



## Monograph of *Nylanderia* (Hymenoptera: Formicidae) of the World, Part I: *Nylanderia* in the Afrotropics

JOHN S. LAPOLLA<sup>1,4</sup>, PETER G. HAWKES<sup>2</sup> & BRIAN L. FISHER<sup>3</sup>

<sup>1</sup>Department of Biological Sciences, Towson University, Towson, Maryland USA 21252. E-mail: jlapolla@towson.edu

<sup>2</sup>AfriBugs CC, 379 Bakenkloof Street, Pretoria North, Gauteng Province, 0182, South Africa. Department of Zoology and Entomology, University of Pretoria, Pretoria, Gauteng Province, 0002, South Africa. E-mail: peter.hawkes@afribugs.com

<sup>3</sup>Department of Entomology, California Academy of Sciences, Golden Gate Park, 55 Music Concourse Drive, San Francisco, CA 94118. E-mail: bfisher@calacademy.org

<sup>4</sup>Corresponding author

### Abstract

The taxonomy of the Afrotropical *Nylanderia* fauna is revised for the first time. Fourteen native species are revealed, of which eight are described as new: *N. boltoni* LaPolla and Fisher, *N. brevisetula* LaPolla and Fisher, *N. impolita* LaPolla and Fisher, *N. luteafra* LaPolla and Fisher, *N. scintilla* LaPolla and Fisher, *N. silvula* LaPolla and Fisher, *N. umbella* LaPolla and Fisher, and *N. usambarica* LaPolla, Hawkes and Fisher. Two species, *N. jaegerskioeldi* and *N. natalensis*, have workers that are indistinguishable from each other, and males are the only reliable way to separate these two species. Three non-native *Nylanderia* species are thought to have been introduced to Africa: *N. bourbonica*, *N. vaga*, and *N. vividula*. An identification key to the worker caste is provided.

**Key words:** Afrotropics, Formicidae, *Nylanderia*, *Paraparatrechina*, *Prenolepis* genus-group

### Introduction

The Afrotropical *Nylanderia* fauna has been poorly known since the first native species from the region was described by Emery over 100 years ago (for a global review of the genus see LaPolla *et al.* earlier in this issue). Most species were described in the early part of the twentieth century, but these species descriptions were completed outside of a comparative framework and, apart from a cursory treatment by Bernard (1953), the fauna has been neglected taxonomically. Part of the reason for this neglect stems from the fact that to this day the Afrotropics remain one of the least collected regions for ants, and specimens of Afrotropical *Nylanderia* are still difficult to find in museum collections.

The Afrotropical *Nylanderia* fauna comprises 14 native species (and 3 introduced species) that display a wide range of morphological variation. For example, propodeal shape provides a key diagnostic feature for many species. Species such as *N. lepida* and *N. impolita* have strongly convex, dome-like dorsal faces of the propodeum, while species such as *N. boltoni* and *N. umbella* have very short, angular dorsal faces of the propodeum. Coloration ranges from light brown to yellowish colored workers as observed in *N. incallida* and *N. luteafra* to dark brown workers as observed in *N. lepida* and *N. mendica*. All castes of one species, *N. silvula*, are a deep reddish-brown (males and queens are darker than workers), an unusual coloration for *Nylanderia* species. Another interesting feature of several Afrotropical *Nylanderia* is that they display cuticular rugulae; globally, the vast majority of *Nylanderia* species have smooth cuticles. The species *N. brevisetula*, *N. incallida*, *N. impolita*, and *N. mendica* all possess rugulose cuticles, particularly on the head and mesopleuron. One species, *N. mendica*, stands out because it possesses distinct striations on the dorsum of the gaster.

Males are known in only a few Afrotropical *Nylanderia* species, but these show an interesting degree of morphological diversity in the genitalia, particularly the digiti and cuspi. While *N. boltoni*, *N. lepida*, *N. natalensis*, and *N. silvula* all have similar digiti and cuspi that are not particularly different from what is observed in male *Nylande-*

ria from other parts of the world, the digiti and cuspi of *N. jaegerskioeldi* and *N. waelbroeckii* are highly distinctive. Digiti are typically larger than the cuspi in *Nylanderia* species. In these two species the digiti are blade-like and smaller than the cuspi, which are much larger and unusually shaped. In *N. jaegerskioeldi* the cuspi are rounded distally and paddle-like with many teeth on the ectal surface. In *N. waelbroeckii* the cuspi are horn-like, with a distal extension of the structure.

*Nylanderia* species are found throughout the continent of Africa, with the majority of species being found in the equatorial rainforests (see figs. 107 & 108). Three species are found outside of rainforest habitats: *N. natalensis* in southern Africa; *N. boltoni* in western, eastern and southern Africa; and the far ranging *N. jaegerskioeldi* in eastern, northern, and western Africa. *Nylanderia jaegerskioeldi* is of particular interest because it appears to be the only Afrotropical species that occurs outside of this biogeographic region, ranging into the Palearctic (North Africa and, perhaps, the northern Mediterranean region). Afrotropical *Nylanderia* species are apparently absent from much of the southern deserts of the continent, and it is particularly surprising that there do not seem to be any endemic species found in the Western Cape Province of South Africa, an area known for high insect endemism. All three authors have collected in the Western Cape, but failed to find new species of *Nylanderia* there.

We present here the first taxonomic revision of the Afrotropical *Nylanderia* with the hope of correcting some of the taxonomic neglect that has plagued this fauna. This work is based largely on worker morphology because for the vast majority of species males remain unknown. However, to underscore the potential importance of males two species, *N. jaegerskioeldi* and *N. natalensis*, have workers that are indistinguishable from each other, and males are the only reliable way to separate these two species. We describe 8 new species, but we expect that more new species will be discovered as new collections are made from across the region.

## Material and methods

Specimens examined for this study are deposited in the following institutions:

BMNH	Natural History Museum, London, UK
CASC	California Academy of Sciences, San Francisco, USA
MSNG	Museo Civico di Storia Naturale “Giacomo Doria,” Genova, Italy
MNHN	Muséum National d’Histoire Naturelle, Paris, France
MHNG	Muséum d’ Histoire Naturelle, Geneva, Switzerland
NHMB	Naturhistorisches Museum, Basel, Switzerland
NMKE	National Museum of Kenya, Nairobi, Kenya
SAMC	South African Museum, Cape Town, South Africa
USNM	National Museum of Natural History, Washington, D.C., USA

All measurements were taken at various powers (4x, 5x, 6.3x, 8x and 10x) with a Nikon microscope using an orthogonal pair of micrometers, recorded to the nearest 0.001 mm, and rounded to two decimal places for presentation. All measurements are given in millimeters. Digital color images were created using a JVC KY-F75 digital camera and Syncroscopy Auto-Montage (v 5.0) software. Morphological terminology for measurements and indices employed throughout are defined as (following Bolton, 1994 and Ward, 2001 with modifications):

- EL (Eye Length): maximum length of compound eye in full-face view.
- GL (Gaster Length): the length of the gaster in lateral view from the anteriormost point of the first gastral segment (third abdominal segment) to the posteriormost point.
- HL (Head Length): the length of the head proper, excluding the mandibles; measured in full-face view from the midpoint of the anterior clypeal margin to a line drawn across the posterior margin from its highest points (to accommodate species where the posterior margin is concave).
- HW (Head Width): the maximum width of the head in full-face view (in males, portion of the eyes that extends past the lateral margins of the head is included).
- MMC (Mesonotal Macrosetal Count): the number of erect macrosetae on mesonotum to one side of sagittal plane.
- PW (Pronotal Width): the maximum width of the pronotum in dorsal view.

- PDH (Propodeum Height): height of the propodeum as measured in lateral view from the base of the metapleuron to the maximum height of the propodeum.
- PMC (Pronotal Macrosetal Count): the number of erect macrosetae on pronotum to one side of sagittal plane.
- SL (Scape Length): the maximum length of the antennal scape excluding the condylar bulb.
- SMC (Scape Macrosetal Count): the number of erect macrosetae on the scape. Scape macrosetae can be difficult to count and the scape may need to be rotated to get an accurate count. This count does not include the terminal cluster of setae often found around the joint of the scape and the funiculus.
- TL (Total Length):  $HL + WL + GL$
- WL (Weber's Length): in lateral view, the distance from the posteriormost border of the metapleural lobe to the anteriormost border of the pronotum, excluding the anterior cervical flange.
- CI (Cephalic Index):  $(HW/HL) \cdot 100$
- REL (Relative Eye Length Index):  $(EL/HL) \cdot 100$
- SI (Scape Index):  $(SL/HW) \cdot 100$

For specimens where latitude and longitude data was not provided on the label, when possible we estimated it (indicated by an asterisk).

For discussion on the use of the term macroseta (vs macrochaeta) see LaPolla *et al.* (earlier this issue). Macrosetal counts on scapes are given for number of macrosetae on one scape; on the pronotum and mesonotum macrosetal counts are for one side of the sagittal plane.

### Synopsis of Afrotropical *Nylanderia* species

- N. boltoni* LaPolla and Fisher, **sp. nov.** West Africa to East Africa to South Africa
- N. brevisetula* LaPolla and Fisher, **sp. nov.** Cameroon, Gabon, and Ivory Coast
- N. impolita* LaPolla and Fisher, **sp. nov.** Widespread throughout West Africa
- N. incallida* (Santschi, 1915) Equatorial Guinea, Ghana, and Ivory Coast  
= *N. arlesi* (Bernard, 1953), **syn. nov.**
- N. lepida* (Santschi, 1915) Widespread throughout West Africa  
= *N. grisoni* (Forel, 1916), **syn. nov.**  
= *N. grisoni fuscula* (Menozzi, 1942), **syn. nov.**
- N. luteafra* LaPolla and Fisher, **sp. nov.** Cameroon and Gabon
- N. mendica* (Menozzi, 1942) Widespread throughout West Africa
- N. natalensis* (Forel, 1915), **stat. nov.** Southern Africa north to Zimbabwe & Mozambique
- N. scintilla* LaPolla and Fisher, **sp. nov.** Ivory Coast
- N. silvula* LaPolla and Fisher, **sp. nov.** Kenya
- N. jaegerskioeldi* (Mayr, 1904) East, North (west to Canary Islands) and West Africa  
= *N. jaegerskioeldi borcardi* (Santschi, 1908)  
= *N. traegaordhi* (Forel, 1904), **syn. nov.**  
= *N. weissi* (Santschi, 1911), **syn. nov.**  
= *N. weissi nimba* (Bernard, 1953), **syn. nov.**  
= *N. zelotypa* (Santschi, 1915), **syn. nov.**
- N. umbella* LaPolla and Fisher, **sp. nov.** Cameroon and Uganda
- N. usambarica* LaPolla, Hawkes and Fisher, **sp. nov.** Tanzania
- N. waelbroeckii* (Emery, 1899) D.R. Congo

### Introduced species to the region

- N. bourbonica* (Forel, 1886)
- N. vaga* (Forel, 1901)
- N. vividula* (Nylander, 1846)

## Key to Afrotropical *Nylanderia* workers

\*These species are thought to be introduced species to the Afrotropical region. The species boundaries of *bourbonica* and *vaga* are poorly defined and are being revised by JSL and others. One species, *N. vividula*, is reported from the Afrotropics, but we have not seen specimens of this species from the region. Males would be particularly useful because they have distinctive genitalia, unlike any African species. We include this species in the key because past reports have noted its presence in the Afrotropics.

1. Dorsal face of propodeum much shorter than declivitous face; in lateral view, propodeum lower than remainder of dorsum, dorsally angular or gently rounded (figs. 2, 5, 17, 41, 47, 59, 62, 65, & 68) ..... 2
  - Dorsal face of propodeum distinctly rounded, about the same length as declivitous face; in lateral view, propodeum higher than or equal to remainder of dorsum, dorsally dome-like (figs. 8, 11, 14, 26, 35, 38 & 50) ..... 10
2. Fewer than 10 erect macrosetae present on each scape (fig. 88) ..... *vividula*\*
  - More than 10 erect macrosetae present on each scape ..... 3
3. Dark brown color overall ..... 4
  - Lighter yellow brown color overall. .... 6
4. Mesopleuron with a dense layer of pubescence (fig. 5) ..... *bourbonica*\*
  - Mesopleuron either without or with sparse pubescence (figs. 59 & 65). .... 5
5. Dorsal face of propodeum gently rounded in profile; antennae and legs only slightly lighter than remainder of body... *vaga*\*
  - Dorsal face of propodeum very short with straight margin in profile; antennae and legs distinctly whitish-brown, sharply contrasting with remainder of body ..... *umbella*
6. Dorsal face of propodeum very short and angular (figs. 2 and 47). .... 7
  - Dorsal face of propodeum gently rounded and convex (figs. 17, 41, and 62) ..... 8
7. Mesocoxae and metacoxae lighter than procoxae. .... *boltoni*
  - Mesocoxae and metacoxae the same color as procoxae ..... *scintilla*
8. Macrosetae on pronotum abundant (PMC = 10–22); macrosetae on head, mesosoma and legs dark, contrasting strongly with the much lighter cuticle. .... *usambarica*
  - Macrosetae on pronotum not particularly abundant (PMC = 3–10); macrosetae on head, mesosoma and legs about the same color as cuticle. .... 9
- 9\*\*. Southern Africa (Botswana, South Africa, Mozambique, and Zimbabwe) ..... *natalensis*
  - Eastern, northern and western Africa ..... *jaegerskioeldi*
10. Entire body dark brown, except for sharply contrasting, almost white protrochanters, mesocoxae and metacoxae ..... 11
  - Body color variable, but if dark brown then mesocoxae and metacoxae are the same color as mesosoma ..... 12
11. Head and mesopleuron cuticle smooth to sometimes slightly rugulose; head length between 0.53–0.68 mm; scape length between 0.60–0.81 mm ..... *lepida*
  - Head and mesopleuron cuticle distinctly rugulose; head length 0.70–0.80 mm; scape length between 0.91–0.98 mm ..... *impolita*
12. Gastral cuticular surface with distinct striations running lengthwise on dorsum (fig. 39); lateral portions of pronotum rugulose (fig. 38) ..... *mendica*
  - Gastral cuticular surface smooth or with faint gastral cuticle striations; lateral portions of pronotum smooth ..... 13
13. Mesosomal macrosetae very short (fig. 8) ..... *brevisetula*
  - Mesosomal macrosetae not short (fig. 14, 35, & 50) ..... 14
14. Body yellow, contrasting with darker erect setae, especially noticeable on the gaster. .... *luteafra*
  - Body color variable, but erect setae not conspicuously darker than remainder of body. .... 15
15. Head, mesosoma and gaster a solid dark reddish-brown; scape length between 0.95–1.04 mm ..... *silvula*
  - Head, mesosoma and gaster yellowish-brown; scape length between 0.74–0.8 mm ..... *incallida*

\*\* Workers of *natalensis* and *jaegerskioeldi* cannot be reliably identified to species. However, males of the two species can be easily distinguished (see figs. 95–100). Geographically, *natalensis* appears to be restricted to southern Africa and *jaegerskioeldi* is found in East, North and West Africa.

## Species accounts

The species diagnoses provided apply only for identifying species in Africa and are not intended as global diagnoses for *Nylanderia* in other parts of the world.

