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On Old World ninetine spiders (Araneae: Pholcidae), with a new genus and species and the first record for Madagascar

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Abstract

Ninetines (Pholcidae: Ninetinae) are tiny spiders, largely restricted to arid habitats where they lead reclusive lives under objects close to the soil. They are rare in collections and poorly known in any respect. Only two genera were previously known from the Old World, the monotypic *Mystes* Bristowe from Malaysia, and *Ninetis* Simon, with four described species ranging from Yemen to Namibia. Here we describe a new genus from Egypt and Uzbekistan, represented by a single new species, *Nita elsaff* **n. gen., n. sp.** Based on ultrastructural data and cladistic analysis we hypothesize that this species is more closely related to some largely New World ninetines (*Chisosa* Huber from Baja California and Texas, *Aucana* Huber from Chile and New Caledonia) than to *Ninetis.* We also describe the first *Ninetis* species from Madagascar (*N. toliara* **n. sp.**), give new records for two previously known species, and present a distribution map for *Ninetis*.

Key words: Pholcidae, Ninetinae, *Ninetis*, *Nita*, Egypt, Uzbekistan, Madagascar, taxonomy, distribution

Introduction

Due to their small size (body length usually about 1–2 mm) and their reclusive life in the leaf litter or under stones, ninetines are rare in collections. Apart from crude habitat data and the notion that *Ninetis subtilissima* Simon, 1890 runs rapidly when disturbed and builds "flimsy webs" (Huber and van Harten 2001), nothing is known about their biology. Ninetines are widely distributed and diverse in the New World (twelve described genera, ranging from Chile to the USA, revised in Huber 2000), but only two genera were previously known from the Old World: *Ninetis* Simon, 1890 from Africa and the Arabian Peninsula (Huber 2000, 2002; Huber and van Harten 2001), and the dubious and monotypic *Mystes* Bristowe, 1938 from Malaysia.

The monophyly of "Ninetinae" remains controversial just as the position of ninetines within Pholcidae. Traditionally, ninetines have been considered a 'basal' taxon in Pholcidae (Simon 1893), and recent molecular data lend support to the hypothesis placing ninetines as sister group to all remaining pholcids (Bruvo-Mađarić *et al*. 2005). However, the sample size in this study was very limited, with only the type species of the nominotypical genus included (*Ninetis subtilissima*). Whether New and Old World ninetines are closely related or have independently adapted to a life in the interstices of the soil and surface layer remains an open question (Huber and Brescovit 2003).

In this note we describe a third ninetine genus from the Old World and the first ninetine from Madagascar, and we give some new records for previously described *Ninetis* species from Africa. The genus *Ninetis* now includes five species: *N. subtilissima* Simon, 1890 (Yemen), *N. minuta* (Berland, 1919) (Kenya, Somalia, Tanzania), *N. russellsmithi* Huber, 2002 (Malawi), *N. namibiae* Huber, 2000 (Namibia), and *N. toliara* **n. sp.** (Madagascar).

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Material and Methods

Material studied herein is deposited in the following institutions:

MCZ	Museum of Comparative Zoology, Cambridge, USA
MRAC	Musée royal de l'Afrique Centrale, Tervuren, Belgium
MZUF	Museo Zoologico "La Specola", Florence, Italy
USNM	National Museum of Natural History, Washington DC, USA
ZFMK	Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany
ZMMU	Zoological Museum of the Moscow University, Russia

Methods and terminology are as in Huber (2000). Measurements are in mm (+/- 0.02 mm if two decimals are given) unless otherwise noted. Eye measurements are +/- 5 μm. Drawings were done with a camera lucida on a Leitz Dialux 20 compound microscope. Photos were made with a Nikon Coolpix 995 digital camera (2048 x 1536 pixels) mounted on a Nikon SMZ 1500 dissecting microscope. For SEM photos, specimens were dried in HMDS (Brown 1993), and photographed with a Hitachi S-2460 scanning electron microscope. Coordinates of localities are either in round brackets (data on label) or in square brackets [data from maps or gazetteers].

Taxonomy

Nita n. gen.

