Descriptions d'espèces

(Discussion de quelques publications de taxonomie)

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PROMETEO
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Belgian Focal Point to the GTI

Bolton 2006

"La fonction de la taxonomie est ***d'établir l'identité***"

- 1. Détection de **caractères uniques** permettant de **diagnostiquer** un taxon

- 2. Comparaison de caractères permettant de **différencier** le taxon des autres taxons proches

- 3. Reconnaissance de caractères permettant **d'associer** les taxons possédant une relation phylogénétique

- 4. Description et classement de ces caractères afin que d'autres personnes puissent **reconnaître** le taxon

Sélection du groupe à étudier

- Valeur taxonomique
- Importance economique
- Valeur en biodiversité, évolution, écologie, éthologie, biogéographie
- Valeur phylogénétique ou étude de la spéciation
- Monographie locale
- Projet proposé (attention: vérifier si une étude n'est pas déjà en cours).

Préliminaires

Il faut être familiarisé aux concepts (et applications) de:

- Type
- Synonymie
- Statut et disponibilité des noms

Critère initial de séparation d'espèces

Ward (2001: 591-592):

“Chez les organismes à reproduction sexuée, les espèces peuvent se concevoir utilement comme des groupes de populations unies entre elles par un flux génétique et possédant des caractéristiques héritées qui les isolent du point de vue de la reproduction des autres populations. Ce concept motive la recherche de discontinuité morphologiques discrètes qui suggèrent l'existence de limites reproductives.

Les inférences à propos de ces limites entre populations sont des hypothèses de travail, sujettes à réévaluation postérieure lorsque des caractères supplémentaires sont disponibles [ces caractères peuvent être morphologiques (e.g. les genitalia des mâles), marqueurs génétiques, des observations directes concernant l'histoire de vie, ...] .

Un échantillonnage limité d'exemplaires ou l'existence d'un polymorphisme intraspécifique discret peuvent conduire à des appréciations erronées.”

2309

A. Mr. B. Finzi
hommage de l'auteur
F. Santschi

REVUE SUISSE DE ZOOLOGIE
Vol, 31, nº 10. — Février 1925.

Revision du genre Acromyrmex Mayr

par le

Dr F. SANTSCHI

avec 2 figures dans le texte

Créés et distingués comme sous-genre du genre *Atta* Fabricius, par G. Mayr, en 1865[1], les *Acromyrmex* ont été élevés au rang de genre par Emery en 1913[2]. Il y rattache comme sous-genre le groupe *Moellerius* Forel qui, jusque-là, était

Acromyrmex hispidus n. sp.

☿ : Long. 4mm,3 à 5mm,6. (Il existe probablement des exemplaires plus grands.) D'un noir-brunâtre. Devant de la tête et gastre brun ferrugineux, les pattes plus claires. Funicule noirâtre avec le bout, les mandibules et les petits tarses roux-brunâtre. Pilosité roussâtre. Tête comme chez *fallax* Sants, avec les yeux convexes et les crêtes du vertex bien développées. Les épines susoculaires médiocres, parfois bifides. Les épines pronotales latérales sont un peu plus courtes que les mésonotales antérieures toutes assez fines, distantes et obliques en dehors. Pronotales médianes bien venues, assez espacées, avec une petite crête entre leur base. Les tubercules du gastre sont moins élevés que chez *fallax* et n'ont pas de crête transversale devant, mais seulement un amas plutôt longitudinal bordant l'espace libre central chez les ☿ major, et qui fait défaut chez les ouvrières de moins de 5mm.

Bolivie : Conraditi (Lizer et Deletang) 3 ☿.

Acromyrmex hispidus Sants. st. *atratus* n. st.

☿ : Long. 3mm à 7mm. D'un noir profond que masque par place une pruinosité grisâtre. Mandibules, bout de l'antenne et petits tarses rouge-brun. Pilosité rousse. Epines pronotolatérales plus longues que les mésonotolatérales, et rarement plus épaisses, sauf chez les ☿ major. Tubercules antérieurs du gastre rangés en crête transversale élevée, les petits tubercules de la partie postérieure ont aussi une tendance à s'aligner transversalement. Pour le reste comme chez le type.

♀ : Noire, long. 11mm. Epines pronotales droites (arquées chez *A. nigra* Sm.), gastre très peu tuberculé.

Argentine : Cordoba. Fives Lille (Weiser) ☿ types. Brésil : Rio Grande do Sul. Porto Alegre R. P. Pius Buck ☿ ♀.

Acromyrmex hispidus Sants. var. *fallax* n. var.

☿ : Long. 4^{mm} à 7^{mm}. D'un brun ferrugineux, le gastre parfois un peu plus obscur. Les antennes brun-noirâtre. Epines mésonotales antérieures un peu épaissies chez les grandes ☿, pas chez les petites, et en général plus courtes que les pronotales latérales; vues de profil elles paraissent verticales bien qu'obliques en dehors. Les susoculaires développées, mais moins que chez *subterraneus* Forel. Tubercules du gastre et le reste comme chez *diabolicus* Sants., mais le gastre faiblement pubescent.

Argentine : Formosa, Guayacubec (Joergensen) ☿ type. Chaco du Santa Fé (Wagner).

Brésil: Rio Grande do Sul (Jhering ☿) ; ces exemplaires reçus par M. Emery ont été confondus avec *A. laticeps* ☿ — Ibidem (Wasmann) var. à gastre un peu plus obscur. ☿ — Santa Catharina (Schmalz) ☿.

Acromyrmex hispidus Sants. st. *formosus* Sants. var. *rufescens* n. var. (Fig. 1).

Taille et aspect comme chez *rusticus* dont cette variété a les petits yeux; elle en diffère par sa couleur d'un roux ferrugineux beaucoup plus clair y compris les appendices et les tubercules du gastre ne formant pas de crêtes longitudinales ni transversales. Epines pronotomédianes un peu moins écartées que chez *formosus*, taille plus grande.

Brésil: Rio Grande do Sul. (JHERING, leg.) Coll. EMERY ☿ type.

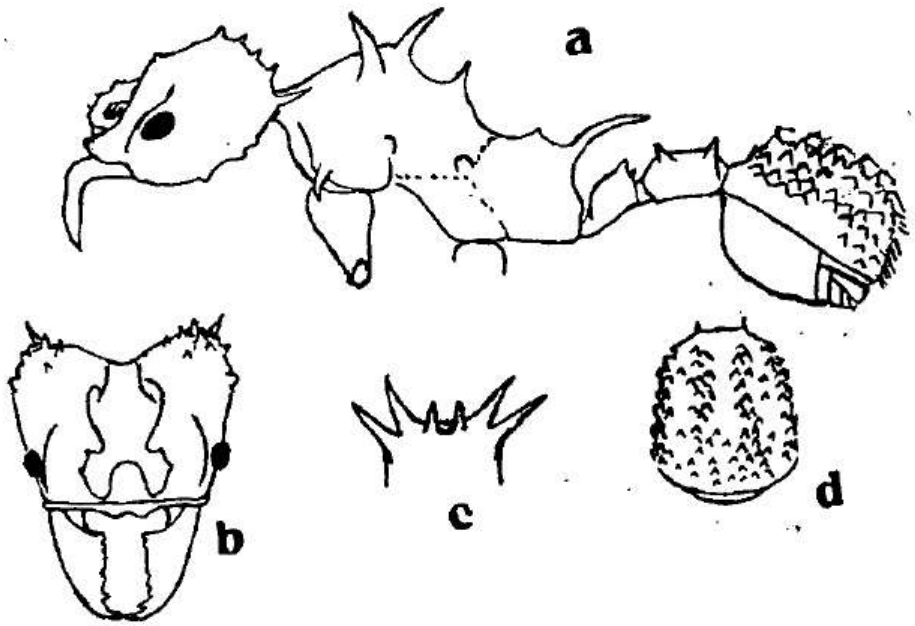

Fig. 1. — *Acromyrmex hispidus* st. *formosus* v. *rufescens* Sants. ☿. — *a*. Profil; les épines pronotales médianes sont cachées par les pronotolatérales. — *b*. Tête de front. — *c*. Epines promésonotales vues de devant. — *d*. Gastre vu de dessus

Résumé des problèmes

- 1. Multiplication débridée des taxons inférieurs à l'espèce
- 2. Critères utilisés peu nombreux et imprécis
- 3. Economie sur les illustrations
- 4. Localité d'origine de l'échantillon imprécis
- 5. Manque les caractères permettant de diagnostiquer le taxon
- 6. Manque une comparaison approfondie du nouveau taxon avec ceux connus
- 7. Uniquement longueur totale du corps
- 8. Où sont conservés les spécimens?

Reprinted from PSYCHE, Vol. 76, No. 2, 1969

Prof. Dr. K. Göllwald

A REVISION OF THE NEOTROPICAL DACETINE ANT GENUS *ACANTHOGNATHUS* (HYMENOPTERA: FORMICIDAE

BY WILLIAM L. BROWN, JR.[1] and WALTER W. KEMPF[2]

INTRODUCTION

At the time it was last reviewed (by M. R. Smith in 1944), *Acanthognathus* contained three species: *ocellatus, lentus* and *brevicornis,* known from Central America and a few localities along the eastern edge of South America. In the present paper we are able to add three distinctive new species—one from the heart of Amazonia, one from the Pacific Slope of Colombia, and one from Southeastern Brasil; and a male of the genus is described for the first time. We present fragmentary observations on living colonies of *A. rudis* and *A. ocellatus* to confirm M. R. Smith's surmise that the genus is predaceous, at least to some extent on Collembola.

Acanthognathus is a very distinctive genus within the tribe Dacetini, to which it clearly belongs, and within which it is one of the two most primitive living genera (Brown and Wilson, 1959). The other primitive member is *Daceton,* containing a single spectacular species confined to hylaean South America (Wilson, 1962). Though *Daceton* and *Acanthognathus* workers share a number of primitive characters (antennal segments 11; palpal segments 5, 3; compound eyes large; antennal scrobes absent; humeri armed), they are very different in size, habitus, and choice of nest site, and thus may have diverged a long time ago. *Acanthognathus* has the aspect of a genus that has begun a shift from epigaeic to cryptic foraging. Its retention of large eyes, multisegmented antennae and palpi, and long mandibles suggests that much of its foraging must still be done in the open,

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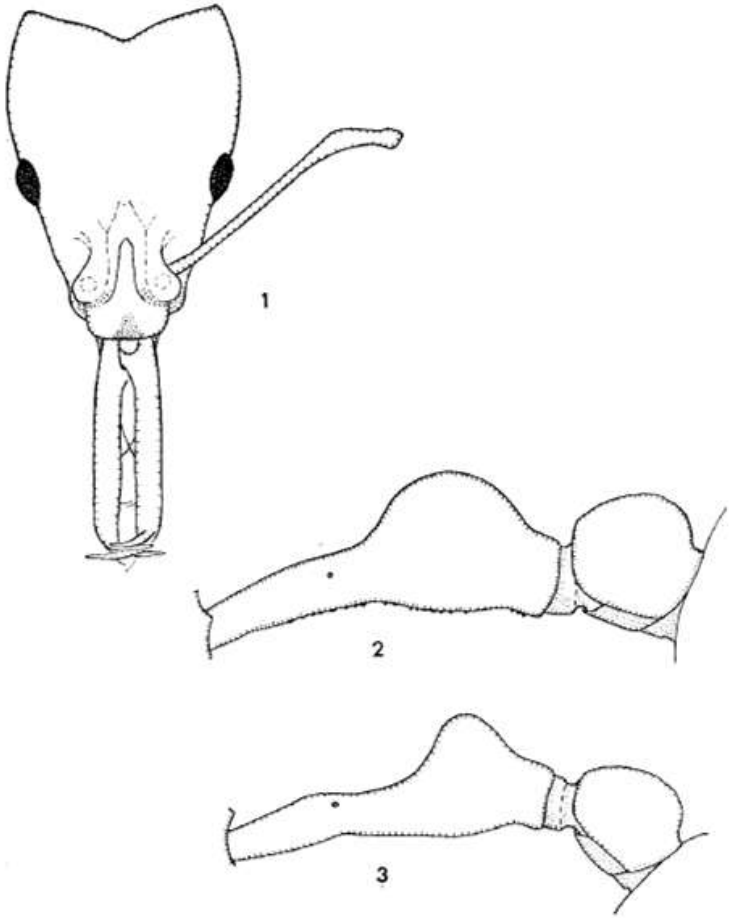
Manuscript received by the editor January 2, 1969



Figures 1 - 3. *Acanthognathus* spp., workers from type series in outline, sculpture and most pilosity omitted. Fig. 1, *A. rudis* sp. n. from type locality (Jardim Botanico, Agua Funda, São Paulo), dorsal view of head and mandibles. Fig. 2, *A. rudis* (Guararema, São Paulo), petiole and postpetiole from side. Fig. 3, *A. stipulosus* sp. n., holotype petiole and postpetiole in side view. Fig. 1 drawn by Brown, Figs. 2 and 3 by Kempf and Brown.

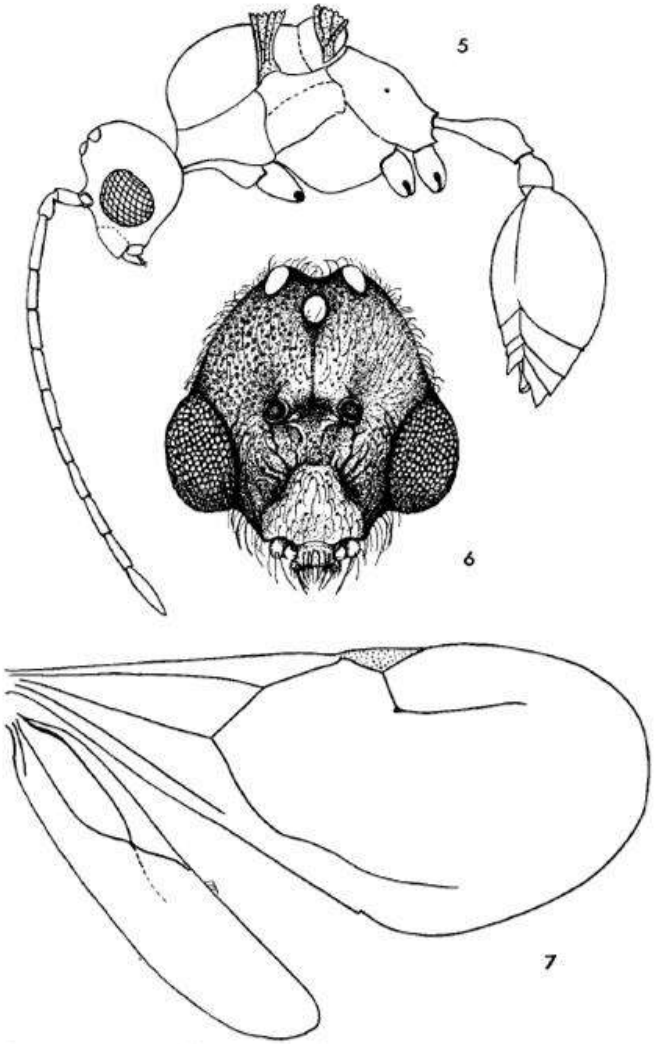
Acanthognathus rudis sp. nov.

