

- Moshitzky, P., I. Fleschmann, N. Chaimov, P. Saudan, S. Klauser, E. Kubli & S.W. Applebaum 1996. Sex peptide activates juvenile hormone biosynthesis in the *Drosophila melanogaster* corpus allatum. Arch. Insect Biochem. Physiol. 32:363-374.
- Patricio, K. & C. Cruz-Landim 2002. Mating influence in the ovary differentiation in adult queens of *Apis mellifera* (Hymenoptera, Apidae). Braz. J. Biol., 62:641-649.
- Röseler, P.F. 1985. A technique for year-round rearing of *Bombus terrestris* (Apidae, Bombinae) colonies in captivity. Apidologie, 16:165.
- Skowronek, W. 1979. Effect of carbon dioxide anaesthesia on the productivity of honey bee queens. Pszczelnicze Zesz. Nauk. 23:89-96.
- Soller, M., M. Bownes & E. Kubli 1997. Mating and sex peptide stimulate the accumulation of yolk in oocytes of *Drosophila melanogaster*. Eur. J. Biochem. 243:732-738.
- Tanaka, E.D. & K. Hartfelder 2004. The initial stages of oogenesis and their relation to differential fertility in the honey bee (*Apis mellifera*) castes. Arthr. Struct. Develop., in press.
- Tasei, J.N. 1994. Effect of different narcosis procedures on initiating oviposition of prediapausing *Bombus terrestris* queens. Entomol. Exp. Appl. 72: 273-279.



## Revisionary Studies on the Attine Ant Genus *Trachymyrmex* Forel. Part 2: The *Iheringi* Group (Hymenoptera: Formicidae)

by

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### ABSTRACT

The *Iheringi* species group is revised in this second paper of a series of taxonomic studies on the fungus-growing ant genus *Trachymyrmex* (Myrmicinae: Attini). We present a diagnosis for the group, a taxonomic list, description of *T. cirratus* n. sp. and of the undescribed sexual castes of *T. holmgreni* Wheeler, along with worker redescrptions of the other five known species. The species are keyed, and their geographic distributions and biology are commented.

### INTRODUCTION

Mayhé-Nunes & Brandão (2002) opened a series of taxonomic studies on the New World fungus-growing ants of the genus *Trachymyrmex* Forel, with a generic diagnosis and a revision of the four species in the *Opulentus* group. We record in the present paper, the principal traits shared by the six species of the *Iheringi* group, following our purpose to carry out a phylogenetic reconstruction of the genus and a formal classification of the species into groups at the end of this series of papers. Brandão & Mayhé-Nunes (submitted) studied the classification of *Trachymyrmex* species in groups, recognizing a clade we called the *Iheringi* group of species, adopting for the group the name of the oldest described species.

Ten names now accepted in *Trachymyrmex* belong to monomorphic attine ants that have lobate scapes, mostly distributed between the South and Southeastern part of the Neotropical region, but five of them are doubtful subspecies, and four are varieties. The oldest species name in the species group, *T. iheringi* (Emery 1888), was cited by Forel (1893) as component of *Trachymyrmex*, when he proposed the genus.

The basal lobes on the antennal scapes shared by the species of the *Iheringi* group are very probably homologous, but are also present in the polymorphic leaf-cutter ants *Acromyrmex* (*Acromyrmex* s. str.) *lobicornis*

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Emery, and its infraspecies. In the subgenus *Moellerius*, *A. fracticornis* Forel also has scapes bearing basal lobes, although much less prominent.

#### MATERIAL AND METHODS

We have adopted the same terminology used for the *Trachymyrmex* of the *Opulentus* group (Mayhé-Nunes & Brandão 2002), and included in the present paper two additional measurements: CI (cephalic index; HW/HL x 100) and FLI (frontal lobes index, to compare among species the lateral expansion of the frontal lobes; IFW/HW x 100). The other measurements abbreviation also are identical to the ones used for the *Opulentus* group: TL, total length; HL, head length (without mandibles); HW, head width (including eyes); IFW, inter frontal width (distance between the lateral margins of frontal lobes); ScL, scape length; TrL, alitrunk length (= Weber's length); HfL, hind femora length; FWL, fore wing length; HWL, hind wing length.

Reference citations follow Ward *et al.* (1996). Acronyms for collections follow Brandão (2000).

CECL - Coleção Entomológica Angelo Moreira da Costa Lima. Instituto de Biologia, Universidade Federal Rural do Rio de Janeiro Seropédica, RJ, Brazil. Note: cited as IBUS in Brandão (2000).

LACM - Los Angeles County Museum of Natural History, Los Angeles, CA, USA.

MCZC - Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA.

MZSP - Museu de Zoologia da Universidade de São Paulo, São Paulo, SP, Brazil.

NHMB - Naturhistorisches Museum, Basel, Switzerland.

USNM - United States National Museum of Natural History, Washington, DC, USA.

Workers of all species (recorded at the proper sections below) were cleaned in acetone using a Thornton ultra-sound equipment for 30 minutes, then coated with gold in a Balzer critical point dryer for 90 seconds at 50 mA. The scanning electron micrographs were prepared in a Leo 440 Scanning Electron Microscope.

#### Group *Iheringi* Figs. 1-41

**Diagnosis:** Antennal scape armed with a remarkable basal lobe (Figs. 1-9, 22, 29, 33, 37). Funicular segments II-VIII as long as broad. Apical part of the antennal scrobe not marked by carinae nor forming prominent tubera. Frontal lobes moderately expanded laterad, the

interfrontal width near 2/3 of the head width across the eyes (FLI 58-66). Preocular carina disappearing a little above the eye. Carina of vertex vestigial. Occipital projections always present. Mandible usually with discal area smooth or, as in some specimens of *T. iheringi*, the grooves are relatively thin and shallow. Superior border of katepisternum always armed with a projection usually triangular or tooth-like, sometimes inconspicuous.

Included species:

*Trachymyrmex cirratus* n.sp. (southeastern Brazil)

*Trachymyrmex holmgreni* Wheeler 1925 (from Bolivia to southeastern Brazil)

*Trachymyrmex iheringi* Emery 1888 (from southern to central and southeastern Brazil)

*Trachymyrmex kempfi* Fowler 1982 (Paraguay to southeastern Brazil)

*Trachymyrmex pruinosus* Emery 1906 (from Argentina to central and southeastern Brazil)

=*Trachymyrmex pruinosus* var. *spinosior* Santschi 1922 **nov. syn.**

*Trachymyrmex tucumanus* Forel 1914 (Argentina)

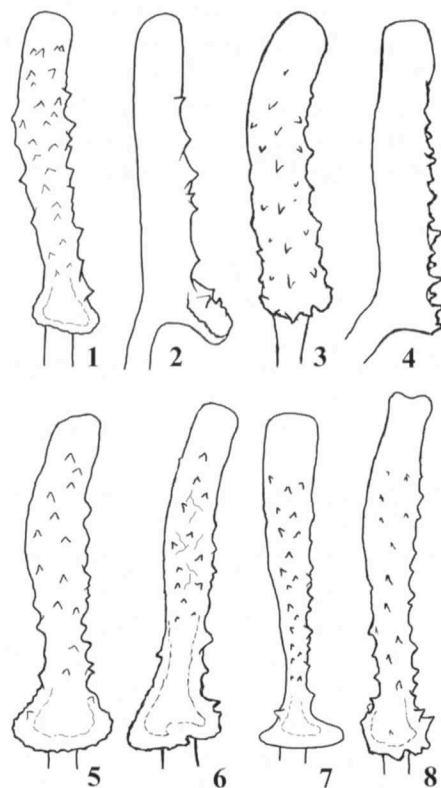
=*Trachymyrmex tucumanus cordovanus* Bruch 1921 **nov. syn.**

=*Trachymyrmex tucumanus* var. *fracticornis* Santschi 1925 **nov. syn.**

=*Trachymyrmex tucumanus* var. *weiseri* Santschi 1925 **nov. syn.**

**Comments:** The first species described in this group, *T. iheringi* (Emery 1888), was proposed in *Atta* (*Acromyrmex*) and transferred to *Trachymyrmex* by Forel (1893), when he proposed the genus as a subgenus of *Atta*. Emery's species was unique in the presence of prominent basal lobe at the antennal scape among the other earlier component species of *Trachymyrmex* cited by Forel (1893): *T. saussurei* (Forel), *T. sharpii* Forel, and *T. septentrionalis* (McCook) [= *T. tardigrada* (Buckley)]. Later, Emery (1906) described another species of the *Iheringi* group, *T. pruinosus*, as *Atta* (*Trachymyrmex*). Despite the general acceptance of this last combination after 1893, Forel (1914) surprisingly proposed *T. iheringi* var. *tucumanus* in *Acromyrmex* (*Trachymyrmex*). Bruch (1921) also cited *Trachymyrmex* as a subgenus of *Acromyrmex*, when he proposed *T. tucumanus cordovanus*, ignoring its raise to generic rank by Wheeler (1916). In the same year worker redescription and descriptions of alates of *T. tucumanus* were published by Gallardo (1916) as *Trachymyrmex*. Since then, all other names of *Iheringi* species group were proposed in the genus *Trachymyrmex*. Bolton (1995) correctly stated that the name





Figs. 1-8. Left antennal scapes of *Trachymyrmex*, workers: 1. *T. iheringi*, frontal view; 2. idem, lateral view; 3. *T. pruinosus*, frontal view; 4. idem, lateral view; 5. *T. cirratus*, frontal view; 6. *T. holmgreni*, frontal view; 7. *T. kempfi*, frontal view; 8. *T. tucumanus*, frontal view (figures 3, 4, 6-8 Kempf del.).

*Trachymyrmex tucumana* st. *cordovana* var. *missionensis* Santschi (1934) is not available.

