* O. P. Cambridge, 1881 by the presence of six protuberances on the cephalic area and the presence of an apophysis on the male palp patella.

Description: Total length 1.50–2.87. Carapace reddish brown with many white setae on small protrusions, organized in branching rows (Fig. 5D); tubercle seta bases on posterior of carapace modified into large points, possibly for stridulation (Figs 5A, 6D, 7C); with pars cephalica extremely elongated forming 'head' (distal portion of elongation) and 'neck' (constricted portion of elongation), with CH/CL ratio of 1.38–3.13; with a pair of anterior, posterior and lateral pronounced-to-rudimentary protrusions on apex of 'head' (total of six), each with a small, thickened seta (Fig. 6C); neck with fissure on anterior side running from chelicerae bases to labrum (Fig. 6B). AME on a bulge with a point or rounded at apex (Fig. 8A, C). AME diameter 0.078–0.11; ratio of AME to all other subequal eyes 1.4–3.3; AME separation 4.7–8.0 × AME diameter; PME separation 3.0–5.9 × AME diameter; AME–PME separation 0.63–1.2 × AME diameter; AME–LE separation 0.79–1.4 × AME diameter; MOQ wider in front than behind or than long; lateral eyes contiguous. Short spine close to PME and LE (Fig. 8C). Sternum reddish brown and longer than wide, hollowed out around coxae (Fig. 8D); white setae with tuberculate

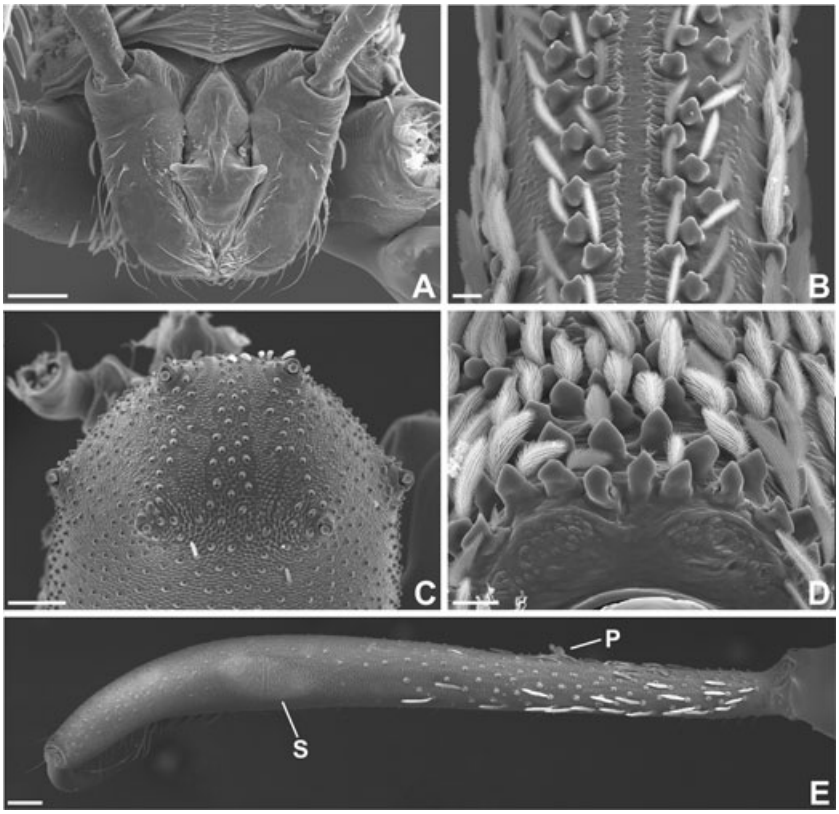

Figure 6. ♀ ***Eriauchenius lavatenda*** **sp. nov.** A, endites, dorsal. B, carapace, anterior, showing seam of carapace enclosure around the 'neck'. C, carapace, dorsal, showing six protrusions. D, carapace, posterior, showing enlarged setal bases, possibly used for stridulation. E, chelicera, lateral, 'S' showing stridulatory ridges, 'P' showing anterior protrusion. Scale bars: A, C and E = 100 μm, B = 20 μm, D = 30 μm.

bases; with expanded tubercle on posterior part of sternum, close to 4th coxae (Fig. 9F). Sclerite in between coxa and carapace (Fig. 7C). Endites converging (Figs 6A, 8B); serrula strongly pointed (Fig. 9C); labrum with two lateral projections on dorsal surface (Fig. 6A). Small round chilum sclerite next to each cheliceral base; one triangular sclerite in between and posteriad (Fig. 7A). ChL/CH ratio 0.96–1.18; chelicerae with small anterior protrusion and downward-pointing thickened seta, ChS/ChL ratio 0.13–0.38; with stridulatory ridge on lateral side (Figs 6E, 9E). The structure used in conjuction with the cheliceral stridulatory file appears to be a group of modified hairs on the prolateral side of the palp (Forster & Platnick, 1984; Lotz, 2003; pers. observ.) as well as sclerotized structures on the male palpal bulb. Peg teeth in three rows; anterior row with two peg teeth and posterior row of one, both sitting opposite fang tip, median row of approximately 20–42, strongest distally and gradually grading to normal setae (Figs 8A, 9A, B). Teeth on retromargin 1–6, may have different numbers of teeth per chelicera on same individual. Abdomen rounded (Figs 1B, D–F, 2A, B, D–F, 3A–D) or concave to flat (Figs 1C, 2C) in the posterior; containing numerous small, round, pale indentations throughout; covered in white, thick setae, occasionally interspersed with black, thin setae; epigynum and booklung covers flat, sclerotized plates (Fig. 7B); abdominal petiole with ridges (Fig. 5B). Spinnerets surrounded by ring; colulus present (Figs 10A–D, 11A–D). Anterior lateral spinneret (ALS) spinning field divided, with the median side with one large major ampullate gland (MAP) spigot and posterior nubbin (N) and the lateral side with approximately 15 smaller piriform gland (PI) (fewer in male) spigots (Figs 10B, 11B). Posterior median spinneret (PMS) of female with one large median minor ampullate gland spigot (mAP), three lateral medium-sized aciniform gland (AC) spigots, and a posterior cylindrical gland (CY) spigot. The PMS also has a peculiar branched structure on the anterior margin, probably a seta, and a large nubbin (N) between the CY and mAP spigots. The male PMS is the same except in lacking the CY and having only two AC (Figs 10C, 11C). Posterior lateral spinnerets (PLS) with a middle row of four AC spigots; in females

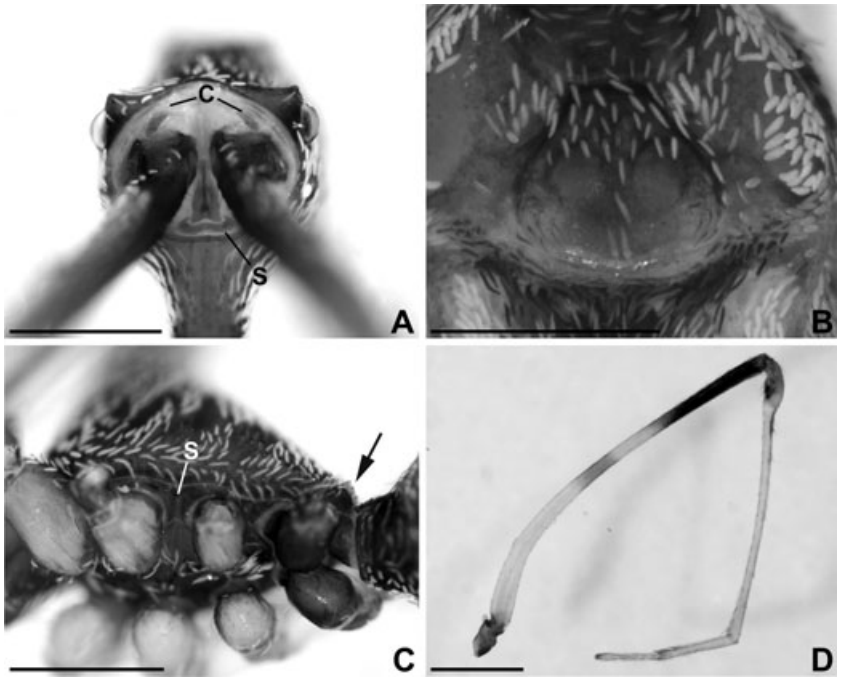

Figure 7. ♀ ***Eriauchenius lavatenda*** **sp. nov.** A, cheliceral bases, anterior–ventral, 'c' showing bipartite chilum, 's' showing sclerite. B, epigynum, ventral. C, carapace, ventral–lateral, 's' showing sclerite in between coxae, arrow showing enlarged setal bases. D, leg IV, left, retrolateral. Scale bars: A–D = 0.5 mm.

only, this row is flanked on each side by two larger CY spigots (Figs 10D, 11D). Posterior respiratory system with two spiracular openings (Fig. 5C). Legs reddish to light brown, covered sparsely with setae; ratio 1-2-4-3; metatarsus III and IV with ventral cluster of modified hairs; femur IV distinctly curved (Fig. 7D); femur I length 1.05–2.03 × CH. Female palp with single claw (Fig. 12D). Male palp with apophysis on patella (PA) either on retrolateral distal end (Fig. 12B) or on retrolateral basal end (Fig. 12A); palpal bulb with dorsal sclerotized piece (BDS), with lateral sclerite (BLS), and with a proapical process (BPAP) that arises from the bulb, all pieces are modified in various shapes; embolus with or without bifurcation, from dark to light, thin to thick. BLS attached internally to the embolus and can be seen when the bulb is expanded (Fig. 13A); attachment also visible through the translucent, retrolateral side of bulb in some species (Fig. 13B–D). Female genitalic bursa with lateral poreplates with pores distributed in continuous or discontinuous groups on each side, with or without a sclerotized structure dividing bursa (Figs 14–17); with a dorsal sclerotized plate (FSGP) that is either a small piece (Figs 15D, 17E) or a more elaborate piece with wide, flat wing-like projection ('wings') extending to each lateral side that is modified into various shapes (Figs 14A–F, 15A–C, E, 16A–E, 17A–D, F). Legendre (1967) suggested that the male palp might come into contact with the FSGP during copulation and that the FSGP may offer tactile information to the male or female. Alternatively, the FSGP may serve as an anchor for muscle attachment (Griswold *et al*., 2005).

Composition: Fourteen species.

Distribution: Madagascar.

ERIAUCHENIUS AMBRE SP. NOV.
(FIGS 1C, 21, 31)

Types: Male holotype and female paratype taken in forest at approximately 1000 m elevation, Parc National Montagne d'Ambre, 2.79 km NE of park entrance, Antsiranana Province, Madagascar, 21–30.xi.1993, collected by J. Coddington, C. Griswold, N. Scharff, S. Larcher, and R. Andriamasimanana, deposited in CAS. CASENT 9012012

Etymology: The name is a noun in apposition from the type locality, Montagne d'Ambre in Madagascar.

Diagnosis: Distinguished from all *Eriauchenius* except *E. jeanneli* by having an abdomen that is flat across the back or invaginated (Fig. 1C), by having BPAP of the male palp a concave triangular shape

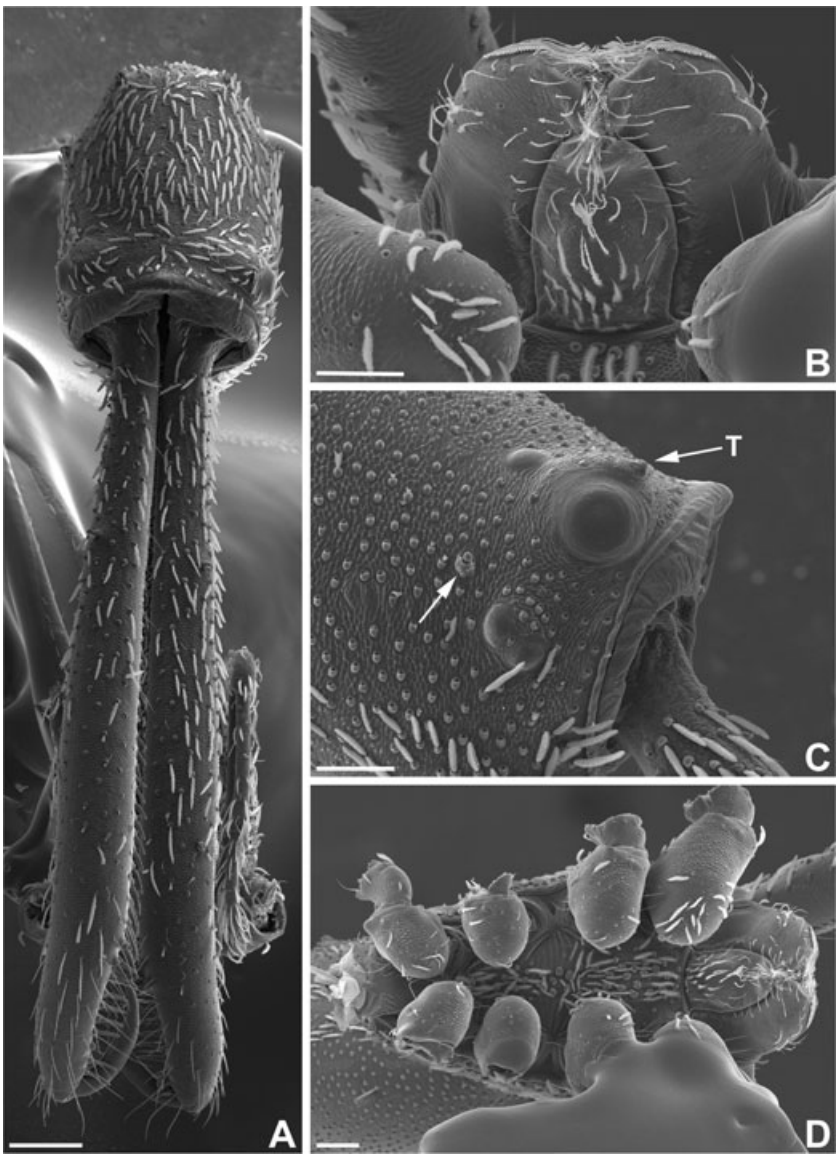

Figure 8. ♀ ***Eriauchenius lavatenda*** **sp. nov.** A, carapace, anterior. B, endites, ventral. C, eyes, lateral, 'T' showing point above AME, arrow showing spine. D, cephalothorax, ventral. Scale bars: A = 200 μm, B–D = 100 μm.

(Fig. 21A–C), and by the FSGP having no posterior elongations, with two lateral anterior points (as in Fig. 14E). Distinguished from *E. jeanneli* by having the anterior piece of E bifurcation being straight and narrow and jutting out past BPAP in the retrolateral direction (Fig. 21A, B, D).

Male (holotype): Total length 1.77. Carapace 0.83 long, 0.57 wide, 1.2 high. Abdomen flat across the back, 0.9 long, 0.83 wide, 1.17 high. Forehead 0.73 long. Bumps on 'head' rudimentary. 'Head' elongated to the posterior. AME on a bulge with a point at apex. AME diameter 0.099; ratio of AME to all other subequal eyes 2.8; AME separation 5.0 × AME diameter; PME separation 3.1 × AME diameter; AME–PME separation 0.86 × AME diameter; AME–LE separation 0.86 × AME diameter. Brown spine in between and slightly posterior to PME and LE. Chelicerae 1.37 long, with ChS 0.3; median row of 24 peg teeth; two teeth on each chelicera. Femur I 1.97 long. Legs light brown; femora 1–4 darkened proximally and distally; tibiae and tarsi speckled with dark bands and spots. PA retrobasal. Palp bulb with BDS a thick dark piece that curves anteriorad; BLS a thin ridge; BPAP a concave triangular shape with three strong processes, one at each corner; E dark, with bifurcation, the anterior piece of bifurcation straight and narrow and the posterior piece flat and curled (Fig. 21A–D).

KEY TO THE SPECIES OF THE GRACILICOLLIS GROUP

MALES (males for *E. halambohitra* and *E. borimontsina* are unknown)

1. Apophysis present on retrolateral distal end of palp femur; palpal patella apophysis on retrolateral distal end, sometimes reduced to a small mound (Fig. 12B)……2
1′ Apophysis absent on palp femur; patella apophysis retrobasal (Fig. 12A)……3
2(1) Six bumps on 'head' prominent; apex of the mound above the AME with a point; 'head' elongated posteriorly (Fig. 18C); male palp with membraneous extension that runs parallel to and reaches length of embolus (Fig. 19A–D); embolus not as curved at tip……*vadoni*
2′ Six bumps on 'head' rudimentary, small; mound above AME rounded; 'head' rounded (Fig. 18A); membrane adjacent to embolus not elongated to tip of embolus (Fig. 20A–D); embolus more curved at tip……*legendrei*
3(1) Abdomen always rounded in lateral view (Figs 1D–F, 2A, B, D–F, 3); BPAP of palp not a concave triangular shape……5
3′ Abdomen with an invagination at posterior end or flat across the back (Figs 1C, 2C); BPAP of palp concave triangular shape (Figs 21A–D, 22A–D)……4
4(3) Embolus bifurcation with both pieces thick (Fig. 22D)……*jeanneli*
4′ Embolus bifurcation with most ventral piece straight, thin, and blunt at the tip and pointing outside of bulb in the retrolateral direction (Fig. 21A, B, D)……*ambre*
5(3) Embolus very exposed, embolus with bifurcation (Fig. 23A–D)……*voronakely*
5′ Embolus not as above……6
6(5) Embolus very wide, flat and elongated; BDS elongated and gradually tapering to apex; BPAP greatly elongated ventrally, running parallel to embolus (Fig. 24A–D)……*namoroka*
6′ Palp not as above……7
7(6) BPAP of palp a wide piece with no obvious constriction or processes that is either rounded across base or flat; BLS of palp a flat plate on ventral face and is not visible through the retrolateral translucent side of the bulb (Figs 25A–D, 26A–D, 27A–D)……8
7′ BPAP of palp flat and two-pronged at base, with constriction (Figs 28A–C, 29A–C, 30A–D); BLS a sclerotized piece showing through the retrolateral translucent side of the bulb, that is small on the face of the palp (Fig. 13B–D)……10
8(7) CH/CL is at least 2.4, usually greater (Figs 1F, 2D)……9
8′ CH/CL is less than 2.2 (Fig. 3A)……*spiceri*
9(8) Without ridge or furrow on anterior side of BPAP; BDS 'U'-shaped in prolateral view, with two prongs of 'U' pointing distally (Fig. 25B–D)……*gracilicollis*
9′ With a ridge or furrow in BPAP; BDS truncated, without 'U'-shaped prongs (Fig. 26A–D)……*lavatenda*
10(7) BDS of palp splays outward in the prolateral direction; with only one process on the prolateral side of BPAP (Fig. 29A–D)……*griswoldi*
10′ BDS of palp flat against the bulb; with two pointed processes, or one pointed process and one rounded mound-like process on the prolateral side of BPAP (Figs 28A–C, 30A–C)……11
11(10) Process on prolateral side at base of BPAP, prominent and pointed; process on retrolateral side of BPAP, much larger than distal process on prolateral side of BPAP; embolus thick with a wide, shallow bifurcation at tip (Fig. 28A–D)……*anabohazo*
11′ Process on prolateral side at base of BPAP, a rounded mound; process on retrolateral side of BPAP, equal in size to distal process on prolateral side (Fig. 30A–C); embolus bifurcating in SEM image (Fig. 30D), and appearing as a trifurcation with light microscope (Fig. 13D)……*tsingyensis*

FEMALES (females for *E. spiceri* are unknown)

1. FSGP a very reduced, small piece, without 'wings'; bursa with one continuous group of pores on each lateral side (Figs 15D, 17E)……2
1′ FSGP with 'wings'; bursa with pores either continuous or discontinous on each lateral side (Figs 14, 15A–C, E, 16, 17A–D, F)……4
2(1) With 3–5 teeth on retromargin of chelicerae; spine on 'head' anterior to posterior eye row (Fig. 18A, C)……3
2′ With 6 teeth on retromargin of chelicerae; spine on 'head' posterior to PER; head rounded, with 6 small rudimentary bumps; with a point at apex of AME tubercle (Fig. 18D)……*borimontsina*
3(2) With 6 prominent bumps on 'head'; apex of the mound above the AME pointed; 'head' elongated to the posterior (Fig. 18C)……*vadoni*
3′ With 6 small rudimentary bumps on 'head'; apex of the mound above the AME rounded; head rounded (Fig. 18A)……*legendrei*
4(1) 'Wings' on FSGP very reduced; width of one 'wing' less than half width of FSGP at widest point; FSGP convex with no posterior elongations (Figs 14D, 16F)……*halambohitra*

4′ 'Wings' on FSGP not reduced; width of one 'wing' equal to or greater than half width of FSGP at widest point; FSGP various……5
5(4) Abdomen always rounded in lateral view (Figs 1D–F, 2A, B, D–F, 3); 'head' usually rounded……6
5′ With an invagination at posterior end of abdomen or flat across the back (Figs 1C, 2C); head 'cone' shaped-……*jeanneli*, *ambre*
6(5) FSGP is extremely elongated towards the posterior, maintaining same or greater width through entire elongation (Fig. 15B, E)……7
6′ FSGP either without any posterior elongation, or if present, the elongation is bifurcated, or narrower than the width of the FSGP, excluding width of wings (Figs 14A–C, F, 15C, 16, 17B–D)……8
7(6) FSGP extremely elongated to the posterior, so that bursa is completely obscured in dorsal view, at least twice as long as wide, excluding 'wings'; pore plate groups on lateral and anterior sides of bursa (Fig. 15A, B)……*namoroka*
7′ FSGP not as elongated to the posterior, elongation tucks under FSGP and points ventrad; visible pore group small and only on far lateral sides of bursa; several small groups of pores hidden on anterior-ventral side of bursa (Figs 15E, 17F)……*voronakely*
8(6) Each side of bursa with one continuous group of pores (Figs 14B, F, 16E, 17B); CH/CL is at least 2.4, usually much greater (Figs 1F, 2D)……9
8′ Each lateral side of bursa with at least two main groups of pores, discontinuous (Figs 14A, C, 15C, 16A, C, 17C, D); CH/CL is less than 2.3 (Figs 1D, 2A, 3B)……10
9(8) FSGP without dorsal circular structure, instead appearing folded dorsally (Figs 14B, 16E)……*gracilicollis*
9′ FSGP with dorsal circular structure (Figs 14F, 17B)……*lavatenda*
10(8) FSGP posterior elongation entire (Figs 14A, 16A, B)……*anabohazo*
10′ FSGP posterior elongation bifurcated (Figs 14C, 15C, 16D, 17C, D)……11
11(10) Apex of the AME tubercle pointed; points on each lateral side of anterior of FSGP very strong and large; posterior elongations generally shorter and fatter, 'wings' generally smaller and FSGP generally wider (Figs 15C, 17C, D)……*tsingyensis*
11′ Apex of the AME tubercle rounded; points on each lateral side of anterior of FSGP rounded and small; posterior elongations generally longer and narrower, 'wings' generally larger and FSGP generally narrower (Figs 14C, 16C, D)……*griswoldi*

Variation (n = 6): Total length 1.67–1.8; CH/CL ratio 1.44–1.76; FL/CH ratio 1.55–1.64. Number of teeth 1–2; median row with 22–29 peg teeth.