(Figs. 1, 2, 4-10)

Acanthognathus ocellatus (not of Mayr): Santschi, 1922: 353-354, fig. 2, worker from State of Rio de Janeiro, Brasil.—Borgmeier, 1927:120, record from State of Rio de Janeiro.— Kempf, 1958:553-554, record from Guararema, S. Paulo.— Brown and Wilson, 1959:282, fig. 3, worker.— Kempf, 1964:67, records from states of Rio Grande do Sul, Santa Catarina, Paraná, São Paulo and Rio de Janeiro.

Holotype worker: TL 4.2, HL 0.93, HW 0.65 (CI 70), ML 0.68 (MI 73), WL 0.86, petiole L in dorsal view 0.55, postpetiole L 0.20 (W 0.20), gaster L 0.97, greatest diameter of compound eye 0.13, scape L (chord to basal collar) 0.76 mm. Standard measurements of a selection of specimens from the type series are listed in Table I.

This species is so well known (under the name *ocellatus*) that Figs. 1, 2, and 4, and the measurements and indices, plus mention



Figures 5-7. *Acanthognathus rudis* sp. n., male from type nest series (Agua Funda). Fig. 5, side view. Fig. 6, full-face view of head, antennae omitted. Fig. 7, wings, microtrichiae omitted. Figs. 5 and 7 drawn by Kempf, Fig. 6 by Ruth Ann DeNicola.

of a few outstanding features, should suffice to characterize it. Note the rather V-like outline of the posterior excision of the head. Head slightly more depressed, less convex above, than in *A. ocellatus*.

The outstanding trait is the fine, nearly opaque, densely rugulose-punctulate sculpture of head and truncus. Among the rugules are crowded numerous small piligerous fossae, especially on the dorsum of the head, but these are clearly visible only in certain lights. Sides of truncus finely punctulate-rugulose, except for the lowest part of the mesothorax, which is smooth and shining. The hairs are abundant, particularly on head and promesonotum, but also present on nodes, short and inclined, slender but blunt, often feebly flattened or clavate toward their apices, those on the head directed anteriad. Pilosity otherwise as described for the genus.

Humeral angles obtuse, not strongly projecting. Propodeal teeth diverging, very feebly curved as seen from above.

The mandibles lack preapical armament, and there is not even a distinct welt at the site of the trigger hair, though a formation extending internally to the base of the hair can be seen within the transparent cuticle of the inner mandibular margin.

Petiole with a low, rounded node (Fig. 2), the lower anterior slope with a low median carina; node obout 0.22 mm long and 0.18 mm wide; postpetiole subglobular. Petiole and postpetiole densely and finely reticulo-punctulate and opaque, except for the almost completely smooth, shining nodal summits.

Color light reddish ferruginous; nodes and gaster yellowish ferruginous; but the gaster with the middle third shading into a broad brownish-red transverse band; appendages yellow to straw.

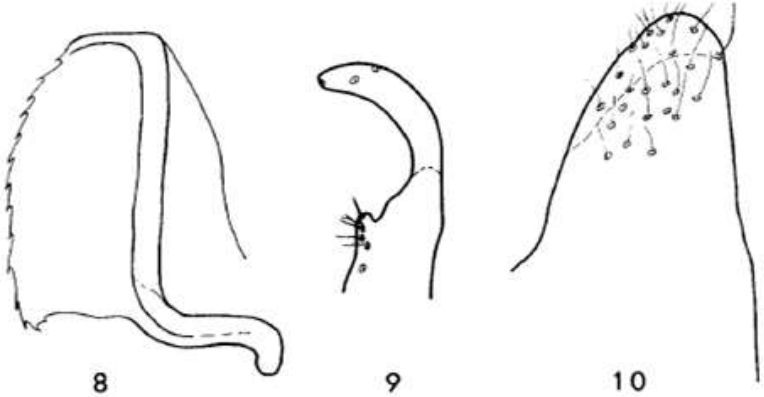
Paratype variation is slight on the whole (see Table I). Workers from Boraceia, S. Paulo State, have the upper as well as lower mesopleura largely smooth and shining. Color varies from light to medium ferruginous.

Queen: Measurements of a queen from the type locality are given in Table I. Her distinguishing specific characters correspond in the usual way to those of the worker. Mesonotum with crowded, slightly vermiculate longitudinal rugulae, interspersed with small fossae. Pronotum and propodeum transversely rugulose. Mesopleura with the upper half rugulose or smooth; lower half mostly smooth and shining.

Male from the type nest series: TL 2.8, HL 0.52, HW without eyes 0.45, with eyes 0.54, L antenna 2.0, ML 0.05, WL 0.90, L forewing 2.55 mm.

See Figs. 5-10. Smooth and shining, with small punctures abundant on head, a few rugae around the antennal insertions. Mesonotum finely and indistinctly longitudinally striolate-punctulate, sericeous-opaque. Color brown to piceous, head darkest (specimens may not be fully colored). Legs and mouthparts yellowish-tan.

Type material: all from Brasil; states are given in capital letters. Holotype (WWK) a worker from a small nest with queen and brood taken in a fragment of rotten wood found lying beside a brook in a moist, shaded gully in the forest reserve of the Jardim Botanico, environs of the city of São Paulo, SAO PAULO, February 1967, W. L. Brown leg. This colony was kept for observation, and eventually yielded two adult males, the only ones so far recorded for the genus. Paratypes, in addition to workers, queen and males from the type nest (MCZ, WWK), are the following (states listed south to north): RIO GRANDE DO SUL: Tainhas, April 1959, F. Plaumann leg., 1 w[orker] (WWK 3250). SANTA CATARINA (all Plaumann leg.): Chapecó, June, August 1960, 2w (WWK s/n and 4618); Ibicaré, July 1959, 1 q(ueen) (WWK 3126) and September 1960, 2 w, (WWK 3621); Nova Teutonia, July 1952 2 w, October 1953 2 w 1 q, June 1957 1 w 2 q, July 1957 1 q, February 1959 1 w, July 1959 1 w (WWK 3100); February 1960 1 w (WWK 3780), June 1960 1 w (WWK 3956); July 1961 1 w (WWK 3379); January 1963 1 w (WWK 3744); June 1963 1 w



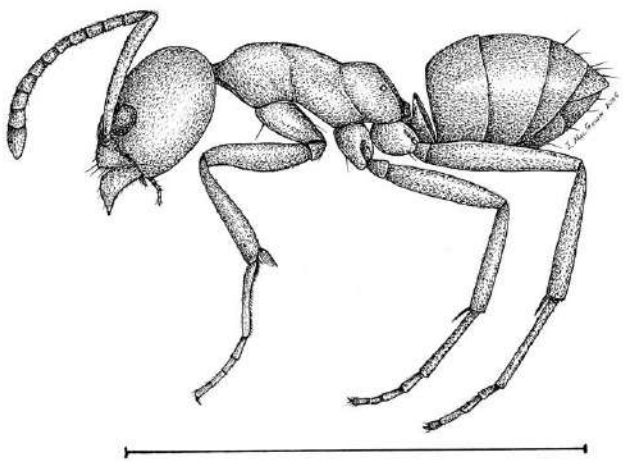
Figures 8 - 10. *Acanthognathus rudis* sp. n., male genitalia from one of the specimens from the type nest series. Fig. 8, aedeagus. Fig. 9, volsella. Fig. 10, paramere, with dashed line indicating apical extremity of excavated portion. Drawn by Brown.

University of California Press
(University of California, Office of the President)

Year 2007 *Paper vol*_126

Taxonomic Revision of the Ant Genus Linepithema (Hymenoptera: Formicidae)

Alexander L. Wild
University of Arizona



ALWC-	Alexander L. Wild personal collection, Tucson, Arizona, USA.
AVSC-	Andrew V. Suarez personal collection, Urbana, Illinois, USA.
BMNH-	British Museum of Natural History, London, UK.
CASC-	California Academy of Sciences, San Francisco, California, USA.
IFML-	Instituto Fundación Miguel Lillo, Tucumán Argentina.
INBP-	Museo Nacional de la Historia Natural del Paraguay, San Lorenzo, Paraguay.
JTLC-	John T. Longino personal collection, Evergreen, Washington, USA.
LACM-	Natural History Museum of Los Angeles County, Los Angeles, California, USA.
MACN-	Museo Argentina de Ciencias Naturales, Buenos Aires, Argentina.
MCSN-	Museo Civico de Historia Natural 'Giacomo Doria', Genoa, Italy.
MCZC-	Museum of Comparative Zoology, Cambridge, Massachusetts, USA.
MHNG-	Muséum d'Histoire Naturelle, Geneva, Switzerland.
MZSP-	Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil.
NHMB-	Naturhistorisches Museum, Basel, Switzerland.
NHMW-	Naturhistorisches Museum Wien, Vienna, Austria.
PSWC-	Philip S. Ward personal collection, Davis, California, USA.
QCAZ-	Museo de Zoología de la Pontificia Universidad Católica del Ecuador, Quito, Ecuador.
UCDC-	R. M. Bohart Museum of Entomology, Davis, California, USA.
USNM-	National Museum of Natural History, Washington, D.C., USA.
WPMC-	William P. MacKay personal collection, El Paso, Texas, USA.

HL - Head length. In full face view, the midline distance from the level of the maximum posterior projection of the posterior margin of the head to the level of the most anterior projection of the anterior clypeal margin. In males, I consider the posterior margin of the head as the vertex between, and not including, the ocelli.

HW - Head width. In full face view, the maximum width of the head posterior to the compound eyes.

MFC - Minimum frontal carinal width. In full face view, the minimum distance between the frontal carinae.

SL - Antennal scape length. Measured from the apex of the first antennal segment to the base, exclusive of the radicle.

FL - Profemur length. In posterior view, measured along the longitudinal axis from the apex to the junction with the trochanter.

LHT - Metatibial length. In dorsal view, measured along the longitudinal axis from the apex to the level of the lateral condyles, excluding the medial proximal condyle.

PW - Pronotal width. In dorsal view, the maximum width of the pronotum measured from the lateral margins.

WL - Wing length. In males and queens, the maximum distance between the base of the sclerotized wing veins to the distal margin of the wing.

MML - Maximum mesosomal length. In males and queens, the distance from the maximum anterior projection of the mesosoma to the maximum posterior projection of the propodeum. In males with a well developed mesosoma the anterior projection of the mesosoma is often formed by a swollen mesoscutum, and the posterior projection is formed by a rearward projection of the propodeal dorsum above the petiole. MML in workers was not taken because the flexible articulation between the pronotum and the mesonotum introduces substantial variation in this measurement.

EL - Eye length. In full face view, the length of the compound eye along the longitudinal axis.

EW - Eye width. With eye held in focal plane facing the viewer, the maximum transverse width of the compound eye.

ES - Eye size. 100*EL*EW.

SI - Scape index. 100*SL/HL.

CI - Cephalic index. 100*HW/HL.

CDI - Carinal distance index. 100*MFC/HW.

OI - Ocular index. In workers, 10*ES/HL (= 1000*EL*EW/HL). In males and queens, 100*EL/HL.

WI - Wing index. In males and queens, 10*WL/MML.

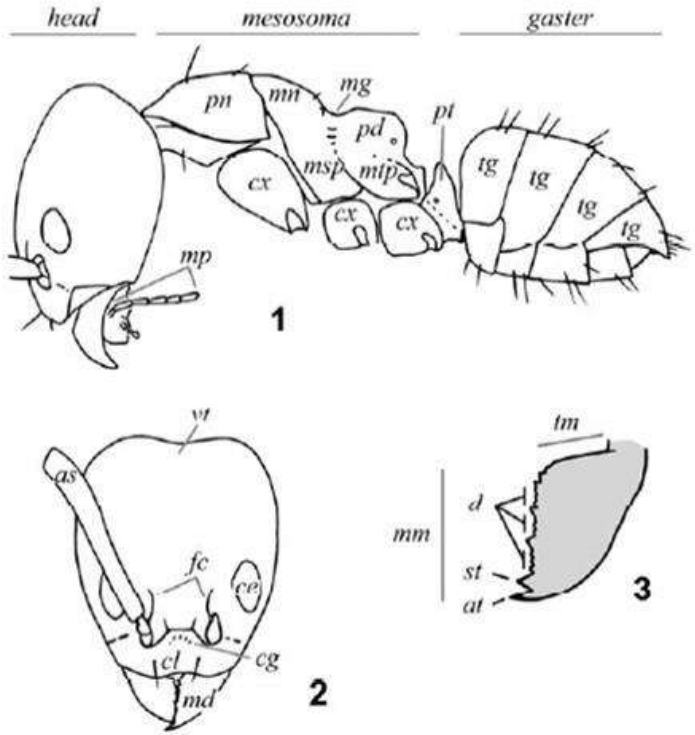
FI - Femoral index. In males and queens, 100*FL/MML.

Pubescence. In most specimens the pubescence forms dense, velvety mats comprised of small, hair-like cuticular projections on at least part of the dorsal surface of the ant. Proper examination of the pubescence requires diffuse lighting at sufficient magnification. If a spot light source is the only light available (as in many fiber-optic lighting systems), the light should be reflected off a white card held close to the specimen instead of pointed directly at the specimen.

The density and extent of the pubescence on various sclerites can vary in taxonomically informative ways, especially among workers. In particular, the pubescence on the mesopleuron and on the metapleuron can be absent (Fig. 4), dense (Fig. 5), or fading to sparse or absent anteroventrally (Fig. 6). The first couplet in the worker key relies on the distance between the appressed pubescent hairs on the metapleuron. In most species the metapleuron is reliably either densely pubescent with tightly spaced hairs or nearly entirely devoid of hairs. This character is ambiguous in some populations of a few common species, and the key has been designed so that these species key out on both sides of the couplet.

Propodeal shape. The propodeum is the posterior dorsal sclerite on the mesosoma. The shape of the propodeum is variable among *Linepithema* workers and is reliably diagnostic of some species or species groups. Unfortunately the shape variation is complex and difficult to describe succinctly, so I have avoided making heavy use of propodeal characters in the keys.

FIGURES



Figures 1-3. Schematic drawings of a *Linepithema* worker illustrating relevant morphological features. 1. Body, lateral view. 2. Head, full face view. 3. Mandible, dorsal view. Abbreviations are as follows: *as*, antennal scape; *at*, apical tooth of mandible; *ce*, compound eye; *cg*, pre-sutural clypeal groove; *cl*, clypeus; *cx*, coxa; *d*, denticles; *fc*, frontal carinae; *im*, inner margin of mandible; *md*, mandible; *mg*, metanotal groove; *mm*, masticatory margin of mandible; *mn*, mesonotum; *mp*, maxillary palps; *msp*, mesopleuron; *mtp*, metapleuron; *pd*, propodeum; *pn*, pronotum; *pt*, petiole; *st*, subapical tooth of mandible; *tg*, gastric tergite; *vt*, vertex.