***Nylanderia boltoni* LaPolla and Fisher, sp. nov.**

(Figs. 1–3, 73 [worker]; 89–91 [male])

Holotype worker, GABON: F.C. Mondah, 21 km 331° NNW Libreville, 00°34'36" N, 009°20'06" E, elev. 10 m; 24.ii.1998 (B.L. Fisher) (CASC) (CASENT0179580); 1 paratype worker, same label data as holotype (USNM); 1 paratype worker, CENTRAL AFRICAN REPUBLIC: P.N. Dzanga-Nodki, 21.4km 53 NE Bayanga, 3 02.01'N, 16 24.57'E, 510 m, 1–7.v.2001 (S. van Noort) (USNM).

**Worker diagnosis:** Head width less than 0.48 mm; yellowish-brown to brown species, with very short, angular propodeal dorsal face; mesocoxae and metacoxae lighter than procoxae in color.

**Compare with:** *N. scintilla* and *N. umbella*

**WORKER. Measurements** ( $n = 4$ ): TL: 1.8–2.3; HW: 0.40–0.47; HL: 0.52–0.61; EL: 0.12–0.15; SL: 0.52–0.64; PW: 0.29–0.37; WL: 0.56–0.69; GL: 0.76–1.0

**Indices:** CI: 77–81; REL: 22–25; SI: 121–136

Overall yellowish brown, with lighter brown to yellow mandibles, antennae, and legs; head and gaster typically darker brown than mesosoma, although in some specimens the mesosoma is the same color as the head and gaster, or just the anterior portion of the pronotum is the same color; cuticle smooth and shining; coxae may be entirely yellowish-brown in color; in some specimens mesocoxae and metacoxae slightly lighter in color than procoxae. Head with a dense layer of pubescence; scapes surpass posterior margin by about the length of the first two funicular segments; scapes with scattered erect macrosetae and a dense layer of pubescence (SMC = 13–16); posterior margin with rounded posterolateral corners, slightly emarginate medially. Mesosoma with erect macrosetae of varying lengths concentrated on posterior pronotum and mesonotum (PMC = 2–4; MMC = 2–4); pubescence scattered across mesosomal notum; metanotal area compact; dorsal face of propodeum angular and low (lower than mesonotum) with very short dorsal face and longer declivitous face; propodeal dorsum with pubescence; declivity smooth and shining with no pubescence. Gaster with erect macrosetae and a dense layer of pubescence.

The queen caste is currently unknown for this species.

**MALE. Measurements** ( $n = 1$ ): TL: 2.0; HW: 0.48; HL: 0.48; EL: 0.22; SL: 0.56; PW: 0.42; WL: 0.78; GL: 0.78

**Indices:** CI: 100; REL: 45; SI: 117

Overall head and gaster light brown, with lighter brown to yellowish-brown antennae, mesosoma, tibia and tarsi; cuticle smooth and shining with short appressed pubescence on head, dorsal mesosoma and gaster with slightly longer pubescence. Compound eyes strongly convex (more than half the length of the lateral margin), with raised ocelli. Scapes surpass posterior margin by about length of first four funicular segments; scapes with sparsely scattered erect macrosetae (SMC = 2–4) and short appressed pubescence. Mandible with small, but distinct, apical tooth, margin emarginate behind, followed by a small, indistinct denticle; basal angle distinct. Mesosoma with short, appressed pubescence and scattered erect macrosetae (PMC = 0; MMC = 7–9) dorsally; dorsal face slightly sloped, well below level of mesonotum; dorsal face and declivitous face about the same length. Gaster with longer pubescence than on mesosoma and scattered suberect and erect macrosetae. Genitalia (figs. 89–91): parameres broadly rounded at apices curving dorsally (such that they obscure some of the genitalia in dorsal view); apical margin of parameres emarginate; ventral margin of parameres at an acute angle; cuspi elongated, apices rounded with peg-like teeth on ental surface where they meet digit; digiti apices broad; peg-like teeth at apices dorsally, ventrally coming to a narrow point that curves towards parameres.

**Etymology.** Named to honor Barry Bolton (retired – Natural History Museum, London) for his truly exceptional contributions to ant systematics and for his kind support of JSL and BLF over the years. It seems to us especially fitting to name an African ant species after Barry because he has contributed enormously to our understanding of African ant systematics through his many publications on the topic.

**Non-type material examined. GABON:** Prov. Ogooue-Maritime, Reserve de la Moukalaba-Dougoua, 12.2 km 305° NW Doussala, 2°17.00' S, 10°29.83' E, 110 m, 26 Feb 2000 (B.L. Fisher); Prov. Ogooue-Maritime, Reserve de la Moukalaba-Dougoua, 12.2 km 305° NW Doussala, 2°17.00' S, 10°29.83' E, 110 m, 1–2 March 2000 (S. van Noort); Prov. Estuaire Pointe Ngombe, Ekwata, 16 km 240° WSW Libreville, 0°19.5' N, 9°18.7' E, 5 m, 27 March 2000 (B.L. Fisher); Prov. Ogooue-Maritime, Reserve de la Moukalaba-Dougoua, 7 km NW Doussala, 2°19.84' S, 10°32.65' E, 110 m, 21 March 2000 (S. van Noort); **GHANA:** Legon AD, 5°36.635' N, 0°10.899' W\*, 13 Aug 1970 (D. Leston); **KENYA:** Western Province, Mumias, 1299 m (G. Fischer); **NIGERIA:** Obudu,

6°40.000' N, 9°10.000' E\*, 1971 (J.T. Medler); Gambari Forest Reserve, 7°8.000' N, 3°50.000' E\*, 31 Dec 1969 (B. Bolton); Owena, CRIN (Cocoa Research Institute of Nigeria), 7°11.663' N, 5°1.389' E\*, 24 Sept 1975 (B. Taylor); **SOUTH AFRICA:** Limpopo Prov., Dwars River, 980 m, 24.97113 S, 30.10259 E, 25–29.iii.2008 (P. Hawkes *et al.*); **TANZANIA:** Pwani Region, Mlola Forest, Mafia Island, 20 m, 7.89576 S, 39.82842 E, 9–13.iii.2008 (P. Hawkes *et al.*).

**Notes.** This species has one of the widest ranges of any Afrotropical *Nylanderia* (the other being *N. jaegerski-oeldi*) being found in West, East and South Africa. Given this large range, spanning several bioclimatic regions, there are some questions as to conspecificity, but the workers from all regions are morphologically very similar to each other, with minor variations noted in color. Males are only known from the Ghana specimens (which were in particularly poor condition) and more collecting of nest series from across the species range would be informative. This species is most likely to be confused with *N. umbella* and *N. scintilla*. It can be separated from *N. umbella* by the fact that *N. umbella* is a much darker brown species, with distinctly contrasting yellowish-brown mesocoxae and metacoxae. The distinction between *N. boltoni* and *N. scintilla* can be more difficult, but in *N. scintilla* the coxae are the same color.

***Nylanderia brevisetula* LaPolla and Fisher, sp. nov.**

(Figs. 7–9, 75 [worker])

Holotype worker, GABON: Ogooue-Maritime: Aire d'Exploit. Rationnelle de Faune des Monts Doudou, 24.3 km 307° NW Doussala, 02°13'35"S 010°24'35" E, elev. 375 m, 6.iii.2000 (B.L. Fisher) (CASC) (CASENT0179575); 6 paratype workers, same label data as holotype (CASC, USNM)

**Worker diagnosis:** Head and mesosoma brown to reddish brown, with darker brown gaster; suberect setae on pronotum and mesonotum distinctly short.

**Compare with:** *N. mendica*

**WORKER. Measurements** ( $n = 6$ ): TL: 2.40–2.80; HW: 0.50–0.70; HL: 0.67–0.71; EL: 0.14–0.18; SL: 0.80–0.90; PW: 0.39–0.45; WL: 0.85–0.92; GL: 0.88–1.16

**Indices:** CI: 85–92; REL: 19–26; SI: 137–142

Head and mesosoma brown to reddish brown, with gaster dark brown, yellowish around acidopore; mandibles, antennae, trochanters, joints of legs and tarsi yellowish. Head rugulose; pronotum smooth and shining, with a few specimens faintly rugulose; gaster faintly striated; mesonotum, mesopleuron, and propodeum faintly rugulose in places. Posterior margin of head broadly rounded, with distinctly rounded posterolateral corners; medially posterior margin slightly emarginate. Scapes surpass posterior margin by about the length of the first 3–4 funicular segments; scapes with erect macrosetae ( $SMC \geq 25$ ) and an abundant layer of decumbent pubescence. Pronotum and mesonotum with scattered, distinctly short, erect to suberect macrosetae ( $PMC = 2-3$ ;  $MMC = 2-4$ ); pronotum gently rounded toward mesonotum; mesonotum distinctly rugulose; metanotal area elongate and rugulose; dorsal face of propodeum rounded, although lower than mesonotum; dorsal face shorter than declivitous face. Dorsally gastral segments with short, erect to appressed macrosetae, with macrosetae becoming slightly longer posteriorly; gaster with a layer of pubescence and appressed macrosetae.

The queen and male castes are currently unknown for this species.

**Etymology.** The species epithet *brevisetula* is a combination of *brevi* (L. = short) and *seta* (L. = bristle) with a Latin diminutive ending (*ula*), referring to the unusually short dorsal macrosetae of the workers.

**Non-type material examined.** **CAMEROON:** Mbalmayo, 3°30.932' N, 11°30.051' E\*, Nov 1993 (N. Stork); **GABON:** Prov. Ogooue-Maritime Res Monts Doudou, 24.3 km, 307° NW Doussala, 2°23.4' S, 10°24.4' E, 375 m, 6 March 2000 (B.L. Fisher); Prov. Ogooue-Maritime Res Monts Doudou, 24.5 km, 307° NW Doussala, 2°14.0' S, 10°23.9' E, 630 m, 18 March 2000 (B.L. Fisher); Prov. Ogooue-Maritime Res des Monts Doudou, 25.2 km, 304° NW Doussala, 2°13.6' S, 10°23.7' E, 640 m, 19 March 2000 (B.L. Fisher); **IVORY COAST:** Tai Forest, 5°19.343' N, 6°33.314' W\*, 15 Aug 1975 (T. Diomande); Sassandra, 4°57.133' N, 6°5.100' W\*, 16 March 1977 (I. Lobi)

**Notes.** This is an unusual *Nylanderia* species with macrosetae on the pronotum and mesonotum both short and suberect. It may be confused with *N. mendica*, because *N. brevisetula* has a rugulose head similar to that of *N. mendica* and the macrosetae on the pronotum and mesonotum of *N. mendica* are also fairly short, though not as short as in *N. brevisetula*. *N. mendica* also has distinct striations both dorsally and ventrally on the gaster, whereas *N. bre-*

*visetula* only occasionally has faint striations dorsally on its gaster. Finally, *N. mendica* has a pronotum with lateral striations whereas *N. brevisetula* has a smooth pronotum laterally. We suspect based on the rugulose cuticles (generally an unusual condition in *Nylanderia*), similarly shaped heads, and the short macrosetae observed in both *N. brevisetula* and *N. mendica* that these two species are closely related.

***Nylanderia impolita* LaPolla and Fisher, sp. nov.**

(Figs. 10–12, 76 [worker])

Holotype worker, GABON: Prov. Ogoové-Maritime: Réserve des Monts Doudou, 24.3 km 307° NW Doussala, 2°13.35' S, 10°24.35' E, elev. 350 m; malaise trap, coastal lowland rainforest, forest margin along river; 9–10.iii.2000 (S. van Noort) (CASC) (CASENT0179589); 1 paratype worker, same label data as holotype; 1 paratype worker with same label data as holotype except date: 8.iii.2000; 1 paratype worker with same label data as holotype except date: 6–7.iii.2000 (CASC, USNM)

**Worker diagnosis:** Overall dark brown with rugulose head and mesosoma; SL  $\geq$  0.9 mm.

**Compare with:** *N. lepida*

WORKER. *Measurements* ( $n = 6$ ): TL: 2.6–3.1; HW: 0.59–0.74; HL: 0.7–0.8; EL: 0.17–0.18; SL: 0.91–0.98; PW: 0.4–0.48; WL: 1.0–1.05; GL: 0.9–1.4

*Indices:* CI: 83–93; REL: 21–24; SI: 131–161

Overall the worker of *N. impolita* matches the description of *N. lepida* with the following differences: 1) larger overall size (TL: 2.6–3.1); 2) scape length  $\geq$  0.9 mm; 3) head and mesosoma rugulose; 4) mesopleuron with distinct rugulae; 5) mesosoma more elongated with lower pronotum than in *N. lepida* (WL  $\geq$  1.0 mm); 6) generally with more erect macrosetae present on the scapes (SMC > 20, often exceeding 30).

The queen and male castes are currently unknown for this species.

**Etymology.** The specific epithet *impolita* (L. = unpolished) is in reference to the fact this species possesses a rugulose cuticle on the head and mesosoma.

**Non-type material examined.** **ANGOLA:** 7 miles west Gabela, 10°15.209' S, 14°22.216' E\*, 16–18 March 1975; **CENTRAL AFRICAN REPUBLIC:** PN Dzanga-Ndoki, Mabea Bai, 21.4 km, 53° NE Bayanga, 3°02.00' N, 16°24.60' E, 510 m, 7 May 2001 (B.L. Fisher); **GABON:** Prov. Ogooue-Maritime, Reserve des Monts Doudou, 24.3 km 307° NW Doussala, 2°13.35' S, 10°24.35' E, 350 m, 6–8 March 2000 (S. van Noort); Prov. Ogooue-Maritime, Reserve des Monts Doudou, 24.3 km 304° NW Doussala, 2°13.63' S 10°23.67' E, 600 m, 16–18 March 2000 (S. van Noort); Prov. Woleu-Ntem 31.3 km 108° ESE Minvoul, 2°04.8'N 12°24.4' E, 600 m, 12 Feb 1998 (B.L. Fisher); **GHANA:** Enchi, 5°49.074' N, 2°49.466' W\*, 28 May 1967 (D. Leston); Bunso nr. Tafo, 6°12' N, 1°49' W\*, 30 July 1969 (D. Leston); Atewa, 6°10.000' N, 0°36.000' W\*, 8 Aug 1964 (D. Leston)

**Notes.** This species has one of the longest scapes of any African *Nylanderia* (SL  $\geq$  0.9). It is most likely to be confused with *N. lepida*, but *N. lepida* is generally smaller in overall size and its cuticle is typically very smooth and shining.

***Nylanderia incallida* (Santschi, 1915)**

(Figs. 13–15, 77 [worker])

*Prenolepis* (*Nylanderia*) *incallida* Santschi, 1915: 263 (worker described). Holotype worker, EQUATORIAL GUINEA: São Tome Island (NHMB) [examined]. Emery, 1925: 218, combination in *Paratrechina* (*Nylanderia*); LaPolla *et al.*, 2010: 127, combination in *Nylanderia*.

