

## **Indian Ocean Goblin Spiders (Araneae, Oonopidae): four New Species of Pelicinoids from Madagascar, with a Redescription of the Type Species *Silhouettella curieusei* Benoit, 1979**

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Indian Ocean goblin spiders (Araneae, Oonopidae):  
four new species of pelicinoids from Madagascar,  
with a redescription of the type species  
*Silhouettella curieusei* Benoit, 1979

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## ABSTRACT

Four new species of oonopid spiders are described from Madagascar, divided between the genera *Silhouettella* and *Noideattella*: *S. perismontes*, sp. nov., *S. perisalma*, sp. nov., *N. omby*, sp. nov., and *N. sylvnata*, sp. nov. A new diagnosis for *Silhouettella* is provided, its type species, *S. curieusei*, from the Seychelles is redescribed, and its morphology thoroughly documented with digital images.

KEYWORDS: Arachnida, Araneomorphae, Taxonomy, Haplogynae

## INTRODUCTION

The objective of the Planetary Biodiversity Inventory (PBI) initiative (Wheeler, 2008) is to provide extensive descriptive taxonomic work for biodiversity rich and poorly known taxa. The Oonopidae PBI project is part of this initiative and has provided more than 1000 descriptions of new species of goblin spiders (Platnick and Dupérré, 2009, 2010, 2011, 2012; Baehr and Ubick, 2010; Fannes, 2010, 2013; Kranz-Baltensperger, 2011; Abraham et al., 2012; Brescovit et

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al., 2012; Henrard and Jocqué, 2012; Izquierdo et al., 2012; Grismado and Ramírez, 2013; Platnick et al., 2013a, 2013b, and many others). This enormous endeavor has been possible thanks to a cyberinfrastructure that allows collaborative descriptive studies. The two major components of this infrastructure are a database that produces automated descriptions that require only minor editing and the documentation of these taxa with thousands of images (<http://research.amnh.org/oonopidae/>), which was programmed and implemented by Xinping Wang. All this information is available to other biologists, and the general public, via “species pages” that allow reliable determinations of known species and identification of new taxa and that promote further studies in the biology of these organisms.

Taxonomic studies are necessary to document and to provide data to preserve biodiversity and to better understand nature. The sources of these data are museum collections and species inventories. The California Academy of Sciences (CASC) Entomology Department has been carrying out a broad survey of terrestrial arthropods of Madagascar from 1998 to 2014. These surveys have sampled more than 60 sites all over the island and produced more than one million specimens. More than 10,000 of these belong to Oonopidae. These data have provided descriptions to date for 52 new species from Madagascar (Ubick and Griswold, 2011a, 2011b; Álvarez-Padilla et al., 2012; Andriamalala and Hormiga, 2013) and more species are in the process of being described (Saucedo et al., 2015). Most of the specimens were products of this impressive collecting effort.

Prominent among the goblin spiders of the Indian Ocean islands are the pelicinoids, including *Silhouettella curieusei* Benoit, 1979, type species of *Silhouettella* Benoit, 1979. This species is among the 33 species of oonopids recorded from the Seychelles archipelago (Simon, 1898; Benoit, 1979; Saaristo, 1999, 2001, 2002). *Silhouettella* previously had six described species (WSC, 2015). Their geographic distribution includes the archipelagos of the Seychelles and Socotra (Saaristo and van Harten, 2002), Israel (Saaristo, 2007), and Turkey (Wunderlich, 2011). The species with the widest distribution is *S. loricatula* (Roewer, 1942) with records from Europe to Central Asia, to North Africa and the Canary Islands (WSC, 2015). The monophyly of *Silhouettella* has never been thoroughly tested; in fact, several congeneric species formed a grade in a recent phylogenetic analysis (Álvarez-Padilla et al., 2012). Nevertheless, these results should be taken with caution because several character complexes were not included in the analysis, e.g., female genital anatomy. Another pelicinoid genus from the Indian Ocean islands is *Noideattella* Álvarez-Padilla, Ubick and Griswold, 2012, described to include 11 species from Madagascar and *N. assumptia*, that also extends to the Seychelles. It is important to mention that in the *Noideattella* paper the authors referred to pelicinoids as silhouettelloids; however, the name *Pelcinus* Simon, 1891, is older than *Silhouettella* and this group of taxa should be referred to as pelicinoids as noticed by Platnick et al. (2012). The monophyly of *Noideattella* was established in the phylogenetic analysis mentioned above (Álvarez-Padilla et al., 2012).

We continue here with the description of pelicinoids from the Indian Ocean islands. Based on examination of 2349 adult specimens we provide descriptions of four new species, two each for *Silhouettella* and *Noideattella*, and the redescription of *Silhouettella curieusei* Benoit. For *S. curieusei* we provide a survey of its anatomy accompanied by digital images and a new diag-

nosis for *Silhouettella*. Additional images for these species are provided on the “species pages” of the Oonopid PBI website (<http://research.amnh.org/oonopidae/>).

## METHODS

**TAXONOMIC METHODS:** A total of 2349 specimens were sorted into five morphospecies. Digital images were recorded with a Leica DFC500 camera attached to a Leica MZ16A stereomicroscope, and a Nikon DXM1200 digital camera attached to a Leica MZ16 stereomicroscope. The software Helicon Focus 4.70 was used for combining these digital images. Scanning electron microscope (SEM) images were taken with a LEO 1450VP at the California Academy of Sciences. All specimen vouchers are deposited at the California Academy of Sciences. Digestions of internal structures were done following Álvarez-Padilla and Hormiga (2008). Specimen distributions can be accessed through the species pages of the Goblin Spider PBI website (<http://research.amnh.org/oonopidae/>). The species described here presented only minute variations in size between conspecific specimens, e.g., less than 0.1 mm of the total length. Female genital anatomy follows the nomenclature of *S. loricatorula* proposed by Mattias Burger (Burger et al., 2006; Burger, 2010). Leg spination nomenclature is as indicated: “tibiae: I, II p1-2-0; r1-2-0,” meaning tibia I and II prolateral surface with a pair of proximal spines, a pair on their middle length and none apical (p1-2-0), retrolateral (r) surface spine formula 1-2-0. All descriptions were produced with the PBI Oonopidae internet-accessible descriptive database. Some characters require SEM examination for verification: when a species was not examined with SEM it is noted that the character cannot be scored, e.g., “Tarsi I to IV superior claw teeth not examined in detail.”

**PHYLOGENETIC RELATIONSHIPS:** Four of the species described here were included in a previous analysis (Álvarez-Padilla et al., 2012: fig. 371) with the following codes: *Noideattella omby* (FA015), *N. sylvnata* (FA021); *Silhouettella curieusei* (same name), *S. perismontes* (FA003), and *S. perisalma* (FA014). The placement of these species is dubious because these taxa formed a grade in the analysis of Álvarez-Padilla et al. (2012). However, we think they need to be described to further document spider biodiversity in Madagascar and it is our hope that their phylogenetic placement will be more thoroughly addressed in the future. To minimize nomenclatural changes we place the new species in the described genera *Noideattella* and *Silhouettella*.

**ANATOMICAL AND MUSEUM ABBREVIATIONS:** For female genitalia we used the nomenclature of Burger et al. (2006) and Burger (2010) and for the male genitalia we used our own nomenclature. Anatomical abbreviations: **ASc**, anterior sclerite; **BL**, book lung; **DL**, embolus dorsal lamella; **GAp**, globular appendix; **GO**, genital opening; **Pa**, papilla; **Re**, receptaculum; **SEM**, scanning electron microscopy; **TEM**, transmission electron microscopy; **TO**, tarsal organ; **UE**, uterus externus; **VL**, embolus ventral lamella.

**INSTITUTIONAL ABBREVIATIONS:** **CASC**, California Academy of Sciences, San Francisco; **FMNH**, Field Museum of Natural History, Chicago; **GWU**, George Washington University, Washington, D.C.; **NHMB**, Natural History Museum, Bern; **MHNG**, Natural History Museum

of Geneva; **MNHN**, Museum National d'Histoire Naturelle, Paris; and **MRAC**, Royal Museum of Central Africa, Tervuren.

## SYSTEMATICS

### *Silhouettella* Benoit, 1979

TYPE SPECIES: *Silhouettella curieusei* Benoit, 1979.

**DIAGNOSIS:** *Silhouettella* species are similar to those of *Pelcinus*, *Lionneta* Benoit, 1979, *Tolegnaro* Álvarez-Padilla et al., 2012, *Farqua* Saaristo, 2001, and some species of *Noideattella* by having eyes well developed occupying all or more than half of the cephalic area (figs. 1, 5, 17, 21) and the female receptaculum wider than long, associated to a globular apical process and lateral apodemes (A1, A2, A3 and GAp in figs. 7, 15, 8, 24). *Silhouettella* species differ from *Pelcinus* by having shorter legs, embolar lamellae without a sail-shaped expansion bordered proximally by a deep groove (Platnick et al., 2012: fig. 30; probably homologous to the dorsal lamella described here), and the female receptaculum rectangular instead of oval (figs. 16, 24, 31; Platnick et al., 2012: figs. 161, 196, 312). *Silhouettella* differs from *Farqua* by the absence of abdominal spots, abdomen completely covered by scuta, and the embolar lamellae bent 90° and subdivided at the apex (Saaristo, 2001: figs. 48A–B); from *Lionneta* by having the femora I and II prolateral surface without macrosetae and the embolus lamellae shorter (Saaristo, 2001: figs. 68–69). *Silhouettella* differs from *Tolegnaro* by the pedicel area without feathery scales (figs. 17, 77; Álvarez-Padilla et al., 2012: fig. 357) and from *Noideattella* by legs without macrosetae; except in *S. loricatula* (Roewer, 1942) (Simon, 1884: 345).

**SPECIES INCLUDED:** *S. curieusei* Benoit, 1979 (Seychelles), *S. betalfa* Saaristo, 2007 (Israel), *S. loricatula* (Roewer, 1942) (Europe to Central Asia, North Africa, Canary Islands), *S. osmaniye* Wunderlich, 2011 (Turkey), *S. tomer* Saaristo, 2007 (Israel), *S. usgutra* Saaristo and van Harten, 2002 (Socotra), *S. perismontes*, new species, and *S. perisalma*, new species (both from Madagascar).

### *Silhouettella curieusei*, Benoit, 1979

Figures 1–8, 48–63, 99

*Silhouettella curieusei* Benoit, 1979: 202, fig. 5D–H. Holotype male and female paratype from *Silhouette Island*, Mare aux Cochons, sur *Pandanus seychellarum*, Seycheles Archipelagous, 500 m (3–4 July 1972, Benoit, P.L.G. and Van Mol J.J.), deposited in MRAC 146.563, PBI\_OON 6264 (examined).

**DIAGNOSIS:** *S. curieusei* can be differentiated from *S. usgutra* species by larger eyes and the carapace smooth with its pars cephalica strongly elevated (Saaristo and van Harten, 2002: fig. 3). The species differs from *S. betalfa*, *S. osmaniye*, and *S. tomer* by lacking a lateral protuberance on the dorsal lamella middle section (Saaristo, 2007: “X” in figs. 93B, 99B; Topçu et al., 2012:

fig. 5). Unique characters for these species are: sternum microsculpture covering entire surface with a reticulated pattern (figs. 2, 50). Femora and tibiae basally half darkened with a wide band.

**DESCRIPTION:** *Male* (PBI\_OON 36153). Total length 1.2. **Cephalothorax:** Carapace orange-brown, without any pattern, broadly oval in dorsal view, anteriorly narrowed to between 0.5 and 0.75 times its maximum width, with rounded posterolateral corners, fovea absent (fig. 1), posterolateral edge with pair of pits, posterior margin not bulging below posterior rim, anterolateral corners without extension or projections, posterolateral surface without spikes, surface of elevated portion of pars cephalica smooth, sides smooth, thorax without depressions (figs. 3, 48), without radiating rows of pits; lateral margin straight, rebordered, with blunt denticles; plumose setae near posterior margin of pars thoracica absent (figs. 1, 49); nonmarginal pars cephalica setae light, needlelike, present in U-shaped row; nonmarginal pars thoracica setae light, needlelike. Clypeus margin slightly rebordered, straight in front view, vertical in lateral view, high, ALE separated from edge of carapace by their radius or more, median projection absent; setae present, light, needlelike. Eyes six, well developed, ALE, PME subequal, larger than PLE, all eyes oval; posterior eye row recurved from above, straight from front; ALE separated by their radius to diameter, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME radius (figs. 1, 3, 5). Sternum longer than wide, orange-brown, uniform, fused to carapace, median concavity absent, without radial furrows between coxae I-II, II-III, III-IV, radial furrow opposite coxae III absent, surface rugose, without pits, sickle-shaped structures absent, anterior margin with pair of deep lateral pouches, posterior margin not extending posteriorly of coxae IV, anterior corner unmodified, distance between coxae approximately equal, extensions of precoxal triangles absent, lateral margins unmodified, without posterior hump; setae sparse, light, needlelike, without hair tufts (fig. 2). Mouthparts: Chelicerae without teeth only denticles observable with SEM (fig. 51), endites and labium pale orange at the base tip lighter. Chelicerae straight, anterior face unmodified; fangs directed medially, shape normal, without prominent basal process; setae light, needlelike, evenly scattered; paturon inner margin with scattered setae, distal region unmodified, inner margin unmodified (figs. 54, 55, 59). Labium triangular, not fused to sternum, anterior margin indented at middle, same as sternum in sclerotization at the base tip lighter. Endites distally excavated, anteromedian tip unmodified, posteromedian part unmodified, same as sternum in sclerotization at the base tip lighter (figs. 2, 9). **Abdomen:** Ovoid, without long posterior extension, rounded posteriorly, interscutal membrane rows of small sclerotized platelets absent posteriorly; dorsum soft portions white, without color pattern. Book lung covers small, very narrow, without setae, anterolateral edge unmodified (figs. 2, 3). Posterior spiracles connected by groove (figs. 7, 8). Pedicel tube short, ribbed, scutopedicel region unmodified, scutum not extending far dorsal of pedicel, plumose hairs absent, matted setae on anterior ventral abdomen in pedicel area absent (fig. 3). Dorsal scutum strongly sclerotized, pale orange, without color pattern, covering full length of abdomen, no soft tissue visible from above, not fused to epigastric scutum, middle surface smooth, sides smooth, anterior half without projecting denticles. Epigastric scutum strongly sclerotized, surrounding pedicel, not protruding, small lateral sclerites absent. Postepigastric scutum

strongly sclerotized, pale orange, long, semicircular, covering nearly full length of abdominal length, fused to epigastric scutum, anterior margin unmodified, without posteriorly directed lateral apodemes (figs. 1–3). Spinneret scutum present, incomplete ring. Dorsum setae present, light, needlelike. Epigastric area setae uniform, light, needlelike. Postepigastric area setae present, dark, needlelike. Spinneret scutum with fringe of needlelike setae. Dense patch of setae anterior to spinnerets absent. Interscutal membrane with setae. **Legs:** Femur IV not thickened, same size as femora I–III, patella plus tibia I shorter than carapace, tibia IV specialized hairs on ventral apex absent, tibia IV ventral scopula absent, metatarsi III and IV weak ventral scopula absent. Leg spines absent. Trichobothria tibia: I three; metatarsus: I one. **Genitalia:** Epigastric region with sperm pore small, oval, situated at level of anterior spiracles, rebordered; furrow without  $\Omega$ -shaped insertions, without setae (figs. 2, 52). Palp normal size, not strongly sclerotized, right and left palps symmetrical, proximal segments yellow; embolus light; femur normal size, two or more times as long as trochanter, without posteriorly rounded lateral dilation, attaching to patella basally; patella shorter than femur, not enlarged; cymbium yellow, narrow in dorsal view, not fused with bulb, not extending beyond distal tip of bulb, without stout setae; bulb yellow, 1 to 1.5 times as long as cymbium, stout, spherical (figs. 2, 4–6). Embolus conformed by two lamellae bent approximately  $90^\circ$ , both lamellae with several terminal apophysis, dorsal lamella usually with two apophysis (figs. 4, 6), ventral lamella with variable number. Male genitalia embolar lamellae as in figures 60–63.