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Species delimitation. I employ the view that species are aggregates of interbreeding or potentially interbreeding populations (the Biological Species Concept, Mayr 1942). Although resources were not available in the present study to directly examine gene flow, species boundaries can be inferred indirectly through morphological and geographic data (Coyne and Orr 2004). Specifically, character states within biological species are likely to be continuous, while character states may be expected to diverge in the absence of gene flow, leaving a distinct gap. Consequently, consistent gaps in morphology between sympatric populations that have opportunity for interbreeding can be taken as a proxy for reduced gene flow and for species boundaries. In the present paper, sympatric character state discontinuities are the primary criteria for recognizing species. Some morphometric examples are given in Figures 77–99.

Unfortunately, not all populations occur in sympatry, either locally or regionally. Allopatric populations are widely recognized as problematic for the Biological Species Concept (Wheeler and Meier 2000). In cases of extreme morphological and ecological disparity, such as the rare chaco species *L. cryptobioticum*, the establishment of a new species from an isolated population is straightforward. However, most cases of allopatry present a range of variation that is considerably more difficult. I describe the observed variation in the discussion section of each species synopsis. Where the evidence is insufficient to either resolve a population into a pre-existing species or to elevate it to species status, I have taken a nomenclaturally conservative stance and treated ambiguous populations as conspecific with known species. While this approach surely obscures some real biological diversity, it prevents a proliferation of names that will later require synonymy.

The final product of species delineation in this paper is not strictly a reflection of biological species, then, but rather an inference of biological species weighted by utilitarian concerns in proportion to the degree of uncertainty in the inference. The resulting species serve as hypotheses that may be tested with additional data. It is my hope, in fact, that this revision will encourage the more detailed research in *Linepithema* that eventually renders the present study obsolete.

Genus *Linepithema* Mayr

Linepithema Mayr 1866: 496. Type species: *Linepithema fuscum* Mayr, by monotypy.

*Worker diagnosis (key characters **in bold**).* Small dolichoderine ants (HW 0.42–0.80) with a monomorphic worker caste. Compound eyes comprising 17–110 ommatidia, centered anterior of midline of head in full face view, not touching lateral margins; **mandible with dentition consisting of an elongate apical tooth and a smaller subapical tooth followed by a series of 3–4 small teeth alternating with denticles** (as in Fig. 3), masticatory and inner margins meeting at a curve armed with 1–3 teeth or denticles; **anteromedial clypeal margin with a broad, shallow concavity**; palp formula 6:4; mesosoma lacking spines or teeth; propodeum in lateral view depressed below level of mesonotum; fourth gastric sternite keel-shaped posteriorly; pilosity moderate to reduced, head lacking standing setae along posterolateral corners and pronotum bearing fewer than 10 standing setae.

Queen diagnosis. Mandible with dentition consisting of an elongate apical tooth and a smaller subapical tooth followed by a series of 3–5 small teeth alternating with denticles (as in Fig. 3), masticatory and inner margins meeting at a curve armed with 1–3 teeth or denticles; anteromedial clypeal margin with a broad, shallow concavity; palp formula 6:4; axilla with a medial suture; mesoscutum covered with a dense, fine pubescence; venter of petiole with a slight lobe.

Male diagnosis. (Excluding some worker-like males in populations of *L. dispertitum*; see species synopses for description and discussion of variation in *L. dispertitum*). Antennal scape shorter than third antennal segment; lateral ocelli emerging above posterior cephalic margin in full face view; anteromedial clypeal margin broadly convex; mandibles with a distinct masticatory margin bearing at least 4 teeth or denticles, sometimes approaching worker dentition; mesoscutum covered with dense, fine pubescence; petiolar scale not inclined anteriorly, instead with scale straight, inclined posteriorly, or present as a low node; forewings with 1–2 closed submarginal cells; hind wings with 2 closed cells; volsella with digitus narrow and sharply downturned distally.

Linepithema anathema Wild, **sp. nov.**

(worker mesosoma Fig. 33; worker head Fig. 34; distribution Fig. 106)

Species group: Humile

Holotype worker. BRAZIL. Minas Gerais: 2 km S Monte Verde, 22º54'S 46º03'W, 1900m, 26.viii.1996, under stone in shrubland, P.S. Ward acc. no. PSW13155 [MZSP].

Paratypes. Same data as holotype, 9 workers [ALWC, BMNH, CASC, LACM, MCZC, MHNG, UCDC, USNM].

Holotype worker measurements: HL 0.64, HW 0.51, MFC 0.14, SL 0.64, FL 0.54, LHT 0.62, PW 0.36, ES 1.94, SI 125, CI 80, CDI 28, OI 30.

Worker measurements: (n = 5) HL 0.62–0.68, HW 0.51–0.56, MFC 0.14–0.15, SL 0.63–0.66, FL 0.54–0.58, LHT 0.59–0.66, PW 0.36–0.40, ES 1.94–2.25, SI 119–126, CI 80–85, CDI 25–28, OI 30–36.

Worker diagnosis: Head narrow in full face view (CI 80–85); antennal scapes relatively long (SI 119–126); mesopleura, metapleura, and all gastric tergites with dense pubescence; gastric tergite 2 bearing suberect to erect setae; mesosoma bicolored with dorsum brown and mesopleura and metapleura light reddish brown.

Worker description: Head in full face view ovoid and relatively narrow (CI 80–85). Lateral margins broadly convex, grading smoothly into posterior margin. Posterior margin convex. Compound eyes large (OI 30–36), comprising 75–90 ommatidia. Antennal scapes long (SI 119–126), approximately as long as HL. In full face view, scapes in repose exceeding posterior margin of head by a length greater than length of first funicular segment. Frontal carinae moderately to narrowly separated (CDI 25–28). Maxillary palps of moderate length, approximately ½ HL, ultimate segment (segment six) longer than segment 2.

Petiolar scale sharp and inclined anteriorly, in lateral view falling short of the propodeal spiracle.

Cephalic dorsum (excluding clypeus) without standing setae. Pronotum without standing setae. Mesonotum without standing setae. Gastric tergite 1 (= abdominal tergite 3) bearing 0–2 very short subdecumbent setae, tergite 2 with 2–3 suberect to erect setae, tergite 3 with 3–4 suberect to erect setae. Venter of metasoma with scattered erect setae.

Integument shagreened and only lightly shining. Body and appendages including gula, entire mesopleura, metapleura, and abdominal tergites covered in dense pubescence.

Normally somewhat bicolored. Head, mesosomal dorsum, gaster, legs, and antennae dark brown. Mandibles, mesopleura, and metapleura a light reddish brown.

Queen and male unknown.

Distribution: Southeastern Brazil.

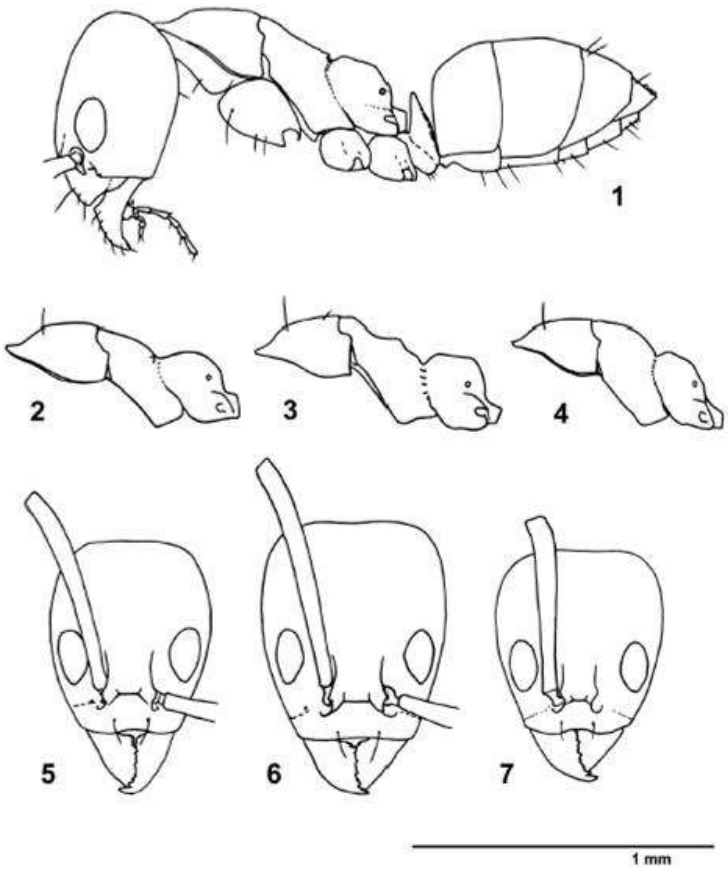
Biology: The type series was collected under a stone in shrubland at 1900 meters elevation. Little is known about this species.

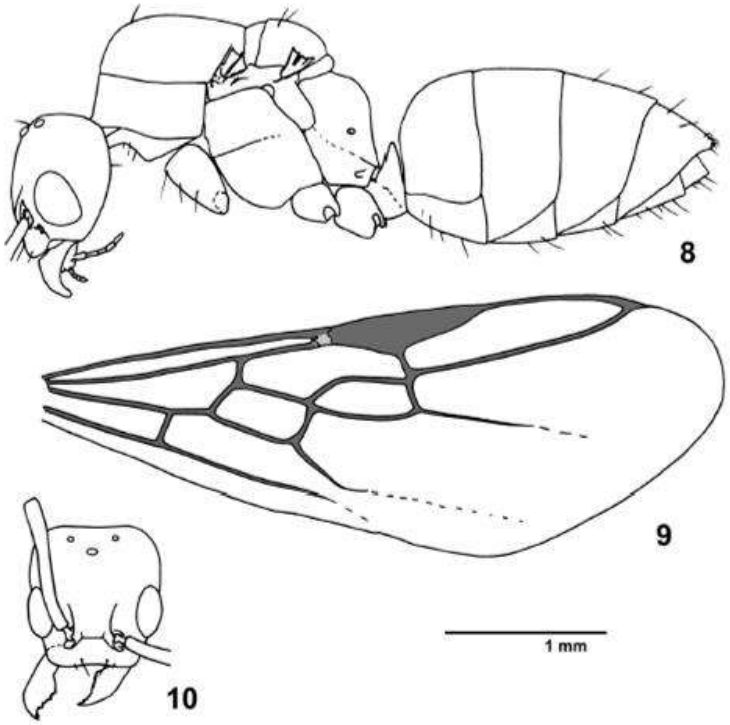
Similar species: Workers of the commonly encountered cosmopolitan species *L. humile* usually lack standing hairs on gastric tergites 1–2 and tend to have a somewhat broader head (CI 84–93). *Linepithema oblongum*, found in the high Andes of Bolivia and northern Argentina, is a very similarly proportioned ant to *L. anathema* but normally has at least some members of each series with dilute pubescence on gastric tergites 2–4. *Linepithema anathema* differs from both *L. humile* and *L. oblongum* in having a more upright, less anteriorly inclined propodeum.

Discussion: The two collections, from Minas Gerais and Paraná, are both similar in appearance. Males are not known, but they will probably key out to *L. micans* or *L. gallardoi*.

Etymology: From Latin, meaning "accursed thing." The long scapes, large eyes, and relatively sparse pilosity of this ant complicate the diagnosis of the morphologically similar pest species *L. humile*.

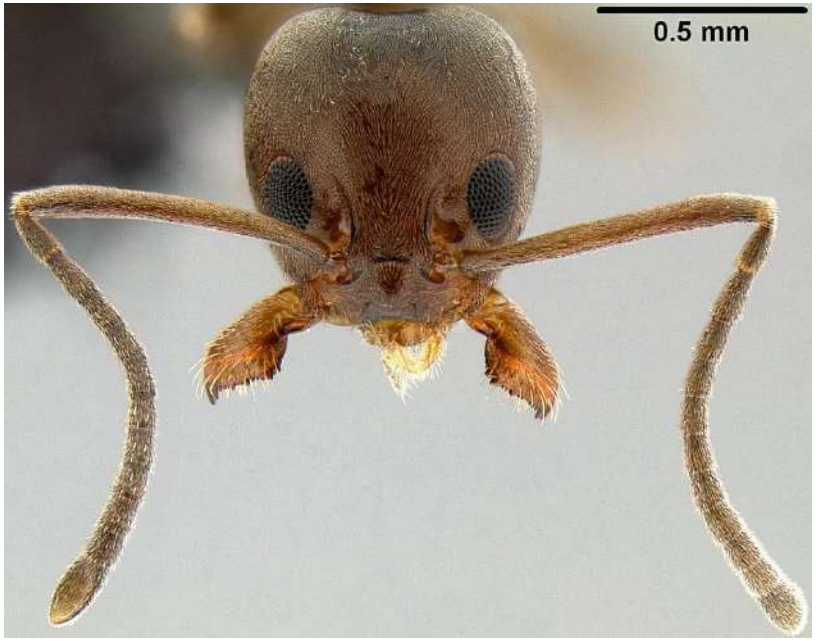
Material examined: BRAZIL. Minas Gerais: 2 km S Monte Verde, 22°54' S 46°03' W, 1900m [ALWC, BMNH, CASC, LACM, MCZC, MHNG, MZSP, UCDC, USNM]. Paraná: Castro [MZSP].





Figs. 8–10. *L. humile*, queen. Specimen from Victoria, Entre Rios, Argentina. 8. Lateral view. 9. Right forewing, dorsal view. 10. Head, full face view.

0.5 mm


0.5 mm

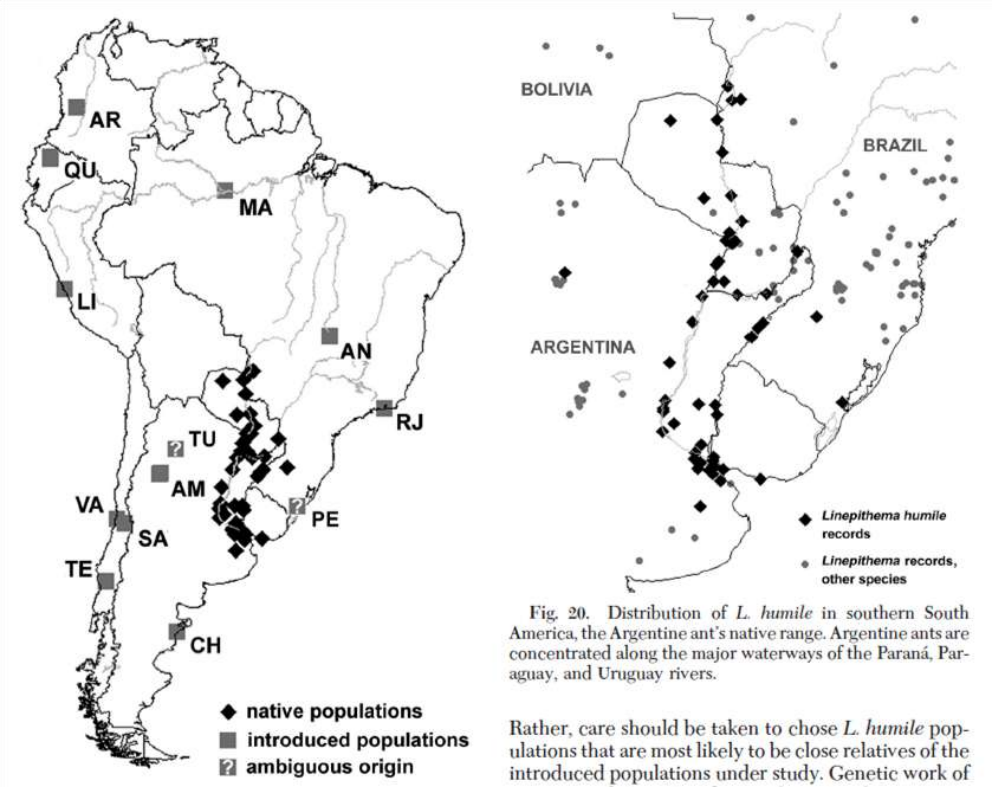


Fig. 20. Distribution of *L. humile* in southern South America, the Argentine ant's native range. Argentine ants are concentrated along the major waterways of the Paraná, Paraguay, and Uruguay rivers.