Lobate antennal scapes is the most notable diagnostic character of the *Iheringi* group species, shared however with species that belong to the supposed closest genus of *Trachymyrmex*, *Acromyrmex lobicornis* and *A. fracticornis*. This character awaits inclusion in a future phylogenetic analysis of the tribe

All species of the *Iheringi* group have frontal lobes moderately expanded laterad, with the interfrontal width close to 2/3 of the head width across the eyes, that seems a common pattern for *Trachymyrmex*. In the *Opulentus* group, however, *T. dichrous* Kempf has frontal lobes moderately approximate, with the interfrontal width near 1/2 of the head width across the eyes (FLI 51).

#### KEY TO TRACHYMYRMEX SPECIES OF THE IHERINGI GROUP (WORKERS):

1. Basal lobe of the antennal scape not enlarged transversely nor very prominent basally or dorsally, its anterior face forming an obtuse angle with the superior face of the slender base of the scape (Figs. 3, 4, 33) ... *T. pruinosus*
- 1'. Basal lobe of the antennal scape usually (not always) wider than the maximum width of the scape and enlarged transversely, distinctly high and obliquely projected on the slender base of the scape (Figs. 1, 5-9, 29, 37), with which forms an acute angle in lateral view (Fig. 2) ... 2
2. Subtriangular frontal lobes rather backwards directed, laterally subdentate (Figs. 13, 37); mesopleurae practically without hairs, especially in the anepisternum (Figs. 14, 38) ... 3

- 2'. Subquadrate or subtriangular frontal lobes rather forwards directed, without lateral teeth (Figs. 9, 25, 29); mesopleurae covered with hairs (Figs. 10, 26, 30) ... 4
3. Basal lobe of the antennal scape prolonged towards the head's middle, when the scape is lodged in the scrobe (Fig. 6); pronotal dorsum, between the anterior border and the lateral and medium projections, practically without hairs or piligerous tubercles (Fig. 15); decumbent hairs strongly curved in the base, relatively scarce in the tergum I of gaster (Fig. 16) ... *T. holmgreni*
- 3'. Basal lobe of the antennal scape more or less rounded, without marked tip (Fig. 8); pronotal dorsum, between the anterior border and the lateral and median projections, with at least some hairs or piligerous tubercles along the sagittal line (Fig. 39); hairs evenly curved more frequent in the tergum I of gaster (Fig. 40) ... *T. tucumanus*
4. Alitrunk covered with evenly short and strongly curved hairs; lateral margin in the tergum I of gaster strongly marked (Figs. 10, 12) ... *T. cirratus* n.sp.
- 4'. Alitrunk with hairs of uneven length, the longer (notably in the mesonotum) not strongly curved in the apex; lateral margin in the tergum I of gaster weakly marked (Figs. 30, 32) ... 5
5. Discal area of the mandibles completely sculptured and subopaque; tergum I of gaster with two types of hairs, some slightly curved, and at least some other strongly curved in the apex; sternum I of gaster with short hairs strongly curved in the apex (Figs. 25-28) ... *T. iheringi*
- 5'. Discal area of the mandibles smooth and shining; tergum I of gaster with long hairs only, more or less sloping and not curved apically; sternum I of gaster without short hairs strongly curved (Figs. 29-32) ... *T. kempfi*

#### *Trachymyrmex cirratus* new species

Figs. 9-12

**Type material:** Worker holotype (MZSP; examined) and 22 worker paratypes (MZSP, CECL). BRAZIL, São Paulo: Agudos [22° 28' S, 49° 00' W], W. W. Kempf [leg.] several dates: 8.iii.1952 (1 paratype); 16.xii.1955 (holotype and 10 paratypes labelled WWK # 1500), 22.xii.1955 (1 paratype), 28.xii.1955 (1 paratype); 15.i.1956 (3 paratypes), 5.xii.1957 (6 paratypes; WWK # 1992).

**Etymology:** In the drafts we found in MZSP, we noticed that Kempf had chosen the Latin adjective *cirrus* (curly) to name this species, in reference to its thick, strongly curved short hairs.



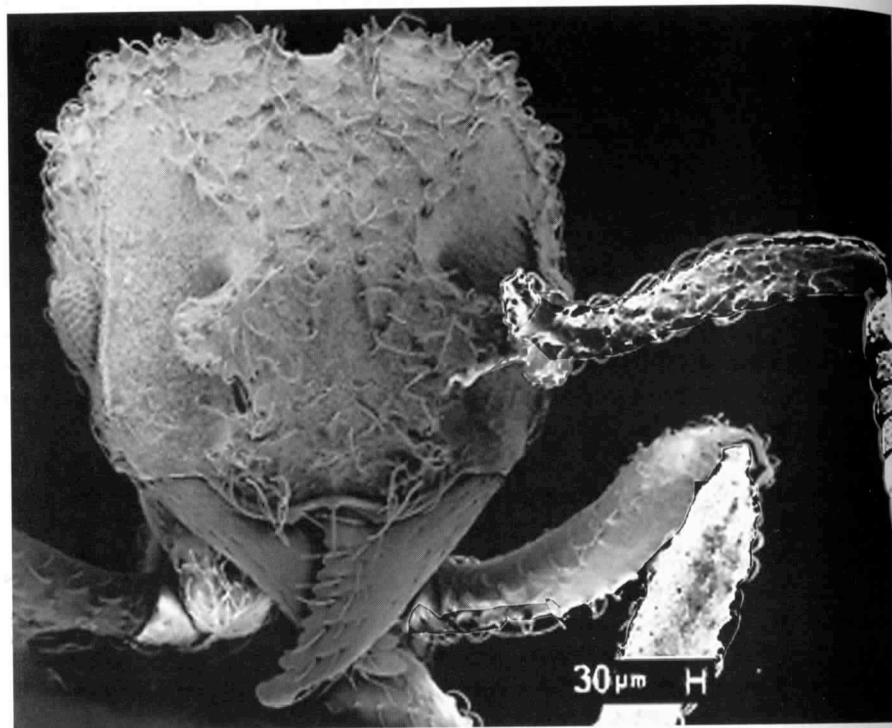


Fig. 9. *Trachymyrmex cirratus*, worker paratype, Brazil, SP: Agudos. Head in frontal view.

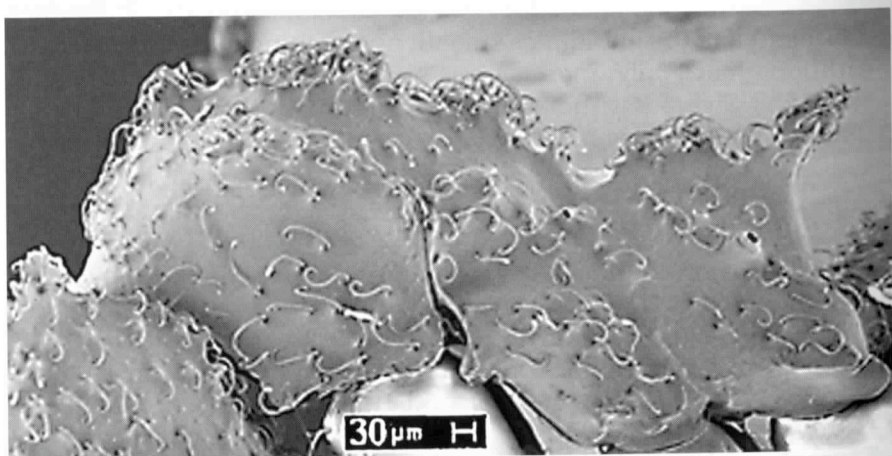


Fig. 10. *Trachymyrmex cirratus*, worker paratype, Brazil, SP: Agudos. Habitus in lateral view.

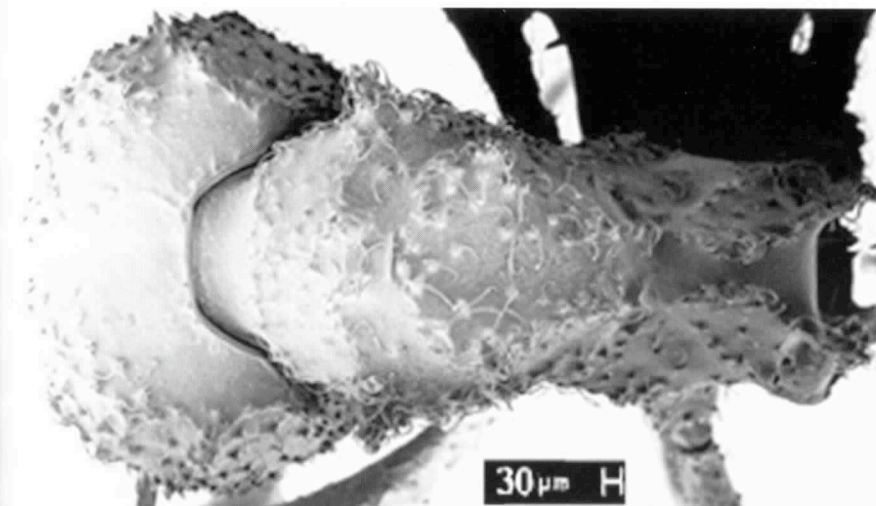


Fig. 11. *Trachymyrmex cirratus*, worker paratype, Brazil, SP: Agudos. Habitus in dorsal view.