*Female:* (PBI\_OON 36133) as in male except as noted. Total length 1.3. As in male except as noted. **Cephalothorax:** Female palp spines absent. Sternum anterior margin unmodified. Endites distally not excavated (fig. 54). Female palp spines absent; tarsus unmodified. **Abdomen:** Postepigastric scutum not fused to epigastric scutum (fig. 53). Supraanal scutum present. **Genitalia:** Receptaculum wider than long. Receptaculum A1 apodemes bearing anterior and posterior extensions. A1 anterior extension aligned with apodemes A2, A1 posterior extension aligned laterally with apodemes A3. Globular appendix (GAp) of variable shape extends dorsally from receptaculum middle anterior surface, GAp aligned with T-shaped sclerite (ASc). ASc originates from posterior end of epigastric scutum. Receptaculum dorsal papillae covering at least 1/3 of its surface and visible through light microscopy. Female genitalia as in figures 7–8 and 56–58. Female genitalia as in figures 7–8 and 56–58.

**DISTRIBUTION:** Seychelles and Madagascar (fig. 99).

**MATERIAL EXAMINED:**  $N = 24$ . **Seychelles:** *Silhouette Island:* Mare aux Cochons, sur *Pandanus seychellarum*, 500 m, July 03, 1972 to July 04, 1972, Benoit, P.L.G. and Van Mol, J.J., 12♂, 4♀, 16 mixed paratypes (MRAC 143.130, PBI\_OON 36153); 1♂ paratype (MRAC 144.645, PBI\_OON 36150); Mt. Daub an versant Est., 600 m, 5–7 July, 1972, Benoit, P.L.G. and Van Mol, J.J., 2♀ paratypes (MRAC 143.199 PBI\_OON 36172). La Digue Mt. 300 m, 28–31 July 1972, Benoit, P.L.G. and Van Mol, J.J., 2♀, 3♂ paratypes (MRAC 143.217 PBI\_OON 36152); Mont Corgat, on ridge toward, sifting forest litter, 445 m,  $4^\circ 29' 43''\text{S}$ ,  $55^\circ 14' 22''\text{E}$ , Jan. 28–30, 2010, B.L. Fisher, 27♂, 22♀ (CASC PBI\_OON 35470); Mont Corgat to Mont Cocos Marrons, along ridge, sifting forest litter, 455 m,  $4^\circ 30' 5''\text{S}$ ,  $55^\circ 14' 23''\text{E}$ , Jan. 24–26, 2010, B.L. Fisher, 6♂, 1♀ (CASC PBI\_OON 35470). *Curieuse Island:* Curieuse Centre, 27 July 1972, Benoit, P.L.G. and Van Mol, J.J., 1♂ paratype (MRAC 143.152 PBI\_OON 36151). *Praslin Island:* Vallée

de Mai, 4°19'52"S, 55°44'20"E, 200 m, sifting litter in palm forest, Feb. 2–3, 2010, B.L. Fisher, 6♂, 1♀ (CASC PBI\_OON 35452).

*Silhouettella perisalma*, new species

Figures 9–16, 47, 74–81, 100

**TYPES:** Male holotype and female allotype from Berlese and sifted leaf litter of a tropical dry forest at an elevation of 210 m, Reserve d'Ankoririka, 10.6 km 13° NE de Tsaramandroso, 24°55'48"S, 46°38'44"E, Mahajanga Province, Madagascar (9–14 April 2001, Fisher et al.), deposited in CASC (PBI\_OON 36175).

**ETYMOLOGY:** The species epithet, a noun in apposition, is dedicated to the first author's dear friends Alejandro Peris and Alma Garza.

**DIAGNOSIS:** *S. perisalma* can be differentiated from *S. curieusei*, *S. osmaniye*, and *S. usgutra* by the yellow and smooth carapace (figs. 9, 11; Saaristo and van Harten, 2002: figs. 15, 16; Topçu et al., 2012). This species differs from *S. tomer* by the eye arrangement (Saaristo, 2007: fig. 101), from *S. betalfa* by the book lung covers round and less than ¼ of posterior spiracles groove length (figs. 10, 11; Saaristo, 2007: fig. 96). Unique diagnostic features include male embolar dorsal lamella with a sclerotized triangular prolateral notch (figs. 78, 10, 47 arrows).

**DESCRIPTION:** *Male* (PBI\_OON 3262). Total length 1.3. **Cephalothorax:** Carapace pale orange or yellow brown, pars cephalica flat in lateral view, posterolateral edge without pits (figs. 9, 11, 64, 65). Sternum pale orange, surface smooth, microsculpture absent, anterior margin unmodified (figs. 10, 66). Mouthparts: paturon inner margin and dorsal surface with scattered setae (figs. 69, 70, 76). Eyes six, well developed, ALE, PME subequal, larger than PLE, all eyes oval; posterior eye row recurved from above, straight from front; ALE separated by their radius to diameter, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME radius (figs. 9, 11, 13). Endites distally excavated, anteromedian tip unmodified, posteromedian part unmodified, same as sternum in sclerotization (figs. 10, 69). Pedicel tube short, ribbed, scutopedicel region unmodified, scutum not extending far dorsal of pedicel, plumose hairs absent, matted setae on anterior ventral abdomen in pedicel area absent (figs. 11, 77). **Abdomen:** Ovoid. Book lung covers round. Postepigastric area setae light. **Legs:** Pale orange, without color pattern. Leg spines absent. Tarsi I to IV superior claws tooth not examined in detail. Trichobothria examined with SEM. Tibia with three trichobothria, two distal and one basal, membrane grade shaped (figs. 63, 68). **Genitalia:** Epigastric region with sperm pore small, oval, situated at level of anterior spiracles, rebordered; furrow without Ω-shaped insertions, without setae (figs. 10, 71). Palp proximal segments pale orange; cymbium pale orange (figs. 10, 13). Embolus dorsal lamella bifurcated (figs. 12, 14), ventral lamella with two or three apophyses (figs. 78–81).

*Female:* (PBI\_OON 3262). Total length 1.4. As in male except as noted. **Cephalothorax:** Endites distally not excavated (fig. 70). Female palp spines absent. **Abdomen:** Postepigastric scutum not fused to epigastric scutum (fig. 72). **Legs:** Tarsi I to IV superior claws tooth not examined in detail. Trichobothria examined with SEM. Tibia: I three two distal one ¼ of the base (figs. 67, 68); metatarsus: I one; base longitudinally narrowed, aperture internal texture



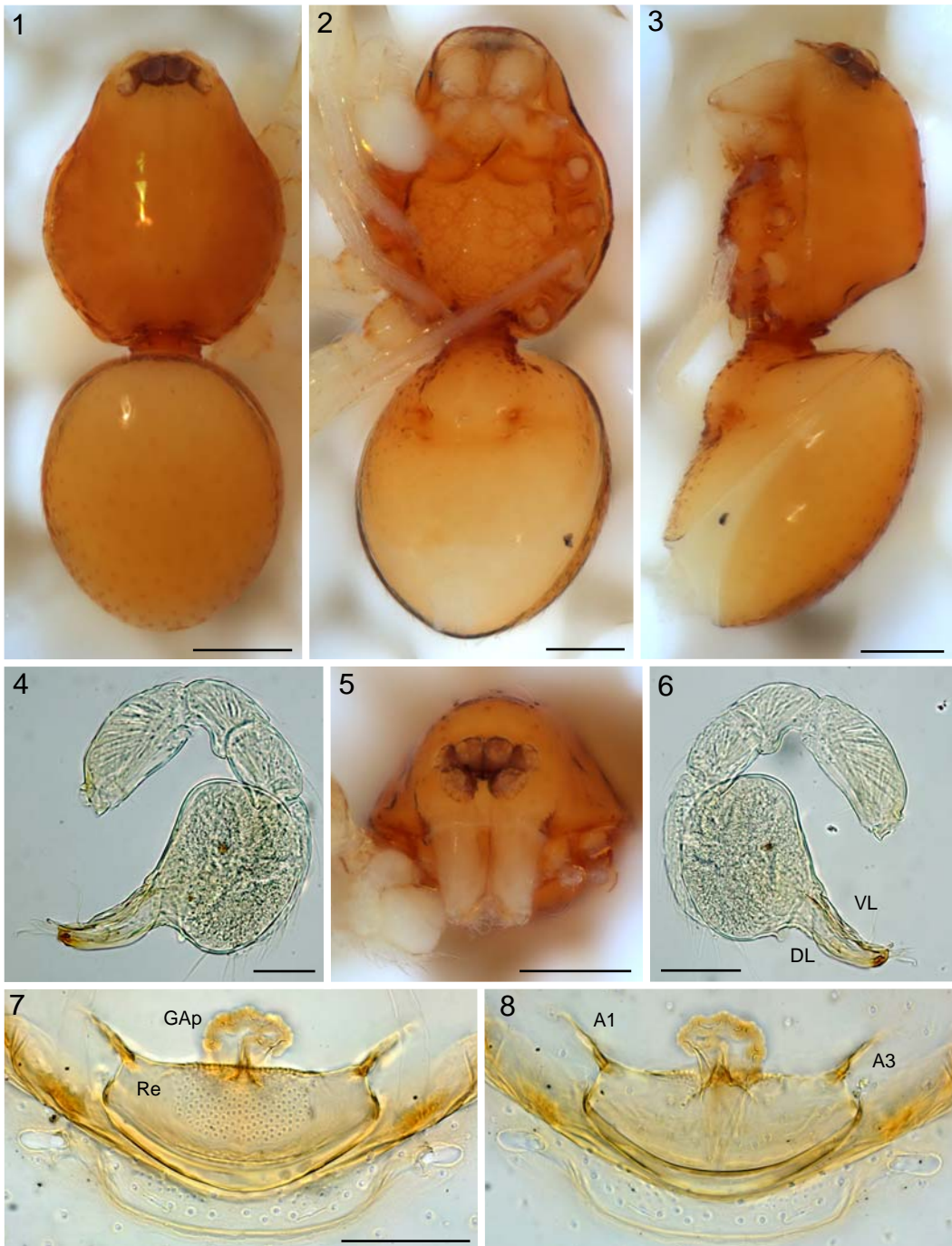
gratelike, hood covered by numerous low, closely spaced ridges (fig. 68). Tarsal organ one with four sensilla visible (fig. 75), tarsal organ four with three. **Genitalia:** Receptaculum length approximately  $\frac{1}{2}$  of its width (figs. 15, 16, 73) Papillae field examined with SEM and concentrated in the center of the receptaculum (figs. 73, 74). Female genitalia as in figures 15–16 and 73.

**DISTRIBUTION:** Endemic to Madagascar (fig. 100).

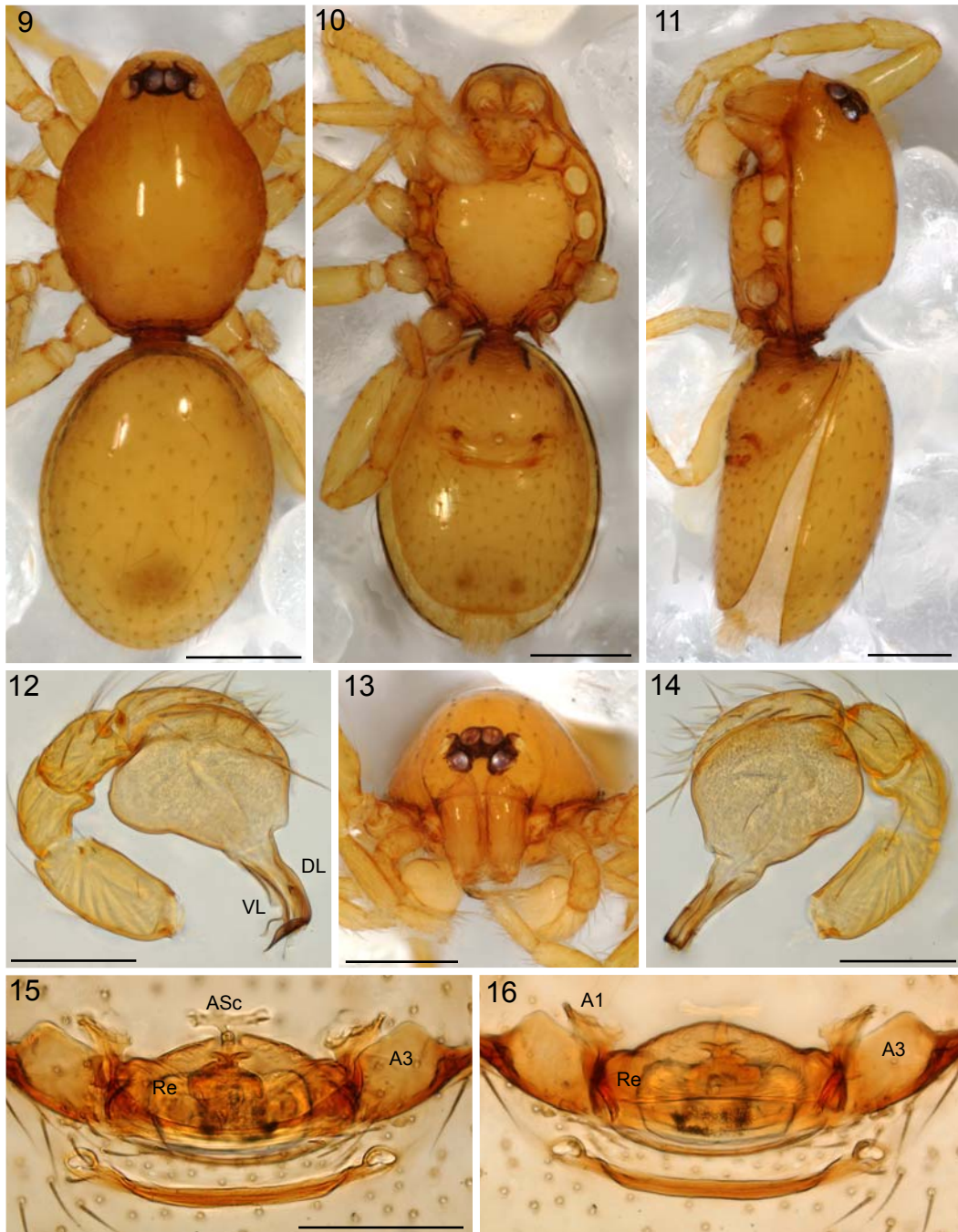
**VARIATIONS:** Body color varies from pale orange to yellow brown in some specimens from Ankarana National Park. Three specimens have distorted eyes.