Type species. *Nita elsaff*, **n. sp.**

Etymology. The name is derived from Nit (Net, Neit, Neith), the goddess of weaving in ancient Egyptian mythology. Gender feminine.

Diagnosis and description. See single known species below.

Relationships. For cladistic analysis, we added *Nita elsaff* to the data matrix from Huber (2001) (the matrix that contains the largest number of ninetine taxa, final matrix available at http://www.uni-bonn.de/~bhuber1/matrices.html) and analysed it with NONA version 2.0 (Goloboff 1993) using equal character weights. After collapsing of unsupported nodes and deletion of suboptimal trees, this resulted in 56 most parsimonious cladograms (185 steps, CI 37, RI 77). Among these cladograms, there were only two alternative topologies regarding the placement of *Nita*. First, as sister to all other ninetines, with the latter supported by the relative lengths of tibia 1/tibia 4. In *Nita*, this value (1.8/1.5=1.2) falls only slightly outside the usual range of ninetines (<1.15), making this a rather poorly supported solution. Second, as part of a tetrachotomy within ninetines, together with *Aucana* (2 species in the matrix) and *Chisosa*. This clade is supported by two characters: the absence (loss) of epiandrous spigots (ambiguous character state in *Chisosa*), and the exposed tarsal organ. Exposed tarsal organs and the lack of epiandrous spigots are unique among ninetines, leading us to prefer this hypothesis. Biogeographically, this clade is now known from Chile and New Caledonia (*Aucana*), Texas and Baja California (*Chisosa*), and Egypt and Uzbekistan (*Nita*).

Nita elsaff n. gen., n. sp.

(Figs. 1–16)

Type material. Male holotype from El Saff (29°57'N, 31°28'E), Giza, Egypt; March 1, 2003 (M. Mohafez), in ZFMK (Ar 005).

Etymology. The species name refers to the type locality and is used as a noun in apposition.

Diagnosis. This species is very easily distinguished from all species of *Ninetis*, the only other African ninetine genus known. Unlike *Ninetis* species, which have either very simple and small procursi or (*N. russell-smithi*) no procursus at all, the present species has a complex and large procursus (Figs. 3, 4). All *Ninetis* species have a very distinctive bulb, with a long ventral apophysis and a dorsal projection that presumably contains the sperm duct (see Fig. 18). In contrast, *Nita elsaff* has a single cylindrical projection on the bulb (Figs. 3, 4). Moreover, *Nita elsaff* has a uniquely modified male clypeus (Figs. 2, 7), while the clypeus of all known *Ninetis* species (and of all other known ninetines) is unmodified. Finally, *Nita elsaff* females have very distinct pore plates (Fig. 6), while pore plates are either absent, invisible, or extremely indistinct in *Ninetis* females. From other potentially close relatives (*Aucana*, *Chisosa*), *Nita* is easily distinguished by the modified male clypeus.

FIGURE 1. *Nita elsaff* **n. sp.**, male dorsal view.