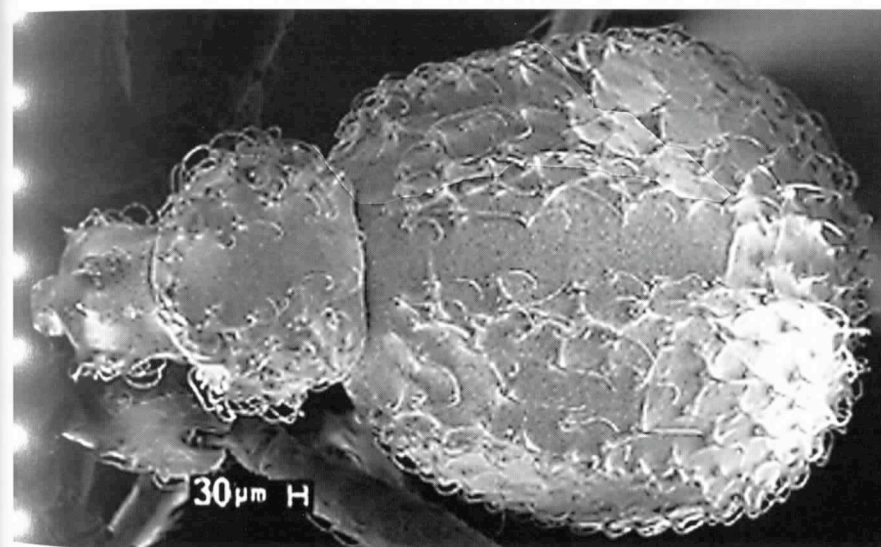


Fig. 12. *Trachymyrmex cirratus*, worker paratype, Brazil, SP: Agudos. Waist and gaster in dorsal view.

**Description:** Worker (measurements in mm). TL 3.2-3.4; HL 0.97-1.00; HW 0.91-0.92; IFW 0.58-0.60; ScL 0.69-0.81; TrL 1.17-1.32; HIL .01-1.07. Reddish-brown with a darker spot on the head front. Integument fine and indistinctly shagreened, opaque. Body clothed with thick strongly curved short hairs, and slender and longer hairs,



oblique to decumbent on appendages, clypeus, occiput, dorsum of alitrunk, waist and tergum I of gaster.

Head in full face view (Fig. 9) little longer than broad (CI 93). Mandible smooth and shining except laterally on base where it is inconspicuously striate, and near the masticatory margin, which bears the apical and sub-apical teeth, and 7 regularly developed teeth. Frontal lobe subquadrate, moderately expanded laterad (FLI 64); anterior border concave in the middle; posterior border weakly concave. Frontal carina diverging caudad, fading out a little before the apex of scrobe. Front and vertex without longitudinal rugulae, with minute isolated piligerous tubercles. Posterior third of antennal scrobe vestigially delimited. Supraocular projection inconspicuous. Occipital corner rounded in full-face view, with many small piligerous tubercles. Occiput notched in the middle. Occipital tooth developed as a stout and tubercle-like projection, rather microtuberculated (Fig. 10). Inferior occipital corner with weak carina. Eye weakly convex, no more than 12 facets in a row across the greatest diameter. Antennal scape slightly surpassing the occipital corner, when laid back over head as much as possible; basal lobe transversely enlarged, its lateral projections equally expanded to the sides; anterior surface surmounted by small tubercles.

Alitrunk (Figs. 10, 11). Pronotum with an indistinct humeral angle; antero-inferior corner roundly angulated; lateral spine small but stout; median projections as two small microtuberculated spines, similar to lateral ones. Mesonotum with the first pair of projections shorter than pronotal lateral spines; second pair lower, a small and crenulated longitudinal ridge; third pair inconspicuously projected as minute teeth. Mesopleura covered with hairs; blunt teeth-like projection on superior border of katepisternum. Alitrunk constricted dorso-laterally at the deeply impressed metanotal groove. Basal face of propodeum narrow, laterally delimited by a row of small teeth; propodeal spines higher and slender than lateral pronotal spines.

Waist and gaster (Fig. 12). Petiole shortly pedunculate, the node proper as long as broad, with two small bifid dorsal teeth; subpetiolar process absent. Postpetiole as long as broad, shallowly excavate above; postero-dorsal border straight; postero-lateral corners without projections. Gaster opaque with minute piligerous tubercles more or less distributed in four irregular longitudinal series in the tergum I.

Female and male. Unknown.

**Material examined:** BRAZIL, São Paulo: Moji-Guaçu (Faz. Campininha).

**Discussion:** The recognition of this species is very easy by the thick and strongly curved hairs scattered on many parts of the body.

subquadrate frontal lobes, and transversely rounded lobes of the antennal scapes. Also the presence of hairs in the mesopleura distinguishes *T. cirratus* from *T. holmgreni*, *T. pruinosus* and *T. tucumanus*.

**Variation:** We did not notice any significant variation in the studied specimens.

**Biology:** Kempf's notebooks entries #1500 and #1992 say only "inho no solo" (nests in soil), a common feature for *Trachymyrmex*.

*Trachymyrmex holmgreni* Wheeler

Figs. 13-24

*Trachymyrmex holmgreni* Wheeler 1925: 37 (worker; Bolivia: Mojos); Kempf 1972: 253 (cat.). Bolton 1995: 420 (cat.).

**Type material:** Probably in the Royal Museum in Stockholm; not examined.

**Description:** Worker (measurements in mm). TL 4.1-4.5; HL 1.12-1.34; HW 1.05-1.22; IFW 0.66-0.78; ScL 0.91-0.98; TrL 1.58-1.75; HfL 1.43-1.58. Dark to reddish brown, sometimes with lighter head or darker gaster. Integument fine and indistinctly shagreened, opaque. Hairs moderately scarce on the body, short and erect or curved on appendages; hook-like mixed with oblique to decumbent hairs on gaster and other parts of body; fine pubescence restricted to funiculus.

Head in full face view (Fig. 13) little longer than broad (CI 95). Mandible smooth and shining except laterally on base where it is finely transversely striate, and near the masticatory margin, which bears the apical and 8 teeth gradually diminishing towards the base. Frontal lobe sub-triangular, moderately expanded laterad (FLI 65), backwards directed and laterally subdentate; anterior border straight; posterior border weakly concave. Frontal carina diverging caudad, fading out a little before the apex of scrobe. Front and vertex with weak longitudinal rugulae. Posterior third of antennal scrobe weakly delimited by the frontal carina and extension of the preocular ones. Supraocular projection as bifid or truncated spine. Occipital corner smoothly rounded in full-face view, surmounted by stout tubercles. Occiput notched in the middle. Occipital tooth developed as a stout rather smooth spine-like projection (Figs. 14, 15). Inferior occipital corner with carina. Eye weakly convex, no more than 14 facets in a row across the greatest diameter. Antennal scape surpassing the occipital corner by nearly 1/4 of its length, when laid back over head as much as possible; basal lobe perpendicularly enlarged, its inner projection bigger than the external ones, prolonged towards the head's middle when the scape is lodged in the scrobe; anterior surface surmounted by small tubercles and ridges.





Fig. 13. *Trachymyrmex holmgreni*, worker, Brazil, MT: Corumbá. Head in frontal view.

Alitrunk (Figs. 14, 15). Pronotum with marked humeral angle; antero-inferior corner armed with a triangular and flattened spine-like projection; lateral spines long; median projections as two separated small truncated, bifid or simple spines. First pair of mesonotal projections similar to pronotal lateral ones; two longitudinal rows bearing

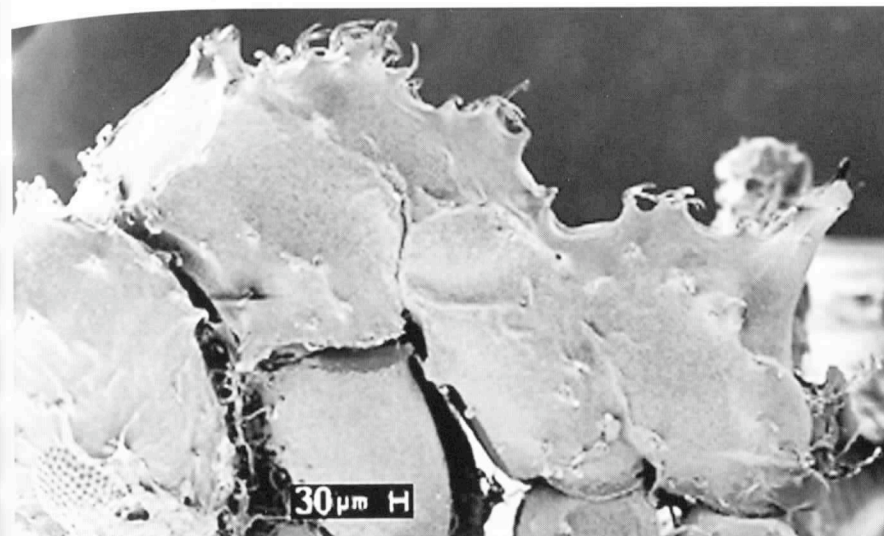


Fig. 14. *Trachymyrmex holmgreni*, worker, Brazil, MT: Corumbá. Habitus in lateral view.

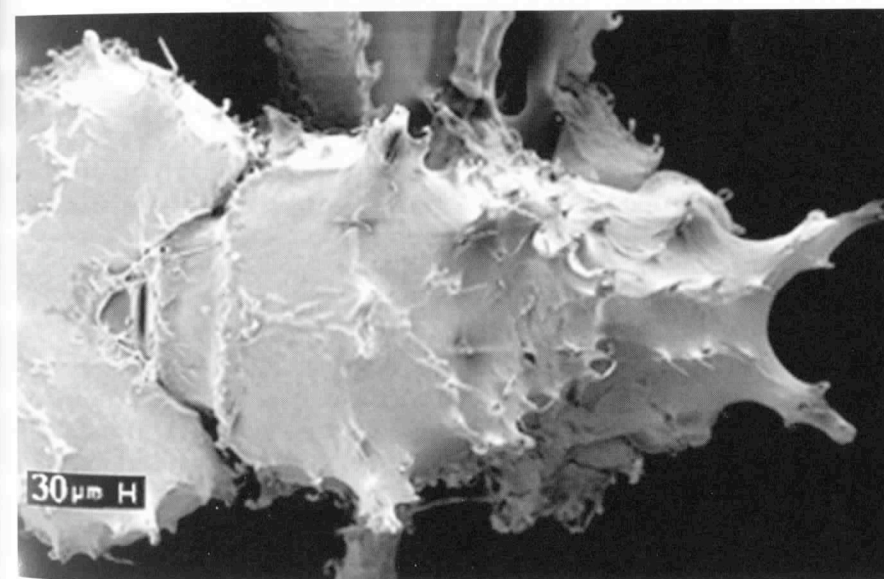


Fig. 15. *Trachymyrmex holmgreni*, worker, Brazil, MT: Corumbá. Habitus in dorsal view.

three small teeth; the second and third pairs vestigial. Mesopleurae practically without hairs; blunt teeth-like projection on superior border of katepisternum. Alitrunk weakly constricted dorso-laterally at the



shallowly impressed metanotal groove. Basal face of propodeum narrow, laterally delimited by a row of small teeth; slender propodeal spines longer than other dorsal projections of alitrunk.