Female (paratype): As male, except the following. Total length 1.97. Carapace 0.63 wide, 1.37 high. Abdomen 1.07 long, 0.93 wide, 1.47 high. F 0.83. AME separation 5.4 × AME diameter; PME separation 3.4 × AME diameter; AME–LE separation 1.1 × AME diameter. Chelicerae 1.53 long, with ChS 0.33; median row of 25 peg teeth; having one tooth on each chelicera. Femur I 2.13 long. Genitalic bursa divided with two main groups of pores on each side; FSGP with two strong points arising from either side at the anterior tip, having 'wings', and lacking any posterior elongation (as in Fig. 14E).

Variation (n = 6): Total length 1.93–2.1; CH/CL ratio 1.59–1.86; FL/CH ratio 1.42–1.58. Number of teeth 1–2, may have different numbers of teeth per chelicera on same individual; median row has 25–30 peg teeth.

Natural history: Specimens were collected in montane rainforest.

Distribution: Known only from Montagne d'Ambre, Madagascar (Fig. 31).

Material examined: MADAGASCAR: *Antsiranana*: All Parc National Montagne d'Ambre: (J. Coddington, C. Griswold, N.Scharff, S. Larcher, and R. Andriamasimanana, CAS, ZMUC and USNM) 2.79 km NE of park entrance, 12°32′S, 49°10′E, elev. 1000 m, 21–30.xi.1993, 10♂7♀ CASENT 9012010, 9012012 (holotype), 9012011; (L. J. Boutin, CAS) 3.6 km 235° SW Joffreville, 12°32′4″S, 49°10′46″E, elev. 925 m, 20–26.i.2001, 1♂1♀ CASENT 9003367.

ERIAUCHENIUS ANABOHAZO SP. NOV.
(FIGS 1D, 13B, 14A, 16A, B, 28, 31)

Types: Male holotype and female paratype taken by beating low vegetation in tropical dry forest at 120 m elevation, Forêt d'Anabohazo, 21.6 km WSW of Maromandia, Antsiranana Province, Madagascar, 11–16.iii.2001, collected by the Fisher/Griswold Arthropod Survey team, deposited in CAS. CASENT 9018930

Etymology: Named from the Anabohazo forest in Madagascar; a noun in apposition.

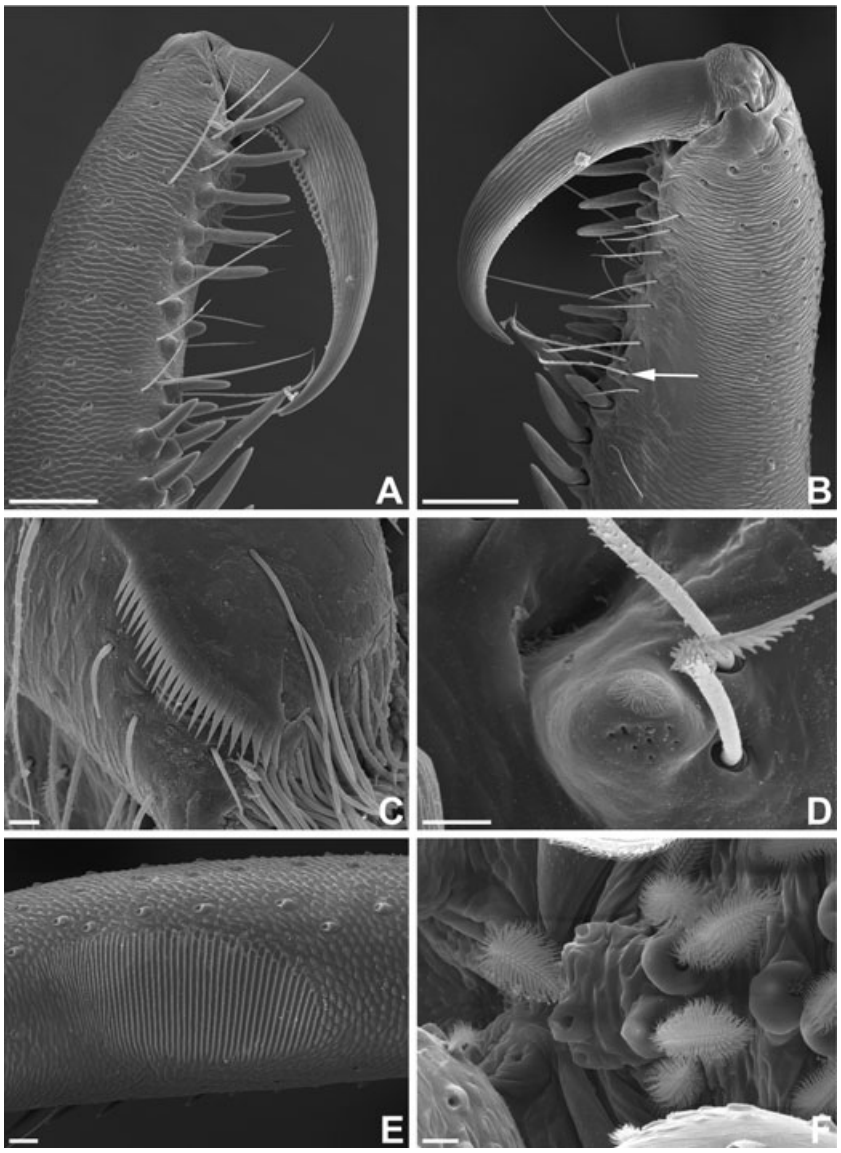

Figure 9. ♀ ***Eriauchenius lavatenda*** **sp. nov.** A, chelicera, left, promargin, showing peg teeth. B, chelicera, left, retromargin, arrow showing gland mound. C, endite, showing serrula. D, gland mound. E, chelicera, showing stridulatory ridges. F, posterior of sternum, ventral, showing protrusion in between coxae IV. Scale bars: A, B = 100 μm, C, D and F = 10 μm, E = 30 μm.

Diagnosis: Distinguished from all *Eriauchenius* by having embolus very thick and dark, with only a wide, shallow bifurcation at the tip, with the opening in between the bifurcation (Figs 13B, 28A–D); by having a large distinct, prominent process arising from the base of the prolateral side and two smaller processes on the retrolateral side of BPAP, and by having BDS of the palp very elongated, but not splayed outward as in *E. griswoldi* sp. nov. (Fig. 28A–C). The FSGP has a posterior elongation that is narrow and not bifurcated (Figs 14A, 16A, B).

Male (holotype): Total length 1.7. Carapace 0.77 long, 0.67 wide, 1.4 high. Abdomen 0.93 long, 0.77 wide, 1.03 high. F 0.77 long. AME on a bulge with a small point at apex. AME diameter 0.11; ratio of AME to all other subequal eyes 2.0; AME separation 5.1 × AME diameter; PME separation 3.4 × AME diameter; AME–PME separation 0.77 × AME diameter; AME–LE separation 1.0 × AME diameter. Short brown spine in between and posterior PME and LE. Chelicerae 1.63 long, with ChS 0.43; median row of peg teeth 28; three teeth on each chelicera. Femur I 2.03 long. Legs off-white; femora 1–4 darkened proximally

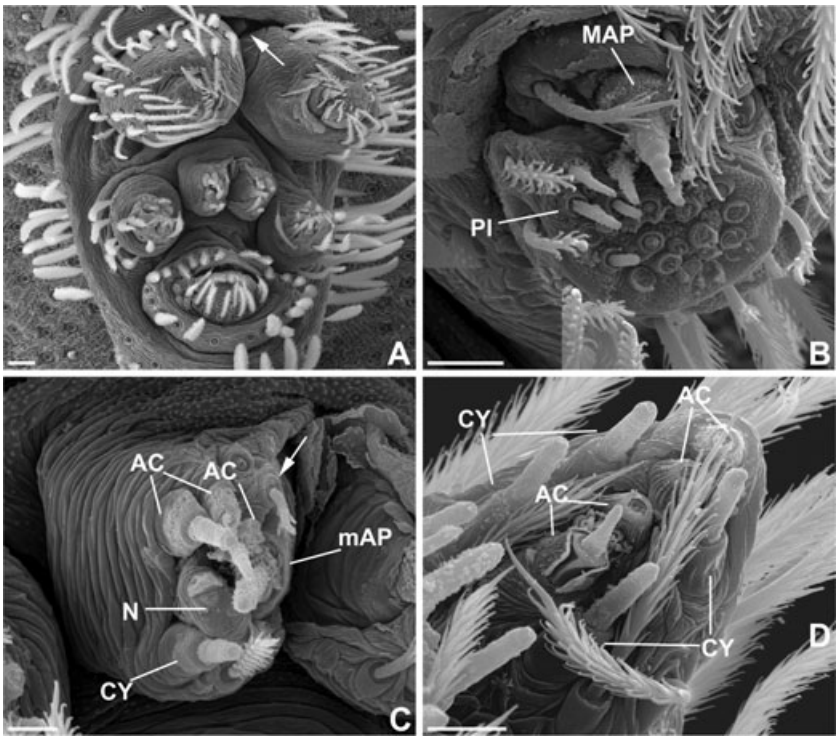

Figure 10. ♀ ***Eriauchenius lavatenda*** **sp. nov.**, spinning organs. A, spinnerets, overview, ventral–posterior, arrow showing colulus. B, anterior lateral spinneret, right. C, posterior median spinneret, right, arrow to branched structure. D, posterior lateral spinneret, left. Scale bars: A = 20 μm, B–D = 10 μm. See text for abbreviations.

and distally; tibiae and tarsi speckled with dark bands and spots. PA retrobasal. Palpal bulb with BDS modified into an elongate, wide dark piece that lays across the ventral face of the palp, with a small bifurcation at the end with both pieces curling back (Fig. 28B, C); BLS very small and hardly visible on ventral face of bulb, extending deep into the retrolateral, translucent side of the bulb (Fig. 13B); BPAP three-pronged, one process larger and pointing retrolaterally and two pointing prolaterally (Fig. 28A–C); embolus dark and thick and widely bifurcating at tip, with the opening in between the bifurcations (Fig. 28D).

Variation (n = 3): Total length 1.63–1.77; ratio of carapace height/length 1.75–1.91; ratio of femur I length/carapace height 1.29–1.45. The median row with 26–28 peg teeth.

Female (paratype): As male, except the following. Total length 2.03. Carapace 0.93 long, 0.73 wide, 1.7 high. Abdomen 1.1 long, 1.0 wide, 1.33 high. F 0.93 long. AME separation 5.5 × AME diameter; PME separation 3.9 × AME diameter; AME–PME separation 0.91 × AME diameter; AME–LE separation 1.2 × AME diameter. Chelicerae 1.83 long, with ChS 0.45; median row of 26 peg teeth. Femur I 2.1 long. Genitalic bursa divided with two groups of pores on each side (Figs 14A, 16A). FSGP with one point arising from each side of the anterior, and a long, blunt, narrow piece extending posteriad; with 'wings' (Figs 14A, 16A, B).

Variation (n = 6): Total length 2.03–2.23; CH/CL ratio 1.71–1.85; FL/CH ratio 1.2–1.31. Number of teeth, 3–4, may have different numbers of teeth per chelicera on same individual; median row has 25–27 peg teeth. Posterior elongation on FSGP can vary in width.

Natural history: Specimens were collected in tropical dry forest by beating low vegetation.

Distribution: North-western Madagascar (Fig. 31).

Material examined: MADAGASCAR: *Antsiranana*: (Fisher/Griswold Arthropod survey team and J. J. Rafanomezantsoa, CAS) Forêt d'Anabohazo: 21.6 km 247° WSW Maromandia, elev. 120 m, 14°18′32″S, 47°54′52″E, 11–16.iii.2001, 3♂6♀ CASENT 9007493, 9018930 (holotype) and 9002611. *Ankaranana*: (V and

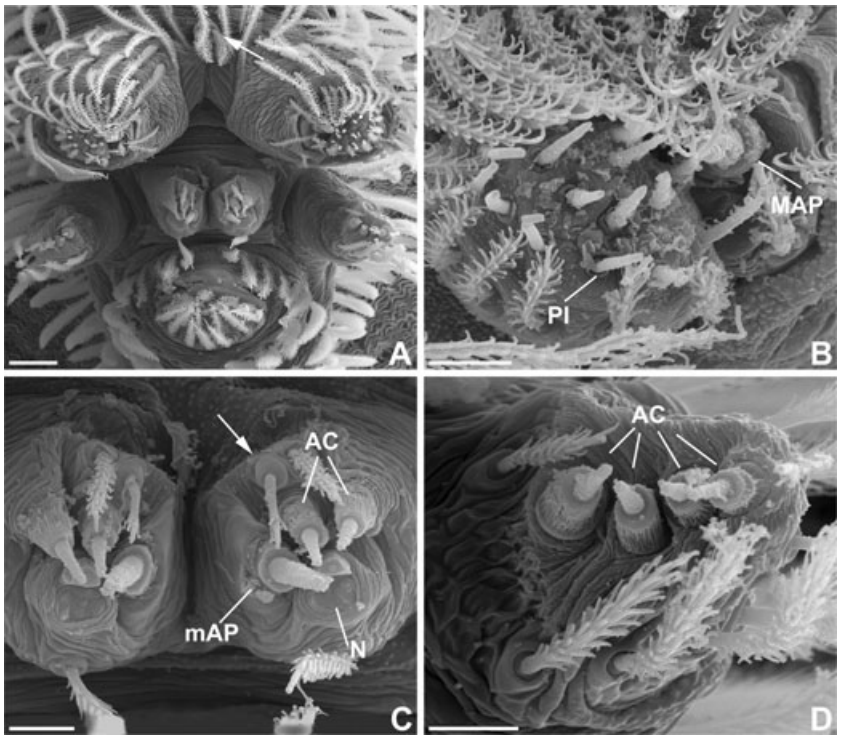

Figure 11. ♂ ***Eriauchenius lavatenda*** **sp. nov.**, spinning organs. A, spinnerets, overview, ventral–posterior, arrow showing colulus. B, anterior lateral spinneret, right. C, posterior median spinneret, left and right, arrow to branched structure. D, posterior lateral spinneret, left. Scale bars: A = 30 μm, B–D = 10 μm. See text for abbreviations.

B. Roth) English Camp: 12°54′34″S, 49°6′36″E, 20–26.viii.1992, 2♀ CASENT 9012016.

ERIAUCHENIUS BORIMONTSINA SP. NOV.
(FIGS 1E, 18D, 31)

Types: Female holotype taken at 700 m elevation, Marojejy Reserve, 8.4 km NNW of Manantenina, Antsiranana province, Madagascar, 10–16.xi.1993, collected by C. Griswold, J. Coddington, N. Scharff, S. Larcher, and R. Andriamasimanana, deposited in CAS. CASENT 9012343.

Etymology: Named by Daniela Andriamalala, 'shivering bird' in Malagasy; a noun in apposition.

Diagnosis: Distinguished from all *Eriauchenius* except *E. legendrei* and *E. vadoni* by the female genitalia having pores on each side of the bursa that are one continuous group, and having a small, reduced FSGP that lacks 'wings' (as in Fig. 15D). Distinguished from all *Eriauchenius* by having six teeth. Distinguished from *E. legendrei* and *E. vadoni* by having the mound above the AME with a point, and having the six bumps on the 'head' very reduced; the 'head' is rounded as in *E. legendrei*, and not posteriorly elongated like *E. vadoni*; also distinguished by the basal constriction in the chelicerae that is followed distally by a bulge (Figs 1E, 18D).

Female (holotype): Total length 2.27. Carapace 0.97 long, 0.87 wide, 2.03 high. Abdomen 1.17 long, 1.1 wide, 1.5 high. F 1.0 long. Protrusions on 'head' rudimentary (Fig. 18D). AME on a bulge with a small point at apex (Fig. 18D). AME diameter 0.099; ratio of AME to all other subequal eyes 1.8; AME separation 8.0 × AME diameter; PME separation 5.9 × AME diameter; AME–PME separation 1.1 × AME diameter; AME–LE separation 1.7 × AME diameter. Short brown spine between and slightly posterior to PME and LE (Fig. 18D). Chelicerae 2.1 long, with ChS of 0.27 and resting at apex of large bulge at base of chelicerae (Figs 1E, 18D); median row of peg teeth 29; six true teeth per chelicera. Femur I 2.2 long. Femora I–IV darkened proximally and distally; tibiae with dark proximal and distal bands. Genitalic bursa with continuous large group of pores on either side; FSGP a very reduced, small plate, lacking 'wings' (as in Fig. 15D).

Variation (n = 2): Total length 2.27–2.4; CH/CL ratio 2.10–2.14; FL/CH ratio 1.08–1.12. Median row with 29–34 peg teeth.

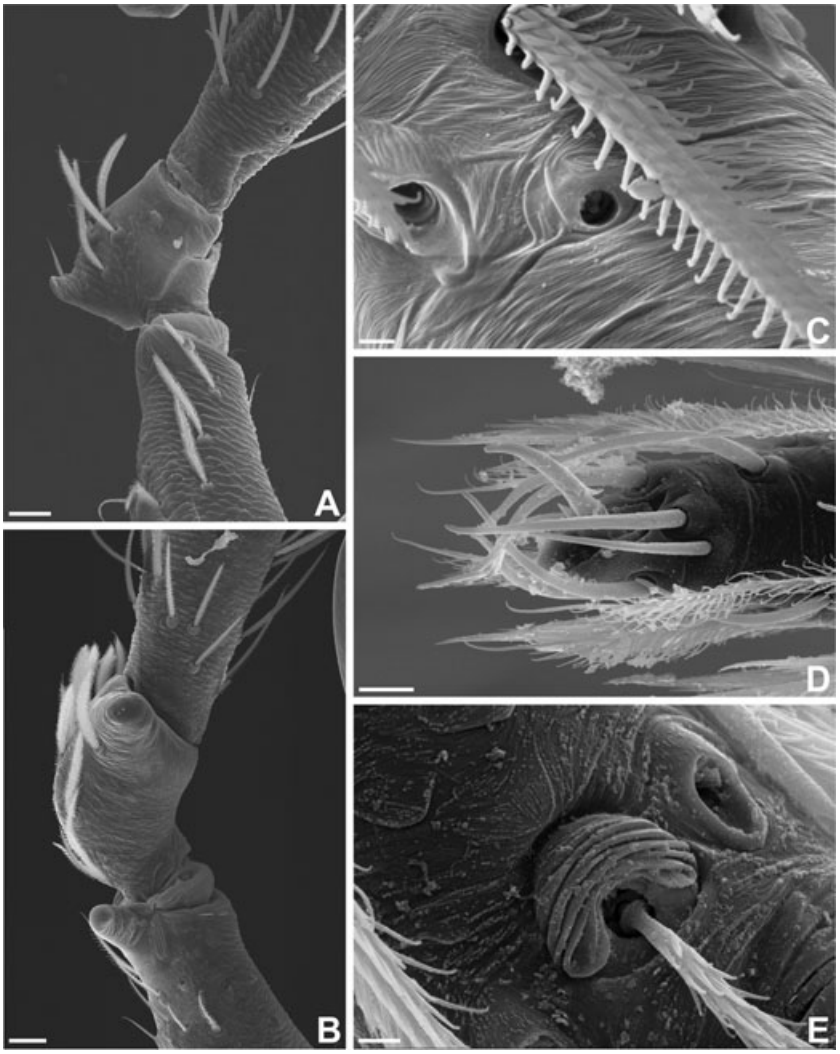

Figure 12. *Eriauchenius* species. A, ♂ ***E. voronakely* sp. nov.**, right palp, showing retrobasal apophysis on patella. B, ♂ *E. legendrei* (Platnick), right palp, showing retrolateral distal apophysis on patella and femur. C, ♀ ***E. lavatenda* sp. nov.**, tarsal organ, leg IV, left. D, ♀ ***E. lavatenda* sp. nov.**, palp claw, left, retrolateral. E, ♀ ***E. lavatenda* sp. nov.**, trichobothria, metatarsus I. Scale bars: A, B = 30 μm, C = 2 μm, D = 10 μm, E = 3 μm.