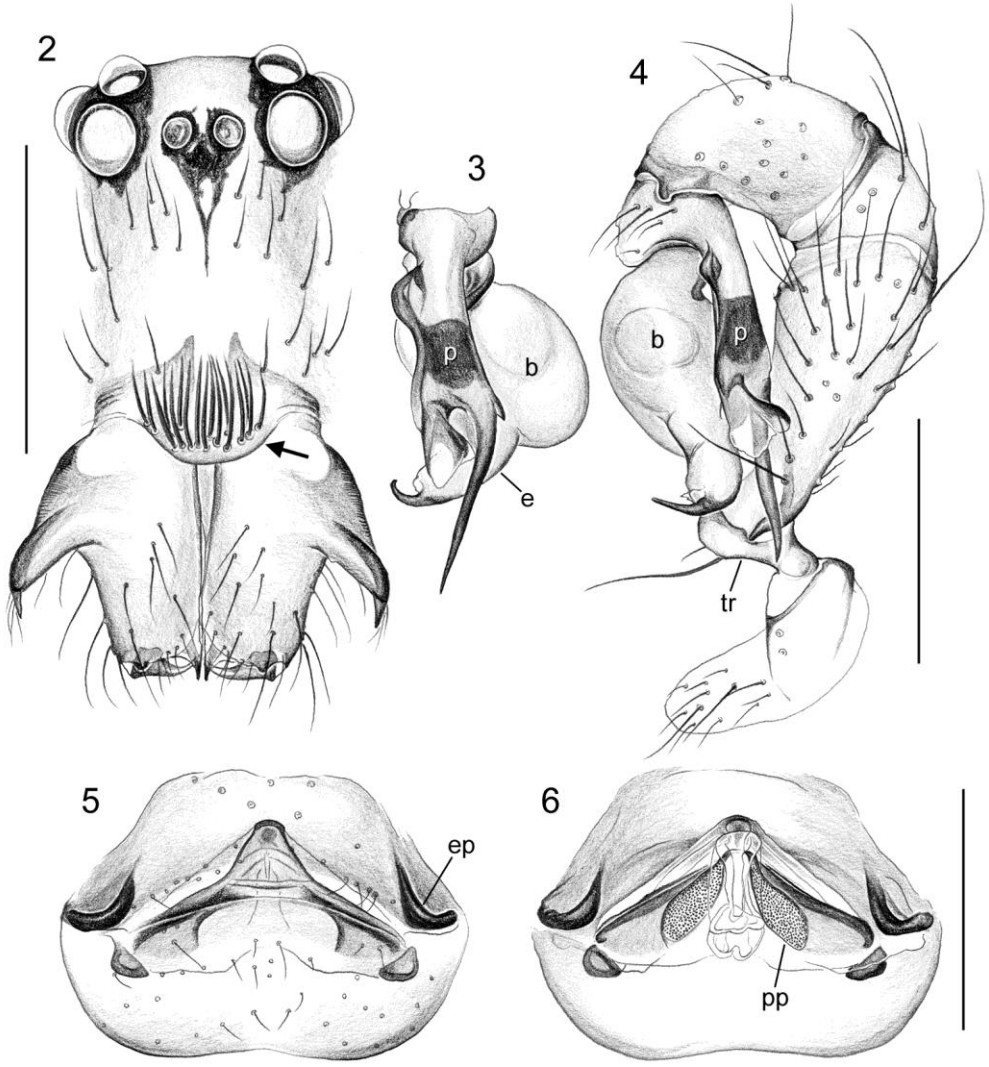
Male (holotype). Total length 1.7, carapace width 0.76. Leg 1: 6.5 (1.73 + 0.30 + 1.80 + 2.03 + 0.63), tibia 2: 1.33, tibia 3: 1.07, tibia 4: 1.50. Tibia 1 length/diameter (L/d): 23. Habitus as Fig. 1; coloration mostly pale ochre-yellow, carapace with narrow median light brown stripe widening frontally to cover ocular area, abdomen monochromous grey. Ocular area slightly elevated; thoracic furrow present, indistinct and shallow; distance PME–PME 115 μm; diameter PME 55 μm; distance PME–ALE 20 μm; distance AME–AME 25 μm, diameter AME 40 μm. Sternum wider than long (0.54/0.48), without frontal humps. Clypeus distinctively modified, with strong hairs situated on a median protrusion (Figs. 2, 7); chelicerae with pair of distinctive frontal apophyses (Figs. 2, 8), with stridulatory ridges (Fig. 12). Palps as in Figures 3 and 4; trochanter projecting ventrally but without distinct apophysis; femur, patella, and tibia widened but otherwise unmodified; procursus distinctive, strongly sclerotized, with small sclerotized flap proximally, long spine and further partly membranous flap (Fig. 11) distally; bulb with one cylindrical projection (presumably the embolus) ending in curved spine (Figs. 3, 10); palpal tarsal organ exposed (Fig. 9). Legs without spines and curved hairs, few vertical hairs; retrolateral trichobothrium of tibia 1 at 57%, prolateral trichobothrium present on all legs; tarsus 1 with about 8 very indistinct pseudosegments. Male gonopore without epiandrous spigots (Fig. 14).