Waist and gaster (Fig. 16). Petiole shortly pedunculate, the node proper as long as broad, with one pair of small spines backwards directed, inserted near the posterior border; subpetiolar process vestigial. Postpetiole as long as broad, shallowly excavated above; postero-dorsal border straight; postero-lateral corners without projections. Gaster opaque with minute piligerous tubercles randomly distributed in the tergum I.

Female (undescribed; Figs. 17-21; measurements in mm). TL 5.6-5.9; HL 1.42-1.51; HW 1.28-1.34; IFW 0.77-0.82; ScL 0.92-0.95; TrL 2.02-2.11; HfL 1.52-1.62; FWL 5.91-6.09; HWL 3.95-4.09. With the same general distinguishing characters of the workers, with the following differences: Three ocelli on vertex, the lateral ones smaller. Pronotum with a pair of strong and acute scapular spines, directed out and forwards, and with a pair of inferior spines pointed down and forwards, smaller than the scapular ones. Mesoscutum surmounted by conspicuous tubercles, but without notable dorsal projections. With the alitrunk in dorsal view, very shallow parapses delimited by the parapsidal furrows; mesothoracic paraptera more or less impressed, with a narrow median portion; scutellum ending in a pair of moderately stout and acute spines, directed backwards, with the sides converging obliquely inwards; metathoracic paraptera concealed by the scutellum in dorsal view; propodeal spiracle orifices visible. Two strong acute spines on propodeum, longer than pronotal ones. First gastric tergite with a longitudinal ridge on each side; disk with two longitudinal series of small piligerous tubercles, absent in the middle of the segment.

Wings pale brown, completely covered by microtrichia. Fore wing with 5 closed cells (sub-median, median, costal, sub-marginal and marginal); anal vein turned up and fused with cubito-anal, not prolonged beyond the junction. Pterostigma conspicuous, although not pigmented. Hind wing with 5 complete veins, and 1 closed cell; 10 hamuli on anterior margin.

Male (undescribed; measurements in mm). TL 5.3-5.6; HL 0.83-0.95; HW 0.94-1.02; IFW 0.34-0.38; ScL 0.85-0.88; TrL 1.82-2.03; HfL 1.63-1.77; FWL 5.27-5.55; HWL 3.50-3.86. Dark brown, with antennae and legs ferruginous brown. Hairs moderately long and inclined, mixed with short and strongly curved hairs, conspicuous on head, dorsum of alitrunk and first segment of the gaster.

Head (Fig. 22). Mandibles finely striated on dorsal surface; masticatory margin with five teeth, gradually diminishing towards the base;

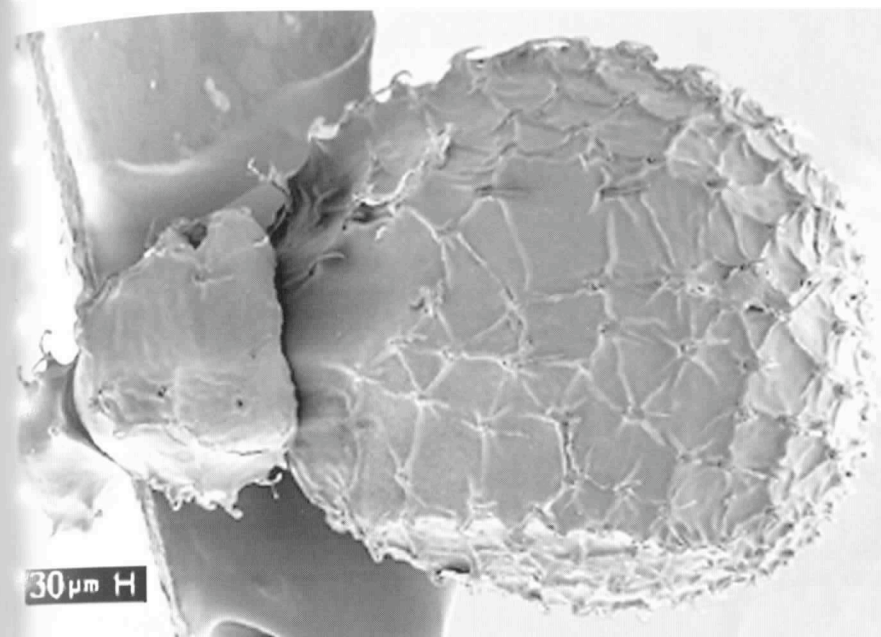
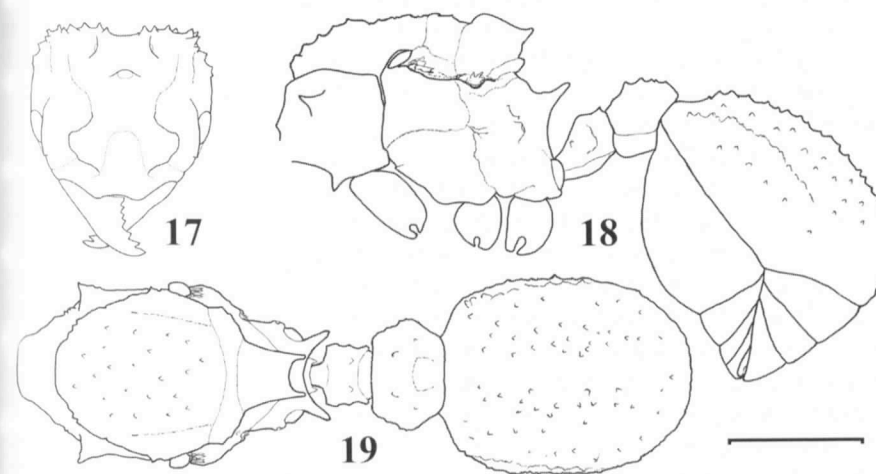
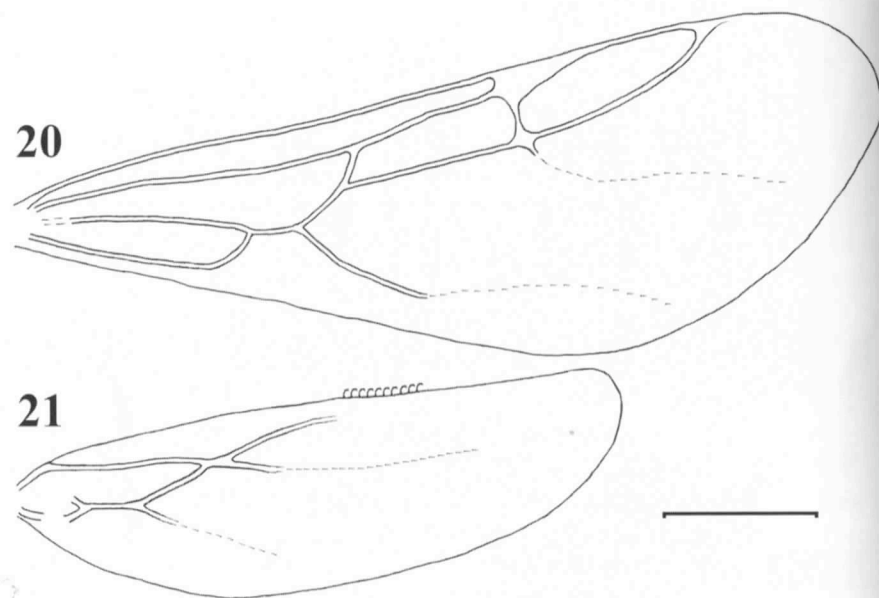


Fig. 16. *Trachymyrmex holmgreni*, worker, Brazil, MT: Corumb . Waist and gaster in dorsal view.



Figs. 17-19. *Trachymyrmex holmgreni*, female, Brazil, MG: Santa Barbara do Monte Verde: 17. Head in frontal view; 18. Habitus (headless) in lateral view; 19. Habitus (headless) in dorsal view. Scale bar = 1mm.