Male: Unknown.

Natural history: Specimens were collected in rainforest by general night collecting.

Distribution: North-eastern Madagascar (Fig. 31).

Material examined: MADAGASCAR: *Toamasina*: (D. Andriamalala and D. Silva, CAS) Parc National Masoala: Ambohitsitondroina Mt., Ambanizana, 15°34′9.9″S, 50°00′12.3″E, elev. 600–650 m, 28.ii.2003, 1♀ CASENT 9015520. *Antsiranana*: (C. Griswold, J. Coddington, N. Scharff, S. Larcher, and R. Andriamasimanana, CAS) Marojejy Reserve: 8.4 km NNW Manantenina, 14°26′S, 49°45′E, elev. 700 m, 10–16.xi.1993, 1♀ CASENT 9012343 (holotype).

ERIAUCHENIUS GRACILICOLLIS (MILLOT, 1948) (FIGS 1F, 14B, 16E, 25, 32, 35, 38)

Archaea gracilicollis Millot, 1948: 7–8. Legendre, 1970: 13–17. Forster & Platnick, 1984: 21.
E. gracilicollis: Wunderlich, 2004: 794. Platnick, 2006.

Types: Archaea gracilicollis Millot, 1948 (type female from Madagascar, Nossi-Bé, Lokoubé, Forêt de Lokobe, collected by J. Millot, deposited in MNHN, examined).

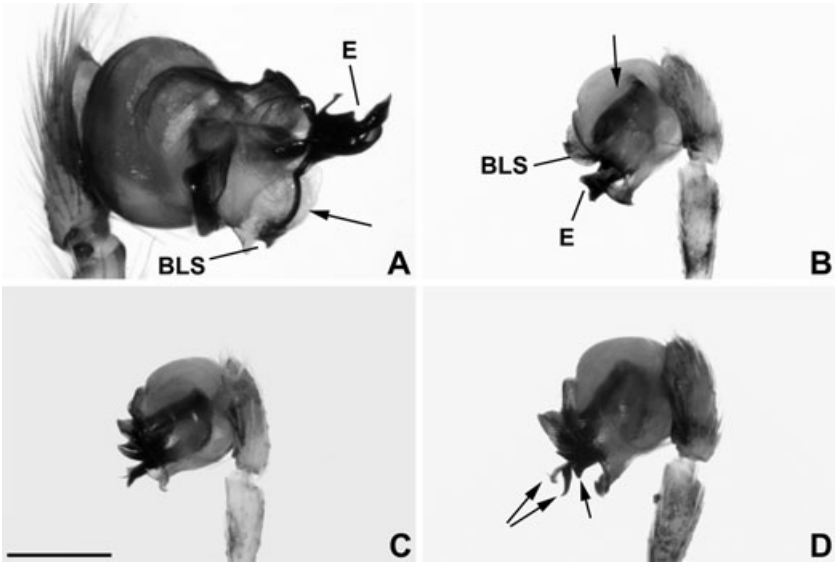

Figure 13. ♂ *Eriauchenius* species, left palpus. A, ***E. lavatenda* sp. nov.**, expanded, prolateral, arrow showing connection of E to BLS. B, ***E. anabohazo* sp. nov.**, retrolateral, arrow showing that the connection of embolus to BLS is transparent through bulb. C, ***E. griswoldi* sp. nov.**, retrolateral. D, *E. tsingyensis* (Lotz), retrolateral, arrows showing trifurcation of embolus in visible light. Scale bars = 0.25 mm.

Diagnosis: Distinguished from all other *Eriauchenius*, except *E. lavatenda* sp. nov., by having the longest, most slender neck, with a CH/CL ratio of greater than 2.6 (Fig. 1F); from all *Eriauchenius* by having BDS of the male palp two-pronged, with a wide and shallow divergence between the two processes, which point ventrad (Fig. 25B–D); by lacking the spine in between the LE and the PME; by the female genitalic bursa having one continuous group of pores on each side and the FSGP lacking a circular-shaped mound (Figs 14B, 16E), unlike *E. lavatenda* sp. nov.

Male: (Reserve Speciale de Bemarivo, CASENT 9017959) Total length 2.2. Carapace 1.0 long, 0.6 wide, 2.97 high. Abdomen 1.23 long, 0.8 wide, 1.0 high. F 1.0. Most anterior pair of protrusions on 'head' forming a ridge (Fig. 1F). AME on a bulge with a point at apex. AME diameter 0.092; ratio of AME to all other subequal eyes 3.3; AME separation 6.5 × AME diameter; PME separation 4.6 × AME diameter; AME–PME separation 1.1 × AME diameter; AME–LE separation 1.2 × AME diameter. Lacking brown spine that occurs between PME and LE. Chelicerae 2.9 long, with ChS 1.1; median row of peg teeth 39; three teeth on each chelicera. Femur I 3.7 long. Legs uniform light brown except femur I–IV darkened distally, patella I–IV darkened and tibia I–IV darkened proximally. PA retrobasal. BDS of palp two-pronged, with a wide and shallow divergence between the two processes, which point ventrad (Fig. 25B–D); BLS modified into flat, sclerotized plate (Fig. 25B, D); BPAP wide and elongated, pointing distally, blunt at end (Fig. 25B); embolus dark and thin, with a bifurcation deep within palp (Fig. 25B, D); palpal bulb with a wide groove on prolateral side of base of BPAP (Fig. 25B).

Variation (n = 6): Total length 2.1–2.4; CH/CL ratio 2.79–3.07; FL/CH ratio 1.19–1.30. Median row with 35–40 peg teeth.

Female: (Reserve Speciale de Bemarivo, CASENT 9017959): As male, except the following. Total length 2.5. Carapace 0.67 wide, 3.0 high. Abdomen 1.46 long, 0.93 wide, 1.2 high. AME diameter 0.092; ratio of AME to all other subequal eyes 2.6; AME separation 6.9 × AME diameter; PME separation 5.2 × AME diameter; AME–PME separation 1.2 × AME diameter; AME–LE separation 1.4 × AME diameter. Chelicerae 2.88 long, with ChS 0.93; median row of 38 peg teeth. Femur I 3.67 long. Genitalic bursa divided in half by a depression, with continuous large group of pores (Figs 14B, 16E). FSGP having 'wings'; FSGP with no posterior elongations, with several folds and ridges in the centre, with two points going laterad (Figs 14B, 16E).

Variation (n = 6): Total length 2.43–2.5; CH/CL ratio 2.67–3.13; FL/CH ratio 1.17–1.31. Number of teeth 3–4, may have different numbers of teeth per chelicera on same individual; median row with 32–42 peg teeth.

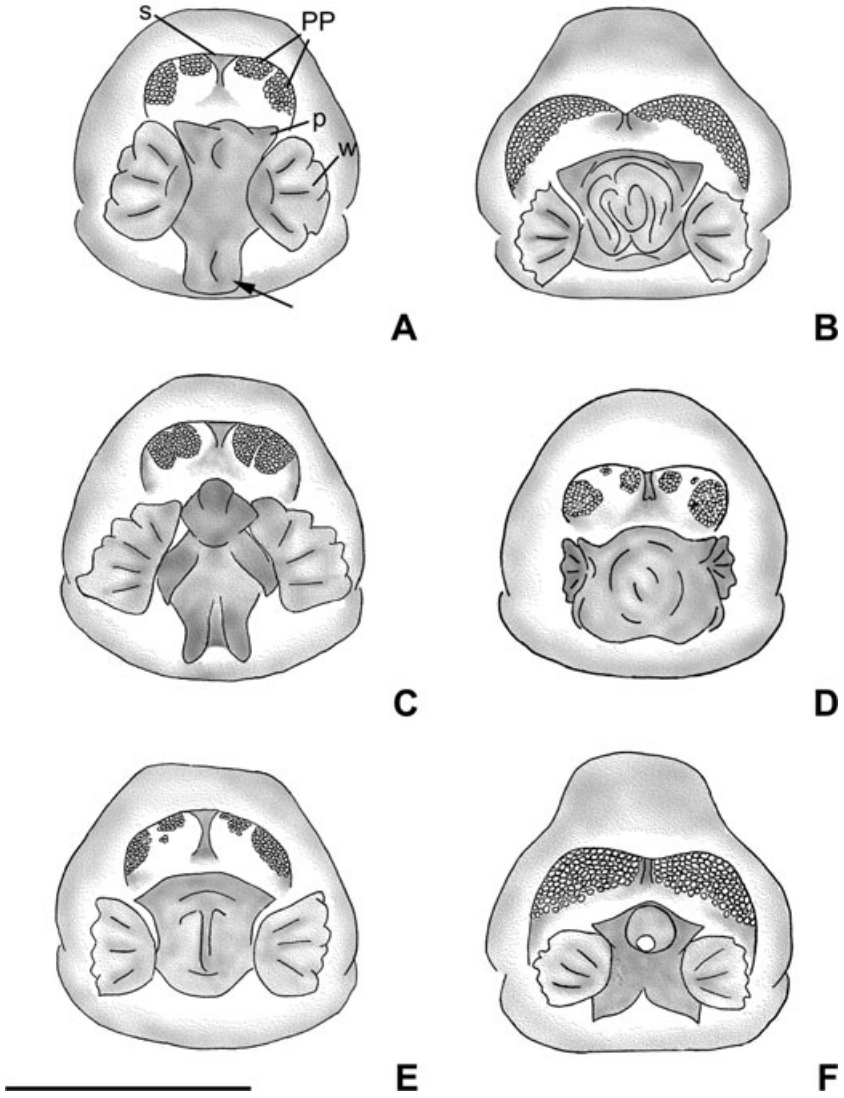

Figure 14. ♀ *Eriauchenius* species, genitalia, dorsal schematic drawings. A, ***E. anabohazo* sp. nov.**, 'p' showing points on FSGP, 'w' showing 'wings' on FSGP, 'PP' showing pore plate groupings on bursa, 's' showing sclerotized structure dividing bursa, arrow showing posterior elongation. B, *E. gracilicollis* (Millot). C, ***E. griswoldi* sp. nov.** D, ***E. halambohitra* sp. nov.** E, *E. jeanneli* (Millot) F, ***E. lavatenda* sp. nov.** Scale bars: A–F = 0.25 mm.

Natural history: Specimens were collected in tropical dry forest and rainforest by beating low vegetation and general night and day collecting.

Distribution: Northern to central Western Madagascar (Fig. 32).

Material examined: MADAGASCAR: *Mahajanga*: (all Fisher/Griswold Arthropod survey team, CAS) Parc National Tsingy de Bemaraha: 10.6 km ESE 123° Antsalova, elev. 150 m, 19°42′34″S, 44°43′5″E, 16–20.xi.2001, 4♂17♀ CASENT 9009300, 9009386, and 9009758; Réserve Spéciale de Bemarivo: 23.8 km 223° SW Besalampy, elev. 30 m, 16°55′30″S, 44°22′06″E, 19–23.xi.2002, 5♂15♀ CASENT 9017959 and 9017990; Parc National de Namoroka: 16.9 km 317° NW Vilanandro, elev. 100 m, 16°24′24″S, 45°18′36″E, 12–16.xi.2002, 5♂9♀ CASENT 9017427 and 9017949. *Antsiranana*: (J. Millot, MNHN) Nossi-Bé, Lokoubé, Forêt de Lokobe, 1♀ (holotype). All Nosy Be, Réserve Naturelle Intégrale de Lokobe: (V and B. Roth, CAS) 13°24′58.8″S, 48°18′26.5″E, 11–14.viii.1992, 1♂1♀ CASENT 9010078; (D. Andriamalala, C. Griswold, H. Ratsirarson, D. Silva, CAS) 4.95 km 125° ESE Hellville, elev. 0–200 m, 13°24′56″S, 48°18′27″E, 15.ii.2003, 4♀ CASENT 9018900 and 9005364; (J. J. Rafanomezantsoa, CAS) 6.3 km 112° ESE Hellville,

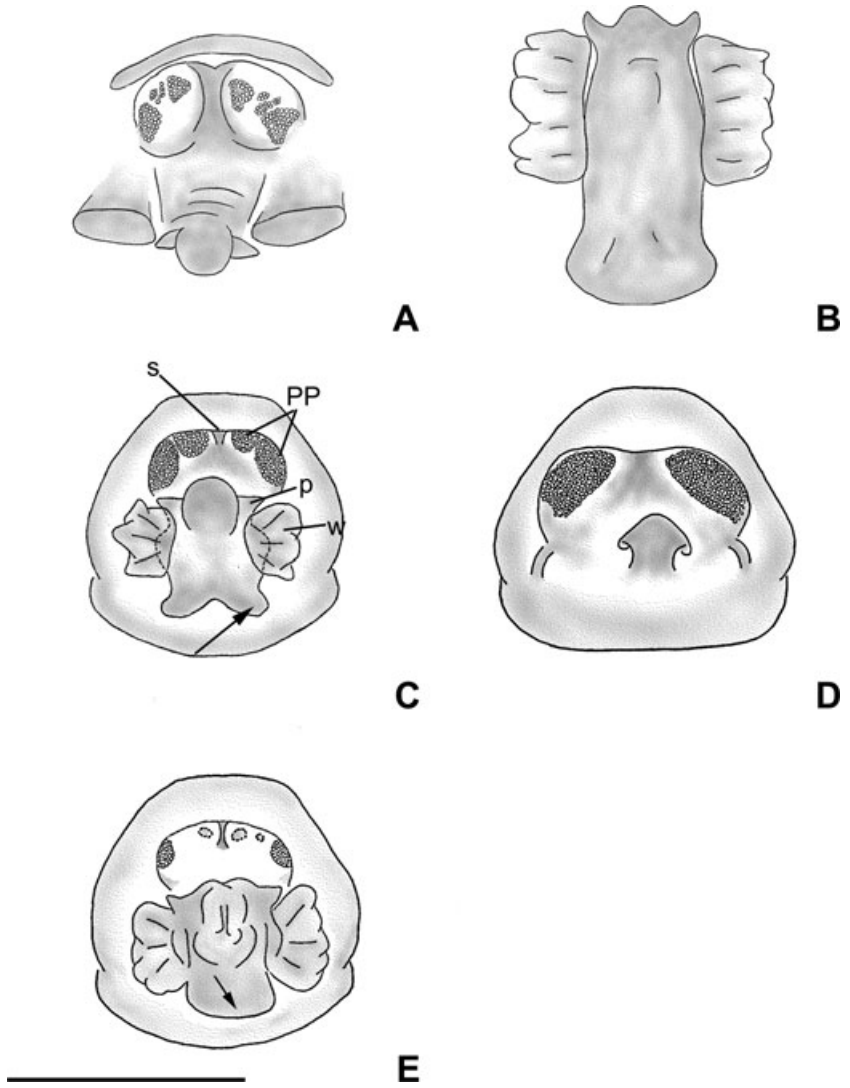

Figure 15. ♀ *Eriauchenius* species, genitalia, schematic drawings**.** A, ***E. namoroka* sp. nov.**, anterior. B, ***E. namoroka* sp. nov.**, dorsal, FSGP is so large that bursa is hidden. C, *E. tsingyensis* (Lotz), dorsal, 'p' showing points on FSGP, 'w' showing 'wings' on FSGP, 'PP' showing pore plate groupings on bursa, 's' showing sclerotized structure dividing bursa, arrow showing one posterior elongation. D, *E. vadoni* (Millot), dorsal. E, ***E. voronakely* sp. nov.**, dorsal, dashed lines show pore groupings on ventral side of bursa, arrow emphasizes that the posterior elongation actually points ventrad. Scale bars: A–E = 0.25 mm.

elev. 30 m, 13°25′10″S, 48°19′52″E, 19–24.iii.2001, 2♂3♀ CASENT 9003300.

ERIAUCHENIUS GRISWOLDI SP. NOV.
(FIGS 2A, 13C, 14C, 16C, D, 29, 32)

Types: Male holotype and female paratype taken by beating vegetation and puffing in tropical dry forest at 100 m elevation, Forêt de Kirindy, 15.5 km 64° ENE of Marofandilia, Toliara province, Madagascar, 28.xi.–3.xii.2001, collected by the Fisher/Griswold Arthropod Survey team, deposited in CAS. CASENT 9018929

Etymology: Named in honour of Dr Charles Griswold, who provided insight into the study of Arachnology, in the morphology and natural history of this group, and in the natural history of Madagascar. Dr Griswold has spent many years collecting arachnids in Madagascar.

Diagnosis: Distinguished from all *Eriauchenius* by having the BDS of the male palps greatly elongated and that splays outward in the prolateral direction; and by having BPAP of the male palp flat and two-pronged at the base, with a constriction, with only one

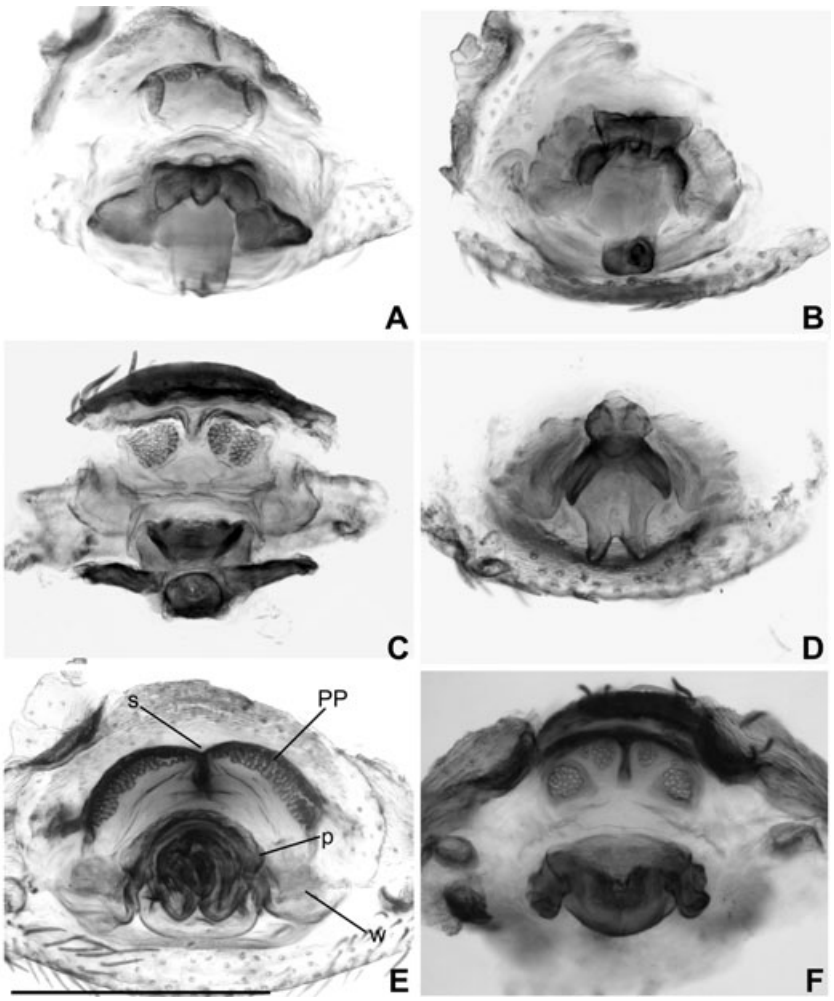

Figure 16. ♀ *Eriauchenius* species, genitalia. A, ***E. anabohazo* sp. nov.**, anterior. B, ***E. anabohazo* sp. nov.**, dorsal. C, ***E. griswoldi* sp. nov.**, anterior. D, ***E. griswoldi* sp. nov.**, dorsal. E, *E. gracilicollis* (Millot), dorsal, 'p' showing points on FSGP, 'w' showing 'wings' on FSGP, 'PP' showing pore plate groupings on bursa, 's' showing sclerotized structure dividing bursa. F, ***E. halambohitra* sp. nov.**, anterior. Scale bars: A–F = 0.25 mm.

process on the prolateral side (Fig. 29A–D). Distinguished from all *Eriauchenius* except *E. tsingyensis* by the FSGP having two long, narrow posterior elongations and having bursa with discontinuous group of pores (Figs 14C, 16C, D). Distinguished from *E. tsingyensis* by having a point at the apex of the AME tubercle and by the FSGP generally being narrower with the 'wings' larger.