Rather, care should be taken to chose *L. humile* populations that are most likely to be close relatives of the introduced populations under study. Genetic work of

Key to the species of *Linepithema* based on workers

1. Metapleuron anterior of metapleural gland orifice with a central area devoid of pubescence; if some appressed hairs present, then distance between hairs is greater than length of hairs (Fig. 4); those specimens ambiguous or intermediate in this character (similar to Fig. 6) should key out through both couplets 2

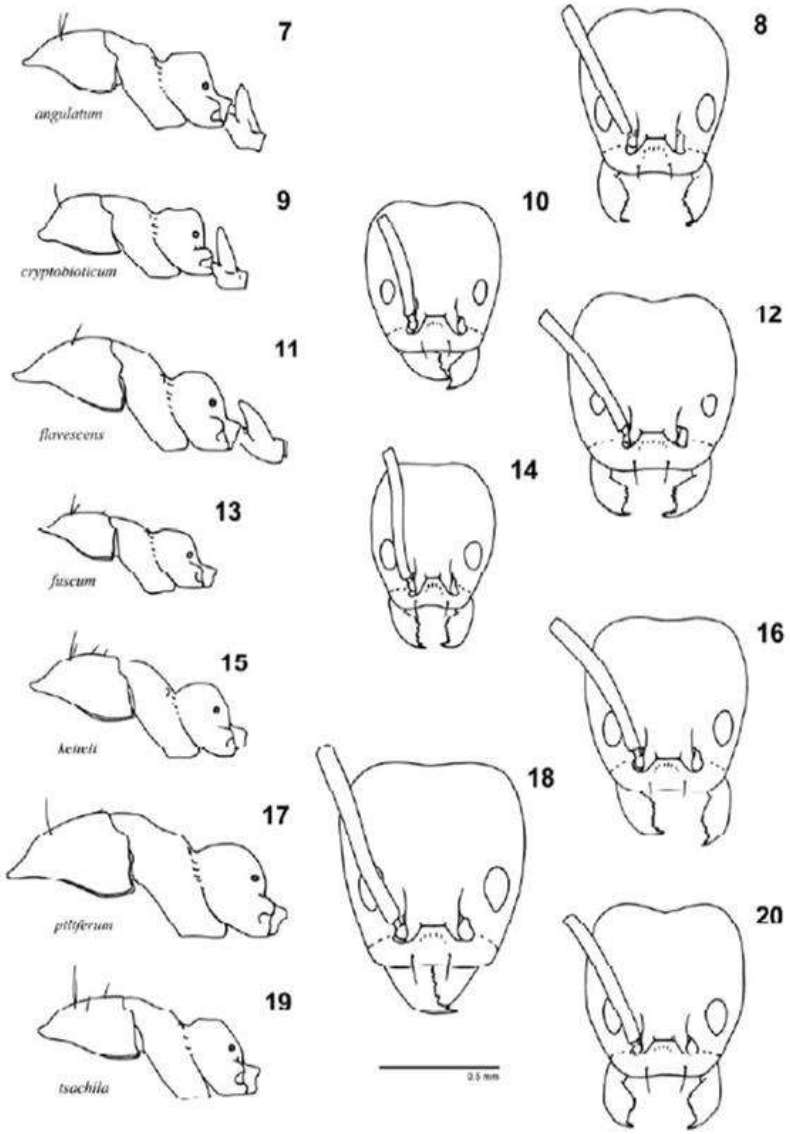
Metapleuron anterior of metapleural gland orifice with many appressed hairs on surface, distance between hairs less than length of hairs, hairs often densely spaced but sometimes fading to sparse ventrally (Figs. 5-6); those specimens ambiguous or intermediate in this character (similar to Fig. 6) should key out through both couplets 16

2. (1) Antennal scapes short (SI < 86), in full face view scapes in repose do not surpass posterior margin; eyes small, with fewer than 40 ommatidia; body color pale yellow to light brown, never medium brown to black 3

Antennal scapes longer (SI > 87), in full face view scapes in repose surpass posterior margin; eye size variable, usually with more than 40 ommatidia (35–50 in *L. fuscum*); body color variable 4

3. (2) Eyes with < 25 ommatidia; antennal scapes very short, SL < 0.45; frontal carinae relatively widely spaced, CDI > 30; petiolar scale in lateral view relatively tall, exceeding level of propodeal spiracle (Fig. 9); propodeum only slightly depressed below level of promesonotum; Paraguay ..... *L. cryptobioticum* (pg. 41)

Eyes with > 25 ommatidia; antennal scapes longer, SL > 0.50; frontal carinae relatively narrowly spaced, CDI < 29; petiolar scale in lateral view not exceeding level of propodeal spiracle (Fig. 11); propodeum depressed well below level of promesonotum; Hispaniola ..... *L. flavescens* (pg. 49)



Key to the species of *Linepithema* based on workers

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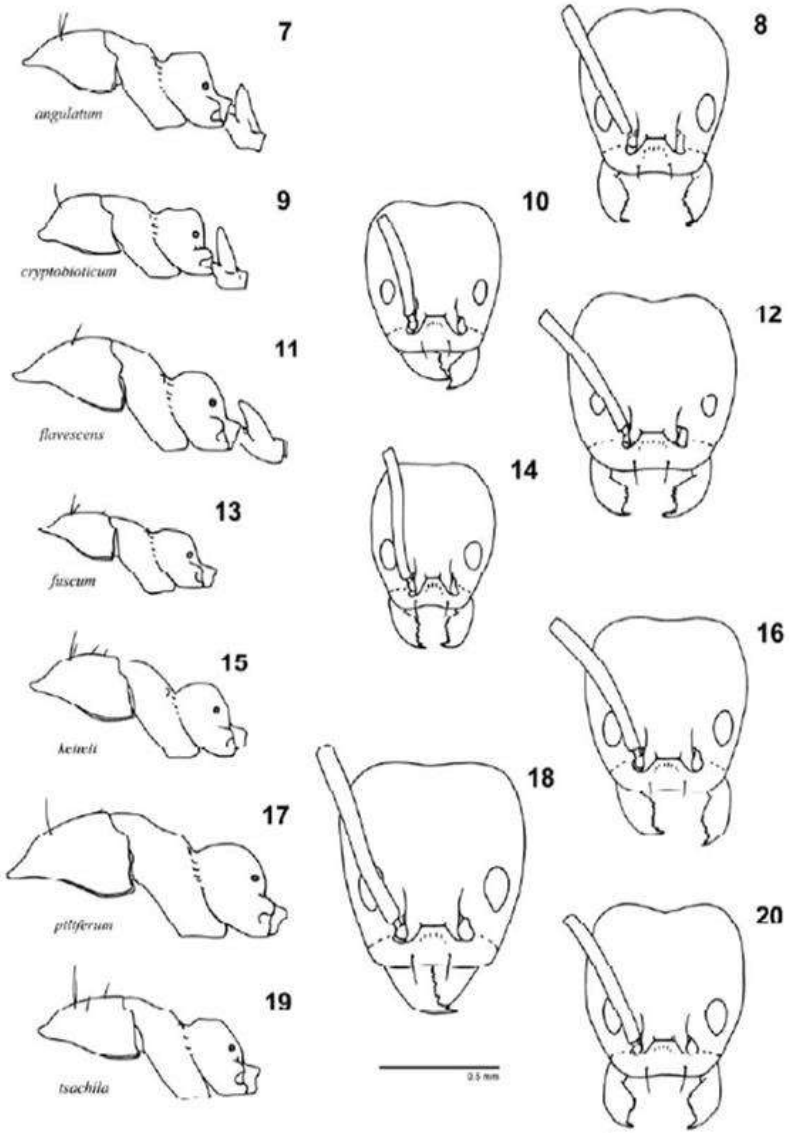

OPEN ACCESS Freely available online

PLoS one

A Revision of Malagasy Species of *Anochetus* Mayr and *Odontomachus* Latreille (Hymenoptera: Formicidae)

Brian L. Fisher[1]*, M. Alex Smith[2]*

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Abstract

Species inventories are essential for documenting global diversity and generating necessary material for taxonomic study and conservation planning. However, for inventories to be immediately relevant, the taxonomic process must reduce the time to describe and identify specimens. To address these concerns for the inventory of arthropods across the Malagasy region, we present here a collaborative approach to taxonomy where collectors, morphologists and DNA barcoders using cytochrome c oxidase 1 (CO1) participate collectively in a team-driven taxonomic process. We evaluate the role of DNA barcoding as a tool to accelerate species identification and description.

This revision is primarily based on arthropod surveys throughout the Malagasy region from 1992 to 2006. The revision is based on morphological and CO1 DNA barcode analysis of 500 individuals. In the region, five species of *Anochetus* (*A. boltoni* **sp. nov.**, *A. goodmani* **sp. nov.**, *A. grandidieri*, and *A. madagascarensis* from Madagascar, and *A. pattersoni* **sp. nov.** from Seychelles) and three species of *Odontomachus* (*O. coquereli*, *O. troglodytes* and *O. simillimus*) are recognized. DNA barcoding (using cytochrome *c* oxidase 1 (CO1)) facilitated caste association and type designation, and highlighted population structure associated with reproductive strategy, biogeographic and evolutionary patterns for future exploration.

This study provides an example of collaborative taxonomy, where morphology is combined with DNA barcoding. We demonstrate that CO1 DNA barcoding is a practical tool that allows formalized alpha-taxonomy at a speed, detail, precision, and scale unattainable by employing morphology alone.

Citation: Fisher BL, Smith MA (2008) A Revision of Malagasy Species of *Anochetus* Mayr and *Odontomachus* Latreille (Hymenoptera: Formicidae). PLoS ONE 3(5): e1787. doi:10.1371/journal.pone.0001787

Anochetus pattersoni Fisher **sp. nov.**

urn:lsid:zoobank.org:act:A1B9370B-2286-41D0-8E28-335C3514A76A

Figures: **worker** 7a–d; **queen** 7e,f; **male** 7g,h, 8d

Type Material: *Holotype*: worker, Seychelles Aldabra Group, Picard Island, in old "Settlement" 09°23′34″S 046°12′14″E 5 m, mostly *Casuarina* with coco palms, exotic vegetation, found after dark on concrete slab in abandoned settlement 19-Dec-05 (coll. S.M.Goodman) collection code: SMG14998 CASENT0068352 1w (CASC). CO1 barcode from same collection as holotype and labeled CASENT0068352-D01

Worker measurements: maximum and minimum based on all specimens, n = 8, (holotype): HL 1.32–1.40 (1.40), HW 1.25–1.31 (1.31), CI 93–95 (94), EL 0.20–0.26 (0.23), ML 0.67–0.72 (0.72), MI 50–51 (51), SL 1.07–1.15 (1.15) SI 85–88 (88), WL 1.62–1.79 (1.78), FL 1.11–1.20 (1.19), PW 0.70–0.76 (0.74).

Queen measurements: maximum and minimum based on n = 1. HL 1.31, HW 1.29, CI 99, EL 0.30, ML 0.64, MI 49, SL 1.05, SI 81, WL 1.81, FL 1.15, PW 0.79.

Male measurements: maximum and minimum based on n = 2 from Madagascar: HL 0.86–0.87, HW 1.07–1.10, CI 124–126, EL 0.65–0.67, SL 0.18, SI 17, WL 1.72–1.77, FL 1.21–1.26

Worker Diagnosis: Dorsal margin of petiole node concave medially (not visible in figures of the workers but easily seen in the queen in Figure 7f.) Anterior portion of pronotal dorsum lightly sculptured compared to posterior portion of pronotum. Propodeal dorsum and angle transversely coarsely rugose, declivitous face below angle with transverse striae, with sculpture thinning near base of face; propodeum angulate in lateral view. Petiole scale broad; anterior half of first gastral tergum smooth and shiny with only fine punctures at base of setae. This species is most similar to the *graeffei* a widespread species across the Indo-Pacific, but differs from the latter by the pattern of sculpture on the mesosomal dorsum, shape the petiole (concave), broader petiole node as seen in lateral view, and its much larger size (HL+ML 1.99–2.12 mm in *pattersoni*, HL+ML<1.75 mm in *graeffei*).

Distribution and biology. This species is limited to the Aldabra group islands with most collections from Isle Picard. References and records to *Anochetus madagascarensis* [e.g. Forel 25:159] most likely refer to this species. No other species of *Anochetus* have been recorded from the Seychelles. Males have been collected in Malaise traps, and a queen with clear wing scares.

Diagnostic barcoding loci: *A. pattersoni*: G-183, G-264, A-399, A-489, A-505, A-552.

Additional material examined for *Anochetus pattersoni:* In addition to the type material, specimens from the following localities were examined in this study. **Seychelles**: **Aldabra Group**: South Island (Grand Terre), Dune Patates 5-Jun-74 (Coll: V. Spaull) CASENT0102280 3w (BMNH); Isle Picard 12–25 Mar-85 (Col: P.Mundel) CASENT0103343 1dQ, CASENT0103344 1w (CASC), MCZ.3680w 1w (MCZC); Ile Picard Settlement, 11; (ANIC32-015992) 1-Nov-68 (coll: W.F.Humphreys) CASENT0172374 1w (ANIC); Ile Polymnie, Anse Cedres, 155; (ANIC32-015991) 1-Nov-68 (coll: W.F.Humphreys) CASENT0172375 1w (ANIC); Cosmoledo, Menai 17-Dec-05 (col: J.Gerlach) CASENT0172609 1w (LACM); Grande Terre, Aldabra 15-Dec-05; (coll: J.Gerlach) CASENT0172610 1w (LACM); Aldabra Islands, Picard 22–29 Sep-05 ex malaise trap 6 m (coll: K.Mach & O.Maurel) CASENT0172611 1 m (LACM); Aldabra Islands, Picard 22–26 May-05 (coll: K.Mach & O.Maurel) CASENT0172617 1 m (LACM).