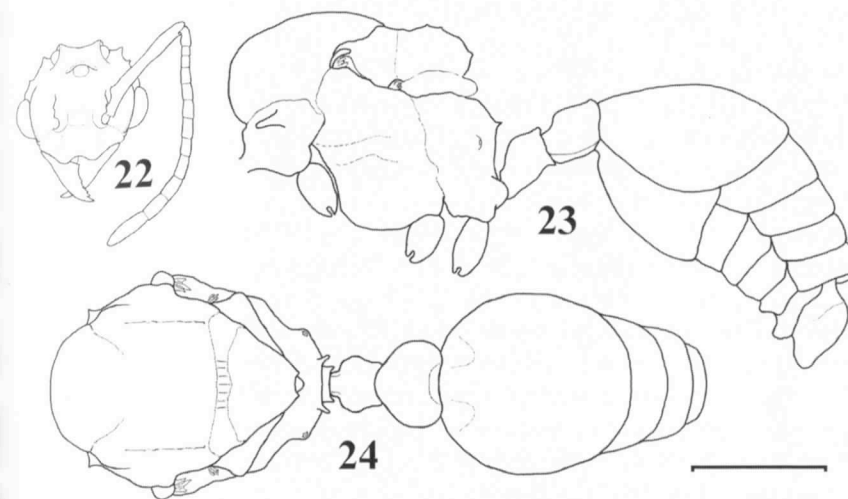




Figs. 20-21. *Trachymyrmex holmgreni*, female, Brazil, MG: Santa Barbara do Monte Verde: 20. Fore wing; 21. Hind wing. Scale bar = 1mm.

external margin slightly sinuous. Median border of clypeus convex, with a large anterior notch; dorsal disk of clypeus without projections, but with one weak longitudinal carina on each side, between the base of frontal lobes and its anterior margin. Frontal lobes rounded and directed forwards, leaving part of the antennal insertions exposed. Frontal carinae subparallel, not reaching the occiput. Preocular carinae distinct, fading out at the posterior border of eyes. Compound eyes big and convex, filling some 1/2 of the head sides. Three prominent ocelli. Antennae with 13 segments; scape clearly surpassing the occipital corners, nearly three times longer than funicular segments I-III combined, with a basal lobe weakly projected; funicular segment I longer than II. Occipital corners rounded, with small spines and tubercles visible in frontal view. Occipital margin gently concave in the middle between the lateral ocelli.

Alitrunk (Figs 23-24): Pronotum with a scapular spine moderately long and acute. Scutum narrow with superficially impressed Mayrian furrows; parapsis shallowly impressed; parapsidial furrows conspicuously marked. Mesothoracic paraptera, in dorsal view, slightly narrowed in the middle, where it is impressed and presents a series of short longitudinal keels, without side projections. Scutellum without dorsal projections, ending as two obsolete tubercles. Metathoracic paraptera



Figs. 22-24. *Trachymyrmex holmgreni*, male, Brazil, MG: Santa Barbara do Monte Verde: 22. Head in frontal view; 23. Habitus (headless) in lateral view; 24. Habitus (headless) in dorsal view. Scale bar = 1mm.

backwards projected, partially visible in dorsal view. Propodeum with a pair of minute spines between basal and declivous faces.

Waist and gaster (Figs 23-24): Dorsum of petiole without projections. Postpetiole a little broader than petiole in dorsal view, superficially impressed above, with the posterior border concave. First gastric tergite without lateral ridges or piligerous tubercles, basally with a superficial impression on each side.

Wings similar as described for the female above; the unique noticeable difference is the 1Cu vein of the fore wing, much shorter in the male.

**Material examined:** ARGENTINA: Misiones. BRAZIL, Distrito Federal: Brasília. Goiás: Anápolis; Campinas; Jataí (Faz. Aceiro). Mato Grosso do Sul: Corumbá. Minas Gerais: Santa Bárbara do Monte Verde (Serra Negra, 1.100m); Varginha. Pará: Cuminá. Paraná: Pirai do Sul. Rio Grande do Sul: Getúlio Vargas; Capão da Canoa (Capão Novo). São Paulo: Agudos; Botucatu; Corumbataí; Moji-Guaçu (Faz. Campininha); Neves Paulista; Rio Claro; Rodovia SP-310 (near São Carlos); São Paulo (Ipiranga).

**Discussion:** The most useful character to distinguish this species from the other members of the *Iheringi* group is the shape of the lobes on the antennal scapes. Among the species that lack pilosity on the mesopleura, it also can be distinguished from *T. pruinosus*, which has triangular frontal lobes. It differs from *T. tucumanus* by the shape of the



small projections on petiolar node, one or two spine-like pairs in *T. holmgreni* and one tooth-like pair in *T. tucumanus*.

**Variation:** Specimens from Corumba have mesonotal projections longer than of any other species of the *Iheringi* group; on the dorsum of petiole they present an additional anterior pair of spines, although smaller than other spines that are commonly absent or rarely vestigial in samples from other localities.

**Biology:** The nest found at Santa Barbara do Monte Verde, Minas Gerais State, by one of us (AJMN) was excavated in sandy soil, in an area with few bushes and scarce low vegetation, about 1.100 meters above sea level. The entrance hole was longer than broad (6 x 2cm) and in one of the sides had a tower of 1cm height, built with mixed grass straws and sand. The internal structure resembles that of nests of other *Trachymyrmex* species, such as *T. pruinosus* discovered by Gallardo (1916), as well as *T. turrifex* described by Wheeler (1907). The seven alternating spheroidal chambers found were vertically disposed, with the following approximate measures: first chamber (3 x 3cm) about 5cm deep, second (7 x 7cm) to 10cm, third (5 x 5cm) to 20cm, forth (9 x 7cm) to 30cm, fifth (7 x 5cm) to 40cm, sixth (5 x 5cm) to 50cm, and seventh (7 x 5cm) to 60 cm. The grayish fungus garden was laminated and set vertically, an appearance characteristic of grass use as fungal substrate. The first chamber had several pupae and little fungus hanging from the roof, suspended by thin roots. In the second chamber, a bulky fungus garden was also hung from the roof by roots. Equally, in the three following chambers, the gardens were big, however rested in the bottom of the chambers. The queen was in the fourth chamber; in the last two chambers, small amounts of fungus were found. Besides these chambers, five more possible trash chambers were observed containing a dark brown material, but without ants corpses. During the excavation, the workers do not feign death, a common behavior of other *Trachymyrmex*. The appearance of the fungus garden and the use of grass straw to build the tower in the entrance of the nest corroborate Gonçalves (1975) observations on *T. holmgreni* cutting fresh leaves of the grass *Paspalum ancyllocarpum*.

*Trachymyrmex iheringi* (Emery)

Figs. 25-28

*Atta* (*Acromyrmex*) *iheringi* Emery 1888:359 (worker, female and male; Brazil, Rio Grande do Sul: São Lourenço).

*Atta* (*Trachymyrmex*) *iheringi*: Forel 1893:600

*Trachymyrmex jheringi*: Kempf 1972:253 (cat.). Bolton 1995: 420 (cat.).

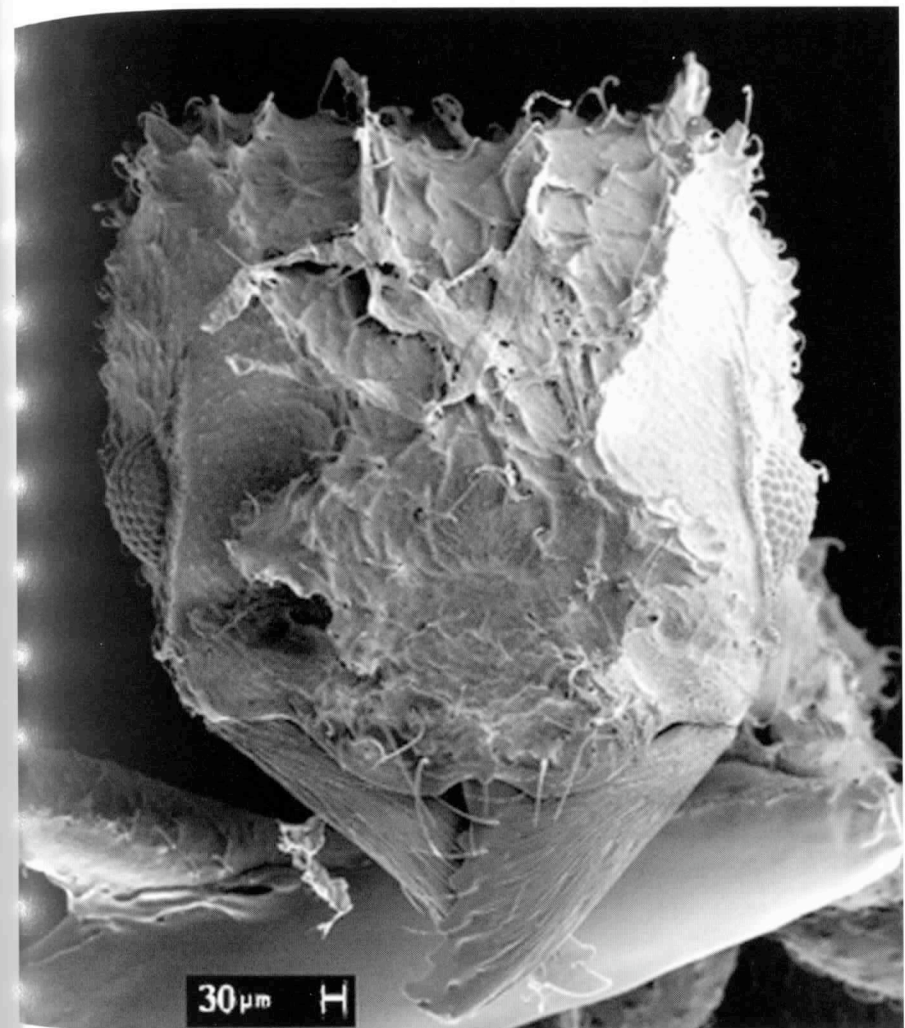


Fig. 25. *Trachymyrmex iheringi*, worker, Brazil, SC: Jaguaruna. Head in frontal view.

**Type material:** Two syntype workers labeled "*iheringi* (type) XXI.V.d.3416 Rio Grande do Sul, Ihering col" in NHMB; not examined (Dietz personal communication).