Male (holotype): Total length 1.77. Carapace 0.73 long, 0.57 wide, 1.33 high. Abdomen 1.03 long, 1.0 wide, 1.13 high. F 0.7. Protusions on 'head' rudimentary. AME on a bulge with a point at apex. AME diameter 0.085; ratio of AME to all other subequal eyes 1.5; AME separation 6.3 × AME diameter; PME separation 4.8 × AME diameter; AME–PME separation 0.83 × AME diameter; AME–LE separation 1.0 × AME diameter. Brown spine in between and slightly posterior to PME and LE. Chelicerae 1.43 long, with ChS 0.33; median row of 24 peg teeth; two teeth per chelicera. Femur I 1.67 long. Legs reddish brown; femora 1–4 darkened proximally and distally; tibiae with dark proximal, distal and median bands. PA retrobasal. Palp bulb with BDS thick, dark, and greatly elongated with a bifurcation at the end with the two pieces curling back and the prolateral side elongated and splaying outward (Fig. 29B); BLS small and hardly visible on face of bulb, hidden by BDS, but visible through and extending deep into the retrolateral, translucent side of the bulb (Fig. 13C); BPAP flat and two-pronged at base, with constriction, with only one process on the prolateral side (Fig. 29A, B); embolus dark, and thick with bifurcation (Fig. 29B, D).

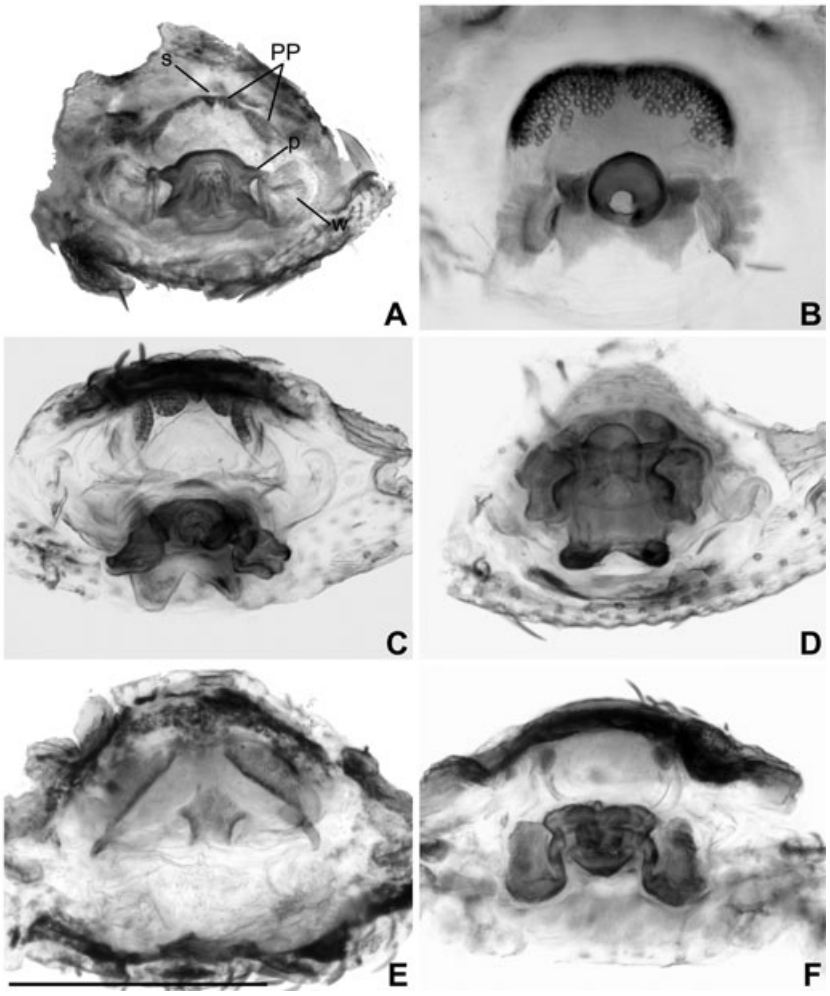

Figure 17. ♀ *Eriauchenius* species, genitalia. A, *E. jeanneli* (Millot), dorsal, 'p' showing points on FSGP, 'w' showing 'wings' on FSGP, 'PP' showing pore plate groupings on bursa, 's' showing sclerotized structure dividing bursa. B, ***E. lavatenda* sp. nov.**, dorsal. C, *E. tsingyensis* (Lotz), anterior. D, *E. tsingyensis* (Lotz), dorsal. E, *E. vadoni* (Millot), dorsal. F, ***E. voronakely* sp. nov.**, anterior. Scale bars: A–F = 0.25 mm.

Variation (n = 6): Total length 1.73–1.9; CH/CL ratio 1.82–2.0; FL/CH ratio 1.16–1.28. Number of teeth 2–3, may have different numbers of teeth per chelicera on same individual; median row with 24–27 peg teeth.

Female (paratype): As male, except the following. Total length 2.13. Carapace 0.77 long 0.67 wide, 1.4 high. Abdomen 1.3 long, 1.17 wide, 1.0 high. F 0.73. AME diameter 0.099; ratio of AME to all other subequal eyes 1.75; AME separation 6.1 × AME diameter; PME separation 4.9 × AME diameter; AME–PME separation 0.63 × AME diameter; AME–LE separation 1.1 × AME diameter. Chelicerae 1.6 long, with ChS 0.4; median row of 22 peg teeth; having three teeth on each chelicera. Femur I 1.8 long. Genitalic bursa with two main groups of pores of equal size, that are hardly separated, on each lateral side; FSGP having 'wings', with anterior having a rounded bulb with dull points on each lateral side, followed by a constriction; FSGP with two narrow posterior elongations that curve dorsally at the tip, with a thinner lighter concavity binding the elongations together (Figs 14C, 16C, D).

Variation (n = 6): Total length 2.0–2.23; CH/CL ratio 1.83–2.23; FL/CH ratio 1.15–1.29. Number of teeth 2–3, may have different numbers of teeth per chelicera on same individual; median row of 22–28 peg teeth. Pores on each side of bursa often looking like one continuous group.

Natural history: Specimens were collected in tropical dry forest and gallery forest by beating low vegetation, sifting litter and by general day and night collecting.

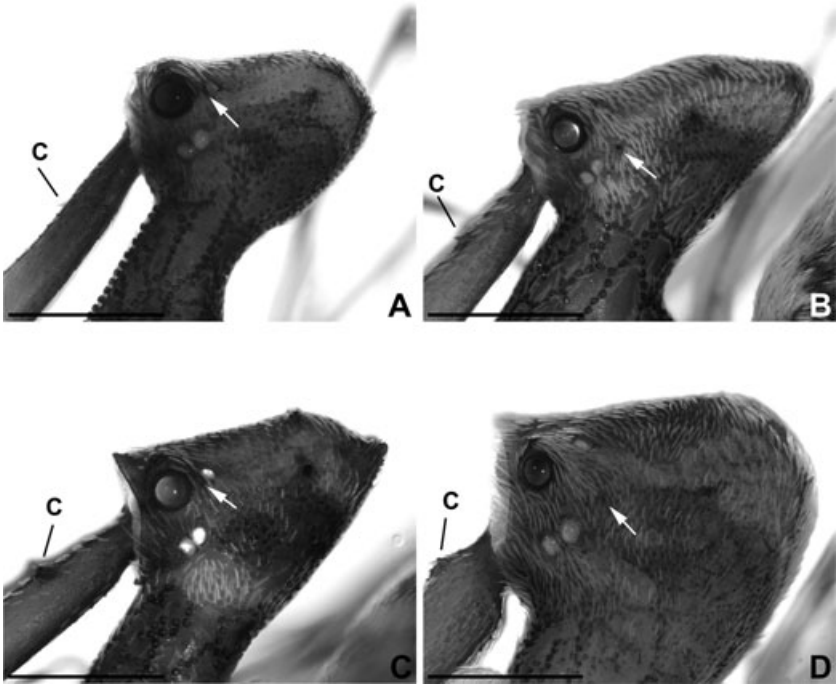

Figure 18. *Eriauchenius* species, cephalothorax, distal end, lateral, 'C' showing placement of cheliceral spine and arrow showing spine next to AME. A, *E. legendrei* (Platnick). B, *E. jeanneli* (Millot). C, *E. vadoni* (Millot). D, ***E. borimontsina* sp. nov.** Scale bars: A–D = 0.5 mm.

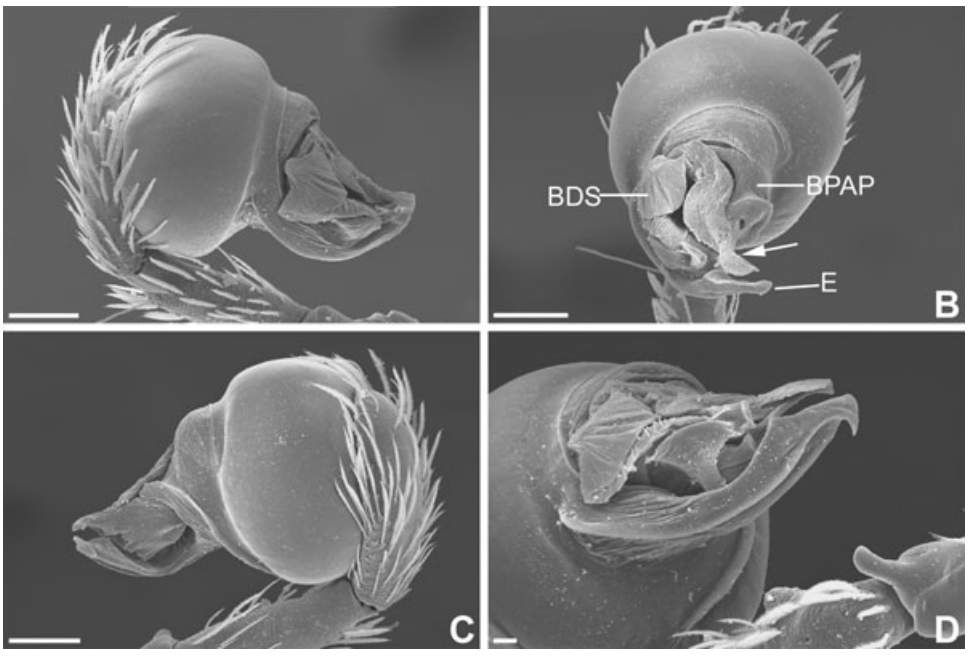

Figure 19. ♂ *Eriauchenius vadoni* (Millot), right palpus, arrow showing membraneous extension parallel to embolus. A, retrolateral. B, ventral. C, prolateral. D, embolus, close, retrolateral–ventral. Scale bars: A–C = 100 μm, D = 20 μm. See text for abbreviations.

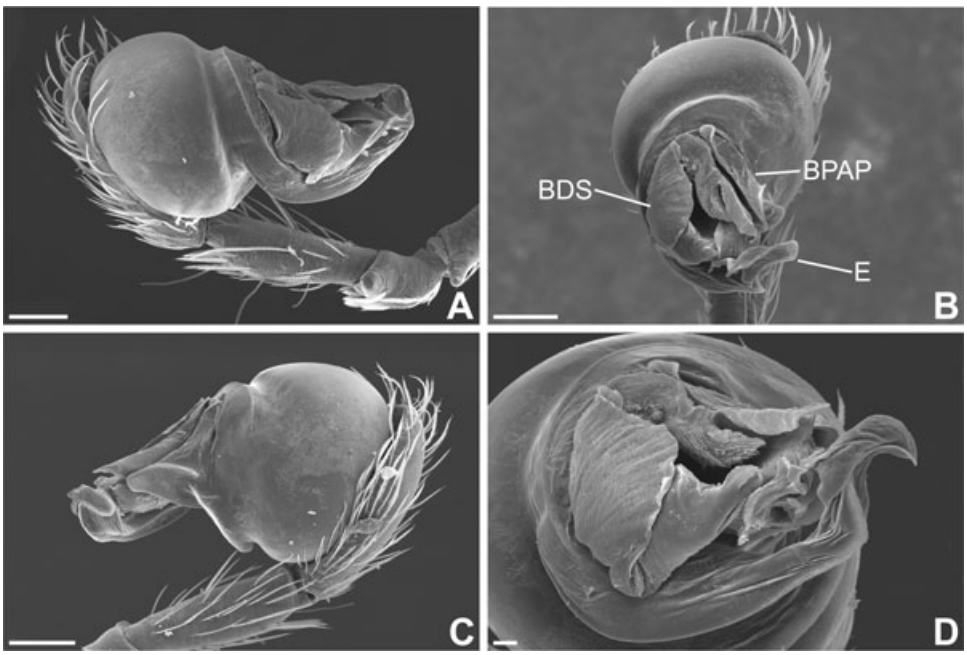

Figure 20. ♂ *Eriauchenius legendrei* (Platnick), right palpus. A, retrolateral. B, ventral. C, prolateral. D, embolus, close, prolateral–ventral. Scale bars: A–C = 100 μm, D = 10 μm. See text for abbreviations.

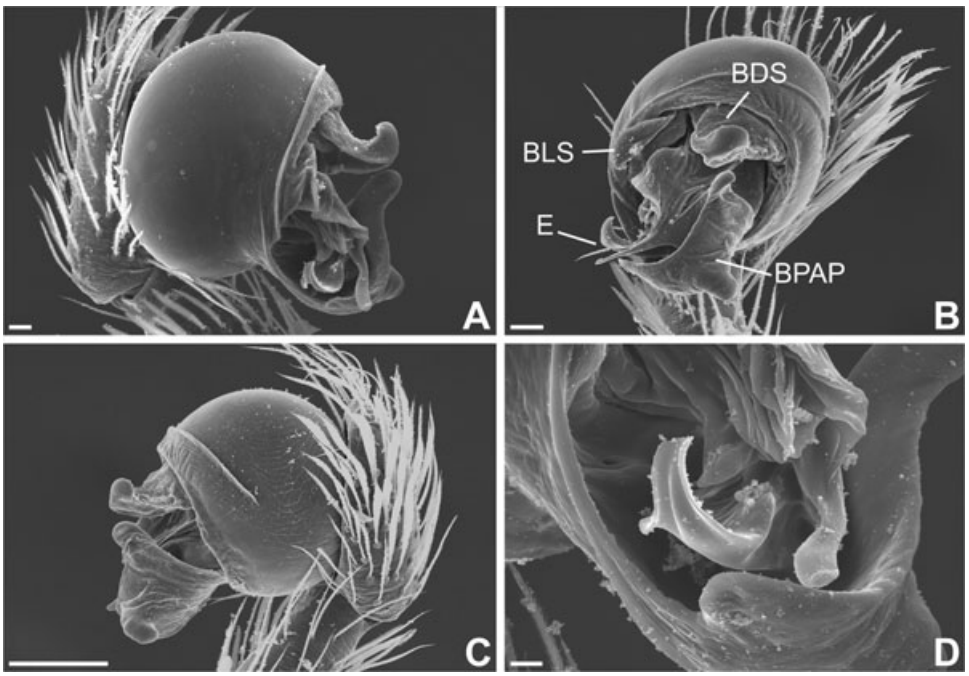

Figure 21. ♂ ***Eriauchenius ambre* sp. nov.**, right palpus. A, retrolateral. B, ventral. C, prolateral. D, embolus, close, retrolateral. Scale bars: A = 20 μm, B = 30 μm, C = 100 μm, D = 10 μm. See text for abbreviations.

Distribution: Central Western to central Southern Madagascar (Fig. 32).

Material examined: MADAGASCAR: *Toliara*: (Fisher/Griswold Arthropod survey team, CAS) Forêt de Kirindy, 15.5 km 64° ENE Marofandilia, elev. 100 m, 20°2′42″S, 44°39′44″E, 28.xi.–3.xii.2001, 12♂18♀ CASENT 9013575, 9018929 (holotype), 9013609, 900552, 900560, and 9013496. *Mahajanga*: (Fisher/Griswold Arthropod survey team, CAS) Forêt de

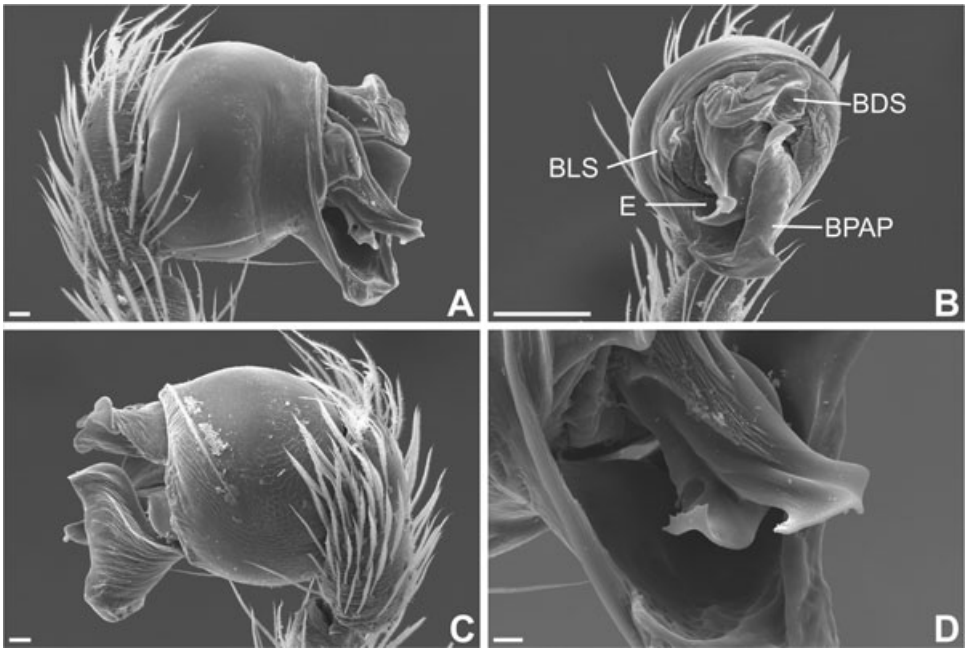

Figure 22. ♂ *Eriauchenius jeanneli* (Millot), right palpus. A, retrolateral. B, ventral. C, prolateral. D, embolus, close, retrolateral. Scale bars: A = 20 μm, B = 100 μm, C = 20 μm, D = 10 μm. See text for abbreviations.

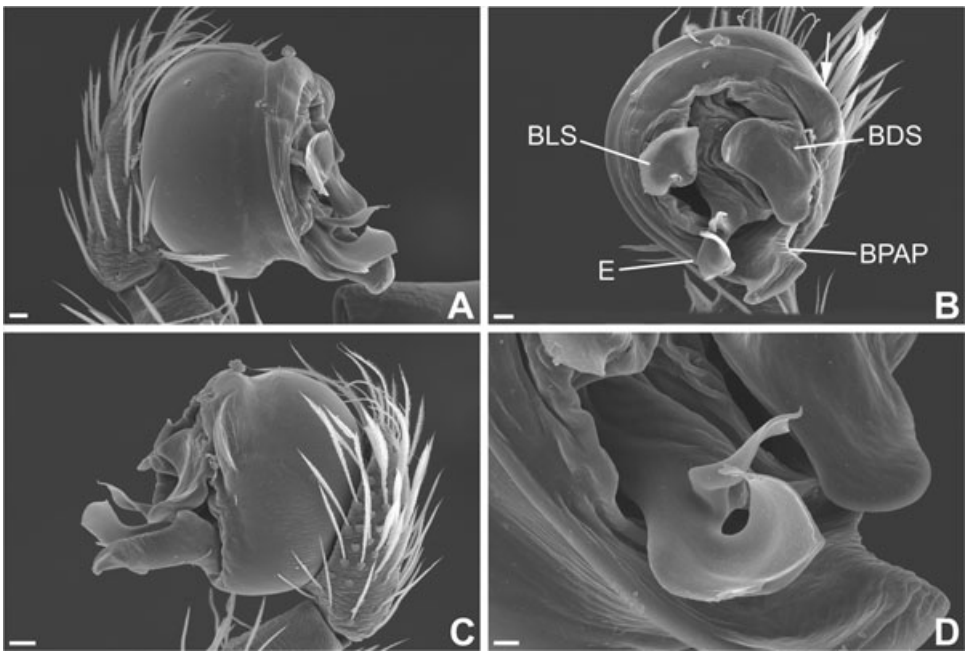

Figure 23. ♂ ***Eriauchenius voronakely* sp. nov.**, right palpus, arrow showing mound on bulb. A, retrolateral. B, ventral. C, prolateral. D, embolus, close, ventral. Scale bars: A, B = 20 μm, C = 30 μm, D = 10 μm. See text for abbreviations.

Tsimembo, 8.7 km 336° NNW Soatana, elev. 20 m, 19°1′17″, 44°26′26″E, 21–25.xi.2001, 1♂5♀ CASENT 9009799. *Fianarantsoa*: All Parc National d'Isalo, Sahanafa River: (B and V. Roth, CAS) 23–25.v.1992, 1♂ CASENT 9012015; (Fisher/Griswold Arthropod survey team, CAS) 29.2 km 351°N Ranohira, elev. 500 m, 22°18′48″S, 45°17′30″E, 10–13.ii.2003, 4♂11♀ CASENT 9018899 and 9017210.