Variation. Tibia 1 in other males from Egypt: 1.57, 1.60; from Uzbekistan: 1.67.

Female. In general similar to male, clypeus unmodified (Fig. 13). Tibia 1: 1.23, 1.50 (Cairo), 1.67 (El Saff). Epigynum large relative to abdomen, with distinctive pair of pockets and internal structures visible through cuticle (Figs. 5, 6, 15, 16).

Distribution. Known from two localities in the Cairo-Giza area, Egypt, and from Uzbekistan.

Material examined. EGYPT: El Saff, Giza: type above, together with 1♀ (used for SEM), same data, in ZFMK. Cairo: Heliopolis (30°06.7'N, 31°17.8'E), in a house, January 19, 2004, March 22 & 26, 2005 (H. El-Hennawy), 2♂1♀ (1♂ used for SEM) in ZFMK (Ar 006–8). Same locality, February 10, 2004 (H. El-Hennawy), 1♀ in pure ethanol, in ZFMK. UZBEKISTAN: Kaskadariya (Qashqadaryo) Region, Guzary Distr., 11 km SE Guzar [38°33.1'N, 66°21.4'E], clayey waste ground, Oct. 18, 1992 (A. A. Zyuzin), 1♂ in ZMMU.



FIGURES 2–6. *Nita elsaff* **n. sp. 2.** Male, frontal view, showing eyes, clypeus (arrow points to modification), and chelicerae. **3.** Left procursus and bulb, ventral view. **4.** Left palp, retrolateral view. **5.** Cleared epigynum, ventral view. **6.** Cleared epigynum, dorsal view. b: bulb, e: putative embolus, ep: epigynal pocket, p: procursus, pp: pore plate, tr: trochanter. Scale lines: 0.3 mm.