**Description:** Worker (measurements in mm). TL 3.5-4.2; HL 1.05-1.09; HW 0.92-1.00; IFW 0.62-0.69; ScL 0.75-0.85; TrL 1.34-1.54; HfL 1.15-1.25. Uniformly dark reddish brown to dark brown. Integument fine and shagreened, opaque. Body and appendages clothed with moderately long and oblique to decumbent hairs; mixed with strongly



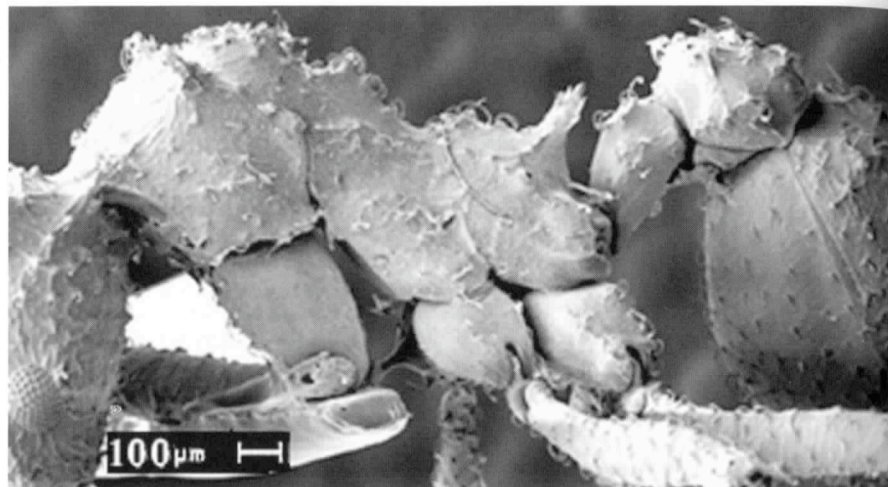


Fig. 26. *Trachymyrmex iheringi*, worker, Brazil, SC: Jaguaruna. Habitus in lateral view.

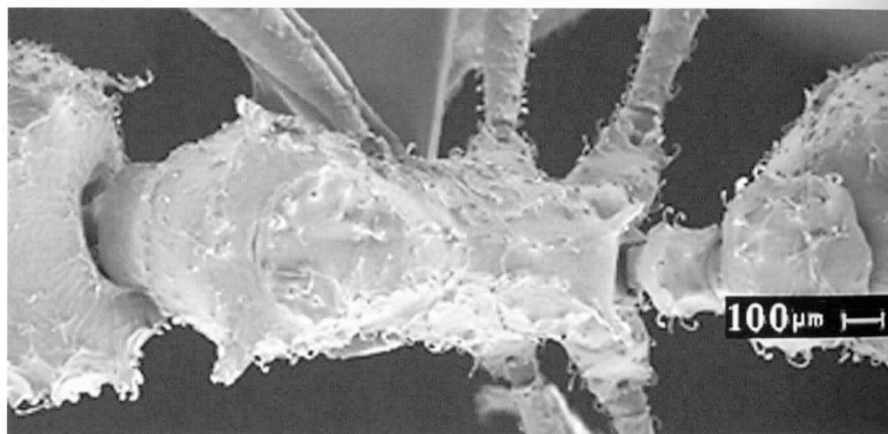


Fig. 27. *Trachymyrmex iheringi*, worker, Brazil, SC: Jaguaruna. Habitus in dorsal view.

curved short hairs on some parts of occiput, alitrunk, postpetiole and gaster.

Head in full face view (Fig. 25) as long as broad (CI 100). Mandible fine and completely striate on its dorsal surface, which bears the apical and sub-apical teeth, and 5 regularly developed teeth. Frontal lobe sub-triangular, moderately expanded laterad (FLI 65); anterior border concave; posterior border rather straight. Frontal carina diverging caudad, reaching the apex of scrobe. Front and vertex with weak longitudinal rugulae. Posterior third of antennal scrobe clearly delim-

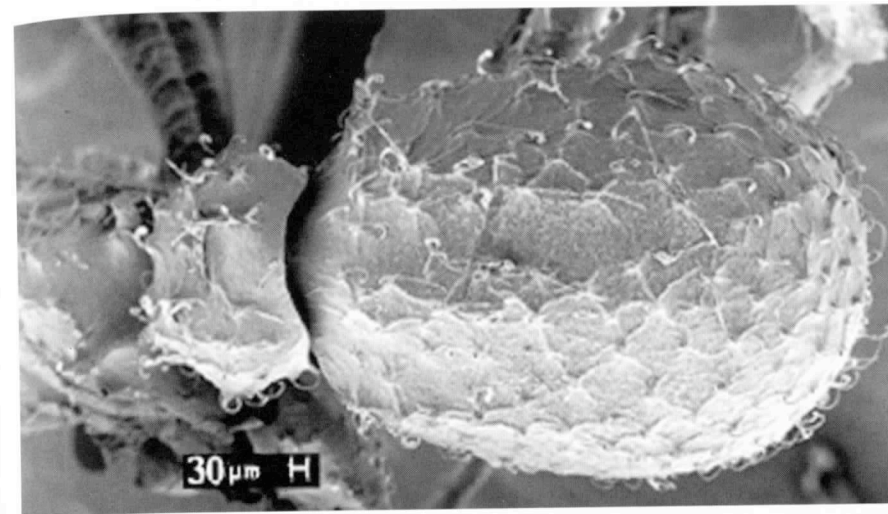


Fig. 28. *Trachymyrmex iheringi*, worker, Brazil, SC: Jaguaruna. Postpetiole and gaster in dorsal view.

ited by the frontal carina and weakly marked by the extension of the preocular ones. Supraocular projection formed by a group of small tubercles. Occipital corner rounded in full-face view, surmounted by some stout piligerous tubercles. Occiput slightly notched in the middle. Occipital tooth developed as a stout and tubercle-like projection, rather microtuberculated (Figs. 26, 27). Inferior occipital corner emarginated, not forming carina. Eye convex, no more than 12 facets in a row across the greatest diameter. Antennal scape slightly surpassing the occipital margin, when laid back over head as much as possible; basal lobe perpendicularly enlarged, its outer projection bigger than the internal ones, outwards directed when the scape is lodged in the scrobe; anterior surface surmounted by small tubercles and ridges.

Alitrunk (Figs. 26, 27). Pronotum with indistinct humeral angle; antero-inferior corner rather angulated; lateral spines long; median projections as a small bifid tubercle. First and second pair of mesonotal projections shorter than pronotal lateral ones, forming a blunt short ridge and teeth-like tubercle, respectively; third pair very small. Mesopleura covered with hairs; superior border of katepisternum vestigially armed with a small and blunt teeth-like projection. Alitrunk weakly constricted dorso-laterally at the shallowly impressed metanotal groove. Basal face of propodeum narrow, laterally delimited by a small dentate ridge; propodeal spines similar to lateral pronotal ones.

Waist and gaster (Figs. 27-28). Petiole shortly pedunculated, the node proper as long as broad, with one pair of small teeth; subpetiolar



process vestigial. Postpetiole slightly broader than long, shallowly excavated above; postero-dorsal border convex; postero-lateral corners without projections. Gaster opaque with minute piligerous tubercles more or less distributed in four irregular longitudinal series on tergum I.

**Material examined:** BRAZIL, Distrito Federal: Brasília. Goiás: Anápolis. Mato Grosso do Sul: Campo Grande. Rio Grande do Sul: Capão da Canoa (Capão Novo). Santa Catarina: Florianópolis (Pântano do Sul); Jaguaruna. São Paulo: Agudos; Neves Paulista; Mirassol.

**Discussion:** The exclusive character of *T. iheringi* is the finely striated discal area of the mandibles; however, Emery (1888) reported that some specimens lack such striation. This species fall with *T. kempfi* into the same dichotomy in the identification key. Although both share very similar frontal lobes, *T. iheringi* first (anterior) pair of mesonotal projections are shorter, whereas the second (posterior) ones are longer (sometimes absent in *T. kempfi*). Two others striking differences are the lack of flexous pilosity and the shape of lobes of antennal scapes in *T. iheringi* (see discussion for *T. kempfi*). We have found in CECL a pin with one worker labeled as: Rio Gr. do Sul, v. Ihering, 2728, Em. det., *Trachymyrmex iheringi* Em. det. Borgmeier. Except by the collection number and the identification label, surely written by Borgmeier, the other informations match with Dietz' annotations taken in the Basel Museum, where he found the syntypes of the species. Kempf (1972) cleared up one information absent in the label of type material: the type-locality of the species is São Lourenço, at southern Rio Grande do Sul State.

**Variation:** Except by the coloration and size of the katepisternum projection we did not observed any other significant variation in the studied specimens

**Biology:** Entry number 2007 in Gonçalves notebook says "ninho subterraneo com olheiro fino na areia", that is, subterranean nest in sand with slim opening.

*Trachymyrmex kempfi* Fowler  
Figs. 29-32

*Trachymyrmex kempfi* Fowler 1982:70 (worker; Paraguay, Nueva Assunción: Teniente Enciso); Brandão 1991:382 (cat.). Bolton 1995: 420 (cat.).

**Type material:** Workers, holotype and 18 paratypes. Paraguay, Nueva Assunción: Teniente Enciso [21° 00'S 61° 00' W] (MCZC, USNM; LACM; not examined).