*Paratrechina arlesi* Bernard, 1953: 257 (worker described). 3 syntype workers, GUINEA (MNHN) [examined]. LaPolla *et al.*, 2010: 127, combination in *Nylanderia*. **SYN. NOV.**

**Worker diagnosis:** Overall brown, gaster with faint dorsal bands of lighter yellowish-brown along segmental lines.

**Compare with:** *N. luteafra*

WORKER. *Measurements* ( $n = 6$ ): TL: 2.5–2.7; HW: 0.5–0.6; HL: 0.6–0.7; EL: 0.14–0.16; SL: 0.74–0.8; PW: 0.4–0.43; WL: 0.81–0.85; GL: 1.1–1.18

*Indices:* CI: 82–87; REL: 23–25; SI: 139–147.

Overall yellowish brown, with lighter brown to yellow antennae and legs; head with lighter brown to yellow patch medially around torulae distally including all of clypeus; gaster with faint dorsal bands of lighter color along segmental lines towards acidopore; head, metanotal area and mesopleuron faintly rugulose, otherwise cuticle smooth and shining; trochanters, mesocoxae, and metacoxae yellowish-brown to whitish. Head with a layer of pubescence; posterior margin with slightly angular posterolateral corners; scapes surpass posterior margin by about the length of the first 3–3.5 funicular segments; scapes with scattered erect macrosetae and a layer of pubescence (SMC = 20–24). Mesosoma with erect macrosetae of varying lengths (PMC = 3–6, MMC = 2–4); metanotal area elongate and rugulose; dorsal face of propodeum dome-like, at about the same height as mesonotum; dorsal and declivitous face about the same length; propodeum with scattered pubescence, especially on dorsal face. Gaster with abundant erect macrosetae and scattered pubescence.

The queen and male castes are currently unknown for this species.

**Non-type material examined.** **GHANA:** Mampong, 7°3.641' N, 1°24.266' W\*, 7 April 1970 (P. Room); **IVORY COAST:** Tai Forest, 5°19.343' N, 6°33.314' W\*, 15 Aug 1975 (T. Diomande)

**Notes.** Bernard's *N. arlesi* type specimens match the type specimens of *N. incallida* very well, which is why we propose the synonymy of *N. arlesi*. The faint dorsal bands of lighter yellowish-brown along the segmental lines of the gaster observed in *N. incallida* make this a fairly easy species to identify and separates it from *N. luteafra*, to which it is most likely to be confused.

### *Nylanderia jaegerskioeldi* (Mayr, 1904)

(Figs. 16–18, 78 [worker]; 19–21 [queen]; 22–24, 98–100[male])

*Prenolepis jaegerskioeldi* Mayr, 1904: 8 (worker described). EGYPT [not examined, depository unknown]. Emery, 1910: 130 (queen and male described); Santschi, 1914: 128, combination in *Prenolepis* (*Nylanderia*); Emery, 1925: 218, combination in *Paratrechina* (*Nylanderia*); LaPolla *et al.*, 2010: 127, combination in *Nylanderia*.

*Prenolepis* (*Nylanderia*) *jaegerskioeldi* var. *borcardi* Santschi, 1908: 533. NORTH AFRICA [not examined, depository unknown]. Emery, 1910: 130, junior synonym of *jaegerskioeldi* (synonymy transferred this study).

*Prenolepis traegaardhi* Forel, 1904: 14 (worker and male described). 1 syntype worker and 2 syntype males, SUDAN (MHNG) [examined]. Forel, 1915: 348, combination in *Prenolepis* (*Nylanderia*); Emery, 1925: 218, combination in *Paratrechina* (*Nylanderia*); LaPolla *et al.*, 2010: 127, combination in *Nylanderia*. **SYN. NOV.**

*Prenolepis* (*Nylanderia*) *weissi* Santschi, 1911: 210 (worker described). 19 syntype workers, CONGO: Brazzaville (NHMB) [examined]. Emery, 1925: 218, combination in *Paratrechina* (*Nylanderia*); LaPolla *et al.*, 2010: 127, combination in *Nylanderia*. **SYN. NOV.**

*Prenolepis* (*Nylanderia*) *jaegerskioeldi* var. *zelotypa* Santschi, 1915: 264 (worker described). Holotype worker, EAST AFRICA (NHMB) [examined]. Santschi, 1919: 238, raised to species; Emery, 1925: 218, combination in *Paratrechina* (*Nylanderia*); LaPolla *et al.*, 2010: 127, combination in *Nylanderia*. **SYN. NOV.**

*Paratrechina weissi nimba* Bernard, 1953: 258 (worker and queen described). 3 syntype workers, GUINEA: Keoulenta (MNH) [examined]. LaPolla *et al.*, 2010: 127, combination in *Nylanderia*. **SYN. NOV.**

**Worker diagnosis:** Overall brown, with abundant pubescence on head, anterior portions of pronotum, mesonotum, and gaster.

**Compare with:** *N. natalensis*

**WORKER.** *Measurements* ( $n = 6$ ): TL: 1.9–2.6; HW: 0.48–0.7; HL: 0.57–0.76; EL: 0.13–0.18; SL: 0.59–0.82; PW: 0.34–0.47; WL: 0.65–0.88; GL: 0.76–1.04

*Indices:* CI: 84–94; REL: 23–26; SI: 115–126

Overall yellowish brown, with lighter brown to yellow mandibles, antennae, pronotum, metanotum, and legs; cuticle smooth; coxae usually all the same color, but in some specimens procoxae slightly darker. Body covered in abundant pubescence, especially head, anterior portions of pronotum, mesonotum, and gaster. Head with a dense layer of pubescence; posterolateral corners slightly angular in full-face view, giving the head a subquadrate appearance. Scapes surpass posterior margin by about the length of the first 2–3 funicular segments; scapes with scattered erect macrosetae and a layer of pubescence (SMC = 17–31). Mesosoma with erect macrosetae (PMC = 3–10; MMC = 2–5) and an abundant layer of pubescence, particularly on notum and propodeum; metanotal area compact; propodeum low (lower than mesonotum), with short, angular dorsal face and longer declivitous face; propodeal dorsum with pubescence; declivitous face smooth and shining, without pubescence. Gaster with abundant erect macrosetae and pubescence.



QUEEN. *Measurements* ( $n = 2$ ): TL: 4.8–4.9; HW: 0.92–0.94; HL: 0.94–0.96; EL: 0.32–0.36; SL: 0.9–1.0; PW: 1.2–1.3; WL: 1.4–1.6; GL: 2.3–2.4

*Indices*: CI: 97–98; REL: 35–37; SI: 98–104

As in worker, with modifications expected for caste. Entire body covered in a dense pubescence; eyes large, but not strongly convex, slightly less than half the length of the head lateral margin (SMC = 10–15; PMC = 0–2; MMC = 20–24).

MALE. *Measurements* ( $n = 2$ ): TL: 2.5–2.6; HW: 0.63–0.64; HL: 0.64–0.65; EL: 0.25–0.29; SL: 0.78–0.8; PW: 0.61–0.62; WL: 0.71–0.89; GL: 0.96–1.2

*Indices*: CI: 97–99; REL: 39–45; SI: 120–123

Overall the male of *N. jaegerskioeldi* is very similar to the male of *N. natalensis*. *N. jaegerskioeldi* is overall more pubescent than *N. natalensis*, but the major distinguishing differences between the males of these two species are found in the genitalia. Genitalia (figs. 98–100): parameres with steeply rounded ventral margin; toward paramere apices, finger-like projections directed dorsally; cuspi large and rectangular with many with peg-like teeth on ental surface where they meet digiti; digiti distinctly smaller than cuspi, blade-like; digiti with peg-like teeth on thin margin that meets cuspi.

**Non-type material examined.** CANARY ISLANDS (SPAIN): Tenerife Golf Sur, 28°01'37" N, 16°36'14" W, 593 m, 11 Dec 2002 (X. Espadaler); **CENTRAL AFRICAN REPUBLIC**: Res. Dzanga-Sangha, 12.7 km, 326° NW Bayanga, 3°00' N, 16°12'E, 370 m, 10–17 May 2001 (B.L. Fisher); PN Dzanga-Ndoki, 21.4 km 53° NE Bayanga, 3°02.01' N 16°24.57'E, 510 m, 6 May 2001 (S. van Noort); Res. Dzanga-Sangha, 12.7 km, 326° NW Bayanga, 3°00.27' N, 16°11.55' E, 420 m, 13 May 2000 (S. van Noort); **KENYA**: Kakamega District, Kakamega Forest: Isecheno; 0.02° N, 34.97° E, 1800 m, 16 Oct 1999 (coll. R.R. Snelling); Western Province, Mumies, Aug 2008 (G. Fischer); Kakamega District, Kakamega Forest, Isecheno, 0.02° N, 34.97° E, 18 June 2007 (M. Pelers); Magombo Kisii, 0°40.388' S, 34°54.855' E, 1935 m, 3 Nov 1976 (P. Werff)

**Notes.** This species has perhaps the widest range of any Afrotropical *Nylanderia*, found across equatorial Africa, northward through North Africa, to as far west as the Canary Islands. It is also apparently the only one that ranges outside of the Afrotropics. Despite the similarity of workers with *N. natalensis*, males of this species are very distinct and different, and seem to indicate the species is not particularly closely related to *N. natalensis*. The parameres have unique dorsal, finger-like extensions that display some variation in length. The digiti are reduced and blade-like, with large, paddle-like cuspi that are unlike any other species in the region. See notes for *N. natalensis* for further discussion on distinguishing these two species.

As conceived here this is a broadly defined species with a range of color, size and setation observed. Despite this, we could find no means morphologically to reliably segregate this variation into distinct species, thus the heterogeneous species defined in this study. This is a good candidate species for containing cryptic species. This species would benefit from further study especially once more specimens are made available for morphological and molecular study. Males are unknown from West African populations and it would certainly be instructive to examine males from this area to help clarify whether or not these are conspecific with eastern and northern populations. We have examined males from both North and East Africa and morphologically they are the same.

### *Nylanderia lepida* (Santschi, 1915)

(Figs. 25–27, 79 [worker]; 28–30 [queen]; 31–33, 92–94 [male])

*Prenolepis* (*Nylanderia*) *lepida* Santschi, 1915: 262 (worker described). Holotype worker, CAMEROON: Victoria (Dr. Reichensperger) (NHMB) [examined]. Emery, 1925: 218, combination in *Paratrechina* (*Nylanderia*); LaPolla *et al.*, 2010: 127, combination in *Nylanderia*.

*Prenolepis* (*Nylanderia*) *grisoni* Forel, 1916: 440 (worker described). 4 syntype workers, D.R. CONGO (MHNG) [examined]. Emery, 1925: 218, combination in *Paratrechina* (*Nylanderia*); LaPolla *et al.*, 2010: 127, combination in *Nylanderia*. **SYN. NOV.**

*Paratrechina* (*Nylanderia*) *grisoni* var. *fuscus* Menozzi, 1942: 178. Holotype worker, EQUATORIAL GUINEA: Fernando Po Island [not examined, depository unknown]. LaPolla *et al.*, 2010: 127, combination in *Nylanderia*. **SYN. NOV.**

**Worker diagnosis:** Overall darker brown, with distinctly smooth and shining cuticle; mesocoxae and metacoxae whitish, with trochanters and other joints of the legs similarly whitish in color.

**Compare with:** *N. impolita*

**WORKER.** *Measurements* ( $n = 14$ ): TL: 1.2–2.6; HW: 0.44–0.58; HL: 0.53–0.68; EL: 0.1–0.18; SL: 0.60–0.81; PW: 0.30–0.42; WL: 0.69–0.93; GL: 0.58–0.98

*Indices*: CI: 78–88; REL: 24–28; SI: 136–152

Overall dark brown with lighter mandibles, antennae, and legs; mesocoxae, metacoxae, trochanters, femurs distally, tibia, and tarsi yellowish to white; area around acidopore yellowish. Cuticle generally smooth and shining, except mesonotum, which is faintly rugulose. Head with scattered pubescence; posterior margin broadly rounded, with distinctly rounded posterolateral corners; scapes surpass posterior margin by about the length of the first three funicular segments; scapes with erect macrosetae (SMC = 12–30) and a layer of pubescence. Pronotum and mesonotum with scattered erect macrosetae of varying lengths (PMC = 3–6; MMC = 2); sparse pubescence on dorsum. Pronotum rounded towards mesonotum; mesonotal area distinct with prominent spiracles; metanotal area elongate; dorsal face of propodeum high and dome-like (higher than mesonotum); dorsal face slightly longer than declivitous face. Gaster shining, with erect macrosetae and occasional pubescence.

**QUEEN.** *Measurements* ( $n = 2$ ): TL: 4.1–5.4; HW: 0.71–0.92; HL: 0.76–0.83; EL: 0.31–0.42; SL: 0.81–0.92; PW: 0.95–1.24; WL: 1.2–1.5; GL: 2.2–3.1

*Indices*: CI: 93–110; REL: 40–50; SI: 100–114

As in worker but with modifications expected for caste. Entire body covered in a dense pubescence; eyes large, but not strongly convex, about half the length of the head lateral margin; scapes and pronotum with no erect setae (PMC = 0); mesonotum and metanotum with scattered erect setae (MMC = 13).

**MALE.** *Measurements* ( $n = 2$ ): TL: 1.6–2.0; HW: 0.45–0.49; HL: 0.47–0.5; EL: 0.21–0.25; SL: 0.52–0.59; PW: 0.47–0.55; WL: 0.52–0.74; GL: 0.63–0.81

*Indices*: CI: 95–98; REL: 42–50; SI: 117–121

Overall brown, with lighter brown to yellow mandibles, antennae and legs (lightest on trochanters); cuticle smooth and shining. Head with suberect to erect macrosetae and a dense layer of pubescence. Compound eyes large (more than half the length of head lateral margin), strongly convex, surpassing lateral margin in full-frontal view, with ocelli large and raised. Scapes surpass posterior margin by about the length of the first 4 funicular segments; scapes with sparsely scattered, erect macrosetae (SMC = 2–4). Mandible masticatory margin edentate, except for distinct apical tooth; basal angle of mandible distinct. Mesosoma enlarged and modified to accommodate flight muscles; with dense layer of pubescence and scattered erect setae (PMC = 0; MMC = 10); declivity with scattered pubescence, largely smooth and shining. Gaster with pubescence and erect macrosetae. Genitalia (figs. 92–94): parameres broadly rounded at apices curving dorsally covering most of the dorsal opening; apical margin of parameres emarginate; ventral margin of parameres at an acute angle; cuspi elongated, apices rounded with peg-like teeth on ental surface where they meet digit; digiti apices broad; peg-like teeth at apices dorsally, ventrally coming to a narrow point that curves towards parameres.