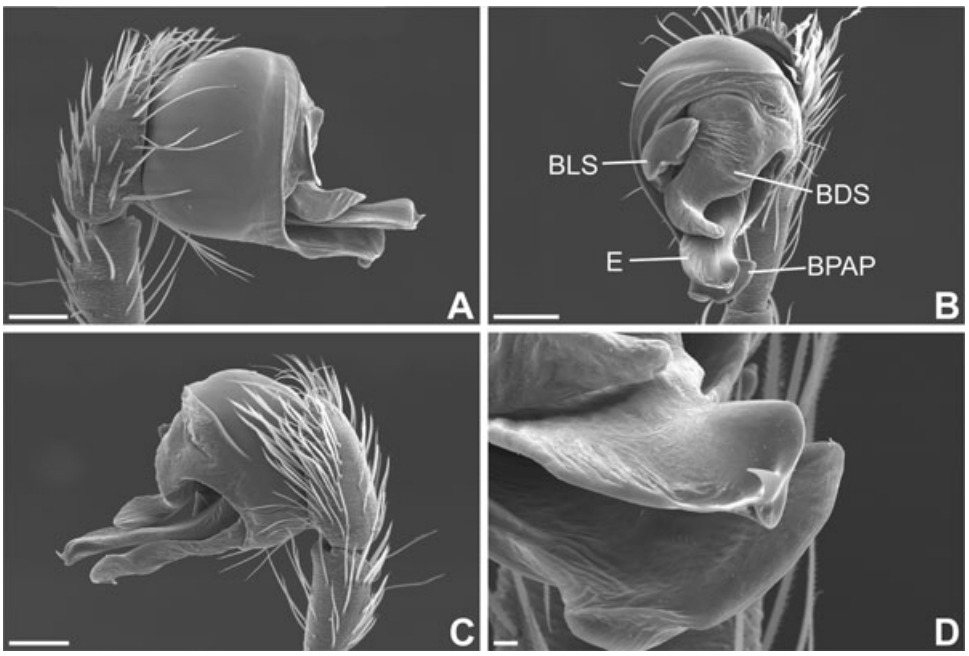

Figure 24. ♂ ***Eriauchenius namoroka* sp. nov.**, right palpus. A, retrolateral. B, ventral. C, prolateral. D, embolus, close, retrolateral–ventral. Scale bars: A–C = 100 μm, D = 10 μm. See text for abbreviations.

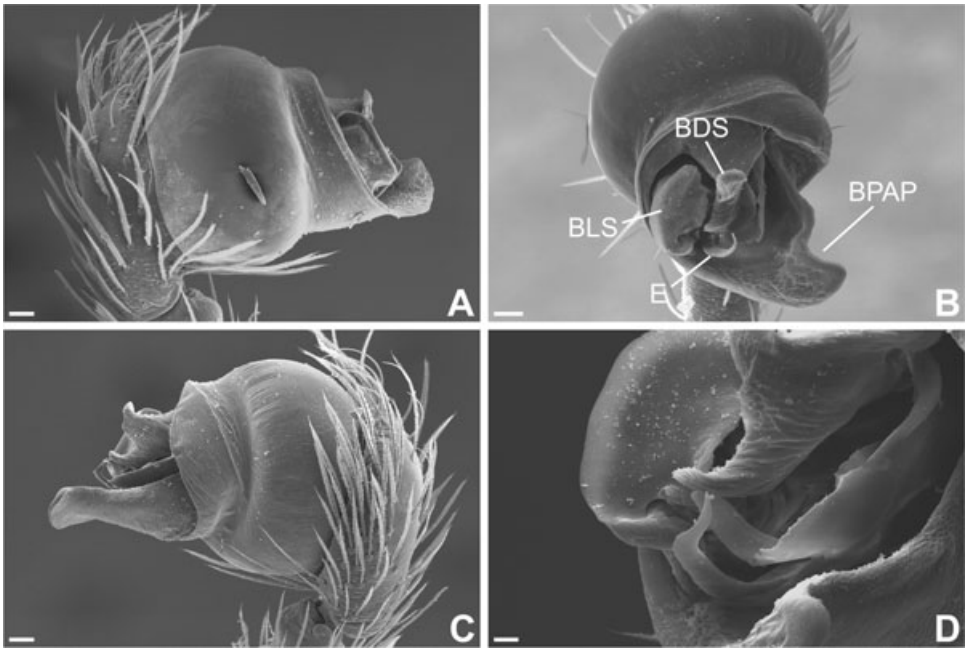

Figure 25. ♂ *Eriauchenius gracilicollis* (Millot), right palpus. A, retrolateral. B, ventral. C, prolateral. D, embolus, close, prolateral–ventral. Scale bars: A–C = 30 μm, D = 10 μm. See text for abbreviations.

ERIAUCHENIUS HALAMBOHITRA SP. NOV.
(FIGS 2B, 14D, 16F, 31)

Types: Female holotype taken by general collecting, during the day, in tropical dry forest at 325 m elevation, Réserve Spéciale d'Ambre, 3.5 km SW of Sakaramy, Antsiranana Province, Madagascar, 26–31.ii.2001, collected by J. J. Rafanomezantsoa, deposited in CAS. CASENT 9004603

Etymology: 'Mountain spider' in Malagasy; a noun in apposition.

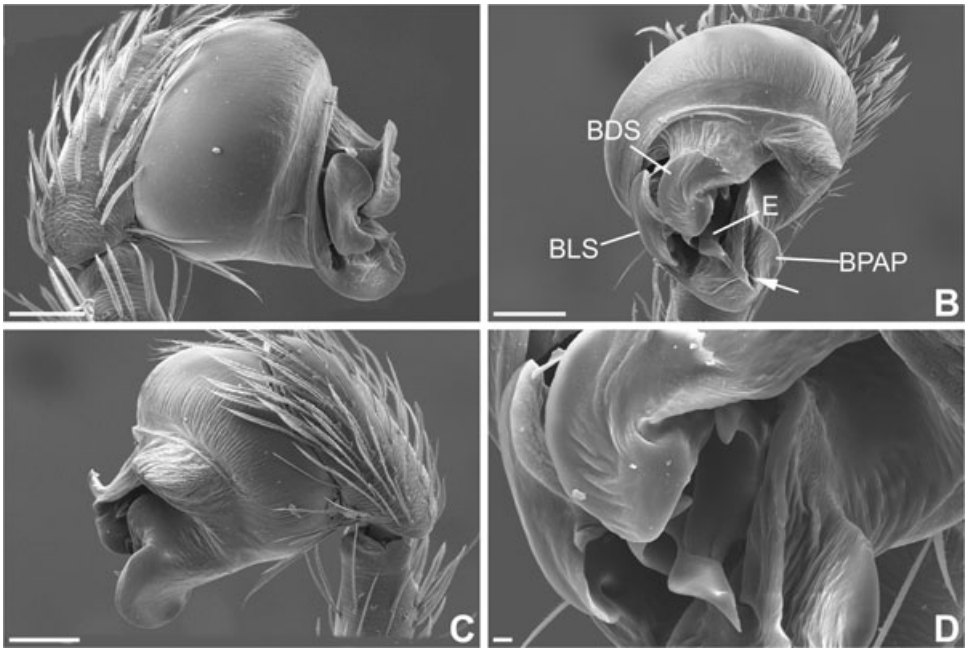

Figure 26. ♂ ***Eriauchenius lavatenda*** **sp. nov.**, right palpus, arrow showing ridge on BPAP. A, retrolateral. B, ventral. C, prolateral. D, embolus, close, apical–ventral. Scale bars: A–C = 100 μm, D = 20 μm. See text for abbreviations.

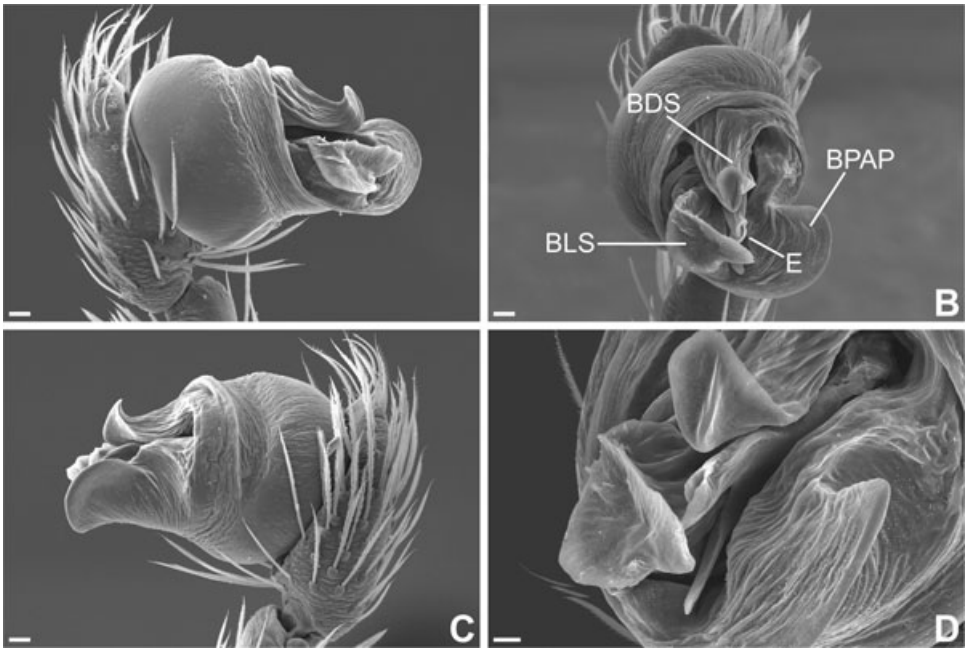

Figure 27. ♂ ***Eriauchenius spiceri*** **sp. nov.**, right palpus. A, retrolateral. B, ventral. C, prolateral. D, embolus, close, ventral. Scale bars: A–C = 20 μm, D = 10 μm. See text for abbreviations.

Diagnosis: Distinguished from all *Eriauchenius* by having the FSGP being broad and rounded dorsally, having no posterior elongations, and having 'wings' that are very reduced (Figs 14D, 16F).

Female (holotype): Total length 1.9. Carapace 0.8 long, 0.63 wide, 1.37 high. Abdomen 1.03 long, 1.0 wide, 1.23 high. F 0.73 long. AME on a bulge with a small point at apex. AME diameter 0.092; ratio of AME

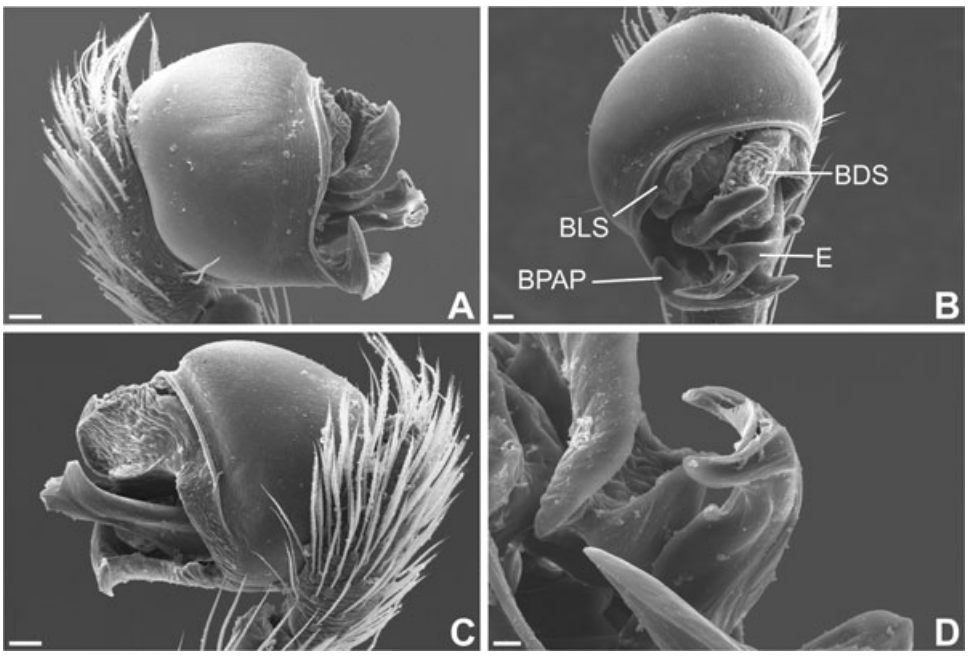

Figure 28. ♂ ***Eriauchenius anabohazo*** **sp. nov.**, right palpus. A, retrolateral. B, ventral. C, prolateral. D, embolus, close, retrolateral–ventral. Scale bars: A = 30 μm, B = 20 μm, C = 30 μm, D = 10 μm. See text for abbreviations.

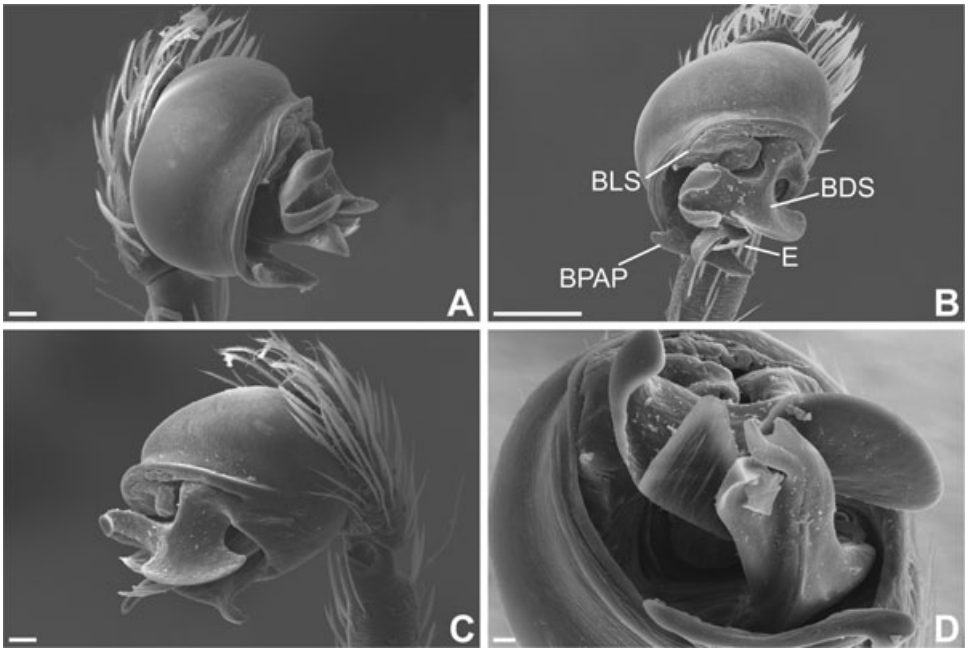

Figure 29. ♂ ***Eriauchenius griswoldi*** **sp. nov.**, right palpus. A, retrolateral. B, ventral. C, prolateral. D, embolus, close, ventral. Scale bars: A = 30 μm, B = 100 μm, C = 30 μm, D = 10 μm. See text for abbreviations.

to all other subequal eyes 2.2; AME separation 5.8 × AME diameter; PME separation 3.8 × AME diameter; AME–PME separation 0.92 × AME diameter; AME–LE separation 1.2 × AME diameter. Short brown spine between PME and LE. Chelicerae 1.43 long, with ChS 0.27; median row of peg teeth 24; two teeth on each chelicera. Femur I 1.63 long. Femora I–IV darkened proximally and distally; tibiae with

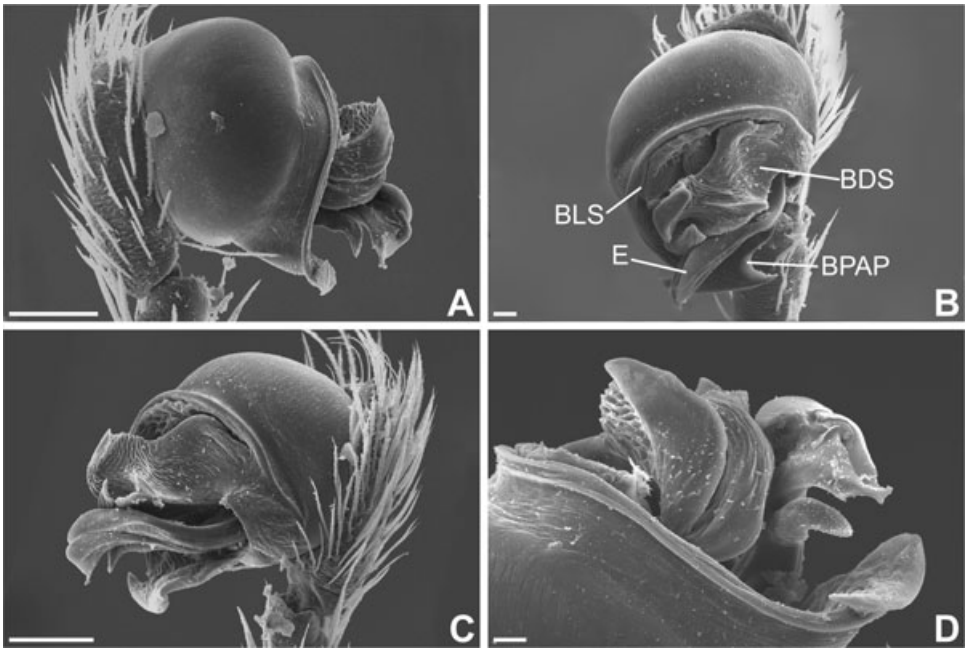

Figure 30. ♂ *Eriauchenius tsingyensis* (Lotz), right palpus. A, retrolateral. B, ventral. C, prolateral. D, embolus, close, retrolateral. Scale bars: A = 100 μm, B = 30 μm, C = 100 μm, D = 20 μm. See text for abbreviations.

dark proximal and distal bands. FSGP having very reduced 'wings'; FSGP with no posterior elongations, with several small folds in the centre, which is broad and dorsally convex, and with two points going laterad (Figs 14D, 16F). Genitalic bursa divided with two main groups of pores on each side, with several small scattered groups of pores in between the large groups (Figs 14D, 16F).

Variation (n = 2): CH/CL ratio 1.7–1.8; FL/CH ratio 1.20–1.24. Number of teeth 2–3, may have different numbers of teeth per chelicera on same individual; median row with 23–24 peg teeth.

Male: Unknown.

Natural history: Specimens were collected in tropical dry forest and montane rainforest by sifting litter and general day collecting.

Distribution: Known only from Montagne d'Ambre, Nothern Madagascar (Fig. 31).

Material examined: MADAGASCAR: *Antsiranana*: (J. J. Rafanomezantsoa, CAS) Réserve Spéciale d'Ambre: 3.5 km 235° SW Sakaramy, elev 325 m, 12°28′8″S, 49°14′32″E, 26–31.i.2001, 1♀ CASENT 9004603 (holotype); (Fisher/Griswold Arthropod survey team, CAS) Park National Montagne d'Ambre:

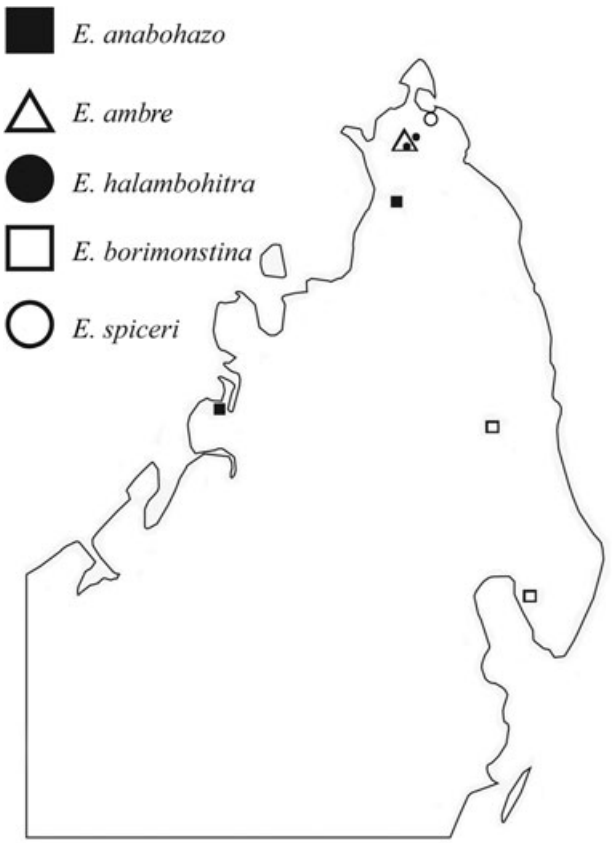

Figure 31. Distribution map for *Eriauchenius* species, Northern Madagascar; image created by Lindsay Upshaw.

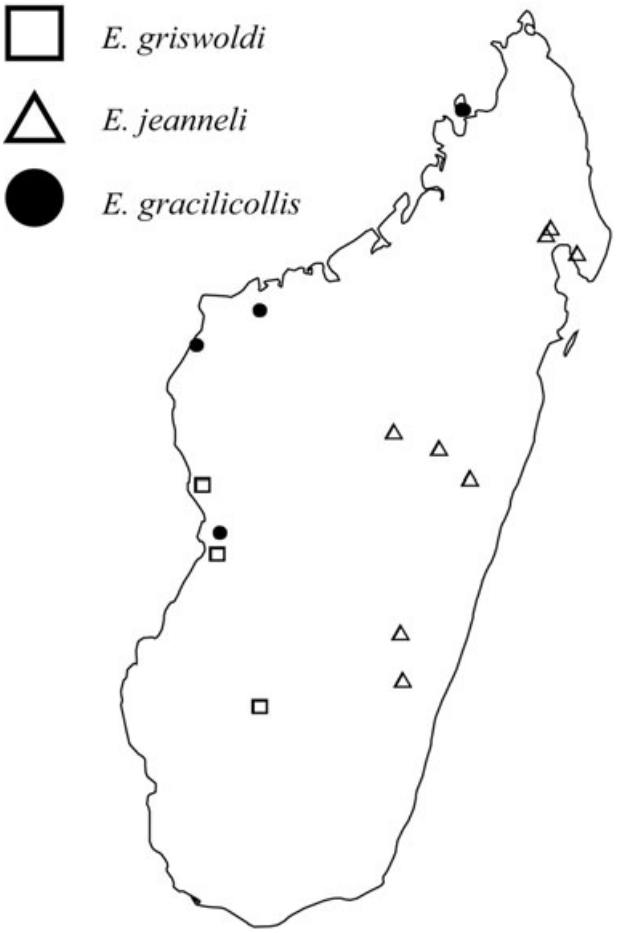

Figure 32. Distribution map for *Eriauchenius* species; image created by Lindsay Upshaw.