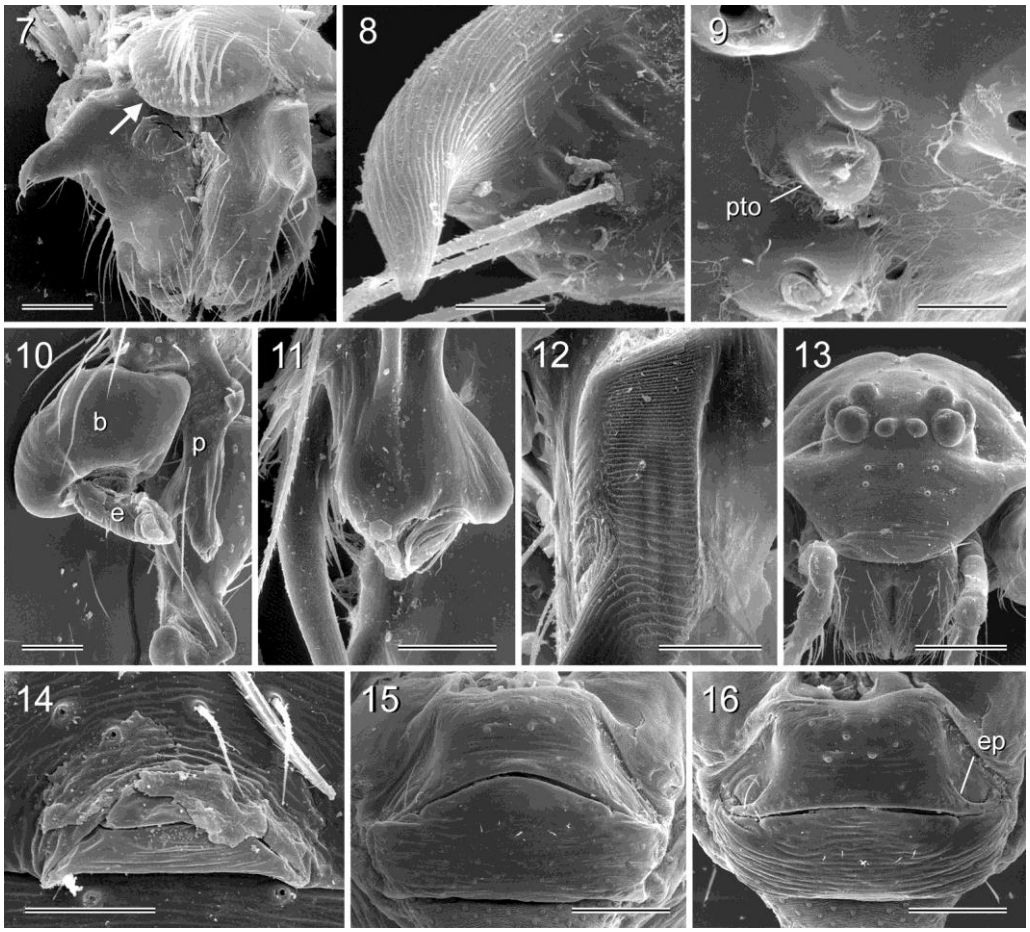
***Ninetis* Simon, 1890**

***Ninetis toliara* n. sp.**
(Figs. 17–28)

Type material. Male holotype from Ifaty (23°09'S, 43°37'E), Prov. Toliara, Madagascar; pitfall trap in sand, desert scrub forest, September 17–22, 1993 (W. E. Steiner, R. Andriamasimanana), in USNM.

Etymology. The species name refers to the type locality and is used as a noun in apposition.

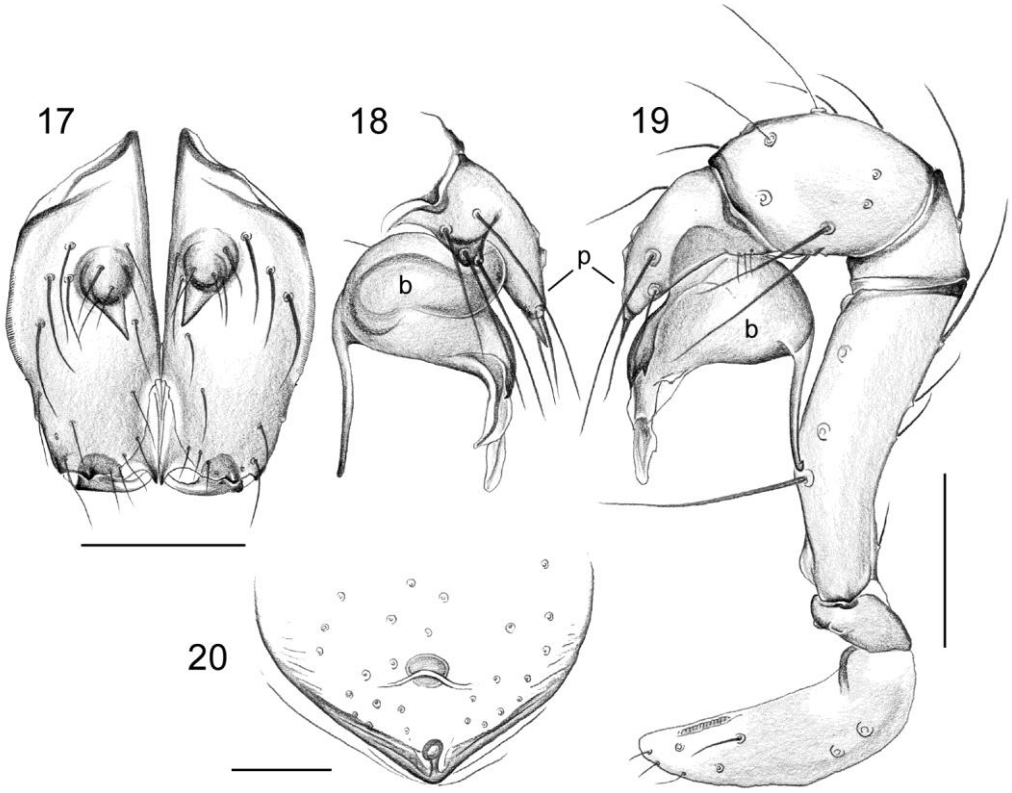
Diagnosis. The present species is easily distinguished from other *Ninetis* species by the combination of male chelicerae, procursus, and bulb (Figs. 17–19). *Ninetis russellsmithi* has similar chelicerae with the apophyses close together, but it lacks a procursus and is provided with a distinctive flap on the bulb; *Ninetis subtilissima* has an almost identical procursus, but the ventral bulbal apophysis is stronger and longer than the dorsal bulbal projection and its male cheliceral apophyses are wide apart. Females are difficult to diagnose; in most other species the epigynum is wider than long or as wide as long, only *Ninetis minuta* has a similarly long epigynum but it lacks the median pocket of *Ninetis toliara* (Figs. 25, 27).