**Non-type material examined.** **ANGOLA:** Salazar (also called: N'dalatando), 9°17.904' S, 14°54.850' E\*, March 1972 (P. Hammond); **CAMEROON:** Prov. Sud Res. Campo. Massif des Mamelles, 15.1 km, 84° E. Ebodje, 2°35.7' N, 9°57.6' E, 180 m, 4 April 2000 (B.L. Fisher); Prov. Sud-Ouest, Bimbila Forest, 7.4 km 119° ESE Limbe, 3°58.9' N, 9°15.8' E, 40 m, 14 April 2000 (B.L. Fisher); Prov. Sud Res. de Faune de Campo, 2.16 km, 106° ESE Ebodje, 2°34.1' N, 9°50.7' E, 10 m, 9 April 2000 (B.L. Fisher); Mbalmayo, 3°30.932' N, 11°30.051' E\*, 655 m, Nov 1993 (N. Stork); Ottotomo, 3°39' N, 11°19' E\*, 2 April 1989 (A. Dejean); **CENTRAL AFRICAN REPUBLIC:** PN Dzanga-Ndoki, 38.6 km 173° S Lidjombo, 2°21.60' N, 16°03.20' E, 350 m, 22 May 2001 (S. van Noort); Res. Dzanga-Sangha, 12.7 km, 326° NW Bayanga, 3°09' N 16°12' E, 340 m, 17 Oct 2001 (B.L. Fisher); PN Dzanga-Ndoki, 39.6 km 174° S Lidjombo, 2°21' N, 16.09' E, 340 m, 24 May 2001 (B.L. Fisher); Res. Dzanga-Sangha, 21.4 km, 53° NE Bayanga, 3°02.01' N, 16°24.57' E, 510 m, 5 May 2001 (S. van Noort); PN Dzanga-Ndoki Mabea Bai, 21.4 km 53° NE Bayanga, 3°02.00' N, 16°24.60' E, 510 m, 4 May 2001 (S. van Noort); Res. Dzanga-Sangha, 12.7 km, 326° NW Bayanga, 3°00.27' N, 16°11.55', 420 m, 11–17 May 2001 (S. van Noort); PN Dzanga-Ndoki, Mabea Bai, 21.4 km, 53° NE Bayanga, 3°02' N, 16°25' E, 510 m, 7 May 2001 (B.L. Fisher); Res. Dzanga-Sangha, 12.7 km, 326° NW Bayanga, 3.00' N, 16°12' E, 370 m, 10–17 May 2001 (B.L. Fisher); **GABON:** Prov. Woleu-Ntem, 31.3 km 108° ESE Minvoul, 2°04.8' N, 12°24.4' E, 600 m, 7 Feb 1998 (B.L. Fisher); Prov. Ogooue-Maritime, Moukalaba, 12.2 km 305° NW Doussala, 2°17.0' S, 10°29.8' E, 10 m, 24 Feb 2000 (B.L. Fisher); Prov. Ogooue-Maritime, Res. Monts Doudou, 24.3 km, 307° NW Doussala, 2°13.4' S, 10°24.4' E, 375 m, 6 March 2000 (B.L. Fisher); Prov. Ogooue-Maritime, Res. Moukalaba 12.2 km, 305° NW Doussala, 2°17.0' S, 10°29.8' E, 10 m,

24 Feb 2000 (B.L. Fisher); La Makande, Forêt des Abeilles, 0°20.684' S, 11°33.593' E\*, 1 Feb 1999 (S. Lewis); Mankokou, 0°33.746' N, 12°51.449' E\*, Oct 1972 (I. Lieberburg); **GHANA**: Mampong, 7°3.641' N, 1°24.266' W\*, April 1970 (P. Room); Tafo, 6°12.974' N, 0°22.247' W\*, 4 Aug 1970 (B. Bolton); Mampong, 7°3.641' N, 1°24.266' W\*, 26 Jan 1970 (P. Room); Asiakwa nr. Kibi, 6°15.835' N, 0°30.130' W\*, 1 May 1992 (R. Belshaw); Tafo (Cocoa Research Institution), 6°12.974' N, 0°22.247' W\*, 11 Dec 1991 (R. Belshaw); Bunso nr. Tafo, 6°12' N, 1°49' W\*, 12 April 1992 (R. Belshaw); **IVORY COAST**: Mt Tonkoui, 7°27.240' N, 7°38.220' W\*, 9 Oct 1980 (V. Mahnert & J.L. Perret); **NIGERIA**: Owena, CRIN (Cocoa Research Institute of Nigeria), 7°11.663' N, 5°1.389' E\*, 24 Sept 1975 (B. Taylor); Gambari Forest Reserve, 7°8.000' N, 3°50.000' E\*, 31 Dec 1969 (B. Bolton); Gambari Forest Reserve, 7°8.000' N, 3°50.000' E\*, 10 June 1969 (B. Bolton); **SÃO TOMÉ**: Roca Zampalma, 0°14.7' N, 6°36.0' E\*, 10 Sept 1949 (G.R. Gradwell & D. Snow); **UGANDA**: Ruwenzori Range, Semliki Forest, 0°48.839' N, 30°3.240' E\*, 22 Aug 1952 (D.S. Fletcher)

**Notes.** In most instances this is an easily identified species, possessing among the shiniest cuticles of any Afro-tropical *Nylanderia*. A few specimens examined exhibited a faintly rugulose cuticle, especially on the head and mesonotum. With these specimens, the cuticular rugosity is always much less defined than is observed in *N. impolita*. In instances where a faintly rugulose cuticle is observed, the overall size and the length of the scape can effectively separate *N. lepida* from *N. impolita*.

### *Nylanderia luteafra* LaPolla and Fisher, sp. nov.

(Figs. 34–36, 80 [worker])

Holotype worker, GABON: Ogooue-Maritime: Reserve de la Moukalaba-Dougoua, 12.2 km 305 NW Doussala, 02°17'00" S, 010°29'50" E, elev. 110 m, 26.ii.2000 (S. van Noort) (CASC) (CASENT0179584); 1 paratype worker with same label data as holotype except date: 29.ii.2000; 1 paratype worker with same label data as holotype except coordinates are: 02°17'00" S, 010°29'83" E (CASC, USNM)

**Worker diagnosis:** Overall yellow in color with contrasting, darker, erect setae and a conspicuously domed propodeum.

**Compare with:** *N. incallida* and *N. usambarica*

**WORKER. Measurements** ( $n = 4$ ): TL: 2.3–2.8; HW: 0.54–0.65; HL: 0.66 = 0.74; EL: 0.13–0.16; SL: 0.83–0.89; PW: 0.39–0.44; WL: 0.87–1.0; GL: 0.81–1.04

**Indices:** CI: 81–89; REL: 21–22; SI: 137–155

Overall yellow to brownish-yellow, with darker, erect macrosetae across body; cuticle shining, rugulose on head, mesonotum (on some specimens, pronotum is slightly rugulose), and propodeum. Posterior margin of head with rounded posterolateral corners, slightly emarginate medially. Scapes surpass posterior margin by about length of the first 3–3.5 funicular segments; scape with erect setae and abundant appressed to decumbent pubescence (SMC = 24–31). Mesosoma with erect macrosetae of varying lengths (PMC = 2–4; MMC = 2–3); in profile, pronotum with linear rise towards mesonotum; metanotal area elongate; dorsal face of propodeum dome-like, slightly lower to about the same height as mesonotum; dorsal face and declivitous face about the same length. Gaster shining, with abundant erect macrosetae.

The queen and male castes are currently unknown for this species.

**Etymology.** The species epithet *luteafra* is a combination of *luteus* (L. = yellow) and *afra* (L. = Africa).

**Non-type material examined.** **CAMEROON**: Ottotomo, 3°39' N, 11°19' E\*, 2 April 1989 (A. Dejean); **GABON**: Prov. Ogooue-Maritime, Reserve des Monts Doudou, 24.3 km 307° NW Doussala, 2°13.4' S, 10°24.4' E, 375 m, 6 March 2000 (B.L. Fisher); Prov. Ogooue-Maritime, Reserve de la Moukalaba-Dougoua, 12.2 km 305° NW Doussala, 2°17.00' S, 10°29.83' E, 110 m, 26 Feb 2000 (S. van Noort); Prov. Woleu-Ntem, 31.3 km 108° ESE Minvoul, 2°04.8' N, 12°24.4' E, 600 m, 12 Feb 1998 (B.L. Fisher).

**Notes.** The only species *N. luteafra* easily might be confused with are *N. incallida*, which has different mesosomal macrosetae (thinner, lighter, and longer), and *N. usambarica*, which has a much higher PSC and lacks a domed propodeal dorsum. The darker macrosetae contrast strongly with the yellow cuticle, a character state seen only in one other species, *N. usambarica*, but these two species can be separated by the characters noted above.

***Nylanderia mendica* (Menozzi, 1942)**

(Figs. 37–39, 81 [worker])

*Paratrechina* (*Nylanderia*) *mendica* Menozzi, 1942: 179 (worker and queen described). Syntype worker and queen, EQUATORIAL GUINEA: Fernando Po Island [not examined, depository unknown]. LaPolla *et al.*, 2010: 127, combination in *Nylanderia*.

**Worker diagnosis:** Overall color dark brown; mesosoma laterally striated; mesonotum rugulose; gaster dorsally and ventrally striated.

**Compare with:** *N. brevisetula*

**WORKER.** *Measurements* ( $n = 4$ ): TL: 2.42–2.86; HW: 0.56–0.66; HL: 0.65–0.72; EL: 0.15–0.18; SL: 0.78–0.86; PW: 0.41–0.43; WL: 0.85–1.0; GL: 0.92–1.16

*Indices:* CI: 81–95; REL: 20–26; SI: 130–144

Overall dark brown, with lighter mandibles, antennae, trochanters, joints of legs and tarsi; yellowish around acidopore. Head and mesosoma rugulose; gaster with distinct striations along dorsal and ventral surfaces. Head with erect and appressed macrosetae; posterior margin broadly rounded, with distinctly rounded posterolateral corners; medially posterior margin slightly emarginate; scapes surpass posterior margin by about the length of the first 3–4 funicular segments; scapes with erect macrosetae and a layer of pubescence (SMC = 30–50). Mesosoma laterally faintly striated; mesonotum rugulose; pronotum and mesonotum with scattered erect macrosetae (PMC = 2; MMC = 2–3); pronotum gently rounded toward mesonotum; metanotal area elongate and rugulose; dorsal face of propodeum dome-like, but lower than mesonotum, dorsal face and declivitous face about the same length. Gaster with suberect to erect and appressed macrosetae.

The queen and male castes are currently unknown for this species.

**Non-type material examined.** CAMEROON: Prov. Sud PN Campo, 43.3 km 108° ESE Campo, 2°17.0' N, 10°12.4' E, 290 m, 7 April 2000 (B.L. Fisher); CENTRAL AFRICAN REPUBLIC: PN Dzanga-Ndoki, 21.4 km 53° NE Bayanga, 3°02.01' N, 16°24.57' E, 510 m, 6 May 2001 (S. van Noort); D.R. CONGO: Epulu, 1°23' N, 28°35' E\*, Nov 1995 (S.D. Torti); GABON: Prov. Ogooue-Maritime, Reserve des Monts Doudou, 24.3 km, 307° NW Doussala, 2°13.35' S, 10°24.35' E, 370 m, 8 March 2000 (S. van Noort).

**Notes.** The striated pronotum and gaster make this species fairly easy to identify. The only species with which it could be confused is *N. brevisetula*, but the short notal setae of that species make it fairly easy to distinguish between *N. mendica* and *N. brevisetula*. As both *N. mendica* and *N. brevisetula* have striations on the gaster (although they are faint and found only on the dorsum in *N. brevisetula*) and similar looking heads, they may be sister species. Unfortunately, males are currently unknown for both species.

***Nylanderia natalensis* (Forel, 1915), stat. nov.**

(Figs. 40–42, 82 [worker]; 43–45, 95–97 [male])

*Prenolepis* (*Nylanderia*) *traegaordhi natalensis* Forel, 1915: 348 (worker described). 5 syntype workers, SOUTH AFRICA: Durban (MHNG) [examined]. Emery, 1925: 218, combination in *Paratrechina* (*Nylanderia*); LaPolla *et al.*, 2010: 127, combination in *Nylanderia*.

**Worker diagnosis:** Overall brown, with abundant pubescence on head, anterior portions of pronotum, mesonotum and gaster.

**Compare with:** *N. jaegerskioeldi*

**WORKER.** *Measurements* ( $n = 5$ ): TL: 2.3–2.7; HW: 0.53–0.64; HL: 0.66–0.71; EL: 0.14–0.2; SL: 0.7–0.76; PW: 0.39–0.47; WL: 0.73–0.86; GL: 0.9–1.2

*Indices:* CI: 81–93; REL: 21–28; SI: 119–132

Workers of this species cannot be reliably separated from *N. jaegerskioeldi*. *N. natalensis* worker description matches *N. jaegerskioeldi* worker description.

The queen caste is currently unknown for this species.

**MALE.** *Measurements* ( $n = 2$ ): TL: 2.3–2.5; HW: 0.49–0.51; HL: 0.57–0.58; EL: 0.21–0.24; SL: 0.67–0.69; PW: 0.56–0.57; WL: 0.8–0.87; GL: 0.95–1.03

*Indices:* CI: 85–87; REL: 37–42; SI: 133–141

Overall brown, with mesosoma in some specimens lighter brown; trochanters, joints of legs, and tarsi yellowish-brown; cuticle smooth and shining, covered with dense pubescence, but mesopleuron and propodeum with

sparser pubescence. Head with suberect to erect macrosetae, with a dense layer of pubescence; compound eyes large (taking up about half of the length of the lateral margin), but not strongly convex; ocelli relatively small. Scapes surpass posterior margin by about length of the first three funicular segments; scapes with scattered erect macrosetae (SMC = 17–25) and a dense layer of pubescence. Mandible with prominent apical tooth, 1–2 subapical teeth and distinct basal tooth. Mesosoma with dense pubescence, except for less dense pubescence on mesopleuron and propodeum; scattered erect macrosetae (PMC = 0; MMC = 9–10) dorsally. Dorsal face of propodeum slightly below level of mesonotum; dorsal face slightly sloped with declivitous face of about the same length; declivitous face smooth and shining with no pubescence. Gaster with suberect and erect macrosetae of varying heights. Genitalia (figs. 95–97): parameres broadly rounded at apices curving dorsally covering most of the dorsal opening; apical margin of parameres complete; ventral margin of parameres at an acute angle; cuspi elongated, apices rounded with peg-like teeth on ental surface where they meet digit; digiti apices broad; peg-like teeth at apices dorsally, ventrally coming to a narrow point that curves towards parameres.

**Non-type material examined.** **LESOTHO:** Mamathes, 30°0.993' S, 28°21.574' E\*, 1702 m, Oct 1957; **MOZAMBIQUE:** Amatongas, 19°11.000' S, 33°45.000' E\*, Feb 1917 (G. Arnold); **SOUTH AFRICA:** KwaZulu-Natal, Umtamvuna Nature Reserve, 31°30.509' S, 30°10.484' E, 160 m, 14 Nov 2000 (S. van Noort); KwaZulu-Natal, Umtamvuna Nature Reserve, 31°02.704' S, 30°10.080' E, 220 m, 18 Nov 2000 (S. van Noort); Durban, 29°51.473' S, 31°1.655' E\*, Jan 31 1917 (G. Arnold); Illovo, 29°50.000' S, 30°12.000' E\*, 11 May 1976 (A.J.M. Carnegie); Nelspruit, Transvaal, 25°27.950' S, 30°59.117' E, June 1980 (M. Samways); Natal, Ifafa, 29°52.000' S, 31°3.000' E, 16 June 1979 (G. Leslie); Willowmore, 33°17.996' S, 23°28.883' E\*, Jan 1914 (H. Brauns); **ZIMBABWE:** Umtali, 18°58.486' S, 32°39.334' E\*, 10 June 1920 (G. Arnold).