3.6 km 235° SW Joffreville, elev. 925 m, 12°32′4″S, 49°10′46″E, 20–26.i.2001, 1♀ CASENT 9003761.

ERIAUCHENIUS JEANNELI (MILLOT, 1948) (FIGS 2C, 14E, 17A, 18B, 22, 32)

Archaea jeanneli Millot, 1948: 12. Legendre, 1970: 27–29. Platnick, 1991: 137.
E. jeanneli: Platnick, 2006.

Types: Archaea jeanneli Millot, 1948 (type specimens from La Mandraka, J. Millot, deposited in MNHN, examined).

Diagnosis: Distinguished from all other *Eriauchenius*, except *E. ambre* by having BPAP of male palp a concave triangular shape (Fig. 22A–C), by having an abdomen that is either invaginated or flat across the back (Fig. 2C), and by the FSGP having no posterior elongations, with two lateral anterior points (Figs 14E, 17A). Distinguished from *E. ambre* by having the anterior piece of the embolus bifurcation being wide and thick and not jutting out past BPAP in the retrolateral direction (Fig. 22A, B, D).

Male: (Parc Nationale Ranomafana, CASENT 9012000) Total length 1.6. Carapace 0.73 long, 0.5 wide, 1.1 high. Abdomen invaginated in the posterior, 0.86 long, 0.7 wide, 1.0 high. F 0.77. 'Head' elongated to the posterior; protrusions on 'head' rudimentary (Fig. 18B). AME on a bulge that is rounded at apex. AME diameter 0.078; ratio of AME to all other subequal eyes 2.2; AME separation 5.5 × AME diameter; PME separation 3.3 × AME diameter; AME–PME separation 1.1 × AME diameter; AME–LE separation 0.91 × AME diameter. Brown spine in between and posterior to PME and PLE. Chelicerae 1.2 long, with ChS 0.27; median row of 28 peg teeth; one tooth on each chelicera. Femur I 1.95 long. Legs reddish brown; femur I–IV darkened distally and proximally, tibia I–IV with distal, proximal and median bands. PA retrobasal. Palp bulb with BDS a thick dark piece that curves anteriad; BLS a thin ridge; BPAP a concave triangular shape with three strong processes at each corner; embolus dark, with bifurcations, both pieces of bifurcation flat, thick and wavy (Fig. 22A–D).

Variation (n = 6): Total length 1.5–1.77; CH/CL ratio 1.38–1.55; FL/CH ratio 1.74–2.03. Median row with 20–28 peg teeth.

Female: (Parc Nationale Ranomafana, CASENT 9012009) As male, except the following. Total length 1.87. Carapace 0.77 long, 0.53 wide, 1.13 high. Abdomen 1.07 long, 0.8 wide, 1.37 high. AME diameter 0.085; ratio of AME to all other subequal eyes 2.4; AME separation 5.7 × AME diameter; PME separation 3.5 × AME diameter; AME–PME separation 1.0 × AME diameter; AME–LE separation 0.83 × AME diameter. Chelicerae 1.33 long, with ChS 0.3. Femur I 2.13 long. Genitalic bursa divided with two main groups of pores on each side; FSGP having 'wings', with two strong points arising from either side at the anterior tip, and lacking any posterior elongation (Figs 14E, 17A).

Variation (n = 6): Total length 1.67–2.03; CH/CL ratio 1.42–1.64; FL/CH ratio 1.75–1.88. Median row with 25–28 peg teeth. In many individuals there are a few small pores in addition to the two main groups of pores on the bursa.

Natural history: Specimens were collected in montane rainforest and in rainforest by beating low vegetation, sweeping and by general night and day collecting.

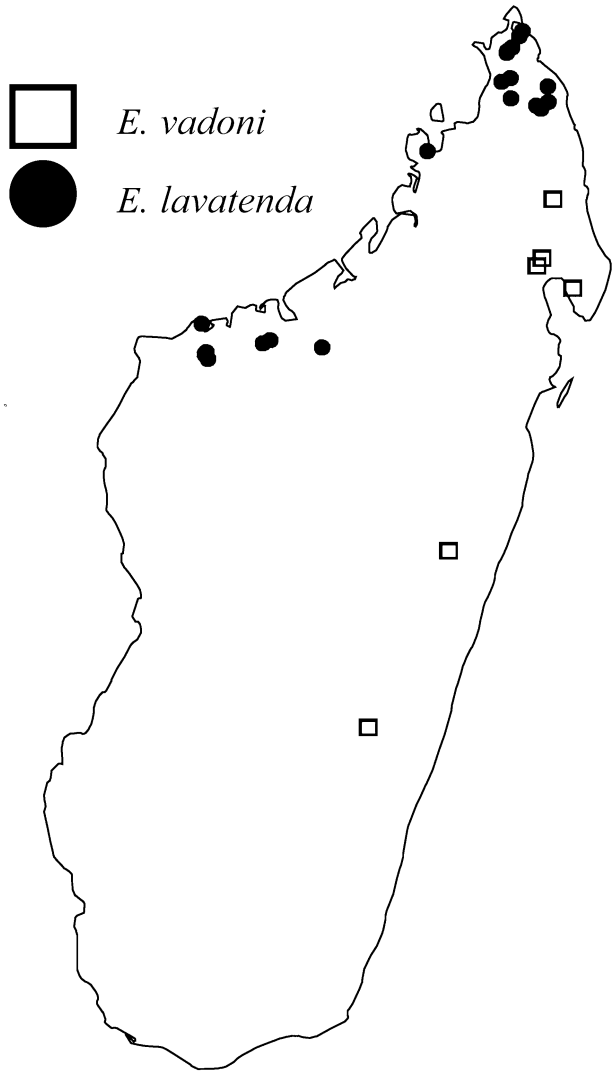

Figure 33. Distribution map for *Eriauchenius* species; image created by Lindsay Upshaw.

Distribution: Central North-eastern to central South-eastern Madagascar (Fig. 32).

Material examined: MADAGASCAR: *Toamasina*: (C. Griswold, D. Silva, D. Andriamalala, CAS) Reserve Analamazaotra, Parc National Andasibe: 23 road km E Moramanga, elev. 960 m, 18°56′38″S, 48°25′03″E, 16–18.i.2003, 2♂1♀ CASENT 9018315 and 9005233. All Parc National Perinet, nr Andasibe: (J. Coddington, C. Griswold, N.Scharff, S. Larcher, and R. Andriamasimanana, CAS, ZMUC and USNM) elev. 1000 m, 18°56′S, 48°24′E, 4–5.xi.1993, 6♀ CASENT 9012329; (V and B. Roth, CAS) 18°55′S, 48°25′E, 1–3.viii.1992, 1♂ CASENT 9012003. Parc National Masoala: (D. Andriamalala and D. Silva, CAS) Ambohitsitondroina Mt., Ambanizana, 15°34′9.9″S, 50°00′12.3″E, elev. 700–750 m, 28.ii.2003, 1♀ CASENT 9015316; elev. 600–650 m, 1–2.iii.2003, 2♀ 9015372. *Antananarivo*: (J. Millot, MNHN) La Mandraka, 2♀ (holotype); (D. Ubick, CAS) 7 km SE Andasibe Parc National (= Perinet), 18°58′S, 48°27′E, 5.ix.2001, 2♂ CASENT 9001265. (All Fisher/Griswold Arthropod survey team, CAS) 3 km 41° NE Andranomay, 11.5 km 147° SSE Anjozorobe, elev. 1300 m, 18°28′24″S, 47°57′36″E, 5–13.xii.2000, 10♂8♀ CASENT 9004085 and 9004009; Réserve Spéciale d'Ambohitantely: Forêt d'Ambohitantely, 20.9 km 72° NE Ankazobe, elev. 1410 m, 18°13′31″S, 47°17′13″E, 17–22.iv.2001, 1♀ CASENT 9012336. *Fianarantsoa*: (W. E. Steiner, USNM) 7 km W of Ranomafana, elev. 1100 m, 1–7.xi.1988, 1♀ (W. Steiner, C. Kremen, R. Van Epps, USNM) 7 km SW Ranomafana, elev. 1200 m, 22.x.1988, 1♂. All Parc National Ranomafana: (all C. Griswold, D. Kavanaugh, N. Penny, M. Raherilalao, E. Rajeriarison, J. Ranorianarisoa, J. Schweikert, and D. Ubick, CAS) Vohiparara, Piste Touristique, elev. 1000 m, 21°13.6′S, 47°24′E, 12, 14, 19, 23.iv.1998, 4♀ CASENT 9012009, 9012008, and 9012002; Vatoharanana, elev. 1200 m, 21°16.7′S, 47°26.1′E, 15.iv.1998, 1♂ CASENT 9012006; 2.3 km N Vohiparara village, 21°12.8′S, 47°23′E, elev. 1100 m, 18.iv.1998 1♂1♀ CASENT 9012000 and 9012007; (Fisher/Griswold Arthropod survey team, CAS) Vatoharanana River, 4.1 km 231° SW Ranomafana, elev. 1100 m, 21°17′24″S, 47°26′00″E, 27–31.iii.2003, 1♀ CASENT 9018921; (B. Roth, CAS) 21°12′S, 47°27′E, Apr –.v.1992, 3♂4♀ CASENT 9012005; (C. Griswold, N.Scharff, S. Larcher, and R. Andriamasimanana, CAS, ZMUC and USNM) Talatekely, elev. 900 m, 21°15′S, 47°25′E, 5–7.vii.1993, 3♂6♀ CASENT 9012330.

ERIAUCHENIUS LAVATENDA SP. NOV.

(FIGS 2D, 5–11, 12C–E, 13A, 14F, 17B, 26, 33)

Types: Male holotype and female paratype taken by beating low vegetation in tropical dry forest at 10 m elevation, Parc National de Baie de Baly, 12.4 km NNW of Soalala, Mahajanga province, Madagascar, 26–30.xi.2002, collected by the Fisher/Griswold Arthropod Survey team, deposited in CAS. CASENT 9018932.

Etymology: 'Long neck' in Malagasy; a noun in apposition.

Diagnosis: Distinguished from all other *Eriauchenius* by the presence of a ridge or furrow along anterior surface of BPAP of male palp (Fig. 26B, D); by the presence of a circular structure on the FSGP, and having the pores on each lateral side of the bursa in

one continuous group (Figs 14F, 17B). *E. lavatenda* and *E. gracilicollis* both have the longest, narrowest 'necks' of the gracilicollis group (Fig. 2D). BDS of the male palp of *E. lavatenda* sp. nov. is a flat plate (Fig. 26A, B, D), while in *E. gracilicollis*, BDS is pronged, with a wide and shallow divergence between the two processes, which point ventrad (Fig. 25B–D).

Male (holotype): Total length 2.2. Carapace 0.97 long, 0.63 wide, 2.63 high. Abdomen 1.23 long, 0.83 wide, 1.0 high. F 0.93. Lateral pair of bumps on 'head' larger than posterior and anterior pair. AME on a bulge with a point at apex. AME diameter 0.099; ratio of AME to all other subequal eyes 2.34; AME separation 6.2 × AME diameter; PME separation 4.6 × AME diameter; AME–PME separation 1.0 × AME diameter; AME–LE separation 1.3 × AME diameter. Short brown spine between and slightly posterior to PME and LE. Chelicerae 2.6 long, with ChS 0.716; median row of 34 peg teeth; three teeth on left chelicera and four teeth on right chelicera. Femur I 3.1 long. Legs uniform light brown except femur IV darkened proximally and distally and with median band. PA retrobasal. BDS and BLS of palp modified into flat, sclerotized plates; BPAP wide and elongated, pointing distally, with a ridge running down anterior centre; embolus dark and blunt at tip, with a bifurcation deep in palp that is difficult to see with a light microscope; with rounded process on prolateral side, proceeded by wide groove (Fig. 26A–D).

Variation (n = 6): Total length 2.13–2.43; CH/CL ratio 2.72–3.06; FL/CH ratio 1.10–1.18. Number of teeth, 3–4, may have different numbers of teeth per chelicera on same individual; median row with 29–37 peg teeth.

Female (paratype): As male, except the following. Total length 2.4. Carapace 1.07 long, 0.67 wide, 2.6 high. Abdomen 1.33 long, 1.0 wide, 1.33 high. AME separation 6.6 × AME diameter; PME separation 4.5 × AME diameter; AME–PME separation 1.2 × AME diameter; AME–LE separation 1.4 × AME diameter. Chelicerae 2.67 long, with ChS 0.78; median row of 33 peg teeth; with three teeth on each chelicera; most distal tooth on left chelicera having two points at apex. Femur I 3.17 long. Genitalic bursa divided in half by a depression, with one large continuous group of pores on each side. FSGP with lateral 'wings', with two small posterior elongations, with a circular shaped mound in centre that has two strong points going laterad (Figs 14F, 17B).

Variation (n = 6): Total length 2.4–2.87; CH/CL ratio 2.4–2.97; FL/CH ratio 1.05–1.22. Number of teeth 3–5, may have different numbers of teeth per chelicera on same individual; median row with 33–37 peg teeth. Posterior elongations on FSGP may be two strong points, large, small, or not present.

Natural history: Specimens were collected from tropical dry forest, rainforest, montane rainforest, or littoral rainforest by sifting litter, beating low vegetation, and general night and day collecting.

Distribution: Northern to central Western Madagascar (Fig. 33).

Material examined: MADAGASCAR: *Ankaranana*: (V and B. Roth, CAS) English Camp: 12°54′43″S, 49°6′36″E, 20–26.viii.1992, 3♂3♀ CASENT 9010077 and 9012331. *Antsiranana*: (all Fisher/Griswold Arthropod survey team, CAS) Forêt d'Antsahabe: 11.4 km 275°W Daraina, elev. 550 m, 13°12′42″S, 49°33′24″E, 12.xii.2003, 1♂5♀ CASENT 9018951 and 9018948; Montagne des Français: 7.2 km 142° SE Antsiranana (= Diego Suarez), elev. 180 m, 12°19′22″S, 49°20′17″E, 22–28.ii.2001, 8♂11♀ CASENT 9007204, 9007203, 9007201 and 9007200; Forêt d'Ampondrabe: 26.3 km 10° NNE Daraina, elev. 175 m, 12°58′12″S, 49°42′00″E, 10.xii.2003, 6♂3♀ CASENT 9018928; Forêt de Binara: 7.5 km 230° SW Daraina, elev. 375 m, 13°15′18″S, 49°37′00″E, 1.xii.2003, 1♀ CASENT 9018950; Forêt Bekaraoka: 6.8 km 60° ENE Daraina, elev. 150 m, 13°10′00″S, 49°42′36″E, 7.xii.2003, 4♂2♀ CASENT 9018944; Forêt di'Andavakoera (sic. Forêt d'Andavakoera): 21.4 km 75° ENE Ambilobe, 4.6 km 356°N Betsiaka, elev. 425 m, 13°7′6″S, 49°13′48″E, 15.xii.2003, 2♀ CASENT 9018949. (All Fisher/Griswold Arthropod survey team and L. J. Boutin, CAS) Forêt d'Orangea: 3.6 km 128° SE Remena, elev. 90 m, 12°15′32″S, 49°22′29″E, 22–28.ii.2001, 3♂8♀ CASENT 9001031, 9003160, 9007247, 9007246 and 9007244; Réserve Spéciale de l'Ankarana: 12.6 km 192° SSW Anivorana Nord, elev. 210 m, 12°51′49″S, 49°13′33″E, 16–22.ii.2001, 6♂9♀ CASENT 9000806, and 9001533 (all J. J. Rafanomezantsoa, CAS) Réserve Spéciale de l'Ankarana: 22.9 km 224° SW Anivorano Nord, elev. 80 m, 12°54′32″S, 49°6′35″E, 10–16.ii.2001, 2♂2♀ CASENT 9002729 and 9002445; Ampasindava, Forêt d'Ambilanivy: 3.9 km 181°S Ambaliha, elev. 600 m, 13°47′55″S, 48°9′42″E, 4–9.iii.2001, 6♂5♀ CASENT 9002368, 9007371, 9007373, 9007372, 9002492 and 9002524. All Parc National Montagne d'Ambre: (Fisher/Griswold Arthropod survey team, CAS) 3.6 km 235° SW Joffreville, elev. 925 m, 12°32′4″S, 49°10′46″E, 20–26.i.2001, 1♂ CASENT 9006678; (Fisher/Griswold Arthropod survey team, J.J. Rafanomezantsoa and L.J. Boutin, CAS) 3.5 km 235° SW Sakaramy, elev. 325 m, 12°28′8″S, 49°14′32″E, 26–31.i.2001, 10♂15♀ CASENT 9006801, 9004533,

9003640, 9000787, and 9006802; (V and B. Roth, CAS) 12°30′57″S, 49°11′4″E, 12.viii.1992, 4♀ CASENT 9012332. *Mahajanga*: All Parc National d'Ankarafantsika: (Fisher/Griswold Arthropod survey team and J. J. Rafanomezantsoa, CAS) Forêt de Tsimaloto, 18.3 km 46° NE de Tsaramandroso, elev. 135 m, 16°13′41″S, 46°8′37″E, 2–8.iv.2001, 1♂3♀ CASENT 9007693 and 9002866; (Fisher/Griswold Arthropod survey team, CAS) Ampijoroa Station Forestière, 40 km 306° NW Andranofasika, elev. 130 m, 16°19′15″S, 46°48′38″E, 26.iii.–1.iv.2001, 1♂4♀ CASENT 9007563. (Fisher/Griswold Arthropod survey team and J. J. Rafanomezantsoa, CAS) Réserve d'Ankoririka: 10.6 km 13° NE de Tsaramandroso, elev. 210 m, 16°16′2″S, 46°2′55″E, 9–14.iv.2001, 5♂8♀ CASENT 9007837 and 9006364. (Fisher/Griswold Arthropod survey team, CAS) Parc National de Baie de Baly: 12.4 km 337° NNW Soalala, elev. 10 m, 16°00′36″S, 45°15′54″E, 26–30.xi.2002, 4♂8♀ CASENT 9018008, 9018004 and 9018932 (holotype). (All Fisher/Griswold Arthropod survey team, CAS) All Parc National de Namoroka: 9.8 km 300° WNW Vilanandro, elev.140 m, 16°28′00″S, 45°21′00″E, 4–8.xi.2002, 50♂36♀ CASENT 9018936, 9018896, 9018938 and 9017353; 16.9 km 317° NW Vilanandro, elev. 100 m, 16°24′24″S, 45°18′36″E, 12–16.xi.2002, 6♂11♀ CASENT 9017931, 9018955, 9018937 and 9017950; 17.8 km 329° WNW Vilanandro, elev. 100 m, 16°22′36″S, 45°19′36″E, 8–12.xi.2002, 5♂9♀ CASENT 9018934.

ERIAUCHENIUS LEGENDREI (PLATNICK, 1991) (FIGS 2E, 12B, 18A, 20, 34)

Archaea legendrei Platnick, 1991: pp. 137–140.
E. legendrei: Platnick, 2006.

Types: Archaea legendrei Platnick, 1991 (holotype male and allotype female taken from pyrethrin fogging of dead leaves on fallen trees in montane rainforest, elevation 1100 m, 7 km W of Ranomafana, Fianarantsoa Province, Madagascar, 1–7.xi.1988, collected by W. E. Steiner, deposited in USNM, examined).

Diagnosis: Distinguished from all other *Eriauchenius*, except *E. vadoni* by having PA on distodorsal side and by having a distodorsal apophysis on the palpal femur (Fig. 12B); and from all *Eriauchenius* except *E. vadoni* and *E. borimontsina* sp. nov. by the female genitalia having pores on each lateral side of the bursa that are one continuous group, and having the FSGP small, reduced and lacking 'wings' (as in Figs 15D, 17E). Distinguished from *E. vadoni* by having a rounded head with only rudimentary protrusions and a longer 'neck' (Figs 2E, 18A), and from *E. borimontsina* by having only 3–4 teeth and lacking a point on the AME tubercle (Fig. 18A).