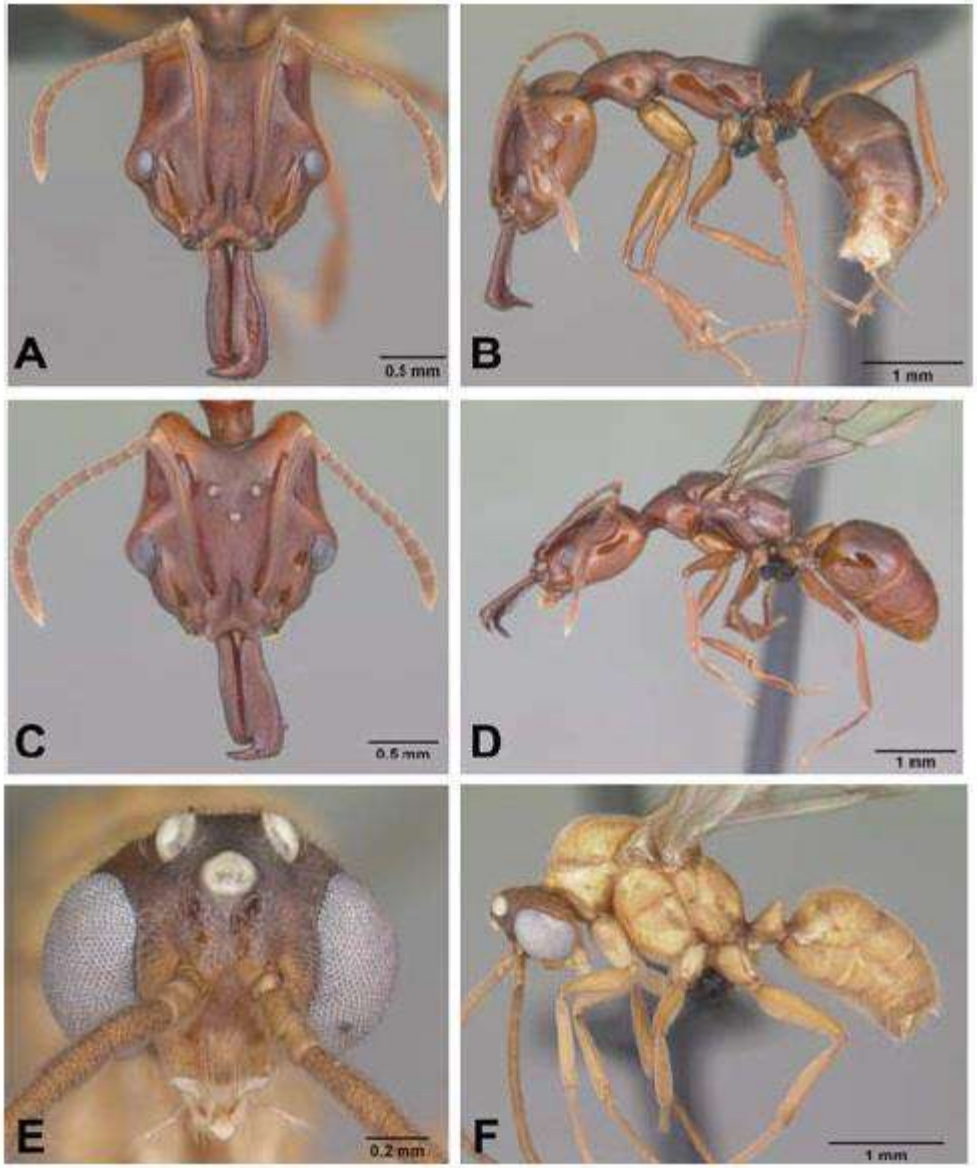


Figure 4. *Anochetus madagascarensis* **full face and lateral view.** A–B, worker CASENT0104547. C–D, queen CASENT0498419. E–F, male CASENT0049282.

doi:10.1371/journal.pone.0001787.g004

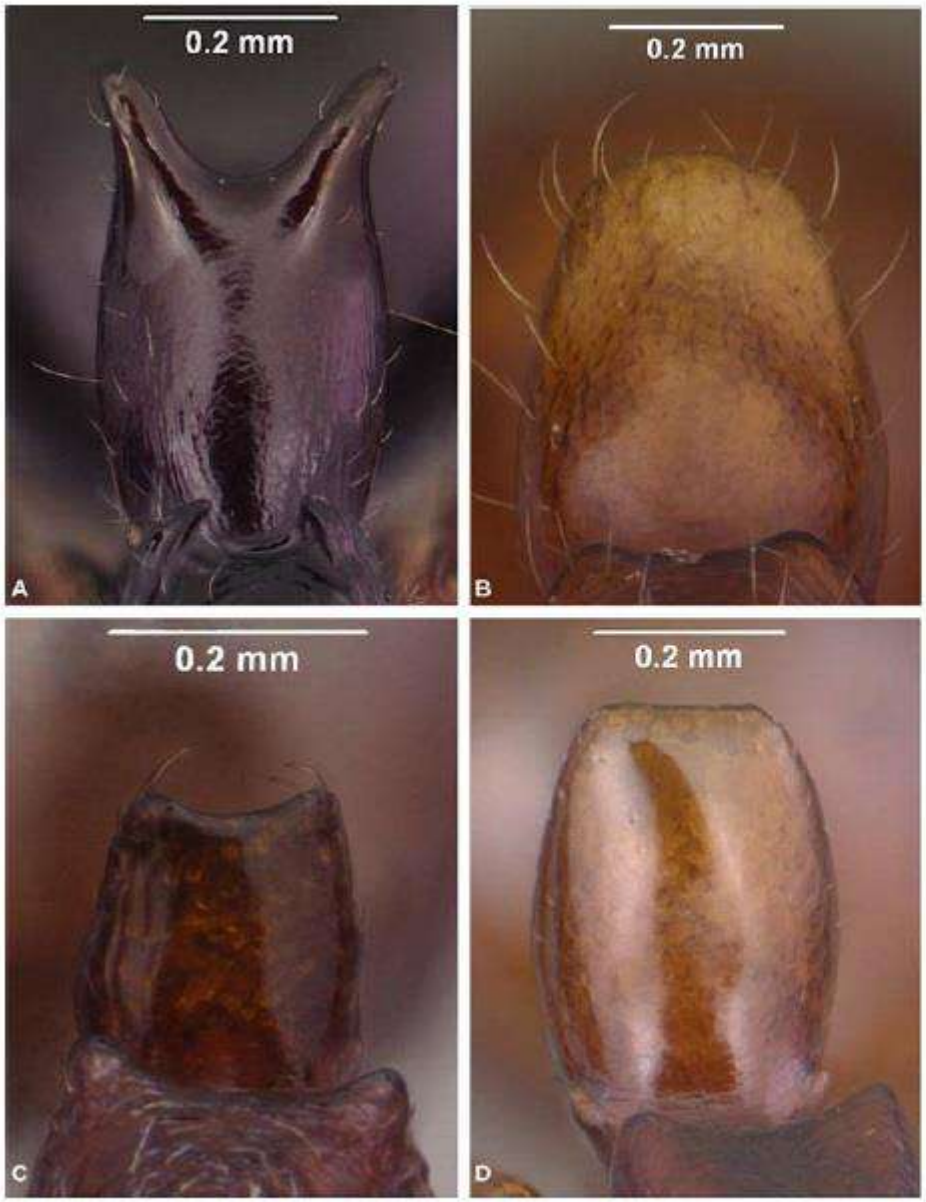


Figure 5. *Anochetus* workers, upper part of petiole from front view. A, *boltoni* CASENT0104542. B, *goodmani* CASENT0104543. C, *grandidieri* (large form) CASENT0497580. D, *madagascarensis* CASENT0498309.

doi:10.1371/journal.pone.0001787.g005

Calodema Supplementary Paper No. 24 (2007)

Six new *Pyramica* species from Suriname (Hymenoptera: Formicidae)

by Dr Dewanand Makhan*

*Willem Bilderdijkhove 19, 3438 PM Nieuwegein, The Netherlands

Makhan, D. (2007). Six new *Pyramica* species from Suriname (Hymenoptera: Formicidae). *Calodema Supplementary Paper No. 24*: 1-7.

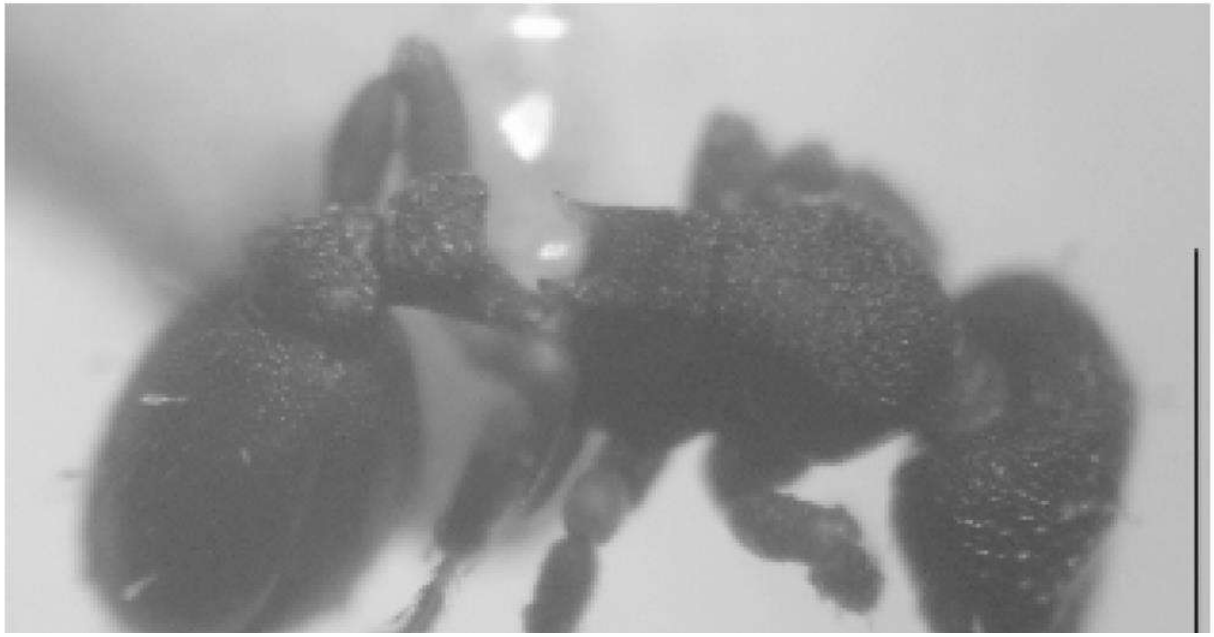
Abstract: Six new *Pyramica* species from Suriname are described: *Pyramica amrishi* sp. nov., *P. aschnae* sp. nov., *P. aschnakiranae* sp. nov., *P. kiranae* sp. nov., *P. rishwani* sp. nov. and *P. wani* sp. nov. A key to the newly described species is provided.

Pyramica amrishi sp. nov. (Figs. 1, 2)

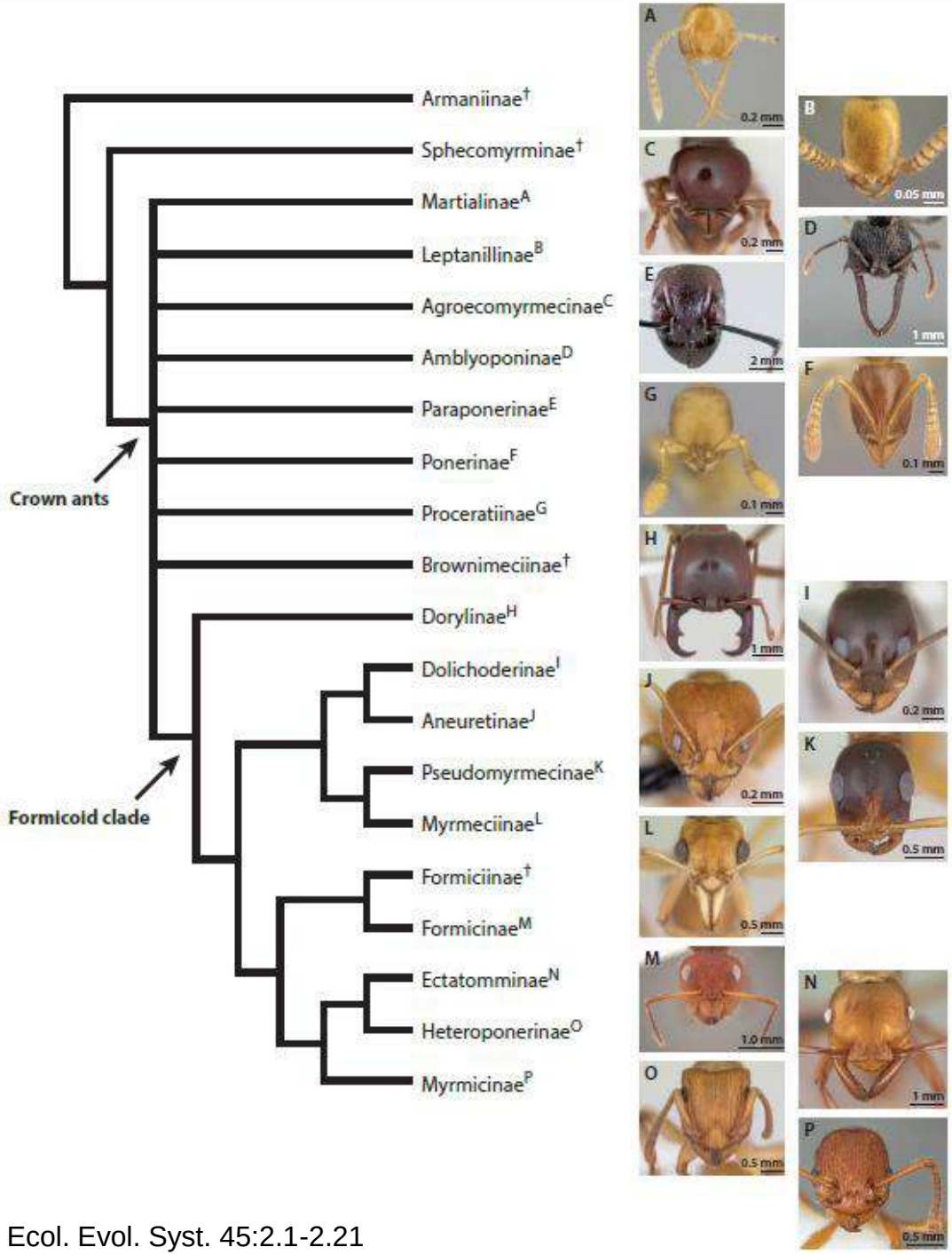
Holotype: worker, Suriname, Kasikasima, 27.3.1996, coll. D. Makhan. Paratypes: 3 workers.

Description (holotype worker): Length 1.7 mm. Colour dark-brown. Total head length 0.7 mm, width 0.6 mm, with fine hairs and with spatulate hairs. Mandible length 0.2 mm, short, with 3 large inner teeth and with fine hairs. Eyes small. Antennae dark-brown, scape with spatulate hairs. Mesosoma length 0.6 mm, width 0.35 mm, with fine hairs. Petiole width 0.15 mm, postpetiole width 0.11 mm, hairs absent. Spongiform appendages absent. Gaster length 0.6 mm, width 0.5 mm, with spatulate hairs.