**Notes.** Workers of *N. natalensis* and *N. jaegerskioeldi* are impossible to reliably tell apart from each other. It appears that *N. natalensis* is slightly less pubescent than *N. jaegerskioeldi*, but this is hard to qualify, and we have not always found it a reliable diagnostic feature. An interesting point, however, is that the male genitalia of these two species are very different, especially the size and shape of volsella and the associated lobes. Males of each are easily distinguishable. The digiti and cuspi of *N. natalensis* (fig. 97) are similar in structure to *N. boltoni*, *N. lepida*, and *N. silvula* (figs. 91, 94, 103). In these species, the cuspi are lobe-like and not nearly as wide as the digiti, and in general fairly typical in appearance for what is observed in *Nylanderia* species in other parts of the world. In *N. jaegerskioeldi* the cuspi are much larger than the digiti and paddle-like (fig. 100); additionally the digiti are thin and blade-like, an unusual shape for *Nylanderia* digiti. There are differences in the paramere shape as well between *N. natalensis* and *N. jaegerskioeldi*. In *N. natalensis* the paramere margin is broadly rounded (fig. 96), whereas *N. jaegerskioeldi* has a finger-like extension of the margin (fig. 99). In general, it would appear that *N. natalensis* is restricted to southern Africa, while *N. jaegerskioeldi* has a wider range from across equatorial Africa to northern Africa.

### ***Nylanderia scintilla* LaPolla and Fisher, sp. nov.**

(Figs. 46–48, 83 [worker])

Holotype worker, IVORY COAST: Palmeraie Lame, no. 86, 13.ii.1976 (T. Diomande) (BMNH); 9 paratype workers same label data as holotype; 3 paratype workers, IVORY COAST: Palmeraie Lame, no. 87; 5.iii.1976 (T. Diomande) (BMNH, USNM).

**Worker diagnosis:** Head width less than 0.51 mm; brownish-yellow species, with very short, angular propodeal dorsal face; all coxae the same color.

**Compare with:** *N. boltoni* and *N. umbella*

**WORKER. Measurements** ( $n = 4$ ): TL: 1.8–2.0; HW: 0.4–0.45; HL: 0.51–0.55; EL: 0.11–0.13; SL: 0.54–0.59; PW: 0.3–0.33; WL: 0.54–0.62; GL: 0.74–0.92

**Indices:** CI: 78–82; REL: 22–24; SI: 125–135

Overall brownish-yellow, often with slightly darker head and gaster, and always with distinctly lighter antennae and legs; coxae all the same color; cuticle smooth and shining. Head with dense layer of short pubescence; scapes surpass posterior margin by about length of first 2–3 funicular segments; scapes with scattered erect macrosetae (SMC = 13–20); head roughly quadrate in appearance with more angular-shaped posterolateral corners present; posterior margin slightly emarginate medially. Mesosoma with macrosetae of varying lengths on pronotum (PMC = 2–5; MMC = 2); pubescence sparse with small patches on dorsum of mesonotum and propodeum; metanotal area compact; dorsal face of propodeum short and angular, slightly lower than mesonotum; declivitous face

distinctly longer than dorsal face. Gaster with scattered erect macrosetae and dense layer of short pubescence giving gaster a somewhat silky appearance.

The queen and male castes are currently unknown for this species.

**Etymology.** The specific epithet *scintilla* (L. = spark) is in reference to the yellow color, shiny pubescence and small size of this species.

**Non-type material examined. NIGERIA:** Gambari, 18.vi.1969 (B. Bolton).

**Notes.** This species is most likely to be confused with *N. boltoni*, however there are several diagnostic morphological features that can be used to separate the two species. In *N. scintilla* the coxae are all the same color (not with lighter meso/metacoxae), and the head is more quadrate than in *N. boltoni*. *Nylanderia boltoni*, *N. scintilla*, and *N. umbella* appear to be closely related based on overall worker morphology. Comparing male morphology would be instructive, but at present only the male of *N. boltoni* is known.

### ***Nylanderia silvula* LaPolla and Fisher, sp. nov.**

(Figs. 49–51, 84 [worker]; 52–54 [queen]; 55–57, 101–103 [male])

Holotype worker, KENYA: Kakamega District, Kakamega Forest, Isecheno; 0.02° N, 34.97° E, 1800 m, 16 Oct 1999 (coll. R.R. Snelling) (LACM); 13 paratype workers, 1 paratype male, same label data as holotype (LACM, USNM).

**Worker diagnosis:** Large species (TL  $\geq$  2.8), with shining reddish-brown cuticle.

**Compare with:** This species is unique in its overall appearance.

**WORKER. Measurements** ( $n = 8$ ): TL: 2.8–3.3; HW: 0.63–0.73; HL: 0.76–0.813; EL: 0.18–0.21; SL: 0.95–1.04; PW: 0.45–0.51; WL: 0.976–1.12; GL: 1.04–1.35

**Indices:** CI: 84–90; REL: 22–26; SI: 142–151

Overall dark reddish-brown, with slightly lighter mandibles and antennae; trochanters, mesocoxae, and metacoxae yellowish to whitish; cuticle shining, with head, mesonotum (extending to mesopleuron), metanotal area, and propodeum rugulose. Posterior margin of head with rounded posterolateral corners, slightly emarginate medially. Scapes surpass posterior margin by about length of the first 3–3.5 funicular segments; scapes extremely setose, with erect macrosetae of varying lengths and a layer of decumbent pubescence (SMC = 45–60). Mesosoma with erect setae of varying lengths (PMC = 3–7; MMC = 2–4); in profile, pronotum elongate, with a linear rise towards mesonotum; metanotal area elongate; dorsal face of propodeum dome-like, slightly higher to even with the mesonotum; dorsal face and declivitous face about the same length; propodeum with scattered short appressed to decumbent pubescence. Gaster shining, with abundant erect macrosetae.

**QUEEN. Measurements** ( $n = 1$ ): TL: 5.1; HW: 1.0; HL: 0.99; EL: 0.34; SL: 1.2; PW: 1.3; WL: 1.7; GL: 2.4  
**Indices:** CI: 101; REL: 51; SI: 115

As in worker, with modifications expected for caste; darker reddish-brown than worker. Body shining with pubescence concentrated on dorsum; eyes large (taking up more than half of lateral margin), strongly convex; (PMC = 1); (MMC = 3).

**MALE. Measurements** ( $n = 3$ ): TL: 2.9–3.0; HW: 0.68–0.72; HL: 0.64–0.66; EL: 0.32–0.33; SL: 0.87–0.95; PW: 0.78–0.82; WL: 1.0–1.3; GL: 1.1–1.2

**Indices:** CI: 105–111; REL: 126–138; SI: 17–19

Overall dark reddish-brown, with lighter brown funiculi, mandibles, and anterior clypeus; mesocoxae, metacoxae, mesotrochanter, metatrochanter, and tarsi white to very light yellow, with yellow protrochanter and joints of legs; cuticle smooth and shining, and covered with a dense pubescence except along mesopleuron and propodeum. Head with largely suberect macrosetae and a dense layer of pubescence. Compound eyes large (taking up most of lateral margin), ocelli large and raised. Scapes surpass posterior margin by about length of first 3–4 funicular segments; scapes with scattered erect macrosetae (SMC = 10–16) and dense layer of pubescence. Mandibular masticatory margin with prominent apical tooth and a smaller subapical tooth; basal margin rounded, but distinct. Mesosoma with dense pubescence and scattered erect setae (PMC = 0; MMC = 7–10) dorsally; declivity below level of mesonotum, smooth and shining; gaster with dense pubescence and scattered, erect macrosetae of varying heights. Genitalia (figs. 101–103): parameres roughly triangular in lateral view curving dorsally; dorsal margin of parameres directed outward from penis valves; cuspi elongated, apices rounded with peg-like teeth on ental surface where they meet digit; digiti apices broad; peg-like teeth at apices dorsally, ventrally coming to a narrow point that curves towards parameres.

**Etymology.** The specific epithet *silvula* (L. = forest) is in reference to the type locality of this species in the Kakamega Forest, one of the last remnants of indigenous forest in the region.

**Non-type material examined. KENYA:** Kakamega District; Kakamega Forest: Isecheno; 0.02° N, 34.97° E; 1800 m; 17 Oct 1999 (coll. R.R. Snelling); Kakamega District; Kakamega Forest: Isecheno; 0.02° N, 34.97° E; 1800 m; 21 April 2001

**Notes.** In addition to being one of the largest Afrotropical *Nylanderia*, the cuticular coloration of this species is unique. Interestingly, despite the difference (such as in color, overall size, shape of propodeum, etc.) in the appearance of the workers, the male digiti and cuspi are similar to those of *N. boltoni*, *N. lepida*, and *N. natalensis*.

***Nylanderia umbella* LaPolla and Fisher, sp. nov.**

(Figs. 58–60, 85 [worker])

Holotype worker, CAMEROON: Mbalmayo, xi.1993 (N. Stork) (BMNH); 3 paratype workers, same label data as holotype (BMNH)

**Worker diagnosis:** Head width less than 0.51 mm; head, mesosoma, and gaster dark brown, contrasting sharply with yellowish-brown antennae, mandibles, mesocoxae, metacoxae, and legs; very short, angular, propodeal dorsal face.

**Compare with:** *N. boltoni* and *N. scintilla*

WORKER. *Measurements* ( $n = 3$ ): TL: 2.1–2.4; HW: 0.49–0.51; HL: 0.59–0.61; EL: 0.14–0.16; SL: 0.62–0.64; PW: 0.35–0.38; WL: 0.62–0.69; GL: 0.92–1.2

*Indices:* CI: 80–84; REL: 23–27; SI: 123–130

Overall dark brown, with lighter brown to yellow mandibles, antennae, and legs; cuticle smooth and shining; procoxae dark brown, with mesocoxae and metacoxae yellow-brown to yellow in color. Head with a dense layer of pubescence; posterior margin with rounded posterolateral corners, slightly emarginate medially; scapes surpass posterior margin by about the length of the first two funicular segments; scapes with scattered erect macrosetae and a dense layer of pubescence (SMC = 13–16). Mesosoma with erect macrosetae of varying lengths concentrated on posterior pronotum and mesonotum (PMC = 3–5; MMC = 2); layer of pubescence covers mesosomal notum; metanotal area compact; dorsal face of propodeum angular and low (lower than mesonotum) with very short dorsal face and longer declivitous face; propodeum dorsum with pubescence; declivity smooth and shining with no pubescence. Gaster with abundant erect macrosetae and a dense layer of pubescence.

The queen and male castes are currently unknown for this species.

**Etymology.** The species epithet *umbella* (L. = shade or shadow) is in reference to the dark brown coloration of this species.

**Non-type material. UGANDA:** Murchison Falls National Park, Rabongo Forest, 02°15' N, 31°48' E\*, 958 m, 11 July 2009 (W. Freund & T. Klug)

**Notes.** This is among the darkest of the Afrotropical species, with strongly contrasting antennae, coxae, and legs. Based on overall similarities in size and shape, *N. umbella* appears closely related to *N. boltoni* and *N. scintilla*.

***Nylanderia usambarica* LaPolla, Hawkes and Fisher, sp. nov.**

(Figs. 61–63, 86)

Holotype worker, TANZANIA: Tanga Region, Nilo Forest Reserve, 1006 m, 4.91456 S, 38.67712 E, 1–4.ix.2005, CEPF-4.4-F24, (P. Hawkes, J. Makwati, R. Mtana) (SAMC) (SAM-HYM-C020684); 11 paratype workers, 9 same label data as holotype, 1 same data but CEPF-4.2-F35, 1 same data but CEPF-4.4-F33 (USNM, CASC, NMKE, SAMC)

**Worker diagnosis:** Abundant macrosetae of varying lengths on pronotum (PSC = 10–22); macrosetae on head, mesosoma and legs dark and contrasting strongly with the much lighter cuticle; propodeal dorsum not domed.

**Compare with:** *N. luteafra*, *N. natalensis* and *N. jaegerskioeldi*

WORKER. *Measurements* ( $n = 6$ ): TL: 2.3–2.8; HW: 0.55–0.64; HL: 0.67–0.74; EL: 0.14–0.16; SL: 0.73–0.80; PW: 0.41–0.47; WL: 0.77–0.90; GL: 0.90–1.4

*Indices:* CI: 82–87; REL: 20–22; SI: 123–133

Overall golden yellow-brown, with lighter golden yellow antennae and legs; head and gaster slightly darker than mesosoma; legs nearly uniform in color, with coxae and trochanters slightly lighter than the remaining segments; cuticle smooth and shining but with faint, almost effaced shagreening, which is more noticeable on lateral propodeum and gaster; macrosetae on head, mesosoma and legs dark and contrasting strongly with the much lighter cuticle; macrosetae on scapes lighter. Head dorsally with abundant macrosetae and a layer of fine pubescence which becomes sparse anterolaterally; posterior margin distinctly emarginate medially; posterolateral corners strongly rounded and sides convex, giving the head a distinctly rounded appearance in full face view; scapes surpass posterior margin of head by about the length of the first 3–4 funicular segments; scapes with scattered erect macrosetae and a dense layer of pubescence (SMC = 24–32). Mesosoma with erect macrosetae of varying lengths on pronotum and mesonotum (PMC = 10–22; MMC = 3–4); pubescence sparse and scattered on pronotum and mesonotum; metanotal area compact; dorsal face of propodeum short and low (lower than mesonotum), rounding broadly into the longer declivitous face; propodeal dorsum and sides with pubescence; declivity smooth and shining with no pubescence. Gaster with erect macrosetae and a layer of sparse pubescence.

The queen and male castes are currently unknown for this species.

**Etymology.** The specific epithet *usambarica* refers to the East Usambara mountain range in which the type series was collected.

**Notes.** This species is currently known only from its type locality in Tanzania. It is most likely to be confused with callows of *N. natalensis* and *N. jaegerskioeldi* but it can be separated from these by the higher PMC and the distinctly indented posterior margin of the head. While the color of *N. usambarica* is similar to that of *N. luteafra*, these species can be readily distinguished by the strongly domed propodeal profile of the latter. *N. usambarica* has the highest PMC of any Afrotropical *Nylanderia* species currently known.

### *Nylanderia waelbroeckii* (Emery, 1899)

(Figs. 70–72, 104–106)

*Prenolepis waelbroeckii* Emery, 1899: 496 (queen and male described). 6 syntype males, Kinshasa, D.R. CONGO (MCSN) [examined]. Forel, 1911: 280, worker described; Wheeler, W.M., 1922: 943; Emery, 1925: 218, combination in *Paratrechina* (*Nylanderia*); LaPolla *et al.*, 2010: 127, combination in *Nylanderia*.

The worker of this species was described by Forel (1911), but no specimens could be located for examination during this study.

The queen caste is currently unknown for this species.