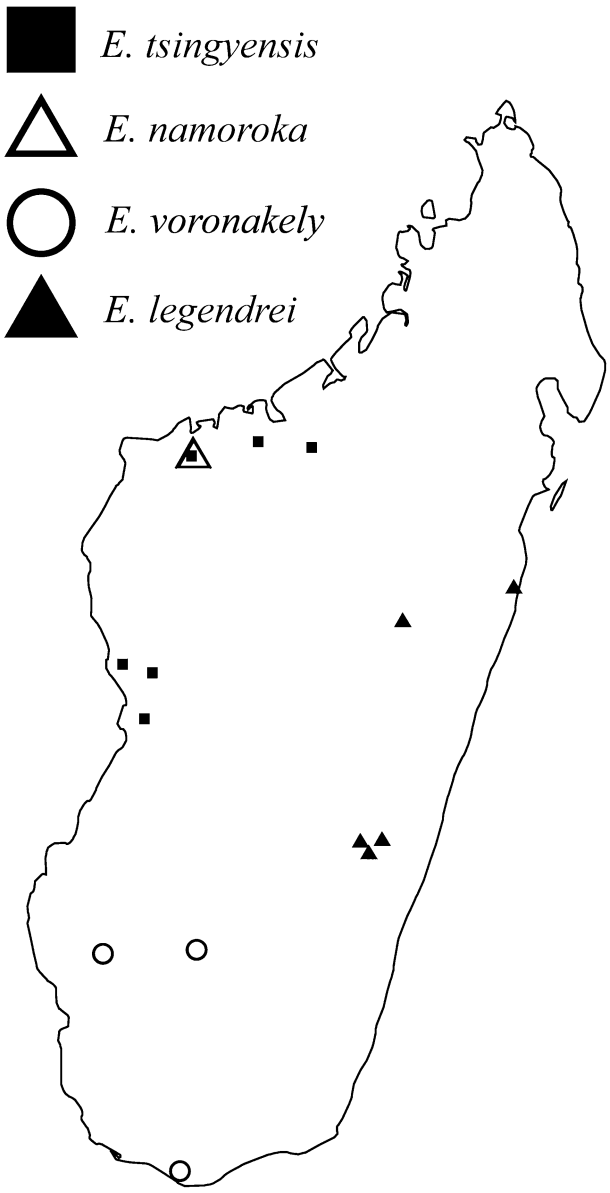

Figure 34. Distribution map for *Eriauchenius* species; image created by Lindsay Upshaw.

Male (holotype): Total length 1.7. Carapace 0.73 long, 0.6 wide, 1.37 high. Abdomen 0.93 long, 0.7 wide, 1.0 high. F 0.6. Protrusions on 'head' very rudimentary. AME on a bulge without a point at apex (Fig. 18A). AME diameter 0.099; ratio of AME to all other subequal eyes 2.3; AME separation 4.9 × AME diameter; PME separation 3.0 × AME diameter; AME–PME separation 0.71 × AME diameter; AME–LE separation 0.93 × AME diameter. Brown spine close to and immediately posterior to PME (Fig. 18A). Chelicerae

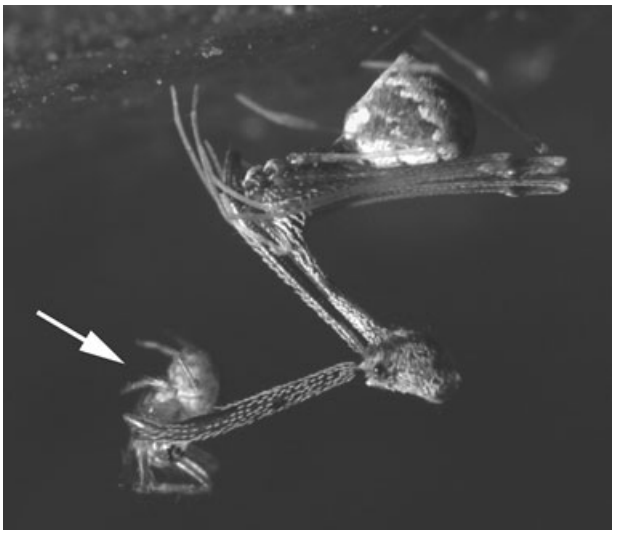

Figure 35. ♀ *E. gracilicollis*, lateral view, hanging upside down, immediately after capture of small spider, only the right chelicera is extended and is holding the captured prey with the fang at the tip, arrow is to the spider prey. Photo by Jeremy Miller.

1.47 long, with ChS 0.27; stridulatory ridge on chelicerae very reduced, but present; median row of peg teeth 23; three teeth on each chelicera. Femur I 2.37 long. Legs reddish brown; femur I–IV darkened distally and proximally, tibia I–IV with darkened proximal, distal and median bands. Palpal femur and PA with a distodorsal apophysis (Fig. 12B). Palpal bulb pale, without dark pieces; BDS of palp fan-like, thin and translucent; BLS absent or unrecognizable; BPAP pyramidal in shape; embolus not heavily sclerotized, elongated and tapering, with a curl at tip (Fig. 20).

Variation (n = 6): Total length 1.63–1.73; CH/CL ratio 1.74–1.86; FL/CH ratio 1.43–1.75. Number of teeth 3–4, may have different numbers of teeth per chelicera on same individual; median row with 20–24 peg teeth.

Female (allotype): As male, except the following. Total length 2.33. Carapace 0.8 long, 0.67 wide, 1.53 high. Abdomen 1.5 long, 1.43 wide, 1.97 high. F 0.73. AME separation 5.4 × AME diameter; PME separation 3.6 × AME diameter; AME–PME separation 1.0 × AME diameter; AME–LE separation 1.1 × AME diameter. Chelicerae 1.67 long, with ChS 0.3. Femur I 2.33 long. Genitalic bursa with continuous large group of pores on either side; FSGP a very reduced, small plate, lacking 'wings' (as in Figs 15D, 17E).

Variation (n = 6): Total length 1.8–2.33; CH/CL ratio 1.83–2.0; FL/CH ratio 1.26–1.57. Number of teeth 3–5, may have different numbers of teeth per chelicera on same individual; median row with 20–24 peg teeth.

Natural history: Specimens were collected in montane rainforest, gallery forest, and disturbed rainforest by beating low vegetation, beating dead leaves in bamboo vine, sweeping, pyrethrin fogging of dead leaves on fallen trees, using pan traps, and by general night and day collecting.

Distribution: Central Eastern Madagascar (Fig. 34).

Material examined: MADAGASCAR: *Fianarantsoa*: (W. E. Steiner, USNM) 7 km W of Ranomafana, elev. 1100 m, 1–7.xi.1988 1♂1♀ (holotype and allotype) and 23–28.i.1990, 1♀. All Parc National Ranomafana: (Fisher/Griswold Arthropod survey team, CAS) Vatoharanana River, 4.1 km 231° SW Ranomafana, elev. 1100 m, 21°17′24″S, 47°26′00″E, 27–31.iii.2003, 1♂ CASENT 9018908; (V. Lee and K. Ribardo, CAS) Talatekely, 21°15′S, 47°26′E, elev. 915–1000 m, 30.x.–20.xi.1998, 1♂ CASENT 9010074; (N. Scharff, S. Larcher, C. Griswold, and R. Andriamasimanana, USNM) Talatekely, 21°15′S, 47°26′E, elev. 900 m, 5–7.xii.1993, 1♂2♀ (B. Roth, CAS) Trail FF, 14.v.1992, 1♂1♀ CASENT 9012334; (all C. Griswold, D. Kavanaugh, N. Penny, M. Raherilalao, E. Rajeriarison, J. Ranorianarisoa, J. Schweikert, and D. Ubick, CAS) Vohiparara, Piste Touristique, elev. 1000 m, 21°13.6′S, 47°24.0′E, 23.iv.1998, 1♂2♀ CASENT 9012333; Talatekely, 21°14.9′S, 47°25.6′E, 5–30.iv.1998, 1♂1♀ CASENT 9012347 and 9010075; Vatoharanana, elev. 1200 m, 21°16.7′S, 47°26.1′E, 15.iv.1998, 1♂5♀ CASENT 9012349; 2.3 km N Vohiparara village, elev. 1100 m, 21°12.8′S, 47°23′E, 10–11,18.iv.1998, 2♀ CASENT 9012348 and 9012345. *Antananarivo*: (Fisher/Griswold Arthropod survey team, CAS) 3 km 41° NE Andranomay, 11.5 km 147° SSE Anjozorobe, elev. 1300 m, 18°28′24″S, 47°57′36″E, 5–13.xii.2000, 5♂4♀ CASENT 9003843, 9014086 and 9004011. *Toamasina*: (D. Andriamalala and D. Silva, CAS) Ivoloina Parque Zoologique: 12 km from Tamatave, elev. 26 m, 18°03′21.6″S, 49°21′32.5″E, 19.ii.2003, 1♂1♀ CASENT 9015766.

ERIAUCHENIUS NAMOROKA SP. NOV.
(FIGS 2F, 15A, B, 24, 34)

Types: Male holotype taken by beating low vegetation in tropical dry forest at 140 m elevation, Parc National de Namoroka, 9.8 km WNW of Vilanandro, Mahajanga province, Madagascar, 4–8.xi.2002, collected by the Fisher/Griswold Arthropod Survey team, deposited in CAS. CASENT 9018935.

Etymology: The name is a noun in apposition from the type locality, Parc National de Namoroka in Madagascar.

Diagnosis: Distinguished from all *Eriauchenius* by having a very thick, wide, flat embolus with a blunt end and no bifurcations, by having BDS of the palp elongated and tapering off at the end with no bifurcations, and by having BLS of the palp a flat sclerotized plate (Fig. 24). The epigynum is unique by the FSGP being extremely elongated and flat and extending posteriorad well beneath the 'wings'; the FSGP is so large that it completely obscures the bursa in the dorsal view (Fig. 15A, B).

Male (holotype): Total length 2.1. Carapace 0.8 long, 0.67 wide, 2.0 high. Abdomen 1.27 long, 1.13 wide, 1.32 high. F 0.87 long. AME on a bulge with a point at apex. AME diameter 0.11; ratio of AME to all other subequal eyes 2.0; AME separation 4.7 × AME diameter; PME separation 3.4 × AME diameter; AME–PME separation 0.77 × AME diameter; AME–LE separation 1.3 × AME diameter. Brown spine in between PME and LE. Chelicerae 2.0 long, ChS 0.48. Median row of peg teeth 24; two teeth on each chelicera. Femur I 2.6 long. Legs off-white; femora 1–4 darkened proximally and distally; tibiae and tarsi speckled with dark bands and spots; patella 1–4 darkened. PA retrobasal. Palpal bulb with BDS modified into an elongate, wide dark piece that gradually tapers off, lays flat across the ventral face of palp and then projects distally alongside the embolus; BLS flat sclerotized piece; BPAP thin, very elongated and blunt at tip, pointing distally; embolus dark, very flat and wide with no bifurcations, with opening at the tip (Fig. 24).

Variation: No other males known.

Female (paratype): (Parc National de Namoroka, CASENT 9018933) As male, except the following. Total length 2.67. Carapace 0.87 long, 0.73 wide, 2.0 high. Abdomen 1.77 long, 1.8 wide, 2.13 high. F 0.82 long. AME separation 4.9 × AME diameter; PME separation 3.5 × AME diameter. Chelicerae 2.1 long, with ChS 0.52; having one tooth on each chelicera. Femur I 2.7 long. Genitalic bursa divided with two main groups of pores on each side, with several small scattered groups of pores in between the large groups (Fig. 15A). FSGP having 'wings', with two points arising from either side at the anterior tip, and with posterior elongation very long, wide, and greatly extended posteriad well below the 'wings' (Fig. 15B).

Variation (n = 2): Total length 2.5–2.67; CH/CL ratio 2.27–2.31; FL/CH ratio 1.37. Number of teeth 1–2; median row has 24–26 peg teeth.

Natural history: Specimens were collected in tropical dry forest by beating low vegetation and by using pan traps.

Distribution: Known only from the Parc National de Namoroka, central Western Madagascar (Fig. 34).

Material examined: MADAGASCAR: *Mahajanga*: All Parc National de Namoroka: (all Fisher/Griswold Arthropod survey team, CAS) 9.8 km 300° WNW Vilanandro, elev. 140 m, 16°28′00″S, 45°21′00″E, 4–8.xi.2002, 1♂ CASENT 9018935 (holotype); 17.8 km 329° WNW Vilanandro, elev. 100 m, 16°22′36″S, 45°19′36″E, 8–12.xi.2002, 1♀ CASENT 9018933; 16.9 km 317° NW Vilanandro, elev. 100 m, 16°24′24″S, 45°18′36″E, 12–16.xi.2002, 1♀ CASENT 9018916.

ERIAUCHENIUS SPICERI SP. NOV.
(FIGS 3A, 27, 31)

Types: Male holotype taken by general collecting, during the day, in tropical dry forest at 180 m elevation, Montagne des Français, 12°19′22″S, 49°20′17″E, 7.2 km SE of Antsiranana (= Diego Suarez), Antsiranana province, Madagascar, 22–28.ii.2001, collected by J.J. Rafanomezantsoa, deposited in CAS. CASENT 9001002.

Etymology: Named in honour of Dr Greg Spicer, molecular systematics professor at San Francisco State University, who provided assistance in the phylogenetic study of this group.

Diagnosis: Distinguished from all *Eriauchenius* by having BDS of the male palp that is a thick, dark piece that curves anteriad, BLS that is a sclerotized plate that projects ventrad, and BPAP that is wide, rounded and elongated without any projections (Fig. 27A–C).

Male (holotype): Total length 1.87. Carapace 0.8 long, 0.7 wide, 1.53 high. Abdomen 1.07 long, 1.03 wide, 1.23 high. F 0.8 long. AME on a bulge with a point at apex. AME diameter 0.099; ratio of AME to all other subequal eyes 1.4; AME separation 6.1 × AME diameter; PME separation 3.9 × AME diameter; AME–PME separation 0.86 × AME diameter; AME–LE separation 1.3 × AME diameter. Short brown spine between PME and LE. Chelicerae 1.63 long, with ChS 0.3. Median row of peg teeth 24; three true teeth on each chelicera. Femur I 1.8 long. Femora I–IV darkened proximally and distally; patella I–IV darkened; tibia and tarsus spotted with dark patches. PA retrobasal. BDS of palp thick, dark piece that curves anteriad; BLS sclerotized plate that

projects ventrad; BPAP wide and elongate; embolus small and dark and with a deep bifurcation (Fig. 27).

Variation: No other males known.

Female: Unknown.

Natural history: Specimen collected in tropical dry forest by general day collecting.

Distribution: Known only from the type locality (Fig. 31).

Material examined: Only the type specimen.

ERIAUCHENIUS TSINGYENSIS (LOTZ, 2003) (FIGS 3B, 13D, 15C, 17C, D, 30, 34)

Archaea tsingyensis Lotz, 2003: 228–230.
E. tsingyensis: Platnick, 2006.

Types: Archaea tsingyensis Lotz, 2003 (male holotype and female allotype taken by beating low vegetation in tropical dry forest at approximately 100 m elevation, Parc National Tsingy de Bemaraha, 2.5 km 62° ENE of Bekopaka, Ankidrodroa River, Mahajanga province, Madagascar, 11–15.xi.2001, collected by the Fisher/Griswold Arthropod Survey team, deposited in CAS, CASENT 9008681, examined).

Diagnosis: Distinguished from all *Eriauchenius* by the embolus having a trifurcation when viewed in a light microscope (SEM pictures show a bifurcation due to translucent membrane) (Figs 13D, 30D); and by having BPAP of the male palp flat and two pronged at the base, with a constriction, with two processes on the prolateral side (Fig. 30). Distinguished from all *Eriauchenius* except *E. griswoldi* sp. nov. by the FSGP having two long, narrow posterior elongations and having bursa with discontinuous group of pores (Figs 15C, 17C, D). Distinguished from *E. griswoldi* sp. nov. by lacking a point at the apex of the AME tubercle, by the FSGP generally being wider with the 'wings' smaller.

Male (holotype): Total length 1.87. Carapace 0.87 long, 0.7 wide, 1.53 high. Abdomen 1.0 long, 0.9 wide, 1.1 high. F 0.77. Protrusions on head rudimentary, but dark. AME on a bulge with a rounded apex. AME diameter 0.11; ratio of AME to all other subequal eyes 2.5; AME separation 5.4 × AME diameter; PME separation 3.5 × AME diameter; AME–PME separation 0.88 × AME diameter; AME–LE separation 1.0 × AME diameter. Brown spine in between and slightly posterior to PME and LE. Chelicerae 1.63 long, with ChS 0.33; median row of 23 peg teeth; two teeth on right chelicera and three teeth on left chelicera. Femur I 2.0 long. Legs light brown; femora 1–4 darkened proximally and distally; tibiae with dark proximal, distal and median bands; tarsi 1–4 banded proximally and distally; patellae I–IV darkened. PA retrobasal. Palp bulb with BDS thick, dark, and greatly elongated with a bifurcation at the end with the two pieces curling back (Fig. 30B, C); BLS small and hardly visible on face of bulb, hidden by BDS, but visible through and extending deep into the retrolateral, translucent side of bulb (Fig. 13D); BPAP flat and two pronged at base, with constriction at base, with two processes on prolateral side (Fig. 30); embolus dark, and thick with trifurcation apparent with a light microscope (Figs 13D, 30D).

Variation (n = 6): Total length 1.67–1.9; CH/CL ratio 1.73–1.84; FL/CH ratio 1.28–1.38. Number of teeth 2–3, may have different numbers of teeth per chelicera on same individual; median row with 22–24 peg teeth.

Female (allotype): As male, except the following. Total length 2.07. Carapace 1.6 high. Abdomen 1.17 long, 1.03 wide, 1.37 high. F 0.85. Flat wide ridge, called 'horns' by Lotz (2003: 228), that is posterior to each PME. AME separation 5.6 × AME diameter; PME separation 3.9 × AME diameter; AME–LE separation 1.3 × AME diameter. Chelicerae 1.7 long, with ChS 0.4; median row of 23 peg teeth; two teeth per chelicera. Genitalic bursa with two main groups of pores on each lateral side; FSGP having 'wings', with anterior having a rounded bulb with sharp, large points on each lateral side, followed by a constriction; FSGP with two thick posterior elongations that curve dorsally at the tip (Figs 15C, 17C, D).

Variation (n = 5): Total length 2.07–2.5; CH/CL ratio 1.76–1.89; FL/CH ratio 1.24–1.28. Number of teeth 2–3, may have different numbers of teeth per chelicera on same individual; median row of 21–24 peg teeth. Bifurcation separating the two posterior elongations of the FSGP can have varying degrees of shallowness. Posterior elongations on FSGP can be very wide and rippled at tip. Wide cranial 'horns' found behind each PME (as described in Lotz, 2003) are only seen on the allotype.

Natural history: Specimens were collected in tropical dry forest by beating low vegetation, sifting litter, and by general night and day collecting.

Distribution: Western central Madagascar (Fig. 34).

Material examined: MADAGASCAR: *Mahajanga*: (all Fisher/Griswold Arthropod survey team, CAS) Forêt de Tsimembo: 8.7 km 336° NNW Soatana, elev.

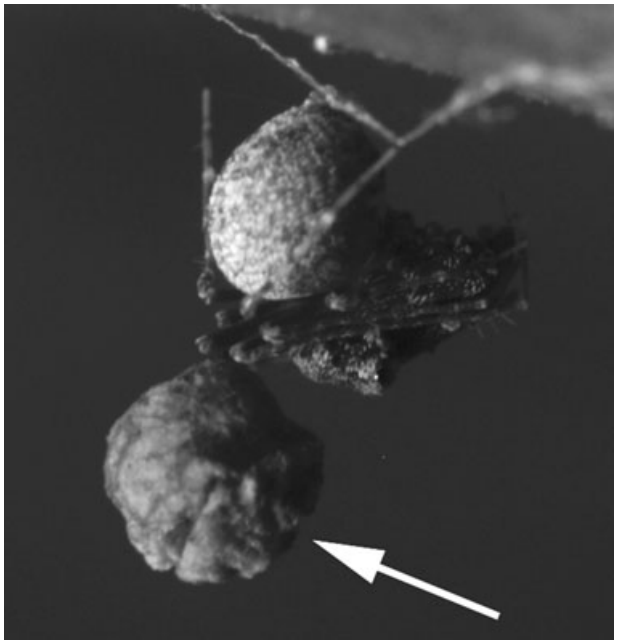

Figure 36. ♀ *E. vadoni*, lateral view, at rest hanging upside down with egg case suspended from third leg, arrow is to the egg case. The spider's anterior is facing right, with legs tucked in, and she is hanging from a visible line of silk. Photo by Jeremy Miller.

20 m, 19°1′17″S, 44°26′26″E, 21–25.xi.2001, 2♂1♀ CASENT 9004718; Parc National de Namoroka: 16.9 km 317° NW Vilanandro, elev.100 m, 16°24′24″S, 45°18′36″E, 12–16.xi.2002, 1♂ CASENT 9018925. All Parc National d'Ankarafantsika: (Fisher/Griswold Arthropod survey team and J. J. Rafanomezantsoa, CAS) Forêt de Tsimaloto, 18.3 km 46° NE de Tsaramandroso, elev. 135 m, 16°13′41″S, 46°8′37″E, 2–8.iv.2001, 3♂1♀ CASENT 9007692 and 9006311; (J. J. Rafanomezantsoa, CAS) Ampijoroa Station Forestière, 5.4 km 331° NW Andranofasika, elev. 70 m, 16°17′56″S, 46°48′47″E, 26.iii.–1.iv.2001, 3♀ CASENT 9006249. All Parc National Tsingy de Bemaraha: (all Fisher/Griswold Arthropod survey team, CAS) 2.5 km 62° ENE Bekopaka, Ankidrodroa River, elev. 100 m, 19°7′56″S, 44°48′53″E, 11–15.xi.2001, 1♂1♀ CASENT 9008681 (holotype and allotype), and 1♂1♀ CASENT 9009147; 10.6 km 123° ESE Antsalova, elev. 150 m, 19°42′34″S, 44°43′5″E, 16–20.xi.2001, 5♂1♀ CASENT 9009756, 9009189 and 9009385.