FIGURES 7–16. *Nita elsaff* **n. sp. 7.** Male chelicerae and clypeus (arrow points to modification). **8.** Male cheliceral apophysis. **9.** Male palpal tarsal organ. **10.** Left procursus and bulb, dorsal view. **11.** Detail of left procursus. **12.** Stridulatory ridges on left male chelicera. **13.** Female prosoma, frontal view. **14.** Male gonopore. **15.** Epigynum, ventral (slightly posterior) view. **16.** Epigynum, ventral view. b: bulb, e: putative embolus, ep: epigynal pocket, p: procursus, pto: palpal tarsal organ. Scale lines: 10 µm (8, 9), 40 µm (11, 12, 14), 100 µm (7, 10), 200 µm (13, 15, 16).

Male (holotype). Total length 1.0, carapace width 0.50. Leg 1: 2.97 (0.83 + 0.20 + 0.77 + 0.77 + 0.40), tibia 2: 0.63, tibia 3: 0.28, tibia 4: 0.77. Tibia 1 L/d: 15. Habitus as in *N. subtilissima* (cf. fig. 1 in Huber and van Harten 2001); entire spider pale ochre-yellow, abdomen rather ochre-grey. Ocular area not elevated, not separated from carapace; no thoracic furrow; distance PME–PME 30 µm; diameter PME 40 µm; distance PME–ALE 15 µm; distance AME–AME 10 µm, diameter AME 25 µm. Sternum wider than long (0.36/0.32), without frontal humps. Clypeus unmodified; chelicerae with pair of distinctive frontal apophyses (Figs. 17, 21), with very fine stridulatory ridges (Fig. 23). Palps as in Figs. 18, 19; proximal segments simple, widened but otherwise unmodified; cymbium with short and simple pointed procursus and small sclerotized prolateral

projection; bulb with slender ventral projection with a tiny hook at the tip and more complex dorsal projection, partly membranous (Fig. 22), probably containing the sperm duct (or situated beside the opening of the sperm duct?). Palpal tarsal organ capsulate, very small, with small orifice (Fig. 26). Legs without spines and curved hairs, few vertical hairs; retrolateral trichobothrium of tibia 1 at 60%, prolateral trichobothrium not seen on any leg; tarsus 1 with about 5 very indistinct pseudosegments. Gonopore with four epiandrous spigots, arranged in two pairs (Fig. 24).



FIGURES 17–20. *Ninetis toliara* **n. sp. 17.** Male chelicerae, frontal view. **18.** Left cymbium with procursus and bulb, prolateral view. **19.** Left male palp, retrolateral view. **20.** Cleared epigynum, ventral view. b: bulb, p: procursus. Scale lines: 0.1 mm.

Variation. Tibia 1 in other male: 0.77 (missing in others).

Female. In general similar to male. Tibia 1, female from type locality: 0.53; females from other localities (N=5): 0.73–0.83. Epigynum large relative to abdomen, external shape similar to *N. minuta*, but with a median pocket (Figs. 25, 27). Pore plates not seen (Fig. 20).