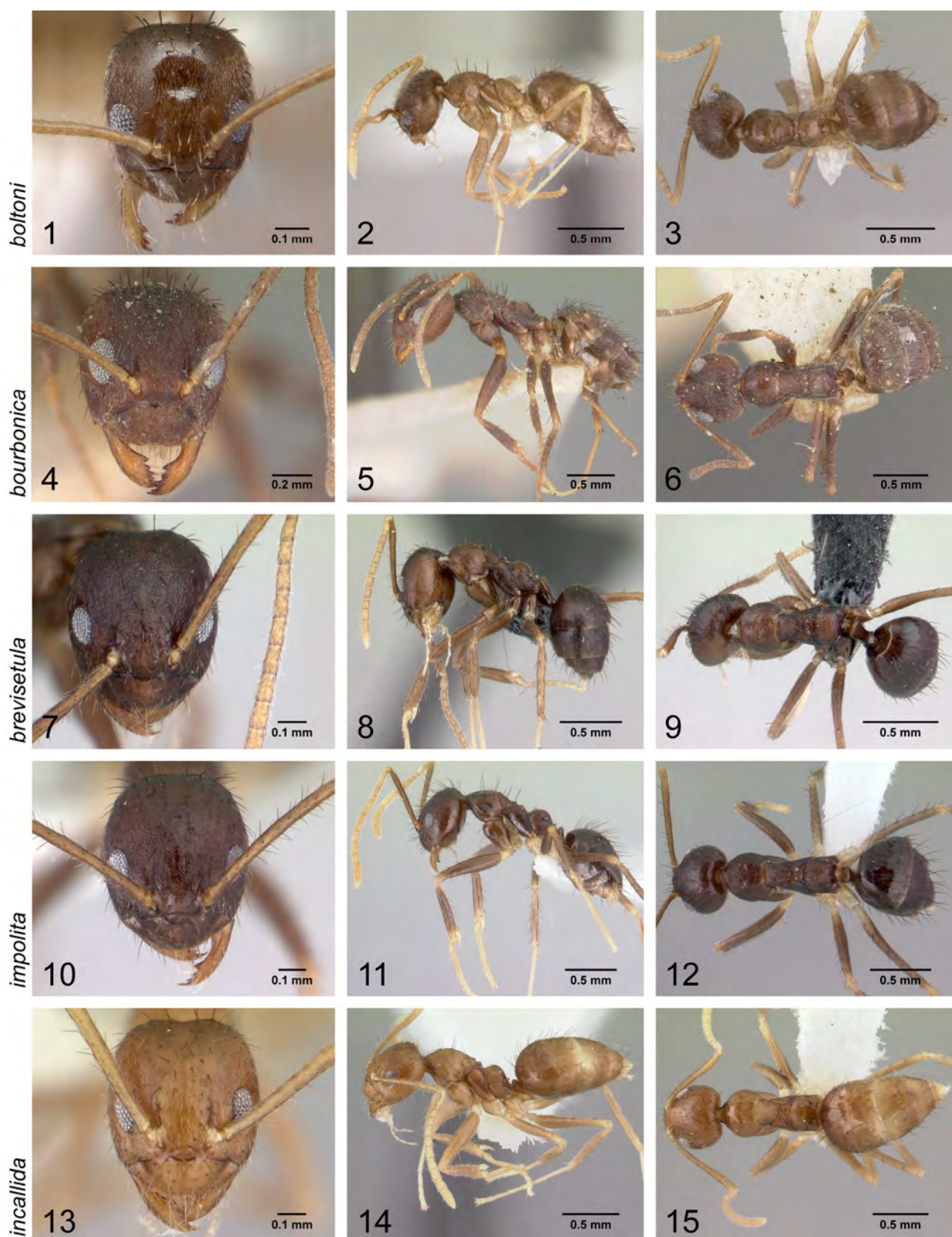
**MALE. Measurements** ( $n = 3$ ): TL: 2.2–2.4; HW: 0.52–0.58; HL: 0.57–0.61; EL: 0.24–0.27; SL: 0.64–0.75; PW: n/a; WL: 0.82–0.94; GL: 0.74–.96

**Indices:** CI: 90–98; REL: 43–46; SI: 122–130

Overall light brown, with darker brown abdomen; tarsi white to very light yellow, with yellow protrochanter and joints of legs; cuticle smooth and shining, covered with a dense pubescence except along mesopleuron and propodeum. Head with largely suberect macrosetae and a dense layer of pubescence. Scapes surpass posterior margin by about length of first 3–4 funicular segments; scapes with scattered erect macrosetae (SMC = 12–13) and dense layer of pubescence. Compound eyes large (taking up most of lateral margin); ocelli large and raised. Mandibular masticatory margin with prominent apical tooth; basal margin rounded, but distinct. Mesosoma with dense pubescence and scattered erect setae (PMC = 0–1; MMC = 15–19) dorsally; declivity below level of mesonotum, smooth and shining; gaster with dense pubescence and scattered erect macrosetae of varying heights. Genitalia (figs. 104–106): parameres rectangular in lateral view; apical margin medially emarginate; cuspi elongated and horn-like; apices of cuspi with finger-like projections directed posteriorly; cuspi peg-like teeth extend from region meeting with digiti to the tips of finger-like projections; digiti distinctly smaller than cuspi, blade-like; digiti with peg-like teeth on thin margin that meets cuspi.

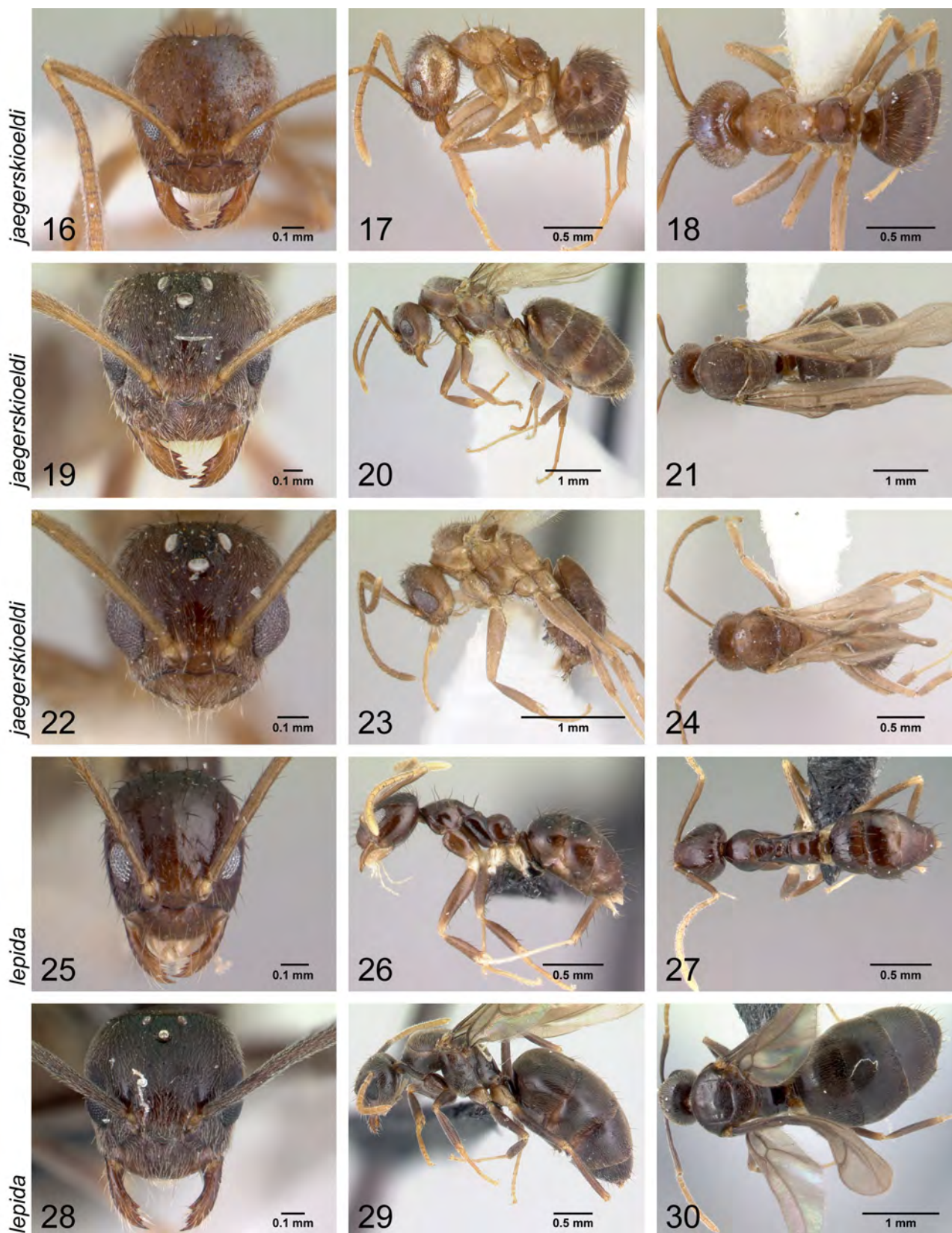
**Notes.** Despite the fact that the worker caste of this species was described by Forel (1911), we have been unable to locate worker specimens to describe here. The male of this species has very unusually shaped digiti and cuspi (see introduction). The horn-like cuspi are particularly noteworthy and unusual for the genus. Based on the overall shape of the cuspi and digiti *N. jaegerskioeldi* and *N. waelbroeckii* appear to be closely related. It is possible that workers presently treated as *N. jaegerskioeldi* in West Africa are in fact *N. waelbroeckii*.





**FIGURES 1–15.** Afrotropical *Nylanderia* species in various views: *boltoni* (worker, 1–3, CASENT0179580, Gabon); *bourbonica* (worker, 4–6, CASENT0101309, Reunion); *brevisetula* (worker, 7–9, CASENT0090304, Central African Republic); *impolita* (worker, 10–12, CASENT0179589, Gabon); *incallida* (worker, 13–15, CASENT0179576, Ivory Coast)





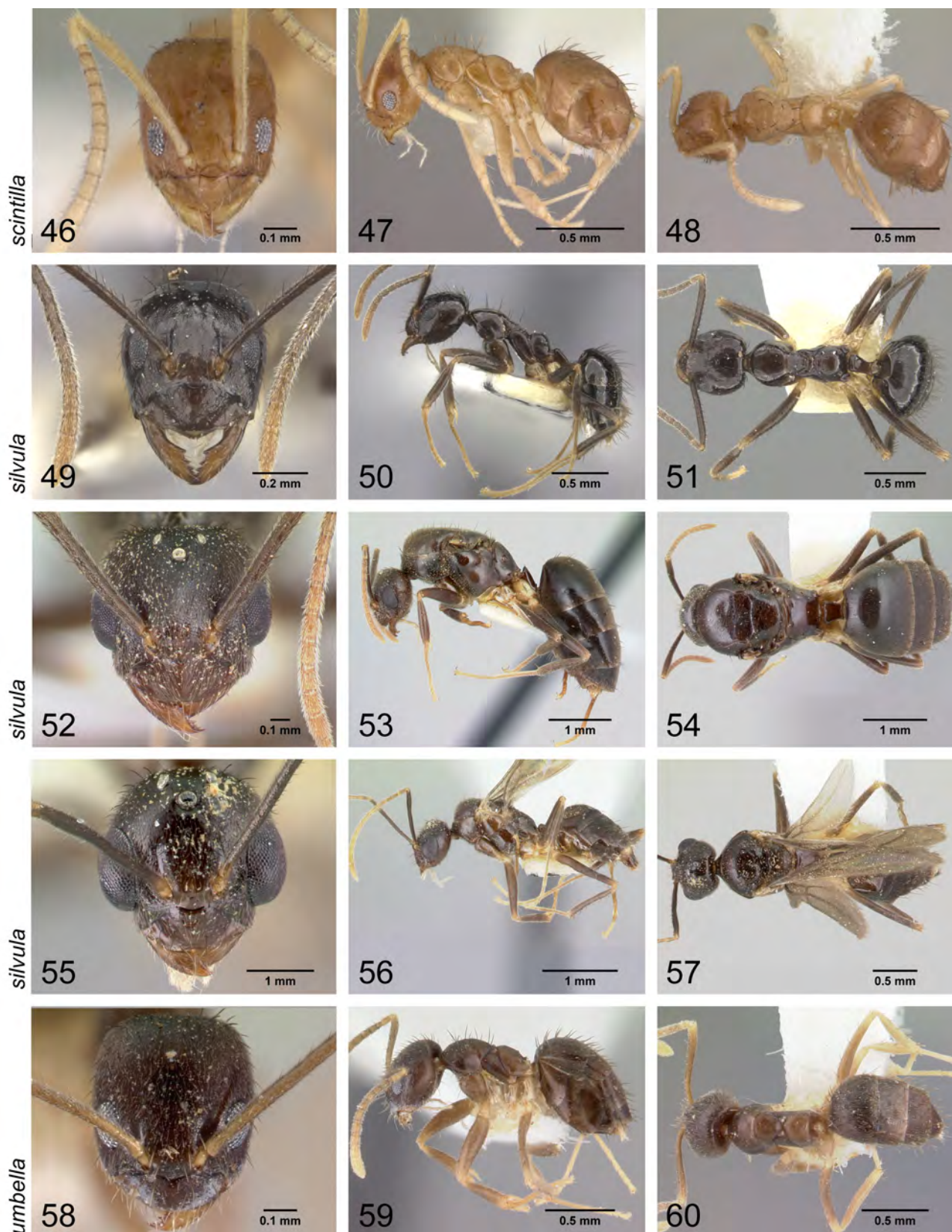
**FIGURES 16–30.** Afrotropical *Nylanderia* species in various views: *jaegerskioeldi* (worker, 16–18, CASENT0179587; queen, 19–21, USNMENT00693668; male, 22–24, CASENT0179588; all from Kenya); *lepida* (worker, 25–27, CASENT0179591, Gabon; queen, 28–30, CASENT0086444, Central African Republic)