**MATERIAL EXAMINED:**  $N = 2139$ . **Madagascar** *Antsiranana*: Forêt Ambato, 26.6 km 33° NE Ambanja, rainforest, sifted litter, 150 m, 13°27'52"S, 48°33'6"E, Dec. 08, 2004, B.L. Fisher, 12♂, 15♀, 27 mixed (CASC PBI\_OON 36101); Forêt d'Analabe, 30.0 km 72° ENE Daraina, littoral forest, 30 m, -13.08333°, 49.90833°, Nov. 27, 2003, B.L. Fisher et al., 2♂, 7♀, 9 mixed (CASC PBI\_OON 3867); Forêt d'Bekaraoka, 6.8 km 60° ENE Daraina, tropical dry forest, 150 m, -13.00277°, 49.01166°, Dec. 07, 2003, B.L. Fisher et al., 1♀ (CASC PBI\_OON 3906); Forêt d'Ampombofofo, littoral forest, 25 m, -12.09944°, 49.33861°, Nov. 21, 2007 to Nov. 22, 2007, B.L. Fisher et al., 4♂ (CASC PBI\_OON 36110); Forêt d'Antsahabe, 11.4 km 275° W Daraina, tropical dry forest, 550 m, -13.00333°, 49.00916°, Dec. 12, 2003, B.L. Fisher et al., 1♂, 2♀, 3 mixed (CASC PBI\_OON 3328); Forêt d'Orangea, 3.6 km 128° SE Ramena, littoral forest, 90 m, -12.25888°, 49.37472°, Feb. 22, 2001 to Feb. 28, 2001, Fisher, Griswold et al., 78♂, 67♀, 149 mixed (CASC PBI\_OON 3893); Forêt d'Binara, 7.5 km 230° SW Daraina, tropical dry forest, 375 m, -13.25500°, 49.61666°, Dec. 01, 2003, B.L. Fisher et al., 1♀ (CASC PBI\_OON 3879); Forêt di'Andavakoera, 21.4 km 356° N Betsiaka, rainforest, 425 m, -13.00194°, 49.00361°, Dec. 15, 2003, B.L. Fisher, 4♂, 9♀, 13 mixed (CASC PBI\_OON 3334); Montagne des Français 7.2 km 142° SE Antsiranana (= Diego Suarez), littoral forest, 180 m, -12.32277°, 49.33805°, Feb. 22, 2001 to Feb. 28, 2001, Fisher et al., 4♂, 2♀, 6 mixed (CASC PBI\_OON 3888); Nosy Be, Reserve Naturelle Integrale de Lokobe, 6.3 km 112° ESE Hellville, rainforest, 30 m, -13.41944°, 48.33111°, Mar. 19, 2001 to Mar. 24, 2001, Fisher, Griswold, et al., 1♀ (CASC PBI\_OON 3895); Reserve Spéciale d'Ambre, 3.5 km 235° SW Sakaramy, tropical dry forest, 325 m, -12.46888°, 49.24222°, Jan. 26, 2001 to Jan. 31, 2001, Fisher-Griswold Arthropod Team, ♂, ♀, 9 mixed (CASC PBI\_OON 3330); Reserve Spéciale d'Ankarana, 22.9 km 224° SW Anivorano Nord, tropical dry forest, 80 m, -12.90888°, 49.10972°, Feb. 10, 2001 to Feb. 16, 2001, Fisher et al., ♂, ♀, 16 mixed (CASC PBI\_OON 3881); Reserve Spéciale Manongarivo: 10.8 km 229° SW Antanambao, rainforest, 400 m, -13.96166°, 48.43333°, Nov. 08, 1998, B.L. Fisher, ♂, ♀, 45 mixed (CASC PBI\_OON 36243). *Fianarantsoa*: Forêt d'Analalava, 29.6 km 280° W Ranohira, tropical dry forest, 700 m, -22.59166°, 45.12833°, Feb. 01, 2003 to Feb. 05, 2003, Fisher et al., 4♂, 6♀, 10 mixed (CASC PBI\_OON 3346); Parc National d'Isalo, 9.1 km 354° N Ranohira, gallery forest, 725 m, -22.48166°, 45.46166°, Jan. 27, 2003 to Jan. 31, 2003, Fisher et al., 1♀ (CASC PBI\_OON 3353). Parc National Ranomafana, 983 m, -21.26281°, 47.42031°, Apr. 23, 2011. L.S. Rahanitriniaina and R. Raveloson, ♂, ♀, 6 mixed (MHNG PBI\_OON\_0032470). *Mahajanga*: Forêt d'Ambohimanga, 26.1 km 314° Mampikony, tropical dry forest, 250 m, -15.96277°, 47.43805°, Dec. 13, 2004, B.L. Fisher, 78♂, 76♀, 154 mixed (CASC PBI\_OON 36100); 15♂, 23♀, 38 mixed (CASC PBI\_OON 36105); Forêt de Tsimembo, 8.7km 336° NNW Soatana, tropical dry forest, 20 m, -19.02138°, 44.44055°, Nov. 21, 2001 to Nov. 25, 2001, B.L. Fisher et al., 4♂, 9♀, 13 mixed (CASC PBI\_OON 3896); Parc National d'Ankarafantsika, 40 km 306° NW Andranofasika, tropical dry forest, 130 m, -16.32083°, 46.81055°, Mar. 26, 2001 to Apr. 01, 2001, Fisher et al., 36♂, 29♀, 65 mixed (CASC PBI\_OON 2765); 1♀ (CASC PBI\_OON 3904); Parc National d'Ankarafantsika, Ampijoroa Station Forestiere, 5.4 km 331° NW Andranofasika, tropical dry forest, 70 m, -16.29888°, 46.81305°, Mar. 26, 2001 to Apr. 01, 2001, Fisher et al., 38♂, 50♀ (CASC PBI\_OON 3894); Parc National d'Ankarafantsika, Forêt

d'Tsimaloto, 18.3 km 46° NE Tsaramandroso, tropical dry forest, 135 m, -16.22805°, 46.14361°, Apr. 02, 2001 to Apr. 08, 2001, Fisher, Griswold et al., 1 ♂ (CASC PBI\_OON 3900); Parc National Ankarafantsika, 61-140 m, -21.26281° 47.42031° Apr. 14-25, 2011, L.S. Rahanitriniaina and R. Raveloson, ♂, ♀, 22 mixed Syntypes (MHNG PBI\_OON\_0032431); ♂, ♀, 37 mixed (MHNG PBI\_OON\_0032384); ♂, ♀, 21 mixed (MHNG PBI\_OON\_0032418); ♂, ♀, 15 mixed (MHNG PBI\_OON\_0032435); ♂, ♀, 9 mixed (MHNG PBI\_OON\_0032460); ♂, ♀, 62 mixed (MHNG PBI\_OON\_0032450); ♂, ♀, 10 mixed (MHNG PBI\_OON\_0032445); 3 ♀ (MHNG PBI\_OON\_0035744); ♂, ♀, 16 mixed (MHNG PBI\_OON\_0032455); 1 ♀ (MHNG PBI\_OON\_0006321); ♂, ♀, 15 mixed (MHNG PBI\_OON\_0032462); ♂, ♀, 76 mixed (MHNG PBI\_OON\_0032414); ♂, ♀, 41 mixed (MHNG PBI\_OON\_0032422); ♂, ♀, 28 mixed (MHNG PBI\_OON\_0032437); ♂, ♀, 9 mixed (MHNG PBI\_OON\_0032466); ♂, ♀, 30 mixed (MHNG PBI\_OON\_0032403); ♂, ♀, 6 mixed (MHNG PBI\_OON\_0032470); ♂, ♀, 5 mixed (MHNG PBI\_OON\_0032387); 1 ♂ (MHNG PBI\_OON\_0032461); 1 ♀ (MHNG PBI\_OON\_0035747); Parc National de Baie de Baly, 12.4 km 337° NNW Soalala, tropical dry forest, 10 m, -16.01000°, 45.26500°, Nov. 26, 2002 to Nov. 30, 2002, Fisher et al., 24 ♂, 14 ♀, 38 mixed (CASC PBI\_OON 3356); Parc National de Namoroka, 16.9 km 317° NW Vilanandro, tropical dry forest, 100 m, -16.40666°, 45.31000°, Nov. 12, 2002 to Nov. 16, 2002, Griswold et al., 14 ♂, 11 ♀, 25 mixed (CASC PBI\_OON 2014); 1 ♂ (CASC PBI\_OON 3339); 3 ♂, 2 ♀, 5 mixed (CASC PBI\_OON 3352); Parc National d'Namoroka, 17.8 km 329° WNW Vilanandro, tropical dry forest, 100 m, -16.37666°, 45.32666°, Nov. 08, 2002 to Nov. 12, 2002, Griswold et al., 1 ♂ (CASC PBI\_OON 3332); 52 ♂, ♀, 486 mixed (CASC PBI\_OON 3857); Parc National d'Namoroka, 9.8 km 300° WNW Vilanandro, tropical dry forest, 140 m, -16.46666°, 45.35000°, Nov. 04, 2002 to Nov. 08, 2002, C. Griswold et al., 2 ♂, 5 ♀, 7 mixed (CASC PBI\_OON 3868); Parc National Tsingy d'Bemaraha, 10.6 km 123° ESE Antsalova, tropical dry forest, 150 m, -19.70944°, 44.71805°, Nov. 16, 2001 to Nov. 20, 2001, B.L. Fisher et al., 12 ♂, 22 ♀, 34 mixed (CASC PBI\_OON 3853); 1 ♂, 1 ♀, 2 mixed (CASC PBI\_OON 3873); Parc National Tsingy d'Bemaraha, 2.5 km 62° ENE Bekopaka, Ankidrodra River, tropical dry forest, 100 m, -19.13222°, 44.81472°, Nov. 11, 2001 to Nov. 15, 2001, B.L. Fisher et al., 9 ♂, 14 ♀, 23 mixed (CASC PBI\_OON 3854); Parc National Ankarafantsika, 27.51 km SSE Marovoay, secondary tropical forest, 126 m, -16.31000°, 46.82305°, Jan. 27, 2009, D. Andriamalala, C. Griswold, G. Hormiga, A. Saucedo, N. Scharff, and H. Wood, 1 ♂, 1 ♀, 2 mixed (GWU PBI\_OON 35155); 1 ♂, 1 ♀, 2 mixed (GWU PBI\_OON 35158); 1 ♂ (GWU PBI\_OON 34350); Reserve d'Ankoririka, 10.6 km 13° NE de Tsaramandroso, tropical dry forest, 210 m, -16.26722°, 46.04861°, Apr. 09, 2001 to Apr. 14, 2001, Fisher et al., 123 ♂, 165 ♀, 90 mixed (CASC PBI\_OON 3262). Reserve Forestière Beanka 52.7 km E of Maintirano, tropical dry forest, 300 m, -18.06222°, 44.52583°, Oct. 22, 2009 to Oct. 24, 2009, B.L. Fisher et al., 1 ♂ (CASC PBI\_OON 36111); 4 ♂, 1 ♀, 5 mixed (CASC PBI\_OON 36127); 1 ♂, 1 ♀, 2 mixed (CASC PBI\_OON 36118), 2 ♀ (MNHN PBI\_OON 36085), 1 ♂ (MNHN PBI\_OON 36157). *Toliara*: 2.7 km 302° WNW Ste. Luce, littoral forest, 20 m, -24.77166°, 47.17166°, Dec. 09, 1998 to Dec. 11, 1998, B.L. Fisher, 17 ♂, 4 ♀, 21 mixed (CASC PBI\_OON 3245); Antafoky, gallery forest, 60 m, -23.47916°, 44.06611°, Jan. 26, 2002, Frontier Project, 2 ♂, 3 ♀, 5 mixed (CASC PBI\_OON 3858); Beza-Mahafaly, 27 km E Betioky, rainforest, 135 m, -23.65000°, 44.63333°, Apr. 23, 1997, B.L. Fisher, 39 ♂, 25 ♀, 64 mixed (CASC PBI\_OON 3869); Vohibasias Forest, 59 km NE Sakaraha, tropical dry forest, 780 m, -22.46666°, 41.83333°, Jan. 13, 1996, B.L. Fisher, 3 ♂, 3 ♀, 6 mixed (CASC PBI\_OON 36394); Fiherenana, degraded gallery forest, 100 m, -23.17694°, 43.96083°, Dec. 01, 2002 to Dec. 04, 2002, Frontier Project, 1 ♂ (CASC PBI\_OON 3298), 1 ♂ (CASC PBI\_OON 3319); Forêt d'Beroboka, 5.9 km 131° SE Ankidranoka, tropical dry forest, 80 m, -22.23305°, 43.36638°, Mar. 12, 2002 to Mar. 16, 2002, B.L. Fisher et al., 1 ♂, 1 ♀, 2 mixed (CASC PBI\_OON 3355); Forêt d'Kirindy, 15.5 km 64° ENE Marofandilia, tropical dry forest, 100 m, -20.04500°, 44.66222°, Nov. 28, 2001 to Dec. 03, 2001, B.L. Fisher et al., 2 ♂, 2 ♀ 4 mixed (CASC PBI\_



FIGURES 1–8. *Silhouettella curiusei* Benoit, 1979. 1. Habitus male, dorsal view. 2. Same, ventral view. 3. Same, lateral view. 4. Palp male, pro-lateral view. 5. Cephalothorax male, anterior view. 6. Palp male, retro-lateral view. 7. Genitalia female, dorsal view. 8. Genitalia female, ventral view. Scale bars = 0.2 mm, except genitalia: 0.1 mm.