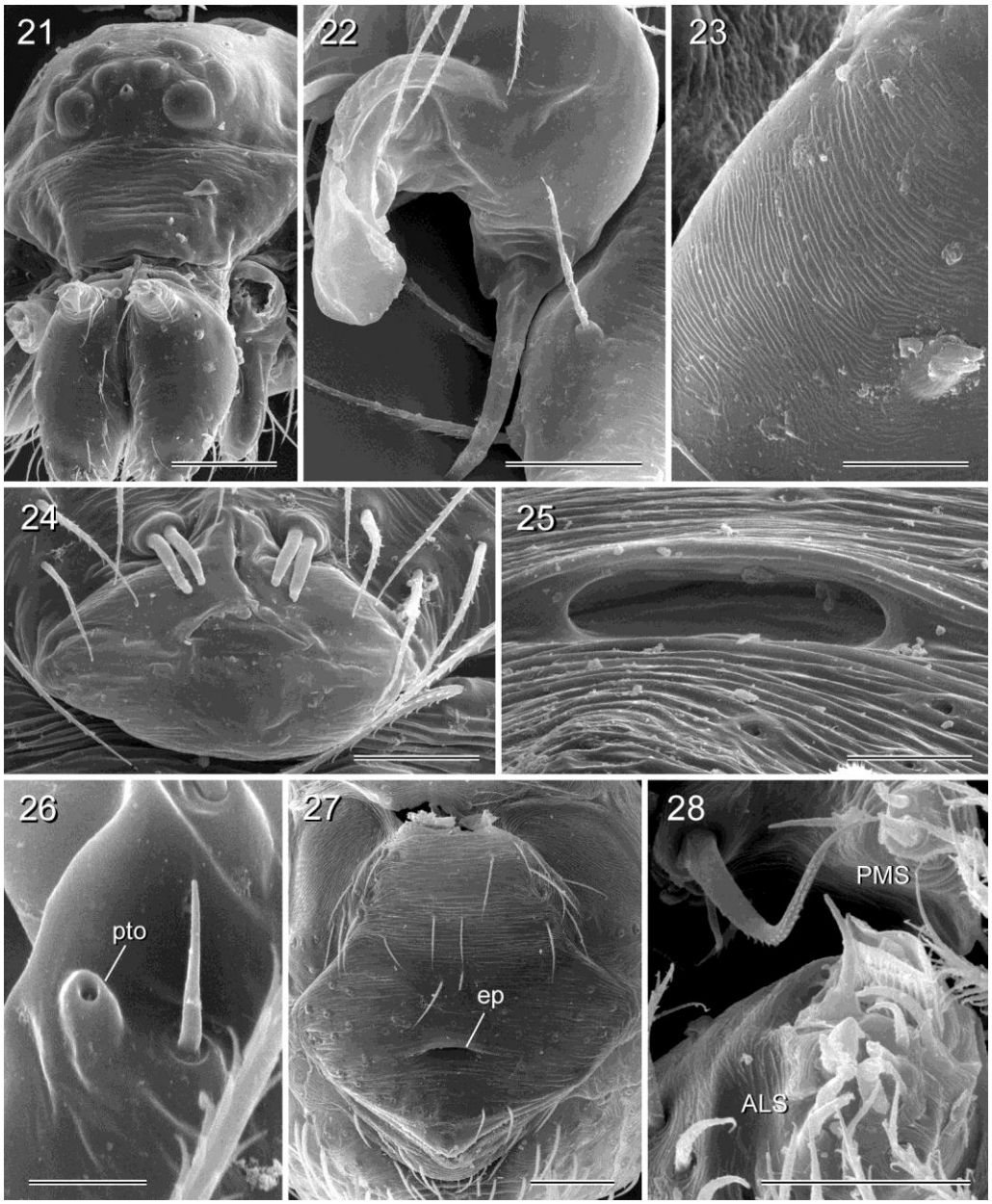
Distribution. Known from three localities in Toliara Prov., Madagascar (Fig. 29).

Material examined. MADAGASCAR: *Toliara:* Ifaty: type above, together with 4♂1♀ (1♂ used for SEM), same data, in USNM. Isalo [Massif de l'Isalo, ~23°12'S, 45°05'E], Oct. 22, 1995 (T. Kopf), 1♀ in ZFMK (Ar 009). Mahafaly, near Eloetse by Lac "Tsimanampetsoa" (Tsimanampetsotsa) (24°10'S, 43°45'E), Sept. 15–16, 1992 (V. & B. Roth), 4♀ in MCZ (34058).