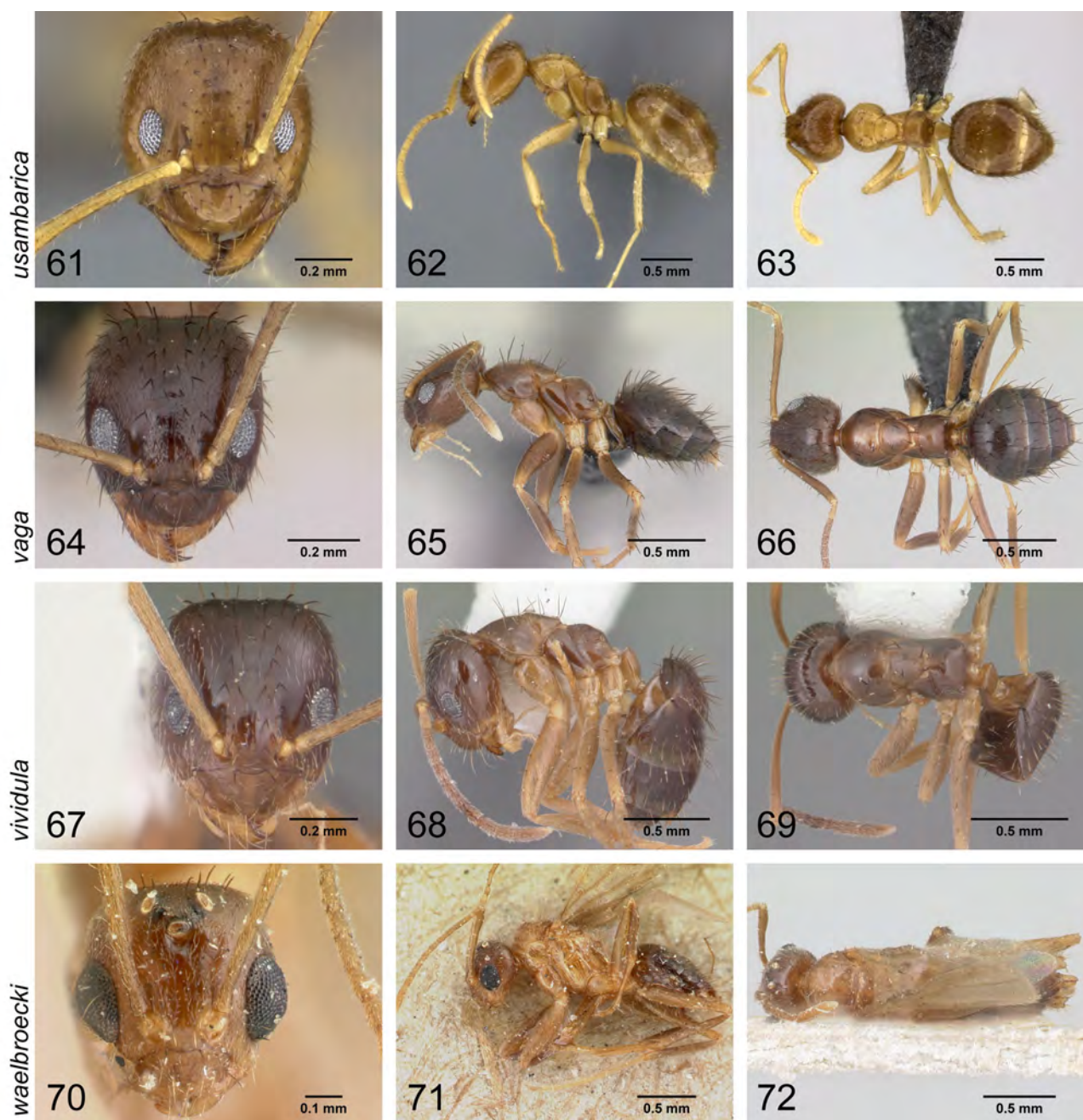


**FIGURES 31–45.** Afrotropical *Nylanderia* species in various views: *lepida* (male, 31–33, CASENT0217337, Gabon); *luteafra* (worker, 34–36, CASENT0179584, Gabon); *mendica* (worker, 37–39, CASENT0179590, Gabon); *natalensis* (worker, 40–42, CASENT0396096; male, 43–45, CASENT0396027; both from South Africa)



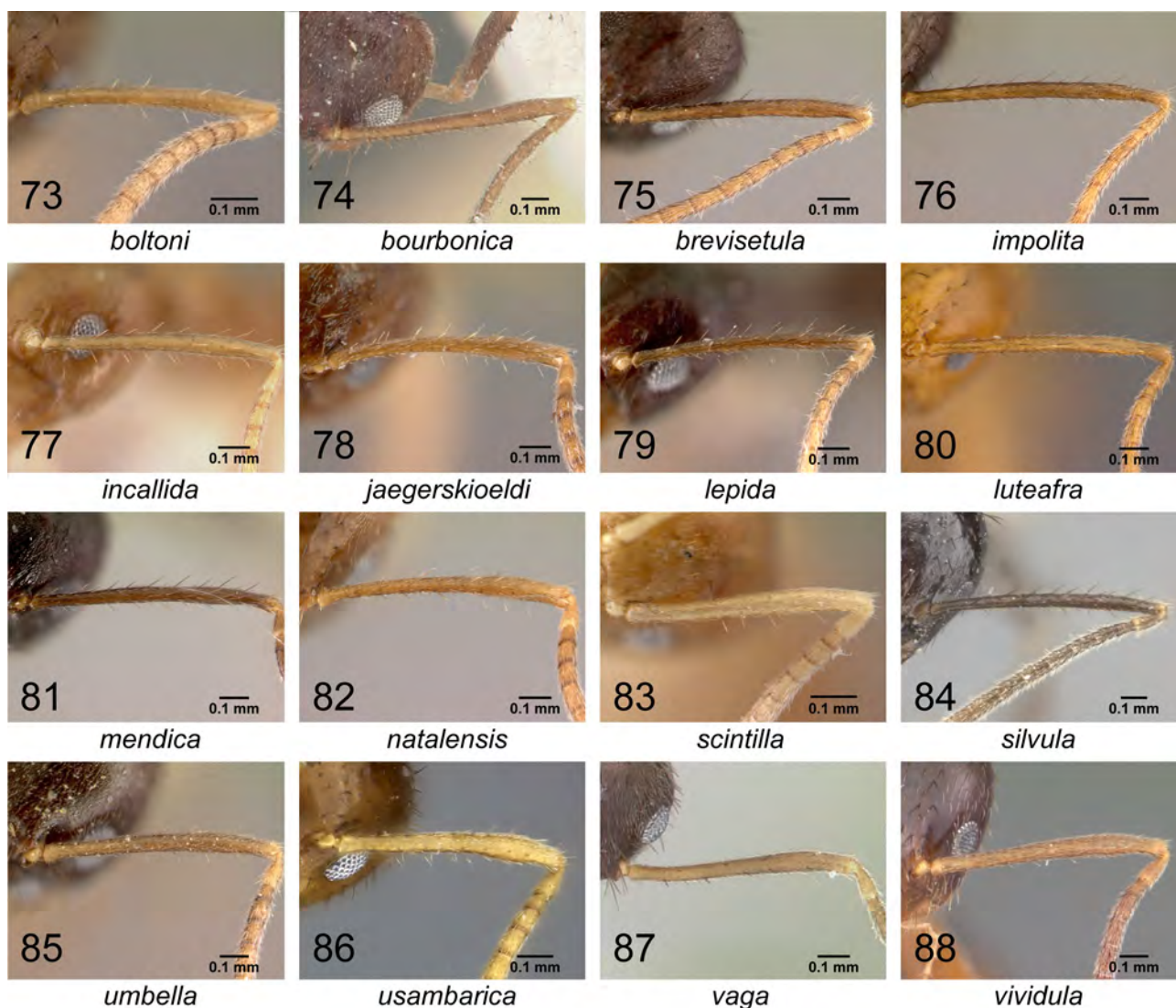


**FIGURES 46–60.** Afrotropical *Nylanderia* species in various views: *scintilla* (worker, 46–48, CASENT0179579, Ivory Coast); *silvula* (worker, 49–51, LACMENT272717; queen 52–54, LACMENT272721; male, 55–57, LACMENT272719; all from Kenya); *umbella* (worker, 58–60, CASENT0179583, Cameroon)

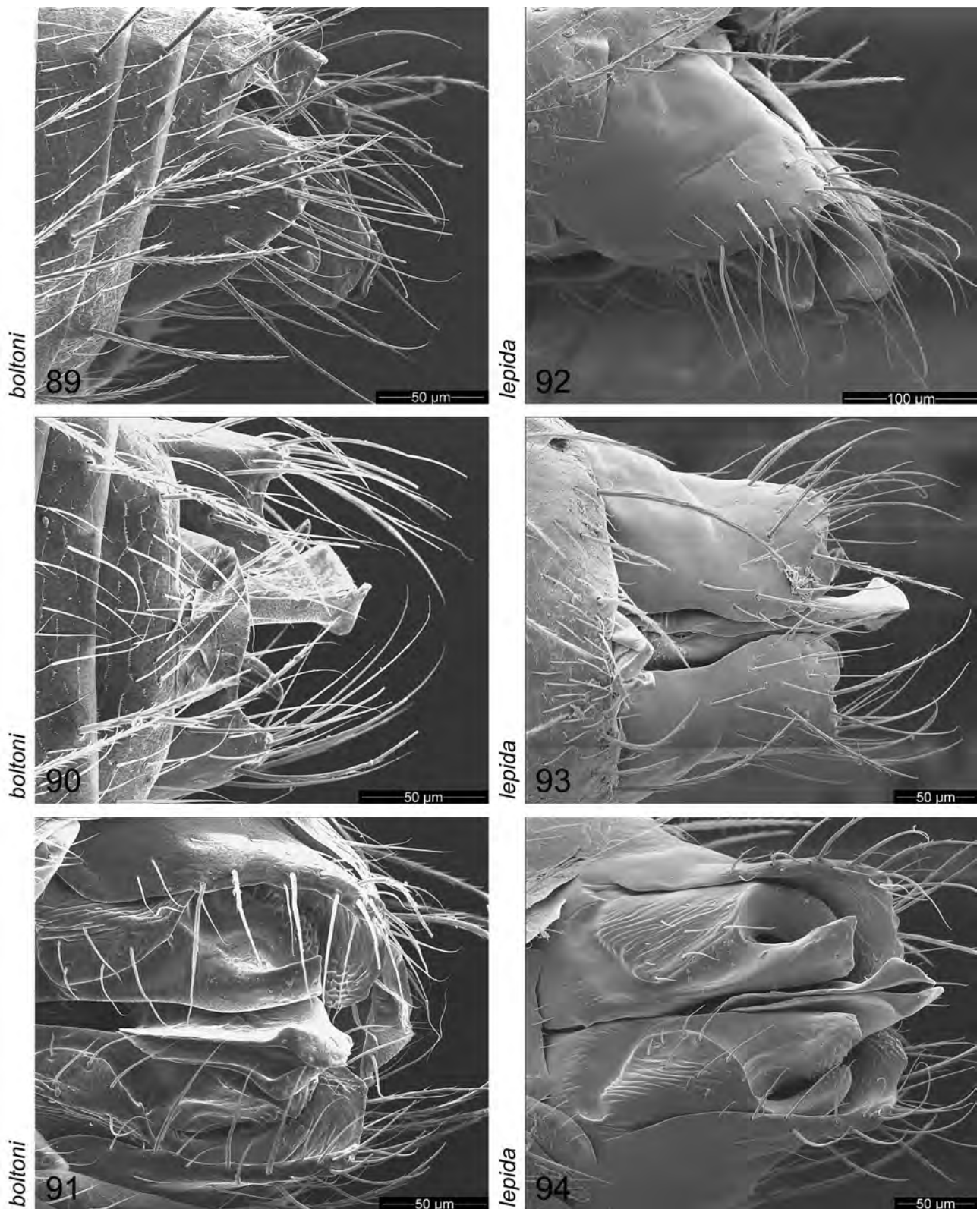


**FIGURES 61–72.** Afrotropical *Nylanderia* species in various views: *usambarica* (worker, 61–63, CASENT0235343, Tanzania); *vaga* (worker, 64–66, CASENT0104253, U.S.A.); *vividula* (worker, 67–69, CASENT0103260, U.S.A.); *waelbroeckii* (male, 70–72, USNMENT00693679, D.R. Congo)



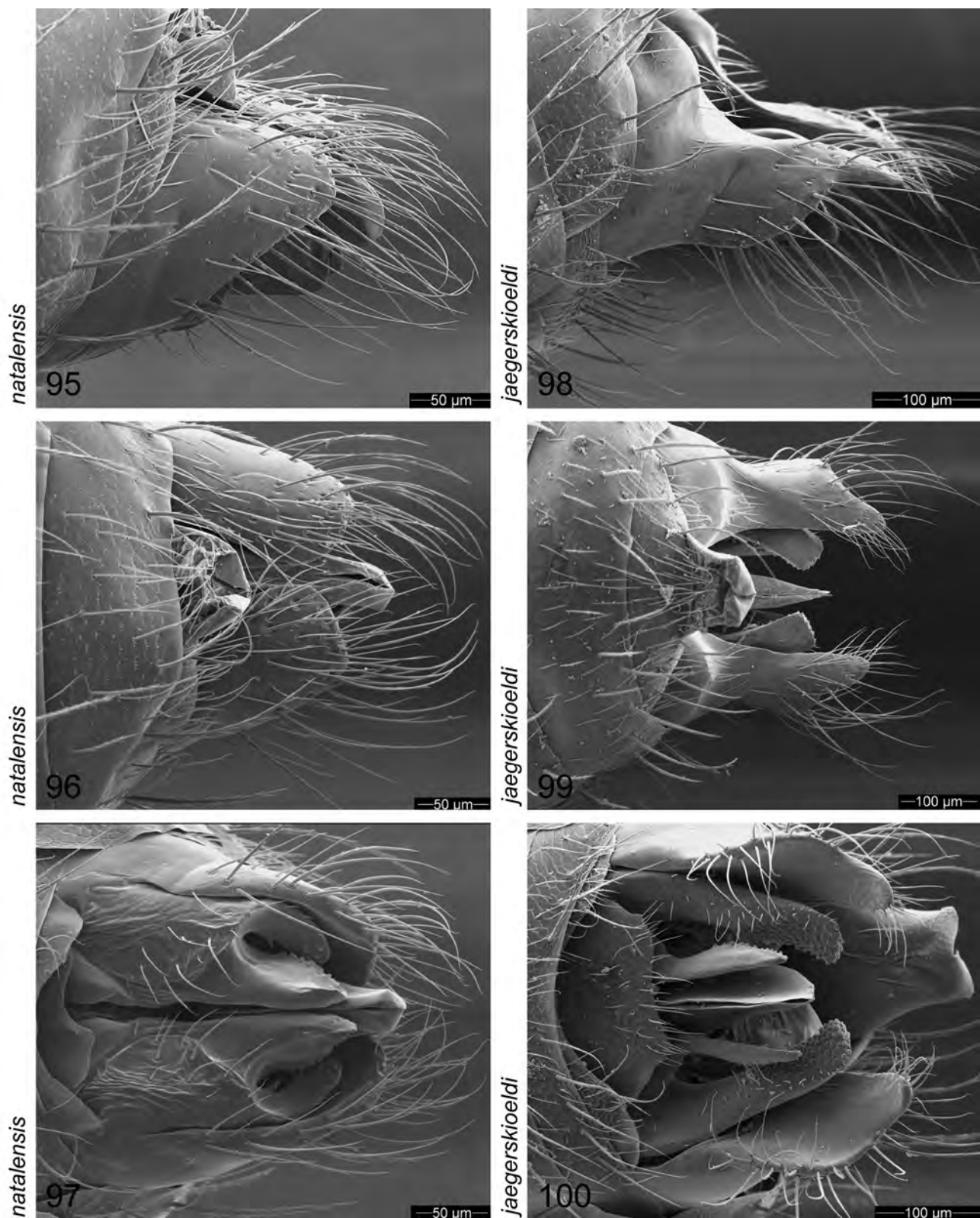


**FIGURES 73–88.** Scares of Afrotropical *Nylanderia* species (workers only): *boltoni* (73, CASENT0179580, Gabon); *bourbonica* (74, CASENT0101309, Reunion); *brevisetula* (75, CASENT0090304, Central African Republic); *impolita* (76, CASENT0179589, Gabon); *incallida* (77, CASENT0179576, Ivory Coast); *jaegerskioeldi* (78, CASENT0179577, Kenya); *lepida* (79, CASENT0179591, Gabon); *luteafra* (80, CASENT0179584, Gabon); *mendica* (81, CASENT0179590, Gabon); *natalensis* (82, CASENT0396096, South Africa); *scintilla* (83, CASENT0179579, Ivory Coast); *silvula* (84, LACMENT272717, Kenya); *umbella* (85, CASENT0179583, Cameroon); *usambarica* (86, CASENT0235343, Tanzania); *vaga* (87, CASENT0104253, U.S.A); *vividula* (88, CASENT0103260, U.S.A.)