FIGURES 9–16. *Silhouettella perisalma* new species. **9.** Habitus male, dorsal view. **10.** Same, ventral view. **11.** Same, lateral view. **12.** Palp male, prolateral view. **13.** Cephalothorax male, anterior view. **14.** Palp male, retrolateral view. **15.** Genitalia female, dorsal view. **16.** Genitalia female, ventral view. Scale bars = 0.2 mm, except genitalia: 0.1 mm.

OON 3901); 28♂, 52♀, 80 mixed (CASC PBI\_OON 3905); Forêt d'Mahavelo, Isantoria River, 5.5 km 37° NE Ifotaka, spiny forest thicket, 115 m, -24.75361°, 46.15138°, Jan. 31, 2002, B.L. Fisher et al., 1♀ (CASC PBI\_OON 3246); 1♂ (CASC PBI\_OON 3851); Forêt d'Mite, 20.7 km 29° WNW Tongobory, Gallery forest, 75 m, -23.52416°, 44.12138°, Feb. 27, 2002 to Mar. 03, 2002, B.L. Fisher et al., 23♂, 27♀, 50 mixed (CASC PBI\_OON 3865); Forêt d'Tsinjoriaky, 6.2 km 84° E Tsifota, spiny forest thicket, 70 m, -22.80222°, 43.42055°, Mar. 06, 2002 to Mar. 10, 2002, B.L. Fisher et al., 25♂, 9♀, 34 mixed (CASC PBI\_OON 3324); Mahafaly Plateau, 6.2 km 74° ENE Itampolo, spiny forest thicket, 80 m, -24.65361°, 43.99666°, Feb. 21, 2002 to Feb. 25, 2002, B.L. Fisher et al., 3♂ (CASC PBI\_OON 3329); 11♂, 7♀, 18 mixed (CASC PBI\_OON 3877); Manderano, spiny forest thicket, 80 m, -23.52333°, 44.09444°, June 08, 2002, Frontier Project, 3♂, 5♀ 8 mixed (CASC PBI\_OON 3320); Manderano, Gallery forest, 75 m, -23.52416°, 44.09277°, May 29, 2002, Frontier Project, 5♂, 3♀ 8 mixed (CASC PBI\_OON 3321); Manderano, gallery forest, 70 m, -23.52722°, 44.08750°, May 10, 2002, Frontier Project, 1♂, 2♀, 3 mixed (CASC PBI\_OON 3350); Manombo, dry forest, 227 m, -22.80250°, 43.76500°, May 09, 2004 to May 21, 2004, Frontier Project, 2♀ (CASC PBI\_OON 3318); Manombo, gallery forest, 177 m, -22.81083°, 43.73444°, Apr. 30, 2004 to May 02, 2004, Frontier Project, 3♀ (CASC PBI\_OON 3450); Manombo, gallery forest, 165 m, -22.81222°, 43.73944°, May 22, 2004 to May 24, 2004, Frontier Project, 5♂, 10♀ 15 mixed (CASC PBI\_OON 3456); Parc National d'Andohahela, Forêt d'Ambobihory, 1.7 km 61° ENE Tsimelahy, 36.1 km 308° NW Tolagnaro, tropical dry forest, 300 m, -24.93000°, 46.64555°, Jan. 16, 2002 to Jan. 20, 2002, B.L. Fisher et al., 4♀ (CASC PBI\_OON 3855); Parc National d'Andohahela, Forêt d'Manantalinjo, 33.6 km 63° ENE Amboasary, 7.6 km 99° E Hazofotsy, spiny forest thicket, 150 m, -24.81694°, 46.61000°, Jan. 12, 2002 to Jan. 16, 2002, B.L. Fisher et al., 4♂, 5♀, 10 mixed (CASC PBI\_OON 3872); Parc National d'Kirindy Mite, 16.3 km 127° SE Belo sur Mer, tropical dry forest, 80 m, -20.79527°, 44.14694°, Dec. 06, 2001 to Dec. 10, 2001, B.L. Fisher et al., 41♂, 22♀, 63 mixed (CASC PBI\_OON 3358); Parc National d'Tsimanampetsotsa, 6.7 km 130° SE Efoetse, 23 km 175° S Beheloka, spiny forest thicket, 25 m, -24.10055°, 43.76000°, Mar. 18, 2002 to Mar. 22, 2002, B.L. Fisher et al., 4♂, 3♀, 7 mixed (CASC PBI\_OON 3341); 12♂, 16♀, 28 mixed (CASC PBI\_OON 3884); Parc National d'Tsimanampetsotsa, Forêt d'Bemanateza, 20.7 km 81° E Efoetse, 23.0 km 131° SE Beheloka, spiny forest thicket, 90 m, -23.99222°, 43.88055°, Mar. 22, 2002 to Mar. 26, 2002, B.L. Fisher et al., 12♂, 5♀, 17 mixed (CASC PBI\_OON 3902); Parc National d'Zombitse, 19.8 km 84° E Sakaraha, dry forest on sandy soil, 770 m, -22.84333°, 44.71000°, Feb. 05, 2003 to Feb. 09, 2003, Fisher, Griswold et al., 7♂ (CASC PBI\_OON 36244); Ranobe, spiny forest thicket, 30 m, -23.03944°, 43.61027°, Jan. 05, 2003 to Jan. 28, 2003, Frontier Project, 3♂, 1♀, 4 mixed (CASC PBI\_OON 3314); Ranobe, spiny forest thicket, 30 m, -23.03944°, 43.61027°, Feb. 17, 2003 to Feb. 21, 2003, Frontier Project, 3♂, 2♀, 5 mixed (CASC PBI\_OON 3315); Ranobe, spiny forest thicket, 30 m, -23.03944°, 43.61027°, Apr. 25, 2003 to Apr. 28, 2003, Frontier Project, 10♂, 3♀, 13 mixed (CASC PBI\_OON 3316); Ranobe, riparian forest, 20 m, -23.04638°, 43.61028°, May 17, 2003 to May 21, 2003, Frontier Project, 2♂, 2♀ 4 mixed (CASC PBI\_OON 3317); Ranobe, spiny forest thicket, 30 m, -23.03944°, 43.61027°, Feb. 05, 2003 to Feb. 09, 2003, Frontier Project, 1♂, 2♀, 3 mixed (CASC PBI\_OON 3875); Reserve Spéciale de Cap Sainte Marie, 12.3 km 262° W Marovato, spiny forest thicket, 200 m, -25.58166°, 45.16833°, Feb. 11, 2002 to Feb. 15, 2002, B.L. Fisher et al., 2♀ (CASC PBI\_OON 3333); 9♂, 3♀, 12 mixed (CASC PBI\_OON 3336); Reserve Spéciale de Cap Sainte Marie, 14.9 km 261° W Marovato, spiny forest thicket, 160 m, -25.59444°, 45.14694°, Feb. 13, 2002 to Feb. 19, 2002, B.L. Fisher et al., 4♂, 5♀, 9 mixed (CASC PBI\_OON 3886); Sept Lacs, Gallery forest, 80 m, -23.52833°, 44.15555°, Mar. 08, 2002, Frontier Project, 2♂, 3♀, 5 mixed (CASC PBI\_OON 3323); Sept Lacs, spiny thicket gallery forest transition, 130 m, -23.52083°, 44.14305°, Aug. 20, 2002, Frontier Project, 8♂, 10♀, 18 mixed (CASC PBI\_OON 3856); Sept Lacs, spiny thicket gallery forest transition,

160 m, -23.52472°, 44.15916°, Mar. 10, 2002, Frontier Project, 5 ♂, 2 ♀, 7 mixed (CASC PBI\_OON 3870); Reserve Spéciale Beza Mahafaly 26.19 km ENE Betioky, Gallery forest, 147 m, -23.65500°, 44.63277°, Jan. 18, 2009, D. Andriamalala, C. Griswold, G. Hormiga, A. Saucedo, N. Scharff, and H. Wood, 1 ♂ (GWU PBI\_OON 35146).

*Silhouettella perismontes*, new species

Figures 17–24, 41, 42, 99

**TYPES:** Male holotype and female allotype from Berlese and sifted leaf litter of a tropical dry forest at an elevation of 300 m, Parc National d'Andohahela, Forêt d'Ambohibory, 1.7 km 61° ENE Tsimelahy, 36.1 km 308° NW Tolagnaro, 24°55'48"S, 46°38'44"E, Toliara Province, Madagascar (16–20 June 2002, B.L. Fisher et al.), deposited in CASC (PBI\_OON 36176).

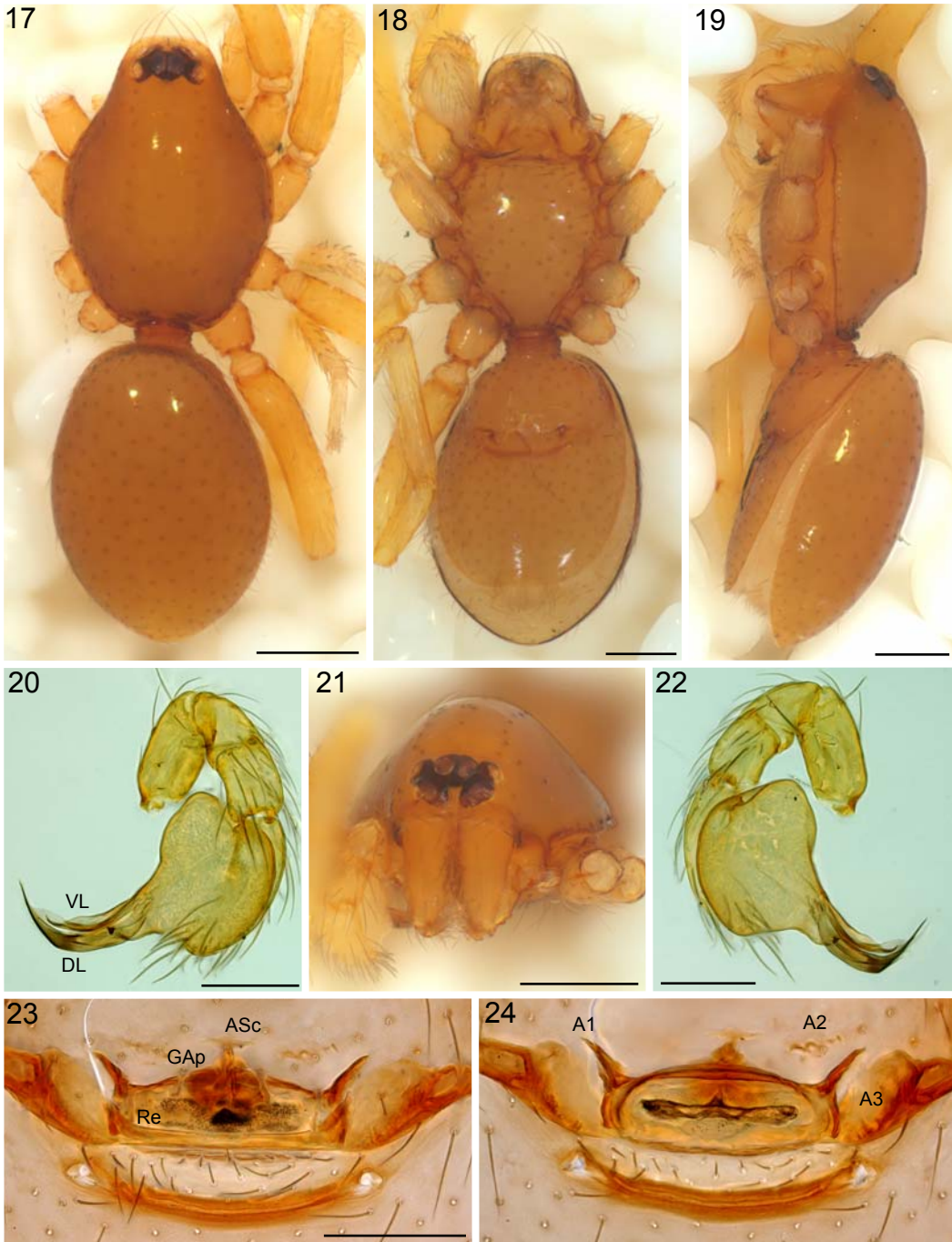
**ETYMOLOGY:** The species epithet, a noun in apposition, is dedicated to first author's dear friends Fernando Peris and Adriana Montes.

**DIAGNOSIS:** *S. perismontes* can be differentiated from *S. curieusei* and *S. perisalma* by the body color and legs pale orange (figs. 1–3, 9–11, 17–19); from *S. betalfa*, *S. osmaniye*, and *S. tomer* by lacking a lateral protuberance on the dorsal lamella middle section (Saaristo, 2007: "X" in figs. 93B, 99B; Topçu et al., 2012: fig. 5). Unique diagnostic features include male embolus, dorsal and ventral lamella teeth or coils absent and bent at a right angle (figs. 20, 22).

**DESCRIPTION:** *Male* (PBI\_OON 36235). Total length 1.35. **Cephalothorax:** Carapace pale orange, pars cephalica flat in lateral view, posterolateral edge without pits. Sternum pale orange, surface smooth, microsculpture absent, anterior margin unmodified. Mouthparts: paturon inner margin with brush (figs. 17–19). Eyes six, well developed, ALE, PME subequal, larger than PLE, all eyes oval; posterior eye row recurved from above, straight from front; ALE separated by their radius to diameter, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME radius (figs. 17, 21). Endites distally excavated, anteromedian tip unmodified, postero-medial part unmodified, same as sternum in sclerotization. Pedicel tube short, ribbed, scutopedicel region unmodified, scutum not extending far dorsal of pedicel, plumose hairs absent, matted setae on anterior ventral abdomen in pedicel area absent (fig. 17). **Abdomen:** Cylindrical. Book lung covers elliptical large almost half receptaculum length (figs. 18, 41). Postepigastric area setae light. **Legs:** Pale orange, without color pattern. Leg spines absent (fig. 42). Tarsi I to IV superior claws tooth not examined in detail. Trichobothria not examined. **Genitalia:** Palp proximal segments pale orange (figs. 20, 22); tibia trichobothria not examined; cymbium pale orange. Embolic lamellae not examined with SEM. Palp as in figures 20 and 22.