Ninetis minuta (Berland, 1919)

New records. SOMALIA: *Jubbada Hose*: Sar Uanle [00°29'S, 42°25'E], ~20 km S Kismaayo, Oct. 24, 1971 ("S.B.S. (P.L.)"), 1♂ in MZUF. Same locality, pitfall trap, dune facing sea, June 10, 1973 (G. Messana et al.),

1♂ in MRAC (172.688). KENYA: Tsavo West, Kisima forest (03°31'S, 38°52'E), sieved litter, Dec. 6, 2000 (R. Jocqué), 1♀ in MRAC (209.976).



FIGURES 21–28. *Ninetis toliara* **n. sp. 21.** Male, frontal view, showing eyes, clypeus, and chelicerae. **22.** Genital bulb appendages. **23.** Stridulatory ridges on male chelicera. **24.** Male gonopore with epiandrous spigots. **25.** Pocket on epigynum, posterior view. **26.** Male palpal tarsal organ. **27.** Epigynum, ventral view. **28.** Female anterior lateral and posterior median spinnerets. ALS: anterior lateral spinnerets, ep: epigynal pocket, PMS: posterior median spinnerets, pto: palpal tarsal organ. Scale lines: 7 µm (26), 20 µm (23, 24, 25, 28), 40 µm (22), 100 µm (21, 27).

***Ninetis namibiae* Huber, 2000**

New records. All material collected by A. Russell-Smith. NAMIBIA: Natukanoka (18°35.8'S, 15°39.0'E), Etosha National Park, Nov. 8–12, 1996, 7♂1♀ in MRAC (215.611). Same locality, November 1996, 4♂1♀ in ZFMK (Ar 010). Same locality, Jan. 17, 1997, 1♂ in ZFMK (Ar 011). Etosha National Park, March 1998,

2♂1♀ in MRAC (215.632, 215.634). Etosha National Park, Helio Hill [19°02'S, 16°29'E], pitfall, March 15, 1998, 1♂1♀ in ZFMK (Ar 012). Same data but March 12, 1998, 1♀ in ZFMK (Ar 013). *Windhoek*: near Klein Windhoek, [22°33'S, 15°09'E], Jan. 19, 1997, 2♂12♀ in MRAC (215.839).

Variation. Specimens from Etosha National Park are slightly smaller than those from Windhoek, and the light median stripe on the epigynum is less distinct. Male chelicerae and palps are indistinguishable.

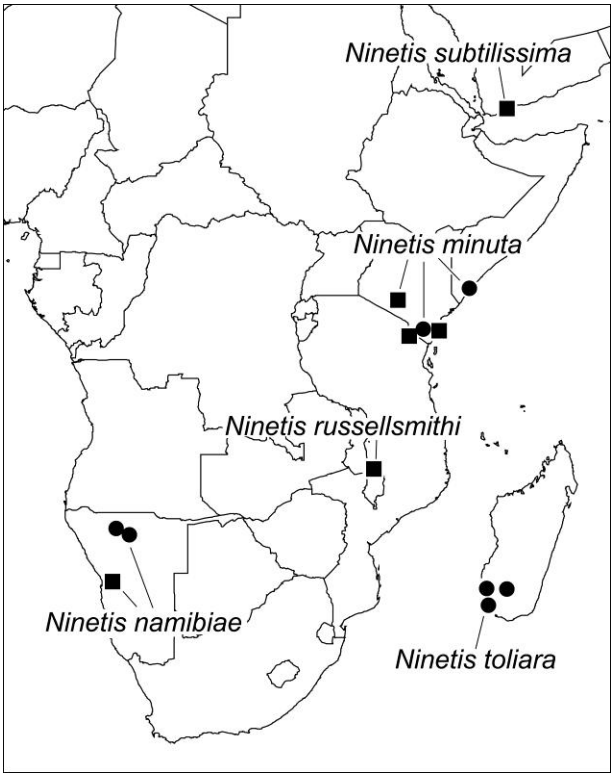


FIGURE 29. Known distribution of *Ninetis* Simon. Circles: new records, squares: previously published records.

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