**FIGURES 89–91.** Male (USNM #00753578; Nigeria) genitalia of *N. boltoni*

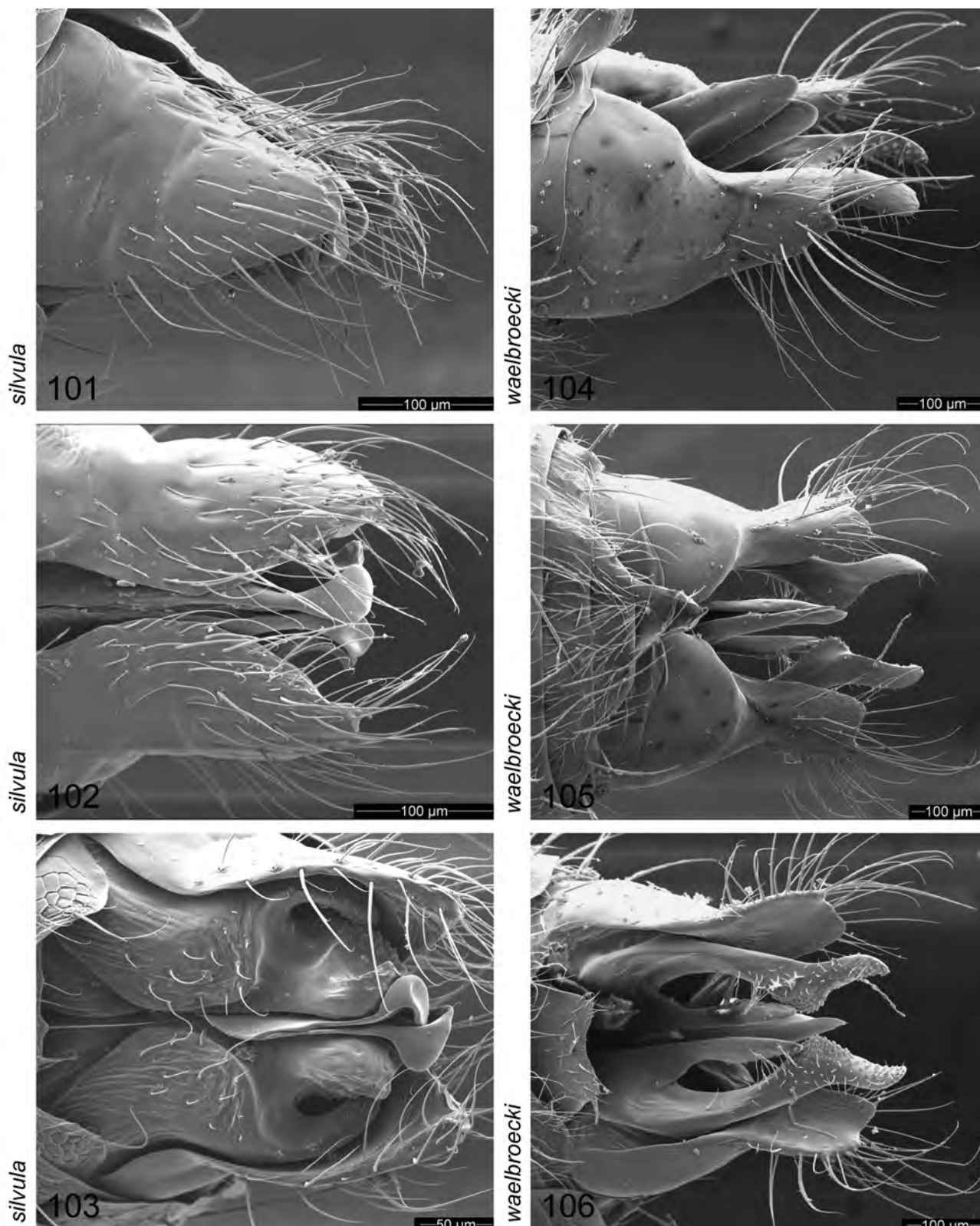
**FIGURES 92–94.** Male (USNM #00753579; Central African Republic) genitalia of *N. lepida*



**FIGURES 95–97.** Male (USNM #00753580; South Africa) genitalia of *N. natalensis*

**FIGURES 98–100.** Male (USNM #00753581; Kenya) genitalia of *N. jaegerskioeldi*

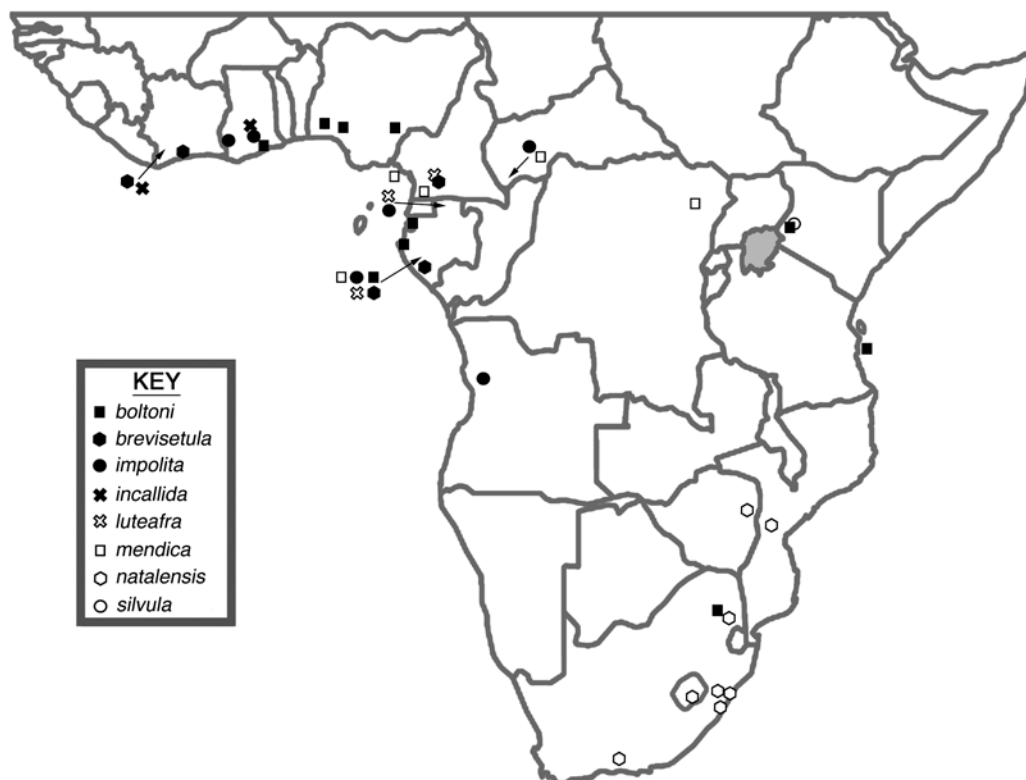




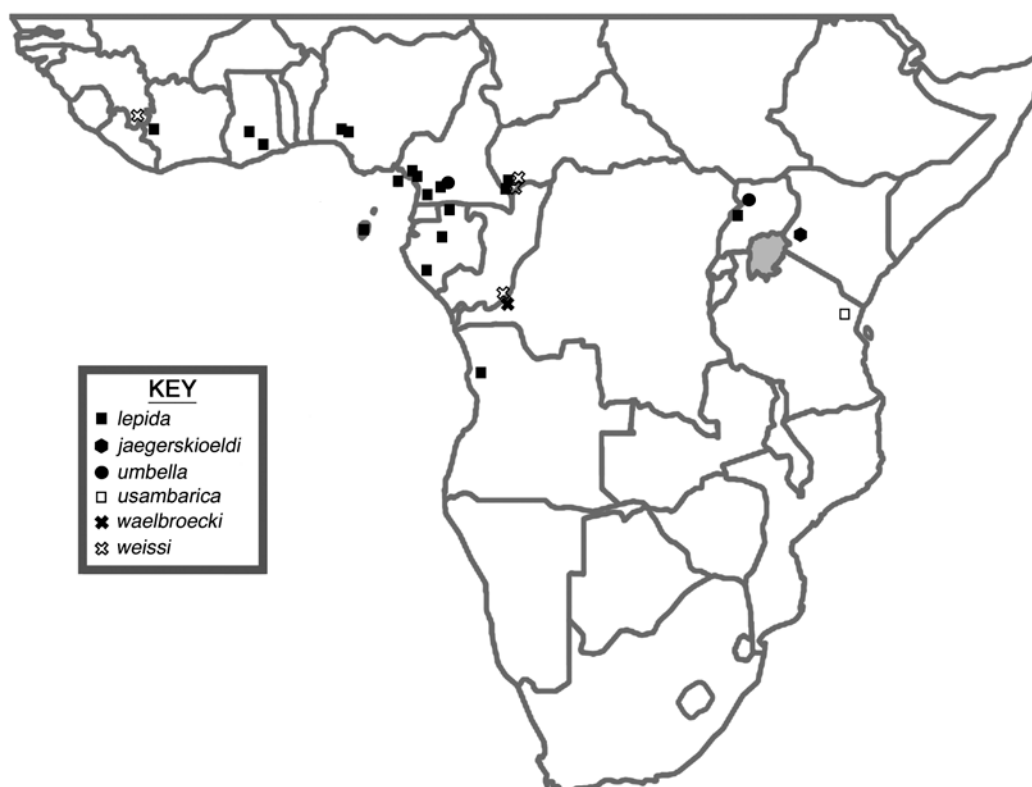
**FIGURES 101–103.** Male (USNM #00753582; Kenya) genitalia of *N. silvula*

**FIGURES 104–106.** Male (USNM #00753583; D.R. Congo) genitalia of *N. waelbroeckii*

107



108



**FIGURES 107 & 108.** Distribution of Afrotopical species.

## Acknowledgments

We thank Barry Bolton (BMNH), Daniel Burckhardt (NHMB), Stefan Cover (MCZ), Dawn Larsen (SAM), Bernhard Merz (MHNG), Eugenia Okonski (USNM), Roberto Poggi (MSNG), Hamish Robertson (SAM), Christine Taylor (BMNH), and Claire Villemant (MNHN) for arranging specimen loans. We thank the imaging team at CAS and Michele Esposito for arranging plates. James Trager provided helpful advice and interesting discussion regarding the creation of some of the new species names. Jack Longino and two anonymous reviewers provided helpful and insightful comments that greatly improved the manuscript. Funds for JSL to travel to Tanzania were provided in part by the Towson University Office of University Research Services through a faculty development grant. This research was supported by the National Science Foundation under grant no. DEB-0743542 awarded to JSL. Funding in support of this research was provided to BLF by WWF-US and National Science Foundation under Grant No. INT 9998672 and DEB-0344731.

## References

- Bernard, F. (1953) La reserve naturelle integrale du Mt Nimba. XI. Hymenopteres Formicidae. *Memoires de l'Institut Français d'Afrique Noire*, 19, 165–270.
- Bolton, B. (1994) *Identification guide to the ant genera of the world*. Harvard University Press, Cambridge, MA. 222 pp.
- Emery, C. (1899) Fourmis d'Afrique. *Annales de la Société Entomologique de Belgique*, 43, 459–504.
- Emery, C. (1910) Beiträge zur Monographie der Formiciden des paläarktischen Faunengebietes. (Hym.) 10. *Deutsche Entomologische Zeitschrift*, 1910, 127–132.
- Emery, C. (1925) Hymenoptera, Fam. Formicidae, subfam. Formicinae. *Genera Insectorum*, 183, 1–302.
- Forel, A. (1886) Diagnoses provisoires de quelques espèces nouvelles de fourmis de Madagascar, récoltées par M. Grandidier. *Annales de la Société Entomologique de Belgique, Comptes-rendus des Seances*, 30, ci–cvii.
- Forel, A. (1901) Einige neue Ameisen aus Südbrasilien, Java, Natal und Mossamedes. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 10, 297–311.
- Forel, A. (1904) Formiciden aus Ägypten und dem Sudan. In Jägerskiöld, L. A. *Results of the Swedish Zoological Expedition to Egypt and the White Nile, 1901*, 1 (no. 9), Uppsala, Sweden, 11 pp.
- Forel, A. (1911) Fourmis d'Afrique et d'Asie. 1. Fourmis d'Afrique surtout du Musee du Congo Belge. *Revue de Zoologie Africaine*, 1, 274–283.
- Forel, A. (1915) Formicides d'Afrique et d'Amérique nouveaux ou peu connus. 2e partie. *Bulletin de la Société Vaudoise des Sciences Naturelles*, 50, 335–364.
- Forel, A. (1916) Fourmis du Congo et d'autres provenances récoltées par MM. Hermann Kohl, Luja, Mayné, etc. *Revue Suisse de Zoologie*, 24, 397–460.
- LaPolla, J.S., S.G. Brady, and S.O. Shattuck. (2010) Phylogeny and taxonomy of the *Prenolepis* genus-group of ants (Hymenoptera: Formicidae). *Systematic Entomology*, 35, 118–131.
- LaPolla, J.S., S.G. Brady, and S.O. Shattuck. (2011) Monograph of *Nylanderia* (Hymenoptera: Formicidae) of the World: An Introduction to the Systematics and Biology of the Genus. *Zootaxa*, 3110, 1–9.
- Mayr, G. (1904) Formiciden aus Ägypten und dem Sudan. In Jägerskiöld, L. A. *Results of the Swedish Zoological Expedition to Egypt and the White Nile, 1901*, 1 (no. 9), Uppsala, Sweden, 11 pp.
- Menozi, C. (1942) Formiche dell'isola Fernando Poo e del territorio del Rio Muni (Guinea Spagnola). 24. Beitrag zu den wissenschaftlichen Ergebnissen der Forschungsreise H. Eidmann nach Spanisch-Guinea 1939 bis 1940. *Zoologischer Anzeiger*, 140, 164–182.
- Nylander, W. (1846) Adnotationes in monographiam formicarum borealium Europae. *Acta Societatis Scientiarum Fennicae*, 2, 875–944.
- Santschi, F. (1908) Nouvelles fourmis de l'Afrique du Nord (Égypte, Canaries, Tunisie). *Annales de la Société Entomologique de France*, 77, 517–534.
- Santschi, F. (1911) Nouvelles fourmis du Congo et du Benguela. *Revue de Zoologie Africaine*, 1, 204–217.
- Santschi, F. (1914) Formicides de l'Afrique occidentale et australe du voyage de Mr. le Professeur F. Silvestri. *Bollettino del Laboratorio di Zoologia Generale e Agraria della R. Scuola Superiore d'Agricoltura*, 8, 309–385.
- Santschi, F. (1915) Nouvelles fourmis d'Afrique. *Annales de la Société Entomologique de France*, 84, 244–282.
- Santschi, F. (1915) Fourmis d'Espagne et des Canaries. *Boletin de la Real Sociedad Española de Historia Natural*, 19, 241–248.
- Ward, P. S. (2001) Taxonomy, phylogeny and biogeography of the ant genus *Tetraponera* (Hymenoptera: Formicidae) in the Oriental and Australian regions. *Invertebrate Taxonomy*, 15, 589–665.
- Wheeler, W.M. (1922) The ants collected by the American Museum Congo Expedition. *Bulletin of the American Museum of Natural History*, 45, 39–269.