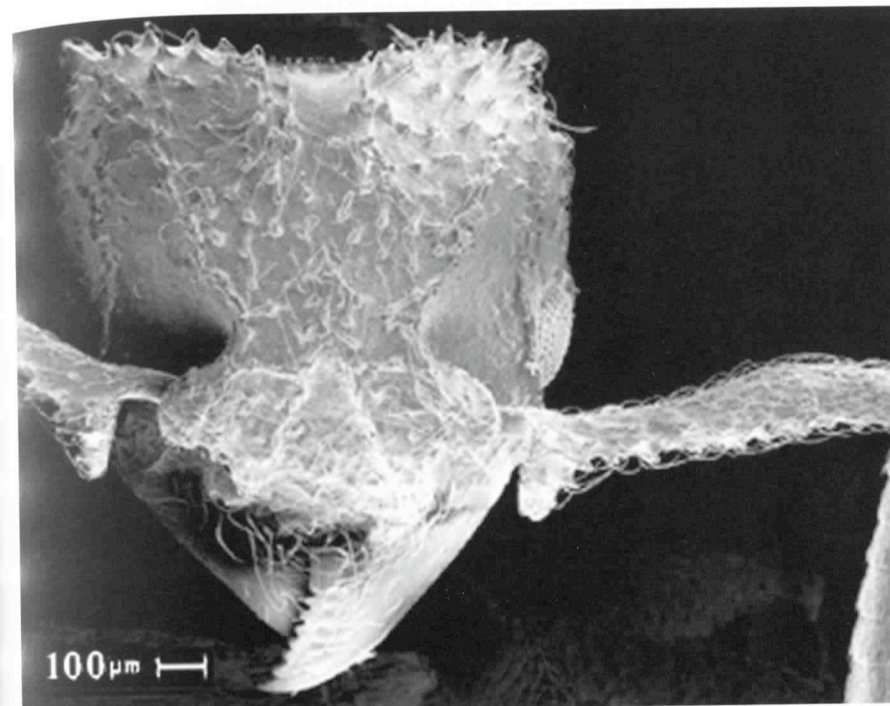


Fig. 29. *Trachymyrmex kempfi*, worker, Brazil, SP: Agudos. Head in frontal view.

**Description:** Worker (measurements in mm). TL 3.8-4.2; HL 1.02-1.14; HW 0.95-1.03; IFW 0.65-0.68; ScL 0.73-0.89; TrL 1.49-1.67; HfL 1.35-1.42. Reddish yellow to reddish brown, with darker postpetiole and gaster in some specimens. Integument fine and indistinctly shagreened, opaque. Body and appendages clothed with moderately long and oblique to decumbent hairs; scarce strongly curved short hairs confined to some parts of postpetiole and gaster

Head in full face view (Fig. 29) little longer than broad (CI 95). Mandible smooth and shining except laterally on base, where it is finely transversely striate, and near the masticatory margin, which bears the apical, and 6 regularly developed teeth. Frontal lobe sub-triangular, moderately expanded laterad (FLI 66); anterior border evenly concave; posterior border slightly convex. Frontal carina diverging caudad, fading out a little before the apex of scrobe. Front and vertex without longitudinal rugulae, with minute isolated piligerous tubercles. Posterior third of antennal scrobe vestigially delimited. Supraocular projection vestigial. Occipital corner rounded in full-face view, with many small piligerous tubercles. Occiput slightly notched in the middle.





Fig. 30. *Trachymyrmex kempfi*, worker, Brazil, SP: Agudos. Habitus in lateral view.

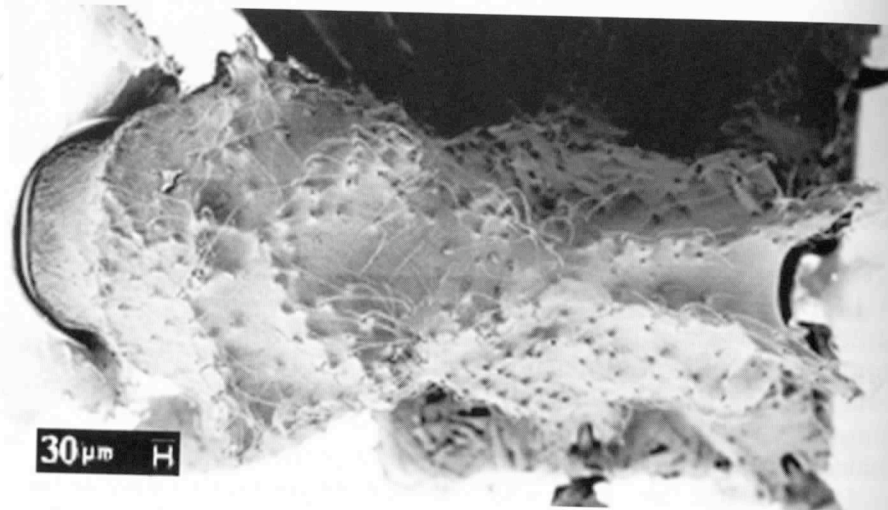


Fig. 31. *Trachymyrmex kempfi*, worker, Brazil, SP: Agudos. Habitus in dorsal view.

Occipital tooth developed as a stout spine-like projection rather smooth. Inferior occipital corner indistinctly emarginated with weak carina. Eye almost flat, no more than 14 facets in a row across the greatest diameter. Antennal scape slightly surpassing the occipital corner, when laid back over the head as much as possible; basal lobe perpendicularly enlarged, its outer projection bigger than the internal ones, outwards directed when the scape is lodged in the scrobe; anterior surface surmounted by small tubercles.

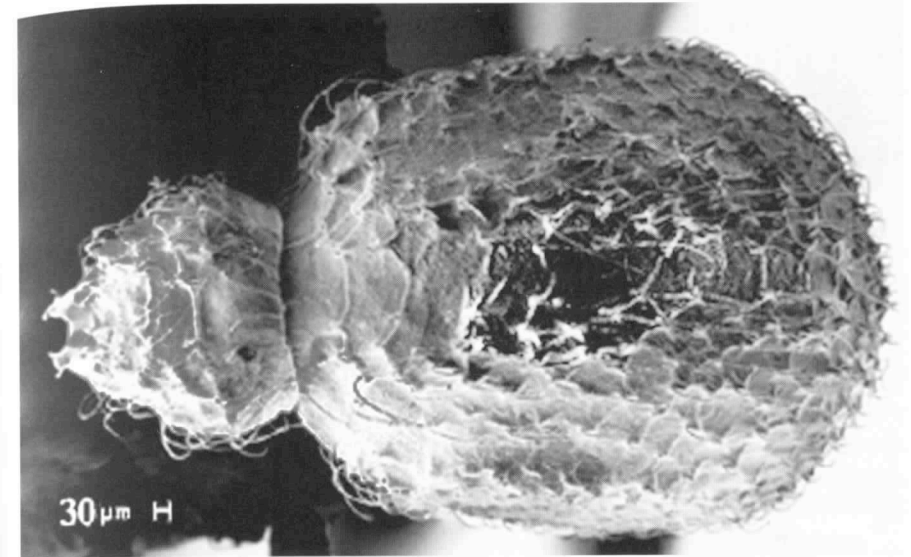


Fig. 32. *Trachymyrmex kempfi*, worker, Brazil, SP: Agudos. Waist and gaster in dorsal view.

Alitrunk (Figs. 30, 31). Pronotum with an indistinct humeral angle; antero-inferior corner armed with a triangular and flattened spine-like projection; lateral spines moderately long; median projections as two small microtuberculated spines. Mesonotum with the first pair of projections a little stouter and longer than pronotal lateral spines; second pair very low, formed by a small and crenulated longitudinal ridge, sometimes vestigial; third pair vestigial or absent. Mesopleura covered with hairs; acute triangular projection on superior border of katepisternum. Alitrunk weakly constricted dorso-laterally at the shallowly impressed metanotal groove. Basal face of propodeum narrow, laterally delimited by a row of small teeth; propodeal spines longer and slender than promesonotal projections.

Waist and gaster (Figs. 30, 32). Petiole shortly pedunculate, the node proper as long as broad, with one or two pairs of minute dorsal teeth; subpetiolar process vestigial. Postpetiole slightly broader than long, shallowly excavate above; postero-dorsal border straight; postero-lateral corners without projections. Gaster opaque with minute piligerous tubercles randomly distributed in the tergum I.

Female and male. Unknown.

**Material examined:** ARGENTINA, Misiones: Loreto. BRAZIL, Distrito Federal: Brasília; Pq. Nac. Brasília. Goiás: Anápolis; Jataí (Faz. Cachoeirinha). Mato Grosso: Gustavo Dutra [Sto. Antônio do Leverger]. Mato Grosso do Sul: Campo Grande (Rochedinho); Três Lagoas. Minas



Gerais; Carmo da Cachoeira; Januária. São Paulo: Agudos; Assis (Rodovia SP-333 Km 42); Boa Esperança do Sul (Faz. Itaquerê); Corumbataí; Itirapina; Moji-Guaçu (Faz. Campininha); Ribeirão Preto; Serra Negra (800m). PARAGUAY, Canindeyú (Res. Nat. Bosque Mbaracayú) Lagunita; Pastoreo; Teniente Enciso.

**Discussion:** This species resembles *T. iheringi* (see discussion), as reported by Fowler (1982), but good distinctive characters are the lobes on antennal scapes pointing outwards and the abundant, long and flexuous pilosity of the body. Kempf labeled specimens that belong to this taxon with a name meaning a *Trachymyrmex* with long hairs in Latin. Indeed, all specimens of *T. kempfi* show long, flexuous decumbent hairs all over the body as mentioned above. Alex Wild collected a sample in Paraguay, compared it with types (deposited in LACM, and not as stated by Fowler although we are not sure whether the collections mentioned by Fowler keep other types) and kindly sent us two workers for deposit in the MZSP. Afterwards, we found an undetermined sample in the MZSP that we recognize as *T. kempfi*, with a handwritten label by Kempf with very similar data to the type material: Paraguay, Tte. Enciso 1975 HF xiv, H. Fowler, # 13414; although they do not belong to the type series, probably belong to the series used by Fowler in the original description.

**Variation:** In comparison with type-locality samples, some São Paulo specimens have the projections on the declivous face of mesonotum and dorsum of petiole vestigial or absent.

**Biology:** Fowler (1982) commented briefly that nests of *T. kempfi* consist of small tumulus of excavated soil, with one entrance and that he observed workers foraging on fresh leguminous vegetation.

*Trachymyrmex pruinus* Emery  
Figs 33-36

*Atta* (*Trachymyrmex*) *pruinosa* Emery 1906:163 (worker; Argentina, Buenos Aires: Tandil).