*Female:* (PBI\_OON 3558). Total length 1.7. As in male except as noted. **Cephalothorax:** Female palp spines absent. **Abdomen:** Postepigastric scutum not fused to epigastric scutum (fig. 41). **Legs:** Tarsi I to IV superior claws tooth not examined in detail. Trichobothria not examined. **Genitalia:** Receptaculum length approximately 1/3 of its width. Papillae field visible with light microscopy as disperse black dots. Female genitalia as in figures 23 and 24.

**DISTRIBUTION:** Endemic to Madagascar (fig. 99).



FIGURES 17–24. *Silhouettella perismontes* new species. 17. Habitus male, dorsal view. 18. Same, ventral view. 19. Same, lateral view. 20. Palp male, prolateral view. 21. Cephalothorax male, anterior view. 22. Palp male, retrolateral view. 23. Genitalia female, dorsal view. 24. Genitalia female, ventral view. Scale bars = 0.2 mm, except genitalia: 0.1 mm.

**MATERIAL EXAMINED:**  $N = 10$ . **MADAGASCAR:** *Toliara*: Parc National d'Andohahela, Forêt d'Ambohibory, 1.7 km 61° ENE Tsimelahy, 36.1 km 308° NW Tolagnaro, tropical dry forest, 300 m, -24.93000°, 46.64555°, Jan. 16, 2002 to Jan. 20, 2002, B.L. Fisher et al., 2 ♀ Paratype (CASC PBI\_OON 3558); 2 ♂, 4 ♀, 8 mixed (CASC PBI\_OON 36235).

*Noideattella* Álvarez-Padilla, Ubick and Griswold, 2012

**TYPE SPECIES:** *Noideattella amboa* Álvarez-Padilla et al., 2012.

**DIAGNOSIS:** *Noideattella* species are similar to those of *Silhouettella*, *Pelycinus*, *Lionneta*, *Tolegnaro*, and *Farqua*. They differ from *Silhouettella* and *Tolegnaro* by the presence of stout spines on the lateral surfaces of tibia I and II and two pairs of spines on metatarsus II (figs. 47, 92, 93) and the absence of feathery scales on the pedicel area. They differ from *Lionneta* by the femora with lateral sides smooth and the embolus lamellae shorter, from *Pelycinus* by having shorter legs and embolar lamellae without a sail-shaped expansion, bordered proximally by a deep groove, and from *Farqua* by the absence of abdominal spots. In addition *Noideattella* species must have the following characters proposed in Álvarez-Padilla et al. (2012): abdomen covered completely by sclerotized scuta (figs. 25–27, 33–35); female internal genitalia with T-shaped anterior sclerite (figs. 32, 40, 63, 64, 73); embolus curved approximately 90° at half its length, and divided into two lamellae armed with several apophyses (figs. 22, 30, 79, 80).

*Noideattella omby*, new species

Figures 25–32, 46, 82–98, 102

**TYPE:** Male holotype, female allotype and one male paratype from Berlese and sifted leaf litter of a littoral forest at an elevation of 25 m, Forêt d'Ampombofofo, 21°5'58"S, 49°20'19"E, Antsiranana Province, Madagascar (21–22 November 2007, B.L. Fisher et al.), deposited in CASC (PBI\_OON 36120).

**ETYMOLOGY:** The species epithet, a noun in apposition, is taken from the Malagasy word for cow, *omby*.

**DIAGNOSIS:** *N. omby* can be differentiated from other *Noideattella* species by the reduced size of the eyes covering less than half of the cephalic area; except from *N. tany* and *N. sylvnata* that have similar eye size and arrangement (Álvarez-Padilla et al., 2012: figs. 1, 201); but differ from these two species by the presence of a cuticular rectangular apophysis on the embolar lamella (figs. 46, 95–98) and the smooth carapace dorsal surface (figs. 25, 27, 82).

**DESCRIPTION:** *Male* (PBI\_OON 3564). Total length 1.2. Body color pale orange (figs. 25–27). **Cephalothorax:** Carapace pale orange, ovoid in dorsal view, pars cephalica flat in lateral view, anteriorly narrowed to 0.49 times its maximum width or less, posterolateral edge without pits, surface of elevated portion of pars cephalica smooth, sides finely reticulate; lateral margin without denticles (figs. 25, 27, 82, 83). Sternum surface and furrows cuticle smooth (figs. 26, 88). Clypeus straight in front view. Ocular area equal than the clypeus height (fig. 29). Eyes well developed, ALE largest; posterior eye row straight from front; ALE-PLE separated by less than ALE radius, PLE-PME separated by less than PME radius (figs. 29, 94). Sternum longer than wide, pale orange (fig. 26), without pits, microsculpture absent, anterior margin



2001 to Apr. 14, 2001, Fisher et al., 1 ♀ (CASC PBI\_OON 3878). *Toliara*: Forêt d'Petriky, 12.5 km W Tolagnaro, littoral rainforest, 10 m, -25.06216°, 46.86933°, Nov. 22, 1998, Sylvian, B.L. Fisher, 2 ♀ (FMNH PBI\_OON 36302).

*Noideattella sylvnata*, new species,

Figures 33–40, 43–45, 101

**TYPE:** Male holotype from Berlese and sifted leaf litter of a montane rainforest at an elevation of 1200 m, Reserve Spéciale d'Anjanaharibe-Sud 9.2 km WSW Befingotra, 14°45'00"S, 49°28'00"E, Antsiranana Province, Madagascar (9 November 1994, B.L. Fisher) deposited in CASC (PBI\_OON 36359).

**ETYMOLOGY:** The species epithet, a noun in apposition, is dedicated to our dear friends Sylvio Drouin and Natacha Merritt.

**DIAGNOSIS:** *N. sylvnata* can also be differentiated from other *Noideattella* species by the reduced size of the eyes covering less than half of the cephalic area; except from *N. tany* and *N. omby* that has similar eye size and arrangement, but differ from these two species by the body color orange-brown (figs. 33–35). Male paturon inner margin with brush of short thorn-like seta (fig. 37). Sternum furrows cuticle reticulated. Abdomen cylindrical, postepigastric scutum almost rectangular. Book lung covers large, ovoid (figs. 34, 44). Embolus dorsal lamellae with a tooth (fig. 45).

**DESCRIPTION:** *Male* (PBI\_OON 1994). Total length 1.4. **Cephalothorax:** Carapace orange-brown, ovoid in dorsal view, pars cephalica flat in lateral view, anteriorly narrowed to between 0.5 and 0.75 times its maximum width, posterolateral edge without pits, surface of elevated portion of pars cephalica smooth, sides granulate; lateral margin without denticles (figs. 33, 35). Clypeus straight in front view. Eyes reduced, tiny, all subequal; posterior eye row straight from front; ALE-PLE touching, PLE-PME touching (fig. 37). Sternum longer than wide, orange-brown, furrow with rows of small pits, surface smooth, without pits, microsculpture only in furrows, anterior margin unmodified, lateral margin without infra-coxal grooves (fig. 34). Mouthparts: Chelicerae, endites, and labium orange-brown. **Abdomen:** Cylindrical. Book lung covers large, ovoid. Dorsal scutum orange-brown, middle surface smooth, sides smooth. Postepigastric scutum orange-brown, long, almost rectangular, covering almost entire abdominal length (fig. 34). **Legs:** Pale orange, without color pattern. Leg spination (only surfaces bearing spines listed, all spines longer than segment width): tibiae: I, II p2-1-1; r1-1-1; IV p0-0-1; metatarsi: I, II p1-1-0; r1-1-0; (leg IV: spine on leg IV smaller than those on legs I and II) (fig. 43). Tarsi I to IV superior claws tooth not examined in detail. Trichobothria not examined. **Genitalia:** Epigastric region with sperm pore situated at level of anterior spiracles. Palp proximal segments pale orange; tibia trichobothria not examined; cymbium pale orange, ovoid in dorsal view, without distal patch of setae; bulb pale orange. Embolus dorsal lamella and ventral not examined with SEM. Palp as in figures 36, 38, and 45.

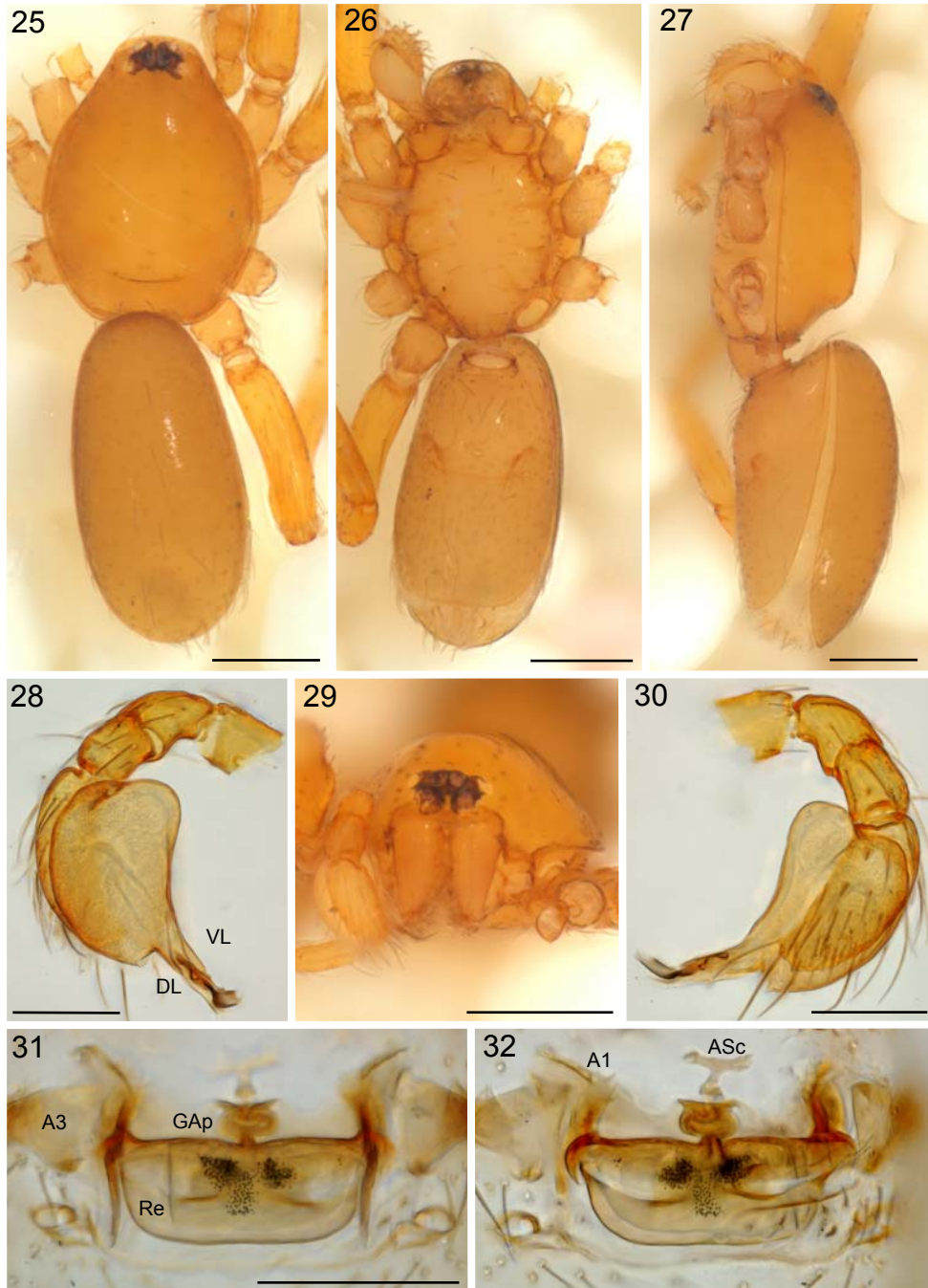
*Female:* (PBI\_OON 1994). Total length 1.5. As in male except as noted. **Cephalothorax:** Female palp spines absent. **Abdomen:** Postepigastric scutum not fused to epigastric scutum,

with continuous transverse groove, lateral margin without infracoxal grooves (fig. 88). Mouthparts: Chelicerae, endites, and labium pale orange. paturon inner margin with scattered setae (fig. 94). Endites distally excavated, anteromedian tip unmodified, posteromedian part unmodified, same as sternum in sclerotization (figs. 26, 85). **Abdomen:** Dorsal scutum pale orange, middle surface reticulate, sides reticulate. Postepigastric scutum pale orange, long, narrow rectangle, covering nearly full length of abdominal length (figs. 26–27). **Legs:** Pale orange, without color pattern. Leg spination (only surfaces bearing spines listed, all spines longer than segment width): tibiae: I, II p1-1-1; r1-1-1; IV p0-0-1; metatarsi: I, II p1-1-0; r1-1-0. Tarsi I to IV superior claws tooth not examined in detail. Trichobothria examined with SEM. Tibia: I three; metatarsus: I one; base longitudinally narrowed, aperture internal texture gratelike, hood covered by numerous low, closely spaced ridges. Tarsal organ I with three sensilla visible. **Genitalia:** Epigastric region with sperm pore situated at level of anterior spiracles (figs. 26, 87). Palp proximal segments pale orange; cymbium pale orange, ovoid in dorsal view, with distal patch of setae; bulb pale orange. Embolus dorsal lamella bifurcated, ventral lamella with two or three apophyses. Palp as in figures 28, 30, and 95–98.