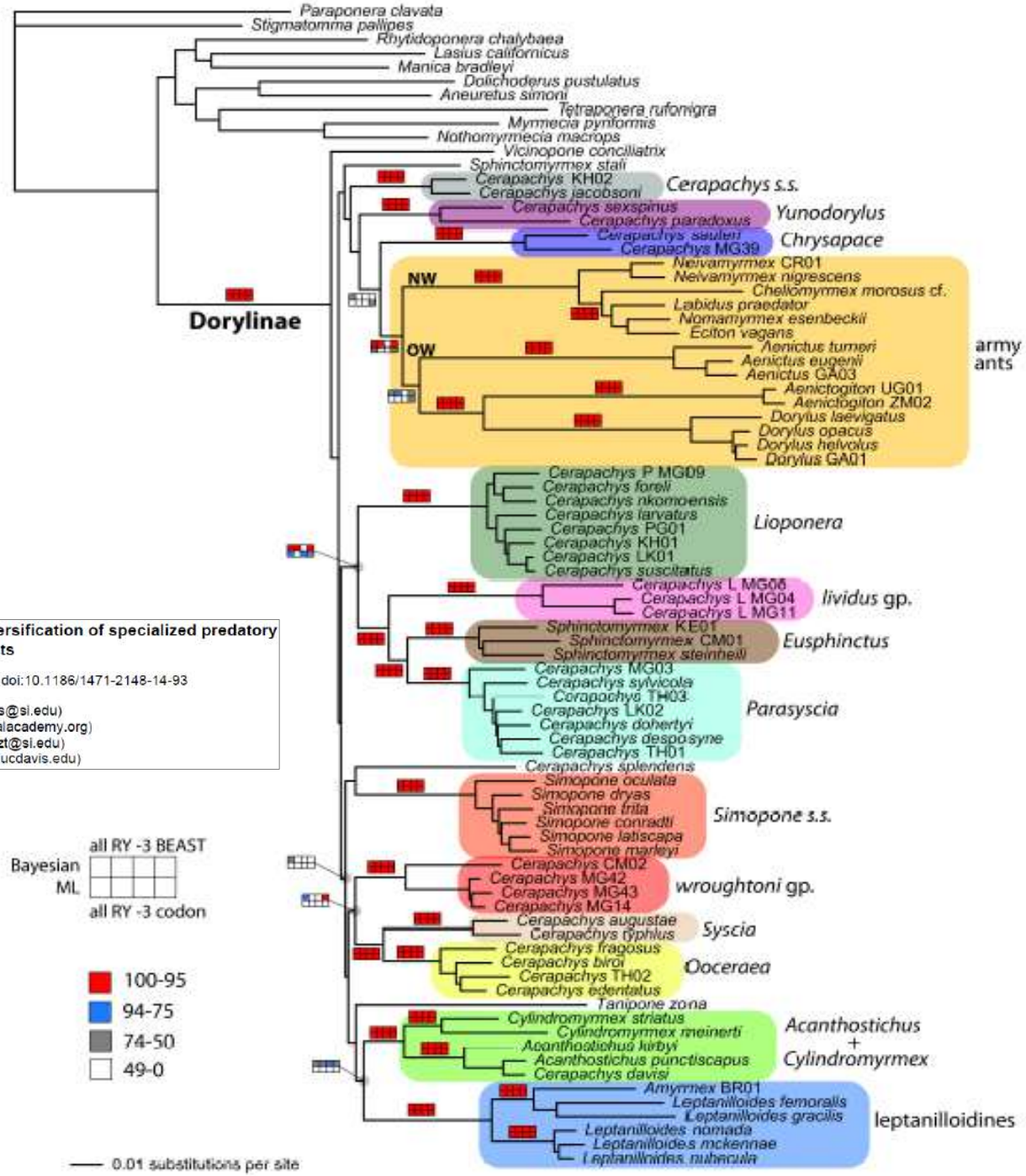
Etymology: This species is named after my son Amrish Makhan.



Exemple d'une étude en cours: Description de nouvelles espèces de *Leptanilloides*



Ward 2014. Ann. Rev. Ecol. Evol. Syst. 45:2.1-2.21



The rise of army ants and their relatives: diversification of specialized predatory doryline ants

BMC Evolutionary Biology 2014, **14**:93 doi:10.1186/1471-2148-14-93

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ZooKeys 133: 19–48 (2011)
doi: 10.3897/zookeys.133.1479
www.zookeys.org

RESEARCH ARTICLE

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Three new species and reassessment of the rare Neotropical ant genus *Leptanilloides* (Hymenoptera, Formicidae, Leptanilloidinae)

Marek L. Borowiec[1,†], John T. Longino[2,‡]

Key to workers of *Leptanilloides*

1 Abdominal segment III (postpetiole) in lateral view much smaller than adjoining fourth abdominal segment (Figure 2A). Spiracle of segment III shifted posteriad on anteromedian side of tergite (Figure 2A). Body size relatively large, HL 0.68–0.75 ..... **2**

– Abdominal segment III in lateral view nearly as high as abdominal segment IV (Figure 2B–D). Spiracle of segment III situated forward on the tergite (Figures 2B–D). Body size relatively small, HL 0.31–0.50 ..... **5**

2 Head subquadrate, CI 85–88; lateral margins nearly straight and parallel (Figure 2E). Propodeal declivity short and vertical, propodeum with dorsal and posterior faces clearly differentiated (Figure 2A) (Ecuador)... ***L. nomada***

– Head subrectangular, CI 75–83; lateral margins convex (Figure 2F). Propodeal declivity usually rounded without clear distinction between dorsal and posterior face (cf. Figure 2B, Figure 4 in Donoso et al. 2006) **3**

3 Head sculpture less dense, at most 10–12 shallow foveolae across face at midlength. Lateral margins of the head distinctly convex. Posterior margin of the head slightly concave (Figure 2F) (Colombia) ..... ***L. legionaria***

– Head sculpture more dense, with at least 15 foveolae across face at midlength. Lateral margins of the head slightly convex. Posterior margin of the head deeply concave. (cf. Figure 2F, Figure 3 in Donoso et al. 2006)..... **4**

4 Legs shorter, HW/HTiL×100 > 78. Hypostomal teeth present (Figure 2H) (Ecuador)..... ***L. nubecula***

– Legs longer, HW/HTiL×100 < 78. Hypostomal teeth absent (Figure 2I) (Costa Rica)..... ***L. mckennae***

5 Lateroclypeal teeth absent. Masticatory margin of mandibles edentate (Figure 5 in Donoso et al. 2006) (Ecuador) ..... ***L. caracola***

– Lateroclypeal teeth present. Masticatory margin of mandibles with teeth (Figure 4D)..... **6**

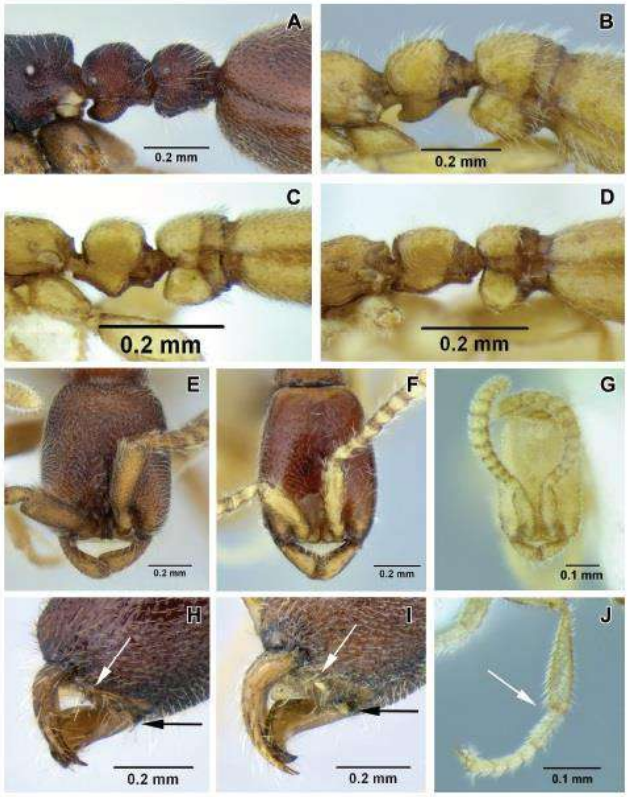

Figure 2. A–D lateral view focusing on propodeum, petiole and abdominal segment III **A** *Leptanilloides nomada* worker (CASENT0234620) **B** *Leptanilloides improvisa* holotype worker (MCZ type 35284) **C** *Leptanilloides femoralis* holotype worker (CASENT0106180) **D** *Leptanilloides biconstricta* paralectotype worker (NMNH type 25705) **E–G** head in full-face view **E** *Leptanilloides nomada* worker (CASENT0234620) **F** *Leptanilloides legionaria* worker (CASENT0234619) **G** *Leptanilloides sculpturata* holotype worker (USNM ENT 00533059) **H, I** ventrolateral view of head capsule focusing on hypostoma **H** *Leptanilloides nubecula* worker (CASENT0234621) **I** *Leptanilloides mckennae* paratype worker (INBIOCRI001281144) **J** hind leg of *Leptanilloides gracilis* worker (CASENT0612940).

***Leptanilloides femoralis* sp. n.**
urn:lsid:zoobank.org:act:17523937-4A7E-4C76-8E33-5067E5089300
http://species-id.net/wiki/Leptanilloides_femoralis
Figures 2C, 4A–I

Type material. Holotype worker: VENEZUELA, *Aragua*: Pico Periquito, PN Henri Pittier, 10.339° -67.706°, 1500m, sifted litter (leaf mold, rotten wood) 17 August 2008 (*P. S. Ward* #16198.06) [unique specimen identifier CASENT0106180] [MIZA]. Paratype workers: 22 workers with the same data as holotype, point-mounted and in alcohol [AMNH, BMNH, CASC, FMNH, LACM, MCZC, MIZA, MZSP, NMNH, QCAZ, UCDC].

Worker measurements (*holotype*): HW 0.25, HL 0.32, SL 0.14, MH 0.12, ML 0.42, PrW 0.15, PW 0.09, PL 0.12, AIIIW 0.13, AIIIL 0.11, AIVW 0.22, AIVL 0.18, FFeW 0.09, FFeL 0.19, HFeL 0.19, HTiL 0.22, CI 78, PI 75, MI 29.

Measurements in mm and indices (*7 measured*): HW 0.23–0.25, HL 0.32–0.34, SL 0.14–0.16, MH 0.12–0.14, ML 0.41–0.44, PrW 0.15–0.17, PW 0.08–0.10, PL 0.12, AIIIW 0.12–0.14, AIIIL 0.11–0.14, AIVW 0.22–0.23, AIVL 0.17–0.19, FFeW 0.08–0.09, FFeL 0.18–0.19, HFeL 0.19–0.20, HTiL 0.20–0.22, CI 71–78, PI 67–80, MI 29–32.

Diagnosis. Worker relatively slender and small compared to most species in the genus, promesonotal connection complete and articulated, abdominal segment III (postpetiole) large relative to petiole, lateroclypeal teeth present, sculpturing moderate, parafrontal ridges present, flange overhanging metapleural gland opening rounded posteriorly. In general habitus and size it is most similar to *Leptanilloides gracilis* but can be distinguished by the small opening of petiolar spiracle (situated in large depression in *gracilis*), the pointed flange over the metapleural gland (rounded in *gracilis*), single pectinate spur on hind tibia (two simple spurs in *gracilis*), and relatively broader femur (FFeW 0.08–0.09 in *femoralis*, 0.06–0.07 in *gracilis*). Both *femoralis* and *gracilis* are similar to *biconstricta* from Bolivia and *improvisa* from Ecuador, but can be distinguished by the distinctly bulging sternite of the petiole, with the bulge most prominent medially (versus indistinctly broadened anteriorly in *biconstricta* and *improvisa*).

Worker description. With characters of *Leptanilloides* (see Diagnosis of *Leptanilloides* based on worker caste, above). Head elongate and rectangular with lateral margins nearly straight and parallel. Posterior corners rounded and posterior border

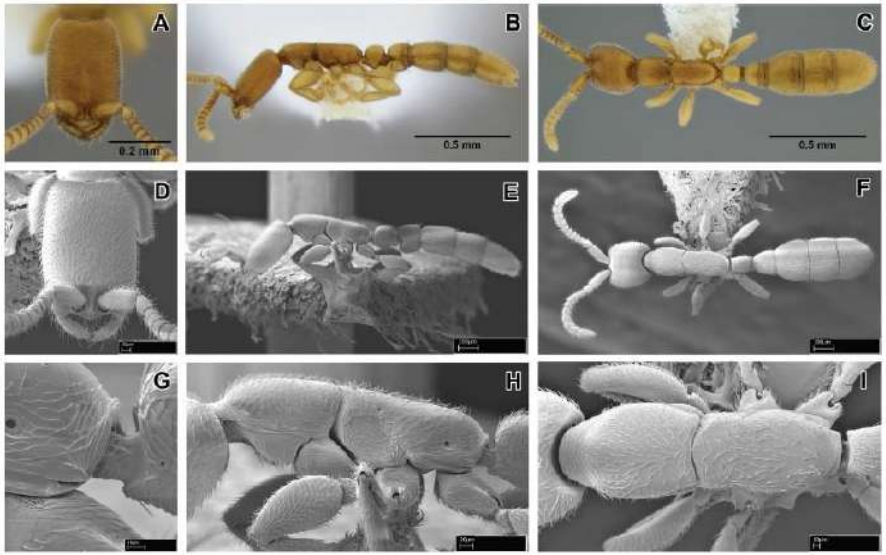

Figure 4. *Leptanilloides femoralis*, new species **A–C** holotype worker (CASENT0106180) **A** head in full-face view **B** body in lateral view **C** body in dorsal view **D–I** paratype worker (CASENT0234586) **D** head in full-face view **E** body in lateral view **F** body in dorsal view **G** propodeum and anterior petiole in lateral view **H** mesosoma in lateral view **I** mesosoma in dorsal view.

200 µm

500 µm

500 µm

200 µm

1 mm

© RBINS
1000 µm

Systematic Entomology (1999) 24, 17–36

Revision of the Neotropical ant subfamily Leptanilloidinae

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Abstract. The rare Neotropical ant subfamily Leptanilloidinae is revised and its internal phylogeny and biogeography discussed. A new genus, *Asphinctanilloides* gen.n., including three new species, *A. amazona*, *A. anae* and *A. manauara*, and three new species of *Leptanilloides*, *L. improvisa*, *L. legionaria* and *L. sculpturata* are described. The only previously known species of the subfamily, *L. biconstricta* Mann (1923), is redescribed, and the larva of *L. legionaria* sp.n. is described. Keys to the genera and the species, and a phylogeny of the group are provided. Emphasis has been placed on the study of abdominal and sting characters.

Journal of Natural History, 2013
http://dx.doi.org/10.1080/00222933.2012.763058

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The first *Leptanilloides* species (Hymenoptera: Formicidae: Leptanilloidinae) from eastern South America

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(*Received 14 April 2012; final version received 21 November 2012*)

We describe a species of the exclusively Neotropical dorylomorph ant genus *Leptanilloides* (Leptanilloidinae), *Leptanilloides atlantica* sp. nov., based on workers collected in the Atlantic Forest, São Paulo, south-eastern Brazil. The 11 species of *Leptanilloides* described are known from relatively high altitudes in western America (from the Andes foothills in Bolivia to Sierra Morena in Mexico). The discovery of a *Leptanilloides* species in south-eastern Brazil represents a significant range extension for the genus; this new species shares characters with *Leptanilloides biconstricta* (Bolivia), *Leptanilloides femoralis* (Venezuela) and *Leptanilloides gracilis* (Mexico) and may be distinguished based on a combination of traits. The hypogaeic habits of Leptanilloidinae combined with inefficient collecting techniques may explain the paucity of information and of specimens of this group in most museum collections as well as its present apparent disjunct distribution. We compare *Leptanilloides* distribution to that of other organisms that show similar disjunct patterns in the Andes and montane sites in the Brazilian Atlantic Forest.