ERIAUCHENIUS VADONI (MILLOT, 1948) (FIGS 3C, 15D, 17E, 18C, 19, 33, 36, 37)

Archaea vadoni Millot, 1948: 8–9. Legendre, 1970: 24–26. Platnick & Forster, 1982: 10. Forster & Platnick, 1984: 21. Platnick, 1991: 137.

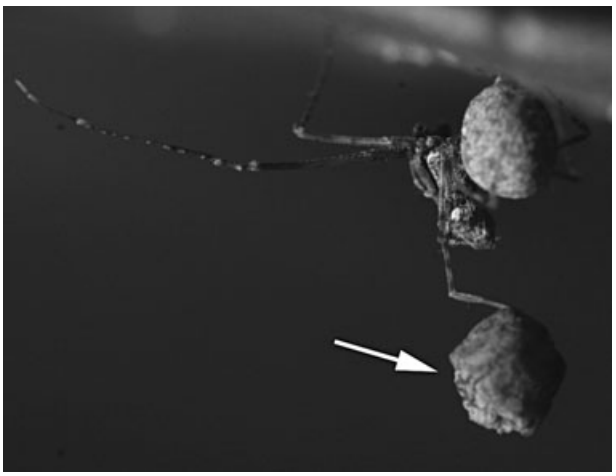

Figure 37. ♀ *E. vadoni*, posterior view, walking upside down with egg case suspended and attached to the right, third leg, arrow is to the egg case. Photo by Jeremy Miller.

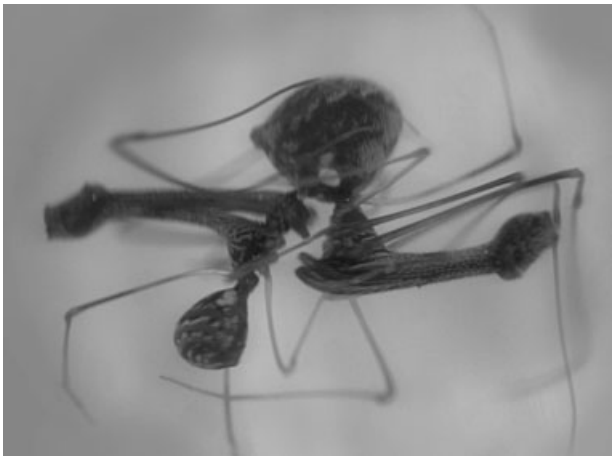

Figure 38. ♂♀ *E. gracilicollis*, lateral view, mating position, with the male on the left and the female on the right.

E. vadoni: Pla1tnick, 2006.

Types: Archaea vadoni Millot, 1948 (type specimens from Ambodivoahangy (Maroantsetra), examined, deposited in MNHN).

Diagnosis: Distinguished from all other *Eriauchenius*, except *E. legendrei* by having a distodorsal apophysis on the palpal femur and patella; and from all *Eriauchenius* except *E. legendrei* and *E. borimontsina* sp. nov. by the female genitalia having pores on each lateral side of the bursa that are one continuous group, and having a small, reduced FSGP that lacks 'wings' (Figs 15D, 17E). Distinguished from *E. legendrei* and *E. borimontsina* sp. nov. by having a 'head' that is tilted back, with prominent protrusions on

'head' (Fig. 18C); from *E. legendrei* by having an elongated membranous piece of the male palp that runs parallel to and is equal in length to E (Fig. 19B–D); and from *E. borimontsina* sp. nov. by having only 3–5 teeth.

Male: (Montagne d'Akirindro, CASENT 9018894) Total length 1.67. Carapace 0.7 long, 0.55 wide, 1.27 high. Abdomen 0.9 long, 0.8 wide, 0.97 high. F 0.7. 'Head' elongated to the posterior. Protrusions on 'head' black and very prominent, most posterior pair largest. AME on a bulge with a large point at apex (Fig. 18C). AME diameter 0.099; ratio of AME to all other subequal eyes 2.3; AME separation 4.7 × AME diameter; PME separation 3.0 × AME diameter; AME–PME separation 0.71 × AME diameter; AME–LE separation 0.79 × AME diameter. Brown spine close to and immediately posterior to PME (Fig. 18C). Chelicerae 1.43 long, with ChS 0.3; darkened proximally and distally; median row of 28 peg teeth; four teeth per chelicera. Femur I 2.13 long. Legs reddish brown; femur I–IV darkened distally and proximally, tibia and tarsus I–IV with 3–7 dark bands. Palpal femur with distodorsal apophysis. PA distodorsal and very reduced, only a rounded bump. Palp bulb pale without very dark pieces; BDS of palp fan-like, thin and translucent; BLS absent or unrecognizable; BPAP pyramidal in shape; embolus not heavily sclerotized, elongated and tapering; membranous piece of palp elongated and running parallel to embolus (Fig. 19).

Variation (n = 6): Total length 1.5–1.67; CH/CL ratio 1.57–1.81; FL/CH ratio 1.67–1.77. Number of teeth 3–4, may have different numbers of teeth per chelicera on same individual; median row with 24–28 peg teeth.

Female: (Montagne d'Akirindro, CASENT 9018888) As male, except the following. Total length 2.0. Carapace 0.73 long, 0.6 wide, 1.47 high. Abdomen 1.23 long, 1.13 wide, 1.5 high. F 0.83. AME separation 5.6 × AME diameter; PME separation 3.7 × AME diameter; AME–PME separation 1.0 × AME diameter; AME–LE separation 0.86 × AME diameter. Chelicerae 1.7 long, with ChS 0.42; darkened distally. Femur I 2.27 long. Genitalic bursa with continuous large group of pores on either side. FSGP very reduced, small plate, lacking 'wings' (Figs 15D, 17E).

Variation (n = 6): Total length 1.67–2.0; CH/CL ratio 1.71–2.0; FL/CH ratio 1.5–1.67. Number of teeth 4–5, may have different numbers of teeth per chelicera on same individual; median row with 25–29 peg teeth.

Natural history: Specimens were collected in montane forest, rainforest, and montane shrubland by beating foliage and low vegetation, pyrethrin fogging of dead leaves on fallen trees and by general night and day collecting.

Distribution: North-eastern to central Eastern Madagascar (Fig. 33).

Material examined: MADAGASCAR: *Antsiranana*: All Parc National de Marojejy: (J. Coddington, C. Griswold, N.Scharff, S. Larcher, and R. Andriamasimanana, CAS, ZMUC and USNM) 8.4 km NNW Manantenina, elev. 700 m, 14°26′S, 49°45′E, 10–16.xi.1993, 3♂ CASENT 9012327 and 9010072; (Fisher/Griswold Arthropod survey team, CAS) 25.4 km 30° NNE Andapa, 10.9 km 311° NW Manantenina, elev. 2000 m, 14°26′42″S, 49°44′6″E, 23.xi.2003, 1♀ CASENT 9018943. *Toamasina*: (J. Millot, MNHN) Ambodivoahangy, Maroantsetra, 3♂1♀ (holotype); (J. Coddington, C. Griswold, N.Scharff, S. Larcher, and R. Andriamasimanana, CAS, ZMUC and USNM) Parc National Perinet (= Andasibe): elev. 1000 m, 18°56′S, 48°24′E, 4–5.xi.1993, 1♂1♀ CASENT 9010073; (D. Ubick, CAS) 7 km SE Parc National Perinet (= Andasibe): 18°58′S, 48°27′E, 5.ix.2001, 1♂ 9012337; (C. Griswold, D. Silva, and D. Andriamalala, CAS) Res. Analamazaotra, Parc National Andasibe: 23 road km E Moramanga, elev. 960 m, 18°56′38″S, 48°25′03″E, 16–18.i.2003, 1♂2♀ CASENT 9005154 and 9005232; (Fisher/Griswold Arthropod survey team, CAS) Montagne d'Akirindro: 7.6 km 341° NNW Ambinanitelo, elev. 600 m, 15°17′18″S, 49°32′54″E, 17–21.iii.2003, 1♂1♀ CASENT 9018894 and 9018888. All Montagne d'Anjanaharibe: (all Fisher/Griswold Arthropod survey team, CAS) 18.0 km 21° NNE Ambinanitelo, elev. 470 m, 15°11′18″S, 49°36′54″E, 8–12.iii.2003, 3♂2♀ CASENT 9018911, 9018915, and 9018901; 19.5 km 27° NNE Ambinanitelo, elev. 1100 m, 15°10′42″S, 49°38′06″E, 12–16.iii.2003, 1♀ CASENT 9018890. All Parc National Masoala: (all D. Silva and D. Andriamalala, CAS) Ambohitsitondroina Mt., Ambanizana, 15°34′18″S, 50°00′21.7″E, elev. 850–900 m, 26.ii.2003, 1♂ CASENT 9015608; 15°34′19.5″S, 50°00′25″E, elev. 900–950 m, 27.ii.2003, 1♂1♀ CASENT 9015468; elev. 950–1010 m, 05.iii.2003, 1♂1♀ CASENT 9015209. *Fianarantsoa*: (W. E. Steiner**,** AMNH) 7 km W of Ranomafana, elev. 1100 m, 22–31.x.1988, 1♂1♀. All Parc National Ranomafana: (C. Griswold, N.Scharff, S. Larcher, and R. Andriamasimanana, USNM) Vohiparara, 21°14′S, 47°24′E, elev. 900 m, 5–7.xii.1993, 1♀ (C. Griswold, D. Kavanaugh, N. Penny, M. Raherilalao, E. Rajeriarison, J. Ranorianarisoa, J. Schweikert, and D.

Ubick, CAS) 2.3 km N Vohiparara village, 21°12.8′S, 47°23′E, elev. 1100 m, 18.iv.1998 1♂1♀ CASENT 9012328.

ERIAUCHENIUS VORONAKELY SP. NOV.

(FIGS 3D, 12A, 15E, 17F, 23, 34)

Types: Male holotype taken by general collecting, during the day, in montane rainforest at 1100 m elevation, Forêt Classée d'Analavelona, 29.2 km NNW of Mahaboboka, Toliara province, Madagascar, 18–22.ii.2003, collected by the Fisher/Griswold Arthropod Survey team, deposited in CAS. CASENT 9018931.

Etymology: 'Little bird' in Malagasy; a noun in apposition.

Diagnosis: Distinguished from all *Eriauchenius* by having BDS and BLS of the male palp that are very simplified flat plates, BPAP being narrow and elongated with a process on the prolateral side (Fig. 23A–C), and by having embolus with a bifurcation (Fig. 23D); bursa has small visible group of pores only on far lateral sides of bursa, 1–2 other small groups of pores are hidden on the anterior–ventral side of the bursa (Figs 15E, 17F).

Male (holotype): (Male holotype is teneral; palp description comes from male taken from near Isalo National Park, Fianarantsoa province, CASENT 9018953). Total length 1.9. Carapace 0.9 long, 0.67 wide, 1.73 high. Abdomen 1.0 long, 0.87 wide, 1.17 high. F 0.8 long. Cephalothorax a pale tan colour, lighter than all other *Eriauchenius*, due to tenerality. Bumps on head rudimentary, but thickened seta on top, large. AME on a bulge with a point at apex. AME diameter 0.099; ratio of AME to all other subequal eyes 1.4; AME separation 5.6 × AME diameter; PME separation 3.8 × AME diameter; AME–PME separation 0.86 × AME diameter; AME–LE separation 1.3 × AME diameter. Short brown spine in between PME and LE. Chelicerae 1.77 long, with ChS 0.42. Median row of peg teeth 24; four true teeth on each chelicera. Femur I 2.1 long. Femora 1–4 darkened proximally and distally; patella 1–4 darkened; tibia speckled with dark bands proximally, distally and with a median band. Palp bulb pale, with the E, BDS and BPAP darker; wide darkened bump on the prolateral side of bulb (Fig. 23B, C). PA retrobasal. BDS and BLS small, simple sclerotized plates on the surrounding membrane; BPAP narrow, blunt at end, with prolateral prong; embolus wide at tip, with a curl that extends past the embolus opening; embolus with bifurcation (Fig. 23).

Variation (n = 3): CH/CL ratio 1.87–1.92; FL/CH ratio 1.21–1.32. Number of teeth, 3–4; median row has 24–25 peg teeth.

Female (paratype): (Réserve Spéciale de Cap Sainte Marie, CASENT 9009659): As male, except the following. Total length 1.96. Carapace 0.83 long, 0.7 wide, 1.53 high. Abdomen 1.03 long, 0.97 wide, 1.23 high. F 0.77 long. AME separation 5.2 × AME diameter; PME separation 3.7 × AME diameter. Chelicerae 1.67 long, with ChS 0.38. Femur I 1.97 long. Genitalic bursa with one small group of pores on each lateral side; hidden on anterior–ventral side of bursa are one small group on left side and two small groups on right side (Figs 15E, 17F). FSGP with 'wings'; with folds in centre and one point arising from either side of anterior; with wide posterior elongation that points ventrad (Figs 15E, 17F).

Variation (n = 3): Total length 1.87–1.96; CH/CL ratio 1.84–2.04; FL/CH ratio 1.22–1.28. Number of teeth, 3–4; median row has 24–25 peg teeth. Poreplates hidden on the anterior–ventral side of bursa can be very small, consisting of 2–3 pores, and there can be several small groups on each lateral side. Posterior elongation on FSGP varies in the degree it points ventrad or posterior.

Natural history: Specimens were collected in montane rainforest, and spiny forest thicket by beating low vegetaion, sifting litter and using malaise traps.

Distribution: South central to Southern Madagascar (Fig. 34).

Material examined: MADAGASCAR: *Toliara*: (all Fisher/Griswold Arthropod survey team, CAS) Fôret Classée d'Analavelona: 29.2 km 343° NNW Mahaboboka, elev. 1100 m, 22°40′30″S, 44°11′24″E, 18–22.ii.2003, 2♂ CASENT 9018931 (holotype) and 9018897; Réserve Spéciale de Cap Sainte Marie: 14.9 km 261°W Marovato, elev 160 m, 25°35′40″S, 45°8′49″E, 13–19.ii.2002, 3♀ CASENT 9012807 and 9009659. *Fianarantsoa*: (R. Harin'Hala, CAS) near Isalo National Park: elev. 750 m, 22°37.60″S, 45°21.49″E, 28.iii.– 9.iv.2003, 1♂ CASENT 9018953.

NATURAL HISTORY

The gracilicollis group species were collected mostly by beating vegetation. They were found in clumps of dead vegetation and debris that was trapped in bushes or trees and also in living vegetation. They were observed to hang upside down under leaves in the field and also in their collection vials in the laboratory. To capture spider prey archaeids wave

their first legs in slow circular motions until they come into contact with another spider. Then both chelicerae quickly reach out at 90° and stab the prey. One chelicera lowers and the other remains extended with the struggling spider impaled on the fang (Fig. 35). Once the prey stops moving the extended chelicera lowers the prey to the mouth. Archaeids appear capable of capturing spiders as large as or larger than themselves. There were no observed instances of cannibalization when adult conspecific males and females were placed in the same container, among adult females and their young, or among newly hatched juveniles. These types of observations need to be performed with heterospecific species. After a female lays eggs the egg case is held and carried around by the female's third leg until the juveniles hatch. Some species hang upside down with the egg case also hanging below them (Figs 36, 37), while others hold the egg case closely to the lateral or anterior side of the body. Silk was observed to be only used to construct egg cases, to attach and hang from the substrate or to suspend themselves over prey and was never used to capture prey. Mating behaviour observations reveal that both females and males vibrate their palps on the stridulatory ridges on the chelicerae in order to communicate during courtship and mating. During mating the male and female have their ventral sides together and face opposite directions (Fig. 38). In *E. gracilicollis*, during copulation the male palps were alternately inserted and the male frequently vibrated his abdomen, which may involve stridulation. By contrast, in *E. workmani*, a species that is not in the gracilicollis group, only one male palp is inserted while the other palp strokes the female's abdomen and the male was never observed to vibrate his abdomen. Only two species were observed mating, and these behaviours are described in detail below.

E. gracilicollis: Matings were observed twice. The male approaches the female while repeatedly vibrating his abdomen and rubbing his palps on the chelicerae stridulatory ridges. The female also rubs her palps on the chelicerae stridulatory ridges. When the male gets close enough to the female he positions himself so they are ventral to ventral, facing opposite directions (Fig. 38). The male holds the female's abdomen with both first legs. The distal end of leg IV of the male is in contact with the distal end of leg I or II of the female. The male braces leg III against the coxae II of the female. In this position, the male alternately inserts one palp and then the other into the epigynum while periodically vibrating his abdomen, presumably stridulating. The female continues to rub her palps on her chelicerae stridulatory ridges while the male alternates the insertion of each palp. Each time the male contacts the epigynum his palp is folded in such a position that the PA appears to brush against the female's abdomen. This behaviour continues for approximately 10 min, after which the male leaves one palp inserted for several seconds, extends his chelicerae outward, slowly pumps his abdomen up and down a few times, and then releases the female. The male then begins what appears to be preening, by putting his palps to his mouth and by pulling his legs along his mouth. The male stays close to the female and periodically the male and female wave their legs and touch each other with their legs. The male also continues periodically to vibrate his abdomen and rub his palps on his cheliceral stridulatory ridges**.** I observed these post-mating behaviours for 2 h.

E. workmani: Matings were observed twice. The male and female both rub their palps against the chelicerae stridulatory ridges during courtship. After leg–leg and leg–body contact they get in the same position as *E. gracilicollis* (Fig. 38). The male inserts only one palp while the non-inserted palp repeatedly strokes the female's abdomen. It is unknown whether the inserted male palp is folded in the same position as it was in *E. gracilicollis***.** The palp appeared folded in the first, but not in the second observed mating. The male kept his palp inserted for approximately 2 min before separating from the female.

CONCLUSION

The study on Madagascar biodiversity that generated the archaeid collection at CAS has lasted for a period of about 10 years and is still ongoing. All new species are from the western side of the island, except for *E. borimontsina* sp. nov., which is in the north-east. This study was very successful in documenting new species of archaeids, of which there are still several more to be described at CAS. There are probably at least 23 endemic species of archaeids in Madagascar, containing at least one monophyletic clade, the gracilicollis group. This striking endemism emphasizes the importance of conserving the unique Malagasy biota.

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APPENDIX 1

There are a total of 12 morphological characters used in the phylogenetic analysis. Inapplicaple characters are coded (–) and missing characters are coded (?).

ADULT MALE

1. Palpal patella apophysis (PA) absent (0); present (1).
2. Palpal patella apophysis (PA) on distal end (0); on apex (1).
3. Palpal femur apophysis on distal end absent (0); present (1).
4. Palpal bulb proapical process (BPAP) triangular (0); rounded, truncated, and wide piece (1); long, thin and flat across bottom, with slight bump on prolateral side (2); short, thick, two pronged, and flat across bottom (3).
5. Distal end of palpal dorsal sclerotized piece (BDS) without bifurcation (0); with bifurcation (1).
6. Epiandrous spigots absent (0); present (1).

ADULT FEMALE

7. Round bulb with lateral 'points' on anterior side of sclerotized genital plate (FSGP) absent (0); present (1).
8. Sclerotized genital plate (FSGP) 'wings' absent (0); present (1).
9. Genitalia with receptaculum (0); or bursa (1).
10. Sclerotized genital plate (FSGP) absent (0); present (1).
11. Sclerotized structure dividing bursa or receptaculum absent (0); present (1).

ADULT, BOTH SEXES

12. Cephalic area with zero protuberances (0); four protuberances (1); six protuberances (2).

APPENDIX 2

Morphological character matrix

	1	2	3	4	5	6	7	8	9	10	11	12
Mecysmaucheniidae sp.	0	–	0	?	0	1	–	–	0	0	0	0
Austrarchaea sp.	0	–	0	0	0	1	–	–	0	0	0	1
Afrarchaea sp.	0	–	0	0	0	0	0	1	1	1	0	1
Eriauchenius ambre	1	1	0	0	0	?	1	1	1	1	1	2
E. anabohazo	1	1	0	3	1	?	1	1	1	1	1	2
E. borimontsina	?	?	?	?	?	?	0	0	1	1	0	2
E. bourgini	0	–	0	0	0	?	0	1	1	1	0	1
E. gracilicollis	1	1	0	1	0	?	1	1	1	1	1	2
E. griswoldi	1	1	0	3	1	?	1	1	1	1	1	2
E. halambohitra	?	?	?	?	?	?	1	1	1	1	1	2
E. jeanneli	1	1	0	0	0	?	1	1	1	1	1	2
E. lavatenda	1	1	0	1	0	0	1	1	1	1	1	2
E. legendrei	1	0	1	0	0	?	0	0	1	1	0	2
E. namoroka	1	1	0	2	0	?	1	1	1	1	1	2
E. spiceri	1	1	0	1	0	?	?	?	?	?	?	2
E. tsingyensis	1	1	0	3	1	?	1	1	1	1	1	2
E. vadoni	1	0	1	0	0	?	0	0	1	1	0	2
E. voronakely	1	1	0	2	0	?	1	1	1	1	1	2
E. workmani	0	–	0	0	0	0	0	1	1	1	0	1

Symbols: (–), not applicable; (?), missing data.