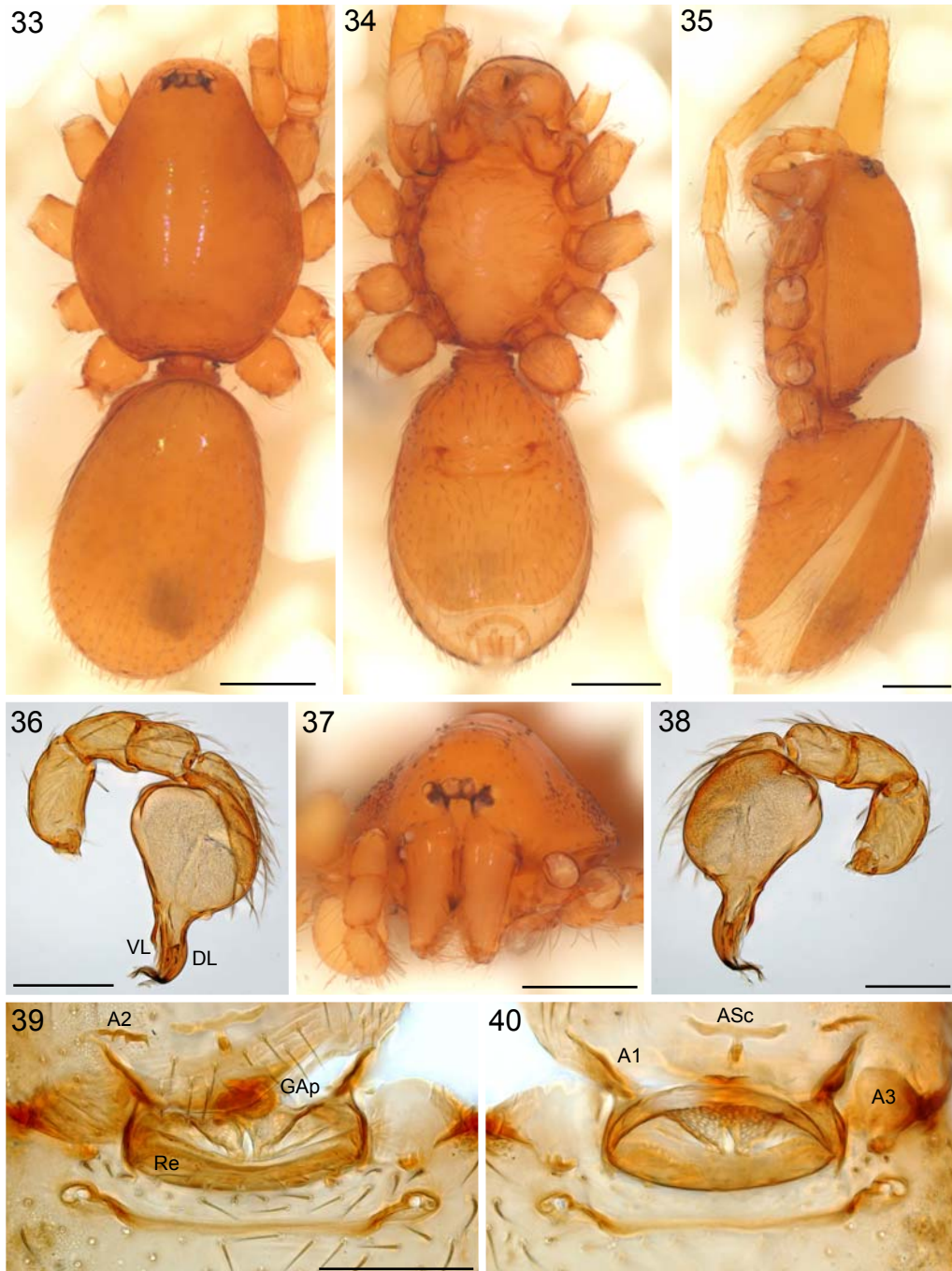
*Female:* (PBI\_OON 3564). Total length 1.3. As in male except as noted. **Cephalothorax:** Sternum anterior margin unmodified. Female palp spines absent; patella without prolateral row of ridges. **Abdomen:** Postepigastric scutum not fused to epigastric scutum (fig. 86). Spinneret scutum with fringe of needlelike setae. **Legs:** Tibia I Emerit's glands present, metatarsi III and IV weak ventral scopula absent. Leg spination (only surfaces bearing spines listed, all spines longer than segment width): tibiae: I, II p1-1-1; r1-1-1; IV p0-0-1; metatarsi: I, II p1-1-0; r1-1-0 (figs. 92, 93). Tarsi I to IV superior claws tooth not examined in detail. Trichobothria examined with SEM. Tibia: I three; metatarsus: I one; base longitudinally narrowed, aperture internal texture gratelike, hood covered by numerous low, closely spaced ridges; metatarsus: I one, IV one. Tarsal organ one with four sensilla visible (fig. 89). **Genitalia:** Receptaculum length approximately  $\frac{1}{3}$  of its width. Papillae field examined with SEM and concentrated anteriorly on the receptaculum surrounding the GAP (figs. 90, 91). Female genitalia as in figures 31 and 32.

**DISTRIBUTION:** Endemic to Madagascar (fig. 102).

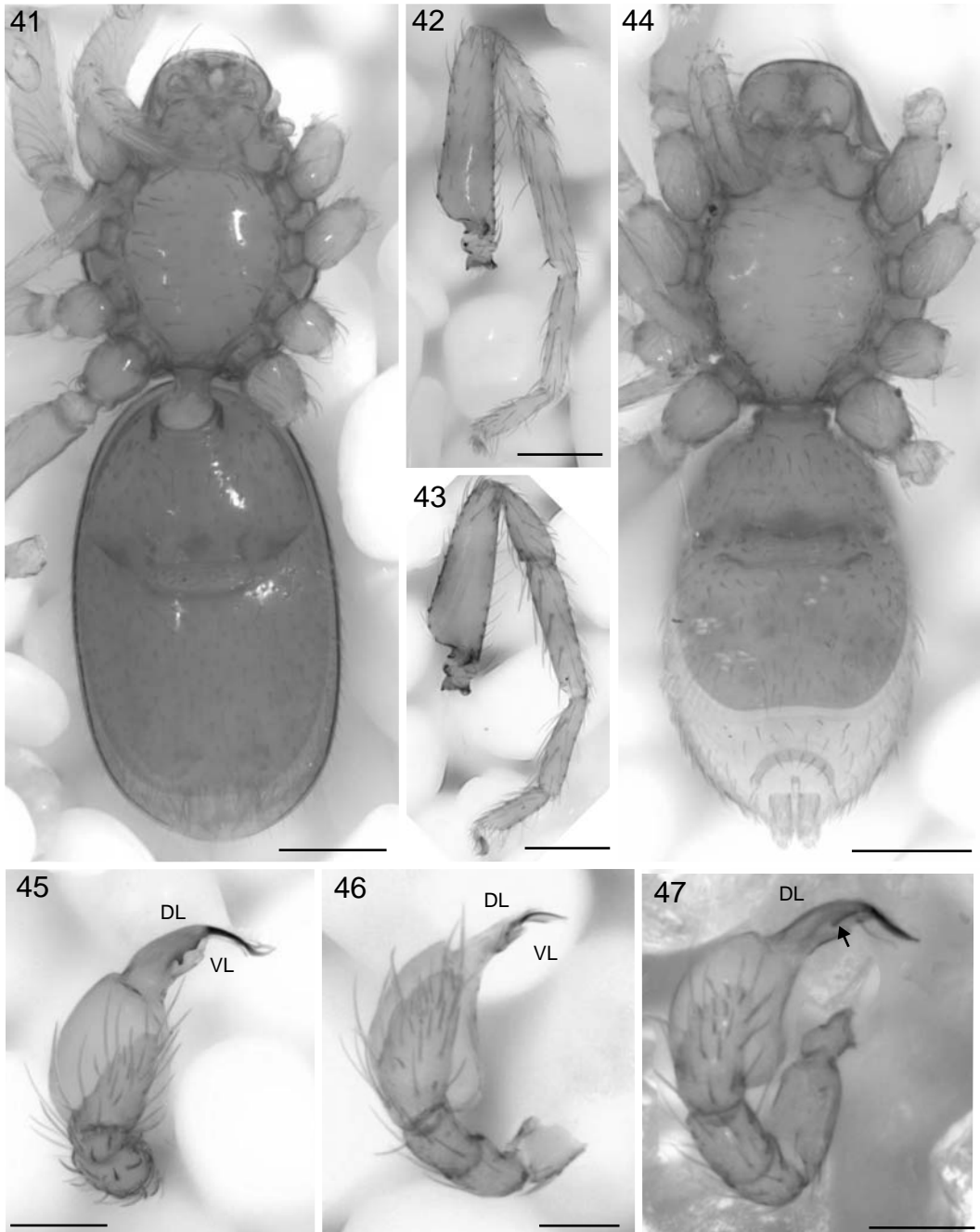
**MATERIAL EXAMINED:** *N* = 159. **Madagascar:** *Antsiranana:* Forêt d'Bekaraoka, 6.8 km 60° ENE Daraina, tropical dry forest, 150 m, -13.00277°, 49.01166°, Dec. 07, 2003, B.L. Fisher et al., 13♂, 16♀, 29 mixed (CASC PBI\_OON 3575); Forêt d'Analabe, 30.0 km 72° ENE Daraina, littoral rainforest, 30 m, -13.08333°, 49.90833°, Nov. 27, 2003, B.L. Fisher et al., 54♂, 38♀, 92 mixed (CASC PBI\_OON 3564); 1♂ (CASC PBI\_OON 3903); Forêt d'Antsahabe, 11.4 km 275° W Daraina, tropical dry forest, 550 m, -13.00333°, 49.00916°, Dec. 12, 2003, B.L. Fisher et al., 1♀ (CASC PBI\_OON 3891); Forêt d'Orangea, 3.6 km 128° SE Ramena, littoral forest, 90 m, -12.25888°, 49.37472°, Feb. 22, 2001 to Feb. 28, 2001, Fisher et al., 2♂, 8♀, 10 mixed (CASC PBI\_OON 3345); Reserve Spéciale d'Ambre, 3.5 km 235° SW Sakaramy, tropical dry forest, 325 m, -12.46888°, 49.24222°, Jan. 26, 2001 to Jan. 31, 2001, Fisher-Griswold Arthropod Team, 1♀ (CASC PBI\_OON 3337); Reserve Spéciale d'Ankarana, 13.6 km 192° SSW Anivorano Nord, tropical dry forest, 210 m, -12.86361°, 49.22583°, Feb. 16, 2001 to Feb. 21, 2001, Fisher et al., 1♀ (CASC PBI\_OON 3286); Reserve Spéciale d'Anjanaharibe-Sud 6.5 km SSW Befingotra, 875 m, -14.75000°, 49.50000°, Dec. 19, 1994, B.L. Fisher, 1♀ (CASC PBI\_OON 3977). *Mahajanga:* Reserve d'Ankoririka, 10.6 km 13° NE Tsaramandroso, tropical dry forest, 210 m, -16.26722°, 46.04861°, Apr. 09,



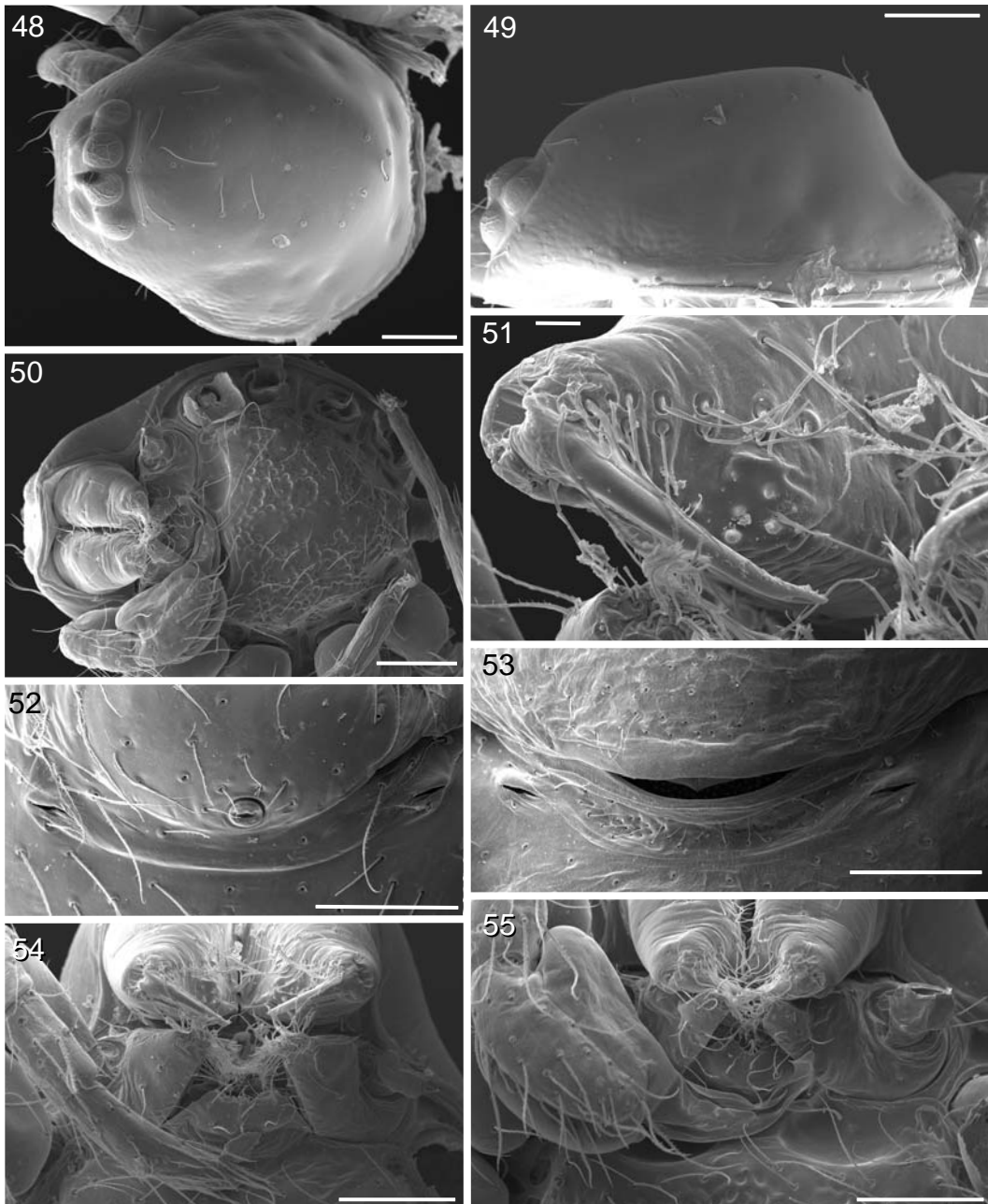
FIGURES 25–32. *Noideattella omby* new species. 25. Habitus male, dorsal view. 26. Same, ventral view. 27. Same, lateral view. 28. Palp male, prolateral view. 29. Cephalothorax male, anterior view. 30. Palp male, retrolateral view. 31. Genitalia female, ventral view. 32. Genitalia female, dorsal view. Scale bars = 0.2 mm, except genitalia: 0.1 mm.