Zootaxa 1201: 47–62 (2006)
www.mapress.com/zootaxa/
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ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

Three new species of *Leptanilloides* Mann from Andean Ecuador (Formicidae: Leptanilloidinae)

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Abstract

We report three new species of the ant genus *Leptanilloides* from Andean Ecuador. *Leptanilloides nomada* **sp. n.** and *L. caracola* **sp. n.** are described from the worker caste, the latter from a unique specimen; *L. nubecula* **sp. n.** is described from workers, males, and two gyne subcastes previously unknown for the entire subfamily. Phenotypic variation in morphological characters in the new species *L. nomada* and *L. nubecula* is more plastic than suggested by the traditional generic diagnosis. These records represent the first case of three *Leptanilloides* species occurring in sympatry. We discuss aspects of the army ant syndrome and its relevance to the genus *Leptanilloides*.

Zootaxa 264: 1-6 (2003)
www.mapress.com/zootaxa/
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ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

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A new Costa Rican species of *Leptanilloides* (Hymenoptera: Formicidae: doryline section: Leptanilloidinae)

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Abstract

Leptanilloides mckennae sp. nov. is described from Costa Rica. This is the eighth species in the poorly-known subfamily Leptanilloidinae, part of the doryline section (army ants and relatives). The other seven species in the subfamily are from widely scattered localities in South America. The new species blurs previously established distinctions between *Leptanilloides* and *Asphinctanilloides*.

Key words: *Leptanilloides*, Formicidae, doryline section, Leptanilloidinae, Costa Rica

Bolton 2006

"La fonction de la taxonomie est ***d'établir l'identité***"

- 1. Détection de **caractères uniques** permettant de **diagnostiquer** un taxon

- 2. Comparaison de caractères permettant de **différencier** le taxon des autres taxons proches

- 3. Reconnaissance de caractères permettant **d'associer** les taxons possédant une relation phylogénétique

- 4. Description et classement de ces caractères afin que d'autres personnes puissent **reconnaître** le taxon

Table 1. Character matrix of the seven species of Leptanilloidinae and, as outgroups, *Leptanilla* sp. and *Protanilla* sp. *Eciton hamatum* was treated as an ingroup. All characters are treated as non-additive.

	1 1234567890	1111111112 1234567890	2222222223 1234567890	3 1
Eciton hamatum	0110201011	00012-1000	1---323000	1
Leptanilla sp.	0010000111	10-0220000	010021201-	2
Protanilla sp.	0110001111	10-1000-1-	----0110-0	2
L. biconstricta	1001000000	0100000001	2000002100	0
L. improvisa	1011001000	01--------	1---------	-
L. legionaria	1011101000	011--011-1	1011012101	1
L. sculpturata	1001001000	01-------1	----------	-
A. amazona	1101010011	0120111011	2110110111	1
A. anae	1101010011	0121100111	2000110101	1
A. manauara	1101010011	0121110011	2110110110	1

1. *Lateral blunt teeth on genae*: (0) absent; (1) overhanging the mandibles.
2. *Propodeal dorsum*: (0) at least two times longer than declivity; (1) equal size.
3. *Flange over the metapleural gland opening*: (0) sharply pointed posteriorly (Figs 21, 24); (1) rounded (Figs 22, 23).
4. *Metatibial gland*: (0) present; (1) absent.
5. *Ventral process of the petiole*: (0) without a posterior angle; (1) with posterior angle; (2) projecting backward as a long spine.
6. *Postpetiolar spiracles*: (0) situated anteriorly; (1) at the midlength.
7. *Petiole*: (0) longer than the postpetiole; (1) shorter or same size.
8. *Helcium with sternite*: (0) well developed, bulging ventrally; (1) reduced, non bulging.
9. *Gaster with constrictions*: (0) between abdominal segments 4 and 5; (1) without.
10. *Gaster with constrictions*: (0) between abdominal segments 5 and 6; (1) without.
11. *Abdominal spiracles 5–7*: (0) backwards on post tergite and visible; (1) near the pretergite and always concealed.
12. *Pygidium (tergite of abdominal segment 7)*: (0) normally developed; (1) extremely reduced to an U-shaped sclerite, which is overhung by the tergite of abdominal segment 6.
13. *Anterior margin of the median connection between the two spiracular plates*: (0) straight; (1) convex; (2) bilobed.
14. *Quadrate plate*: (0) with antero-dorsal corner with long projection; (1) without.
15. *Quadrate plate apodeme*: (0) smaller or as wide as body of the plate; (1) wider; (2) not differentiated.
16. *Oblong plate*: (0) with postincision towards the dorsal margin, although it may not touch it; (1) with no postincision; (2) with postincision parallel to the dorsal margin.
17. *Oblong plate*: (0) sclerotized; (1) weakly sclerotized.
18. *Ventral arm of apodeme*: (0) reduced; (1) developed.
19. *Fulcral arm*: (0) present; (1) absent.
20. *Gonostylus*: (0) unfused and separated from the posterior arm of oblong plate; (1) fused along its width.

Table 1. List of informative characters to separate *Leptanilloides atlantica* from similar species in the genus (*L. biconstricta*, *L. femoralis* and *L. gracilis*).

	L. atlantica	*L. biconstricta*	*L. femoralis*	*L. gracilis*
Flange over the metapleural gland	sharply pointed	sharply pointed	rounded	sharply pointed
Mesopleura and metapleura reticulation	not interrupted	interrupted	not interrupted	not interrupted
Petiole length	as long as postpetiole	petiole longer than postpetiole	petiole shorter than postpetiole	petiole shorter than postpetiole
Fore femur width	relatively enlarged	not enlarged (slender)	enlarged	not enlarged (slender)
Abdominal segments IV–VI	separated by shallow constrictions	separated by deep constrictions	separated by deep constrictions	separated by deep constrictions
Anterior subpetiolar tooth	present	present	absent	absent
Ventral profile of subpetiolar process	straight	straight	distinctly bulging medially	distinctly bulging medially
Sternite on abdominal segment III	anteriorly bulging	evenly rounded	posteriorly bulging	evenly rounded

HV	mag ▫	spot	pressure	tilt	1 mm
15.00 kV	90 x	3.5	3.76e-1 Torr	-5 °	Leptanilloides 01 EC spm 4052301

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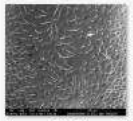
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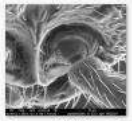
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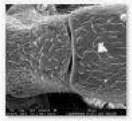
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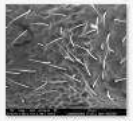
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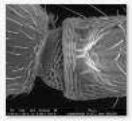
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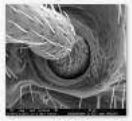
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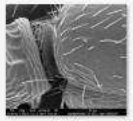
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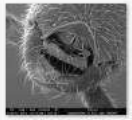
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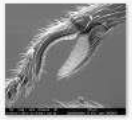
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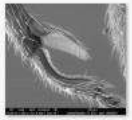
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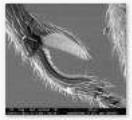
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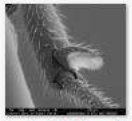
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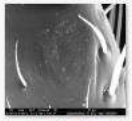
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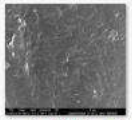
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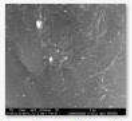
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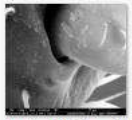
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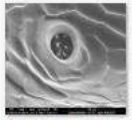
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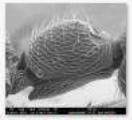
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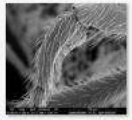
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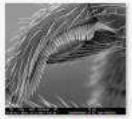
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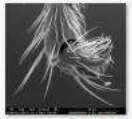
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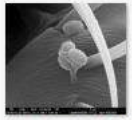
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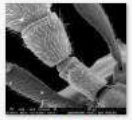
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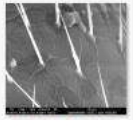
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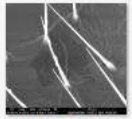
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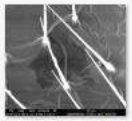
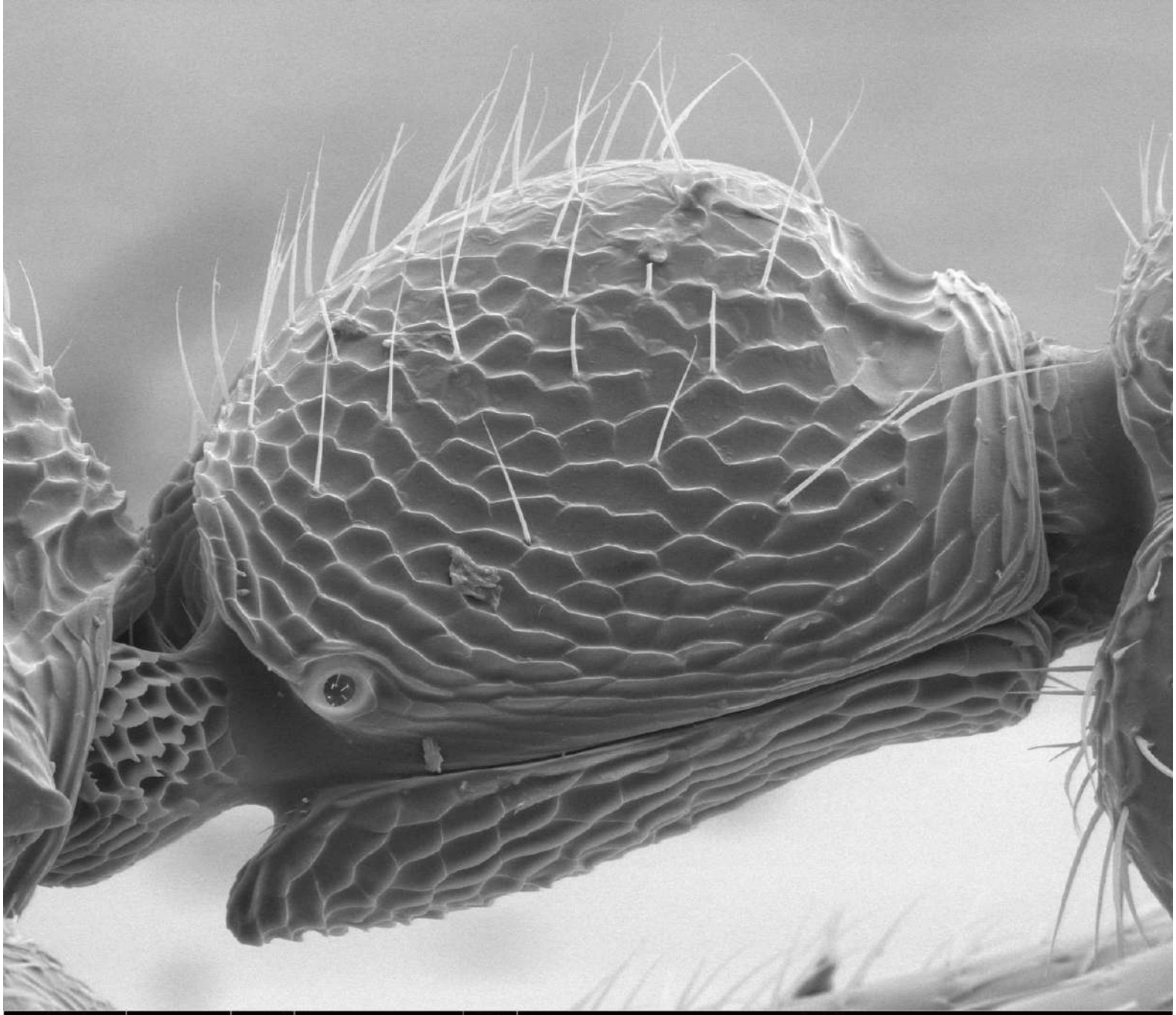

Leptanilloides 01(EC) spm. 4052301-13

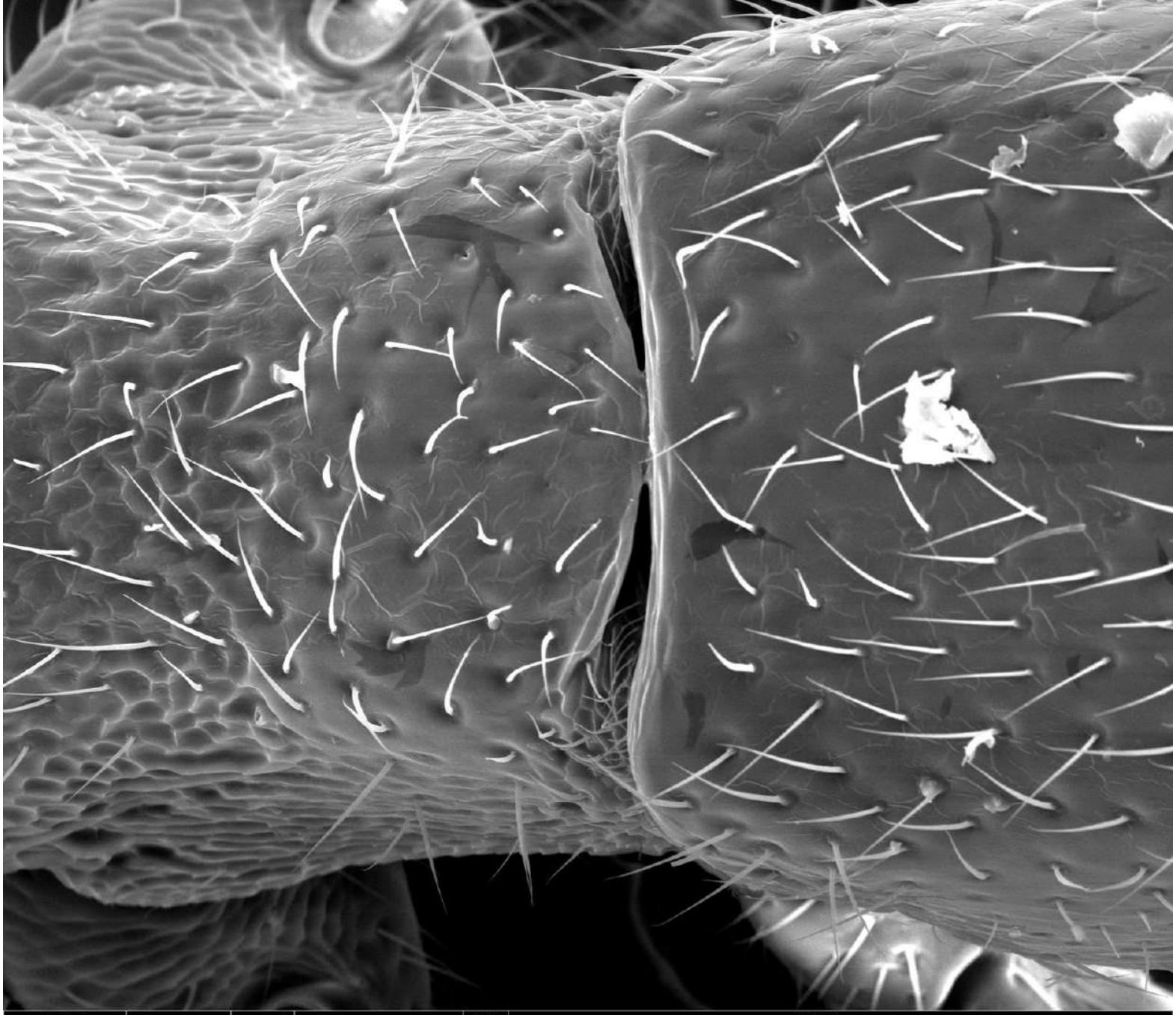
The promesonotal connection has also been described as universally unfused and flexible in workers of the genus (Brandão et al. 1999a, Longino 2003, Donoso et al. 2006). We have found that this character is in fact very variable in *Leptanilloides*, ranging from completely unfused and apparently flexible in *L. biconstricta*, *L. caracola*, *L. erinys*, *L. femoralis*, *L. gracilis*, *L. improvisa* and *L. sculpturata* (Figure1F) and gradually increasing in fusion in *L. legionaria* through *L. mckennae* to *L. nubecula* and *L. nomada* (Figure 1E), where the connection seems to be completely fused dorsally, barely visible as a faint groove. The fusion of the promesonotal connection correlates with other morphological features: the lateroclypeal teeth are reduced, abdominal segment III is small in relation to segment IV, and the spiracles of abdominal segment III are shifted posteriorly. The latter three characters had already been noticed by Donoso et al. (2006) and interpreted as blurring the distinction between *Asphinctanilloides* and *Leptanilloides*. The segregation of *Leptanilloides* into two natural species groups seems to be supported by molecular data, although taxon sampling is still unsatisfactory (Phil Ward, pers. comm.). Adding somewhat intermediate species to the dataset, like *L. legionaria* that has a small abdominal segment III but only weakly fused promesonotal suture, or *L. biconstricta* with apparently complete promesonotal connection but intermediate abdominal segment III, may blur this distinction.