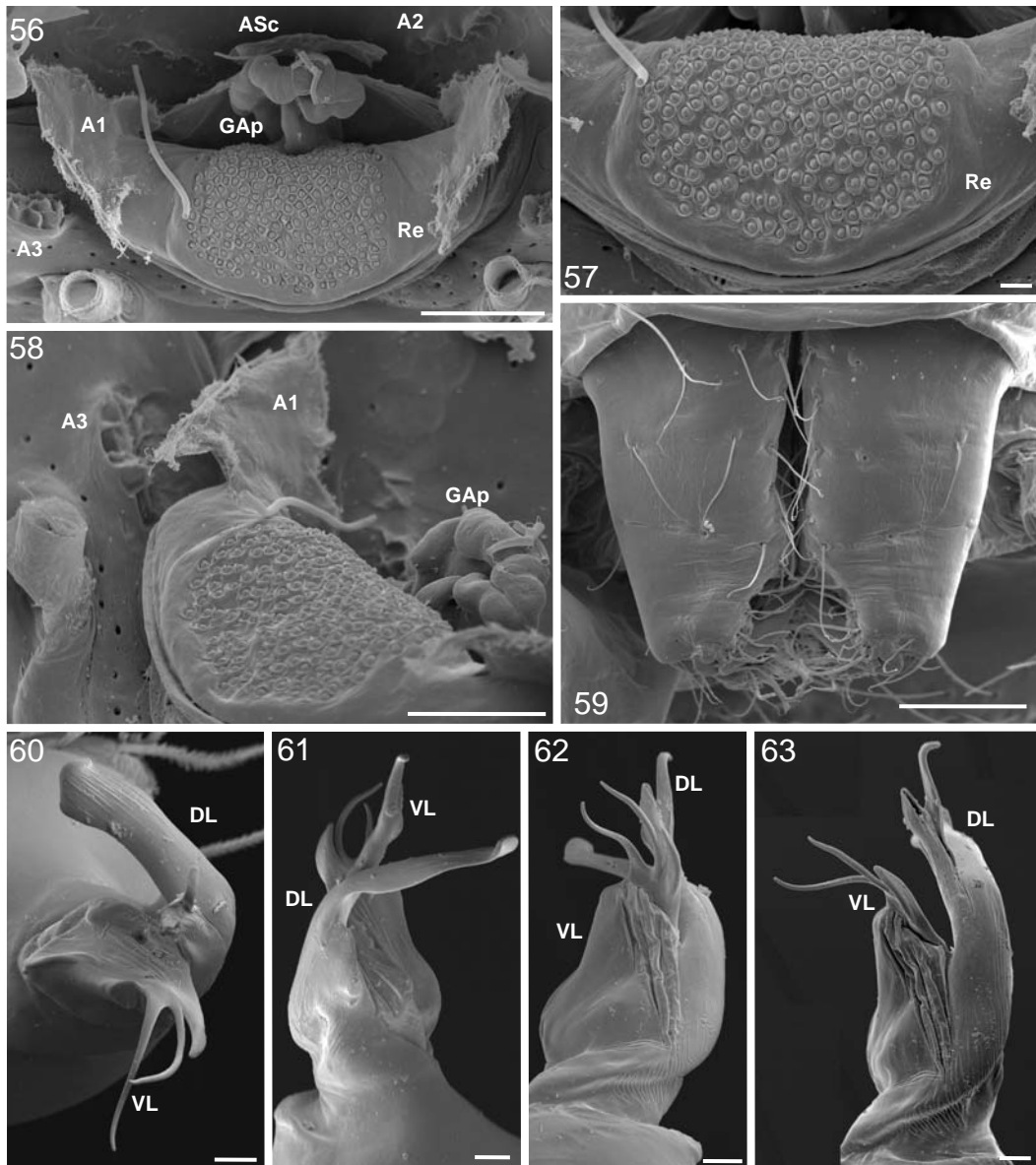
FIGURES 33–40. *Noideattella sylvnata* new species. 33. Habitus male, dorsal view. 34. Same, ventral view. 35. Same, lateral view. 36. Palp male, prolateral view. 37. Cephalothorax male, anterior view. 38. Palp male, retrolateral view. 39. Genitalia female, ventral view. 40. Genitalia female, dorsal view. Scale bars = 0.2 mm, except genitalia: 0.1 mm.



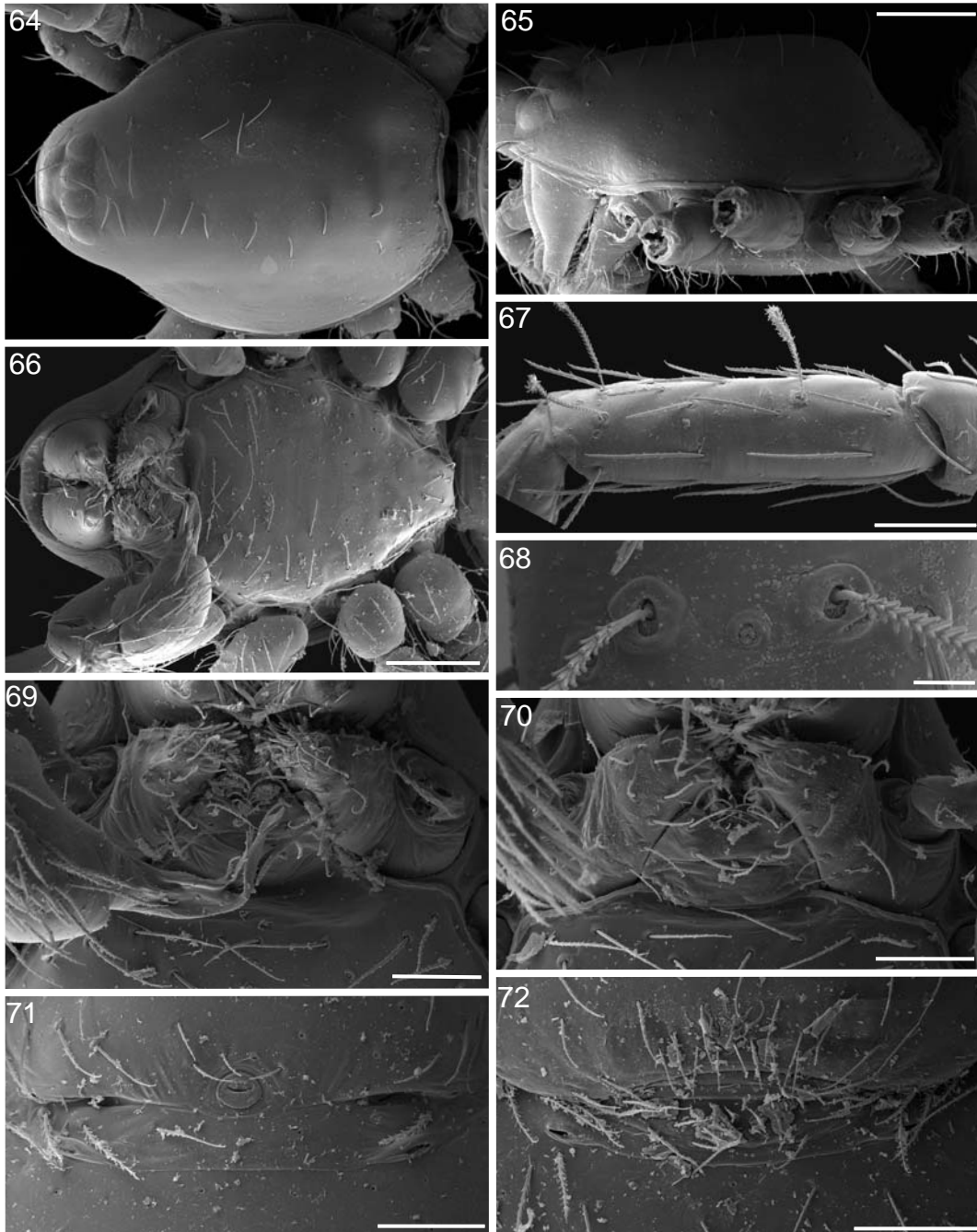
FIGURES 41–47. *Silhouettella perismontes* new species (figs. 41–42), *Noideattella sylvnata*, new species (figs. 43–45). *Noideattella omby* new species (fig. 46). *Silhouettella perisalma* new species (fig. 47). 41. Habitus female, ventral view. 42. Leg 1 male, prolateral view. 43. Leg 1 male, prolateral view. 44. Habitus female, ventral view. 45. Palp male, dorsal view. 46. Palp male, dorsal view. 47. Palp male, prolateral view, arrow indicating triangular prolateral notch. Scale bars = 0.2 mm, except genitalia: 0.1 mm.



FIGURES 48–55. *Silhouettella curieusei* Benoit, 1979. **48.** Cephalothorax male, dorsal view. **49.** Same, lateral view. **50.** Same, ventral view. **51.** Chelicerae female, ventral view. **52.** Epigastric region male, ventral view. **53.** Epigastric region female, ventral view. **54.** Endites female, ventral view. **55.** Endites male, ventral view. Scale bars = 100  $\mu\text{m}$ , except endites = 50  $\mu\text{m}$  and female chelicerae = 10  $\mu\text{m}$ .

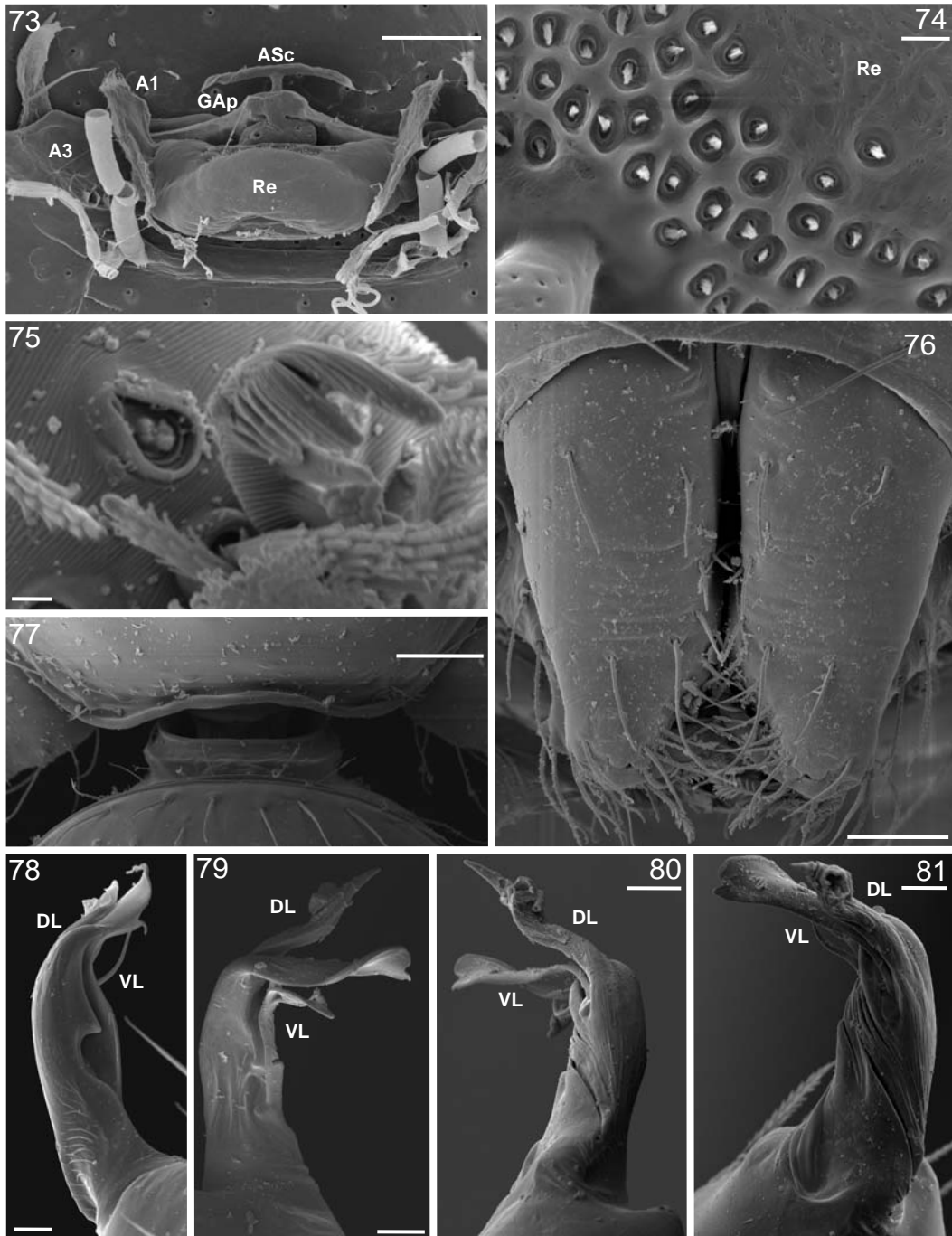


FIGURES 56–63. *Silhouettella curieusei* Benoit, 1979. 56. Genitalia female, dorsal view. 57. Receptaculum, dorsal view. 58. Genitalia female, lateral view. 59. Chelicerae male, anterior view. 60. Embolus, ventral view. 61. Embolus, prolateral view. 62. Embolus, retrolateral view. 63. Embolus, dorsal view. Scale bars = 50  $\mu\text{m}$ , except emboli = 10  $\mu\text{m}$ .