Diagnosis of *Leptanilloides* based on worker caste

Antennae with 12 segments.
Apical antennal segment slender, not swollen; round in cross-section.
Clypeus with well developed, translucent lamella (apron).
Lateroclypeal teeth (same as "genal" teeth in Donoso et al. 2006) present or absent.
Parafrontal ridges absent or weakly developed.
Preocular grooves absent.
Frontal carinae vertical, very reduced and fused, completely exposing antennal sockets.
Antennal scrobes absent.
Maxillary palps two-segmented, except in *gracilis*, where apparently weakly fused and forming one segment; labial palps two-segmented (palp formula 1,2 or 2,2) (in situ count in *gracilis*, *femoralis* and *legionaria*, also reported by Brandão et al. 1999a).
Mandibles subtriangular, edentate or with small, blunt teeth on both masticatory and basal margins.
Eyes absent.
Ocelli absent.
True occipital margin concealed behind vertex in full face view.
Ventrolateral margins of head with carina encircling the foramen only.
Head ventrally with carina complete around foramen magnum, evenly rounded.
Pronotal flange not separated from collar by distinct ridge.
Promesonotal connection complete and apparently flexible (*biconstricta*, *caracola*, *erinys*, *femoralis*, *gracilis*, *improvisa*, *sculpturata*) or partly to almost completely fused and not flexible (*legionaria*, *mckennae*, *nomada*, *nubecula*).
Propleura and mesopleura distinctly separated, the connection continuous with promesonotal portion.
Mesometapleural sulcus usually visible, weakly impressed and running towards metanotal sulcus, anepisternum not delineated dorsally or posteriorly.
Transverse mesopleural sulcus absent.
Posterior head, mesosoma, petiole and abdominal segment III immarginate.
Petiole laterally above spiracle immarginate.



HV	mag ▫	spot	pressure	tilt	100 µm
15.00 kV	900 x	3.0	3.76e-1 Torr	-5 °	Leptanilloides 01 EC spm 4052301



HV	mag ▫	spot	pressure	tilt	100 µm
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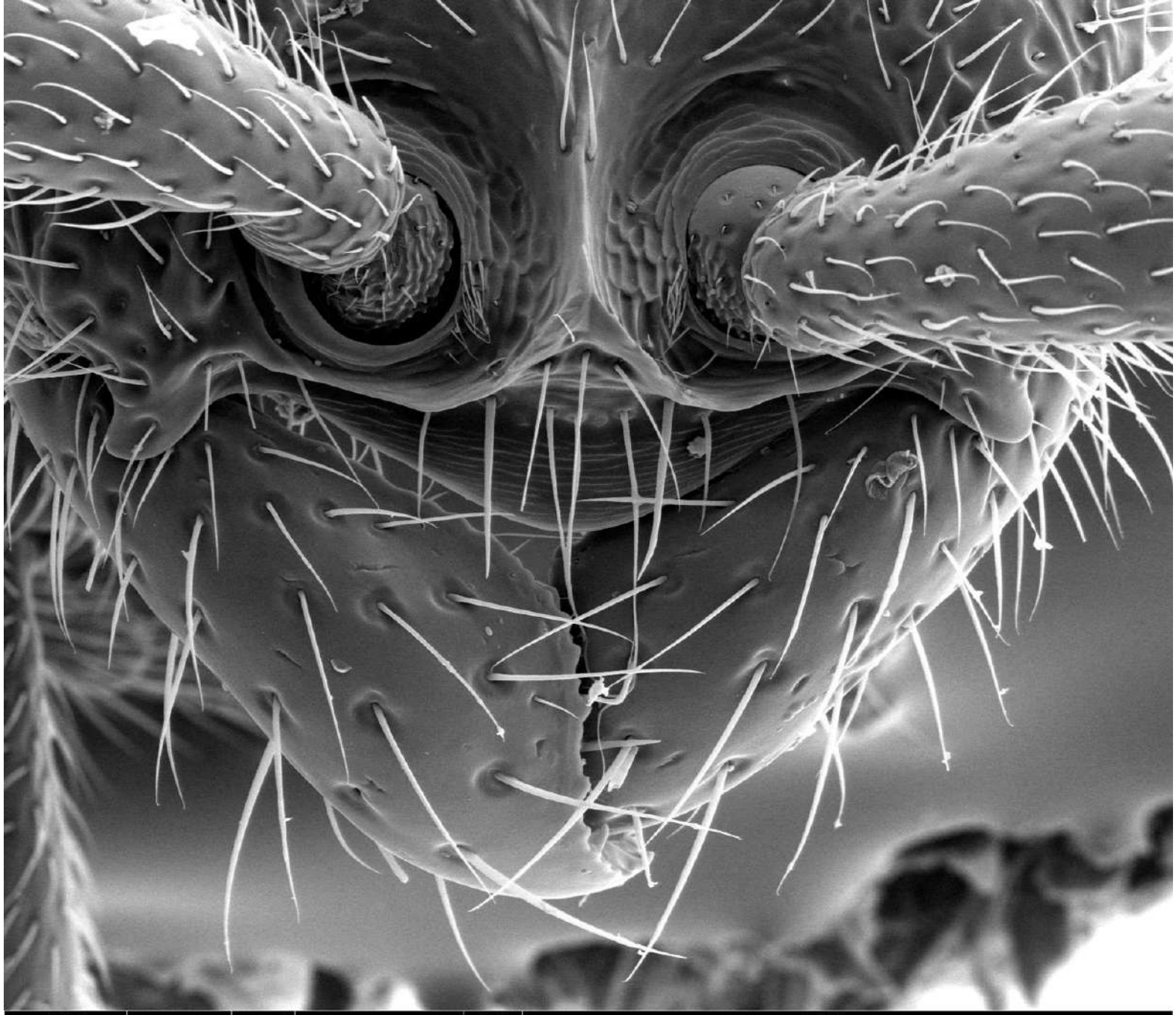

HV	mag ▫	spot	pressure	tilt	100 µm
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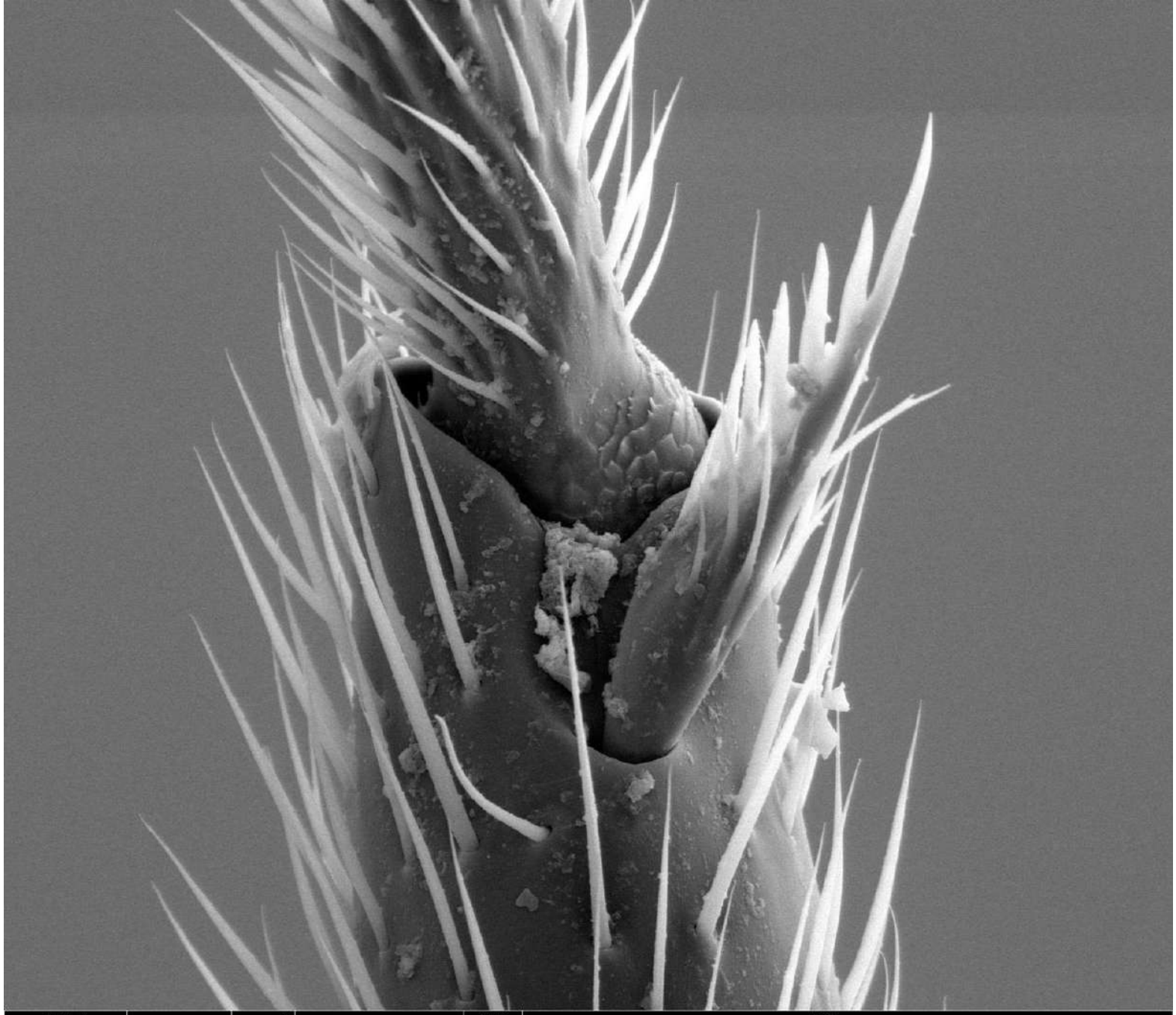
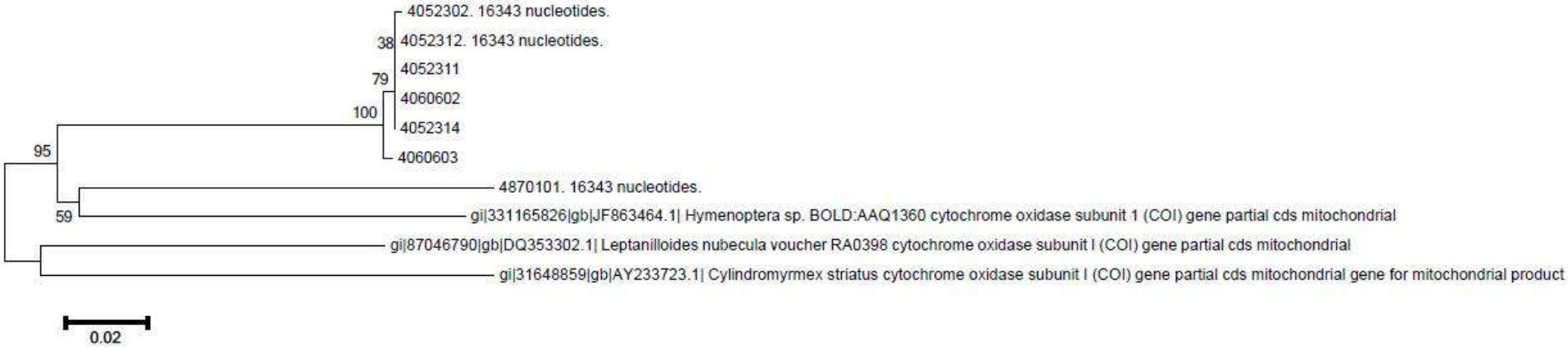


HV	mag ▫	spot	pressure	tilt	50 µm
12.50 kV	2 000 x	3.5	4.50e-1 Torr	18 °	Leptanilloides 01 (EC) spm. 4060601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38
4052312. 16343 nucleotides.
79
4052311
100
4060602
4052314
95
4060603
4870101. 16343 nucleotides.
59
gi|331165826|gb|JF863464.1| Hymenoptera sp. BOLD:AAQ1360 cytochrome oxidase subunit 1 (COI) gene partial cds mitochondrial
gi|87046790|gb|DQ353302.1| Leptanilloides nubecula voucher RA0398 cytochrome oxidase subunit I (COI) gene partial cds mitochondrial
gi|31648859|gb|AY233723.1| Cylindromyrmex striatus cytochrome oxidase subunit I (COI) gene partial cds mitochondrial gene for mitochondrial product
0.02

100
gi|636848105|gb|KJ523541.1| Leptanilloides nubecula voucher CASENT0052779 wingless (wnt-1) gene partial cds
87
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gi|87046654|gb|DQ353106.1| Leptanilloides nomada voucher RA0397 wingless (Wg) gene partial cds
100
100
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68
4052311 Wg CompleteFrgt PartialGene
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97
gi|256860810|gb|FJ588490.1| Amyrmex sp. BR01 wingless gene partial cds
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gi|31616335|gb|AY233640.1| Cylindromyrmex striatus wingless (wnt-1) gene partial cds
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