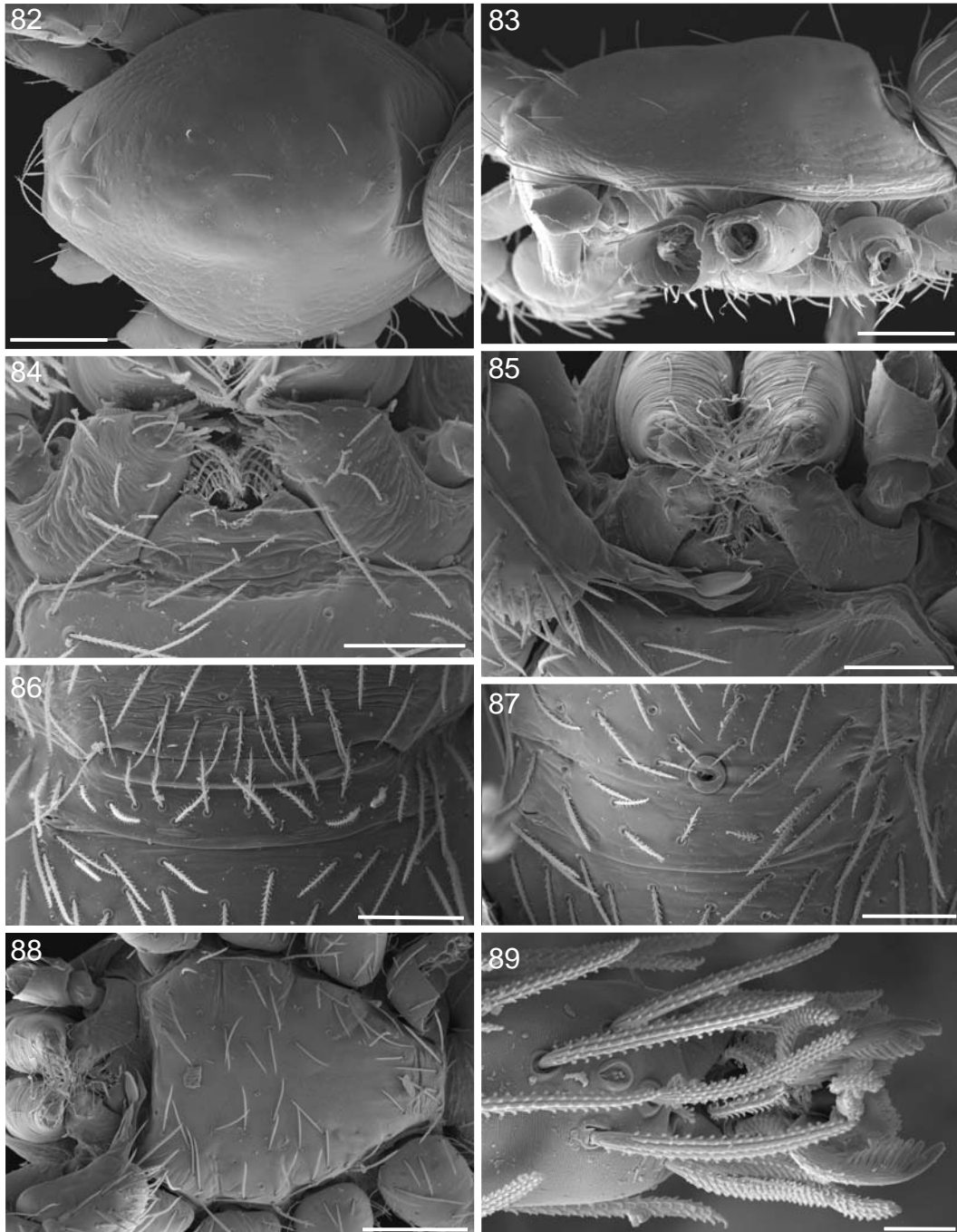


FIGURES 64–72. *Silhouettella perisalma* new species. 64. Cephalothorax male, dorsal view. 65. Same, lateral view. 66. Same, ventral view. 67. Tibia I female, retrolateral view. 68. Trichobothria tibia I female, dorsal view. 69. Endites male, ventral view. 70. Endites female, ventral view. 71. Epigastric region male, ventral view. 72. Epigastric region female, ventral view. Scale bars = 100  $\mu\text{m}$ , except endites = 50  $\mu\text{m}$  and tibia I trichobothria = 10  $\mu\text{m}$ .

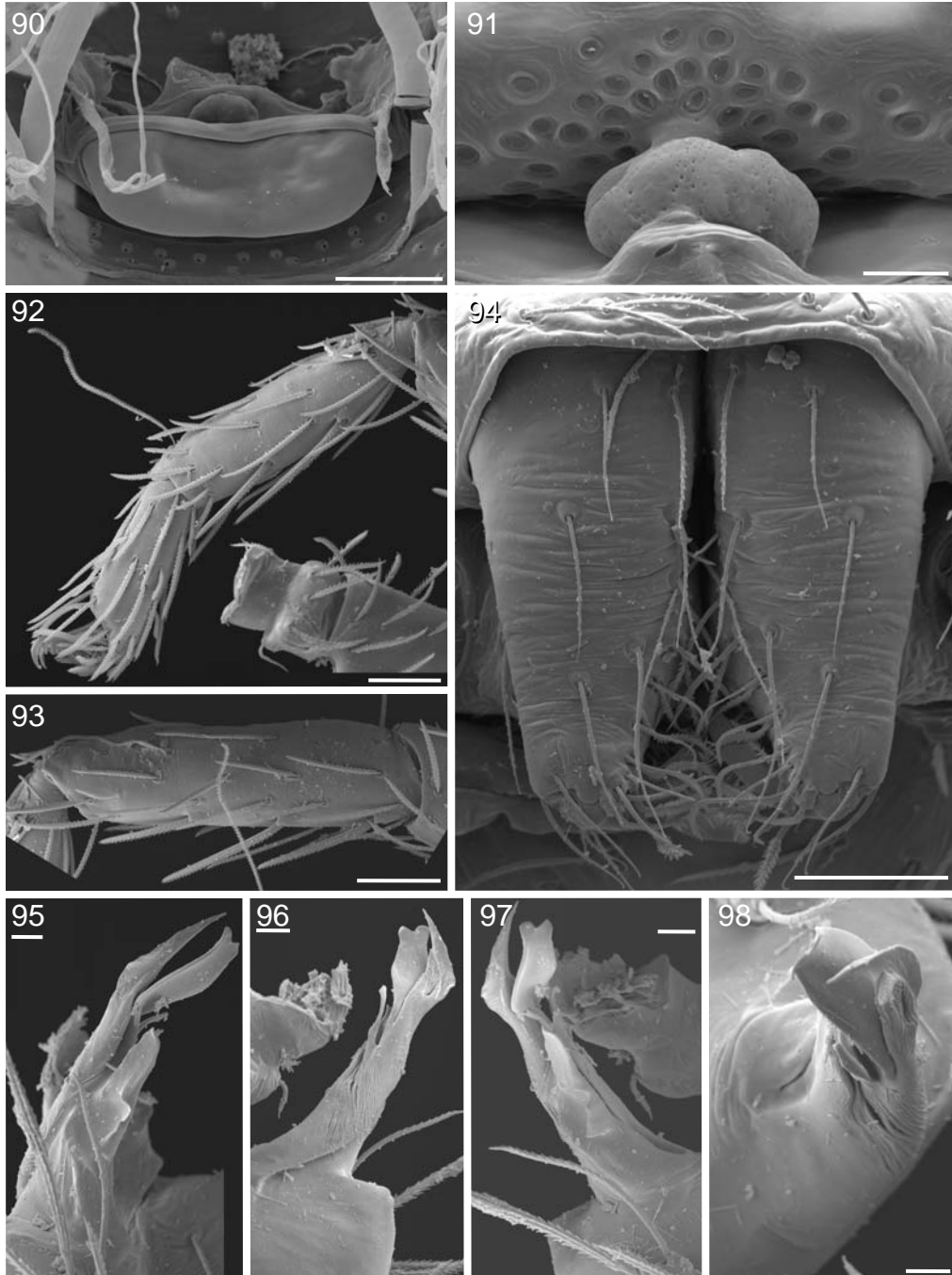




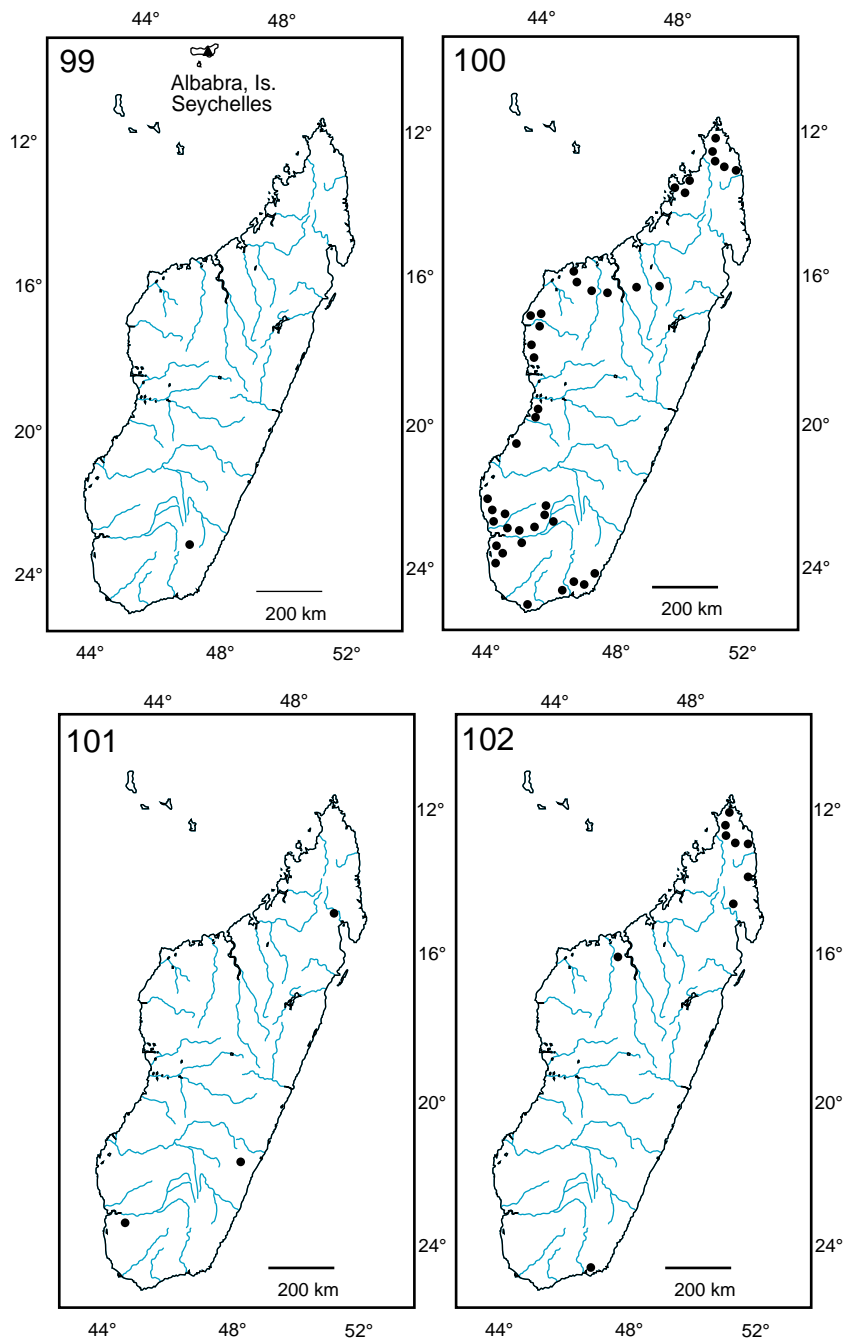
FIGURES 73–81. *Silhouettella perisalma* new species. 73. Genitalia female, dorsal view. 74. Receptaculum accessory gland ducts, dorsal view. 75. Tarsal organ female, dorsal view. 76. Chelicerae male, anterior view. 77. Pedicel area male, dorsal view. 78. Embolus, dorsal view. 79. Embolus, prolateral view. 80. Embolus, retrolateral view. 81. Embolus, ventral view. Scale bars = 50  $\mu$ m, except emboli = 10  $\mu$ m, female receptaculum accessory gland and tarsal organ 75 = 2  $\mu$ m.



FIGURES 82–89. *Noideattella omby* new species. **82.** Cephalothorax male, dorsal view. **83.** Same, lateral view. **84.** Endites female, ventral view. **85.** Endites male, ventral view. **86.** Epigastric region female, ventral view. **87.** Epigastric region male, ventral view. **88.** Cephalothorax male, ventral view. **89.** Tarsal organ I female, dorsal. Scale bars = 100  $\mu\text{m}$ , except endites = 50  $\mu\text{m}$  and female tarsal organ = 10  $\mu\text{m}$ .



FIGURES 90–98. *Noideattella omby* new species. 90. Genitalia female, dorsal view. 91. Receptaculum accessory gland ducts, dorsal view. 92. Metatarsus and tarsus I female, retrolateral view. 93. Tibia I female, retrolateral view. 94. Chelicerae male, anterior view. 95. Embolus, dorsal view. 96. Embolus, retrolateral view. 97. Embolus, prolateral view. 98. Embolus, ventral view. Scale bars = 50  $\mu\text{m}$ , except emboli and Receptaculum accessory gland ducts = 10  $\mu\text{m}$ .



FIGURES 99–102. Distribution maps. **99.** *Silhouettella curieusei* Benoit, 1979, triangle; *Silhouettella perismon-tes*, new species, circle. **100.** *Silhouettella perisalma*, new species, circles. **101.** *Noideattella sylvnata*, new species, circles. **102.** *Noideattella omby*, new species, circles.

covering  $\frac{3}{4}$  of abdominal length (fig. 44). Spinneret scutum with fringe of needlelike setae. **Legs:** Metatarsi III and IV weak ventral scopula absent. Leg spination (only surfaces bearing spines listed, all spines longer than segment width): tibiae: I, II p2-1-1; r1-1-1; IV p0-0-1; metatarsi: I, II p1-1-0; r1-1-0; (leg IV: spine on leg IV smaller than those on legs I and II). Tarsi I to IV superior claws tooth not examined in detail. Trichobothria not examined. **Genitalia:** Receptaculum length approximately  $\frac{1}{2}$  of its width. Papillae field not examined with SEM concentrated dorsally around the GAP. Female genitalia as in figures 39 and 40.

**DISTRIBUTION:** Endemic to Madagascar (fig. 101).

**MATERIAL EXAMINED:**  $N = 14$ . **Madagascar:** *Antsiranana:* Reserve Spéciale d'Anjaharibe Sud, 6.5 km SSW Befingotra, rainforest, 875 m, -14.75000°, 49.50000°, Dec. 19, 1994, B.L. Fisher, 1 ♀ (CASCC PBI\_OON 36285); 1 ♂ (CASCC PBI\_OON 36286); 1 ♀ (CASC PBI\_OON 36287); 1 ♀ (CASC PBI\_OON 36288), .2 km WSW Befingotra, montane rainforest, 1200 m, -14.75000°, 49.46666°, Nov. 09, 1994, B.L. Fisher, 2 ♂, 1 ♀, 3 mixed (CASC PBI\_OON 1994); 1 ♀ Paratype (CASC PBI\_OON 36360); 1 ♀ (CASC PBI\_OON 36361); 1 ♀ (CASC PBI\_OON 36362). *Fianarantsoa:* 7.6 km 122° Kianjavato, Forêt Clasee Vatovavy, montane rainforest, 175 m, -21.40000°, 47.94000°, June 06, 2005 to June 08, 2005, B.L. Fisher et al., 1 ♂ (CASC PBI\_OON 3451). 1 ♀ (MRAC PBI\_OON 36329); 1 ♀ (MRAC PBI\_OON 36343). *Toliara:* Tolagnaro Fort Dauphin at 45 km Tolagnaro route vers Amboasary, 60 m, Dec. 04, 1989, R. Hausar, 1 ♂ (MRAC PBI\_OON 36080).

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