*Trachymyrmex pruinus*: Gallardo 1916:249 (female and male; redesc. worker; nest; biology; Argentina, Buenos Aires: Bella Vista). Kempf 1972: 253 (cat.). Bolton 1995: 421 (cat.).

*Trachymyrmex pruinus* var. *spinosior* Santschi 1922:359 (worker; Argentina, Cordoba: Cabana) **nov. syn.**

**Type material:** Probably in Emery's collection; not examined. Two syntypes workers labeled as "*pruinosa* var. *spinosior* (type) XXI.V.d.3418, Cordoba, Cabana, Scott col" in NHMB (Dietz personal communica-

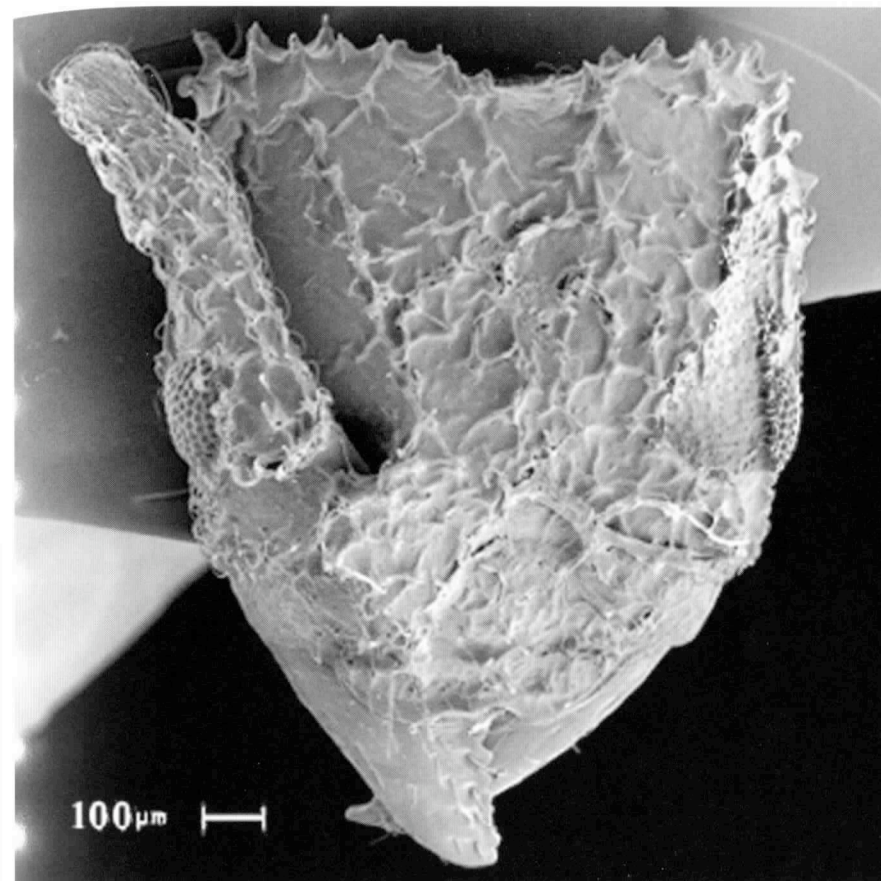


Fig. 33. *Trachymyrmex pruinus*, worker, Argentina, Santa Fe: Vila Guillermina. Head in frontal view.

tion); not examined. One syntype worker of *Trachymyrmex pruinus* var. *spinosior* in MZSP, examined.

**Description:** Worker (measurements in mm). TL 3.4-3.7; HL 1.02-1.09; HW 0.92-1.02; IFW 0.60-0.64; ScL 0.71-0.77; TrL 1.31-1.42; HfL 1.11-1.20. Dark ferruginous brown, some specimens with darker head and gaster, and reddish brown mandibles, legs and tip of funiculus. Integument fine and indistinctly shagreened, opaque. Hairs moderately scarce on the body, short and erect or curved on appendages; hook-like mixed with oblique to decumbent hairs on other parts of body.

Head in full face view (Fig. 33) little longer than broad (CI 92). Mandible smooth and shining except laterally on base where it is finely



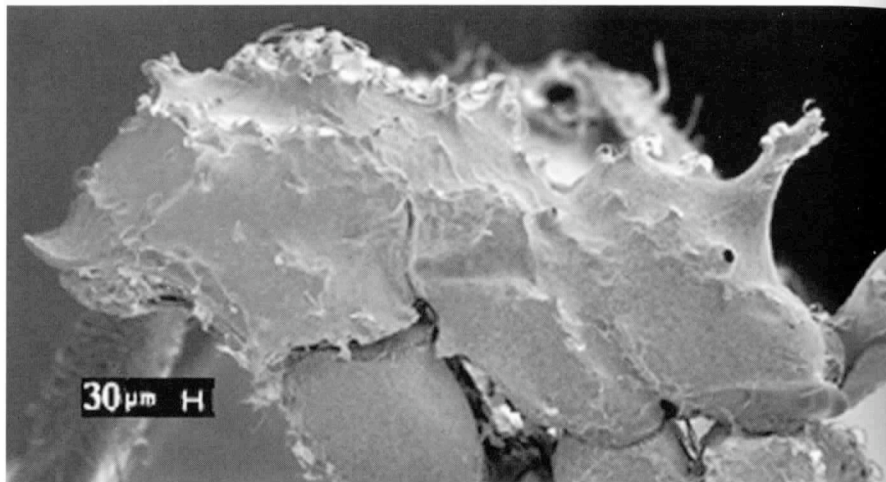


Fig. 34. *Trachymyrmex pruinosus*, worker, Argentina, Santa Fe: Vila Guillermina. Habitus in lateral view.

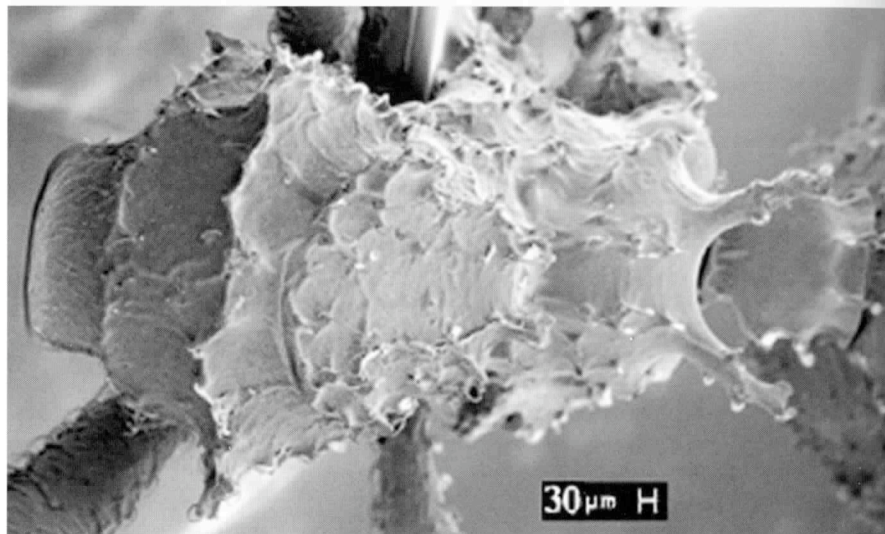


Fig. 35. *Trachymyrmex pruinosus*, worker, Argentina, Santa Fe: Vila Guillermina. Habitus in dorsal view.

transversely striate, and near the masticatory margin, which bears the apical and 7 regularly developed teeth. Frontal lobe triangular, moderately expanded laterad (FLI 64); anterior and posterior borders straight. Frontal carina diverging caudad, reaching the apex of scrobe. Front and vertex with small isolated piligerous tubercles. Posterior third of

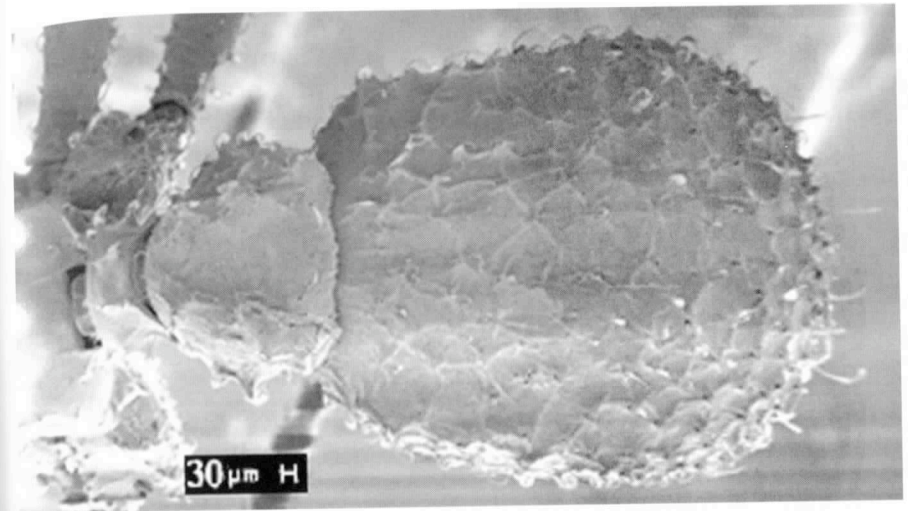


Fig. 36. *Trachymyrmex pruinosus*, worker, Argentina, Santa Fe: Vila Guillermina. Waist and gaster dorsal view.

antennal scrobe clearly delimited by the frontal carina and weakly marked by the extension of the preocular ones. Supraocular projection vestigial. Occipital corner rounded in full-face view, with many small piligerous tubercles. Occiput notched in the middle. Occipital tooth developed as a stout spine-like projection rather microtuberculated. Inferior occipital corner indistinctly emarginated with weak carina. Eye weakly convex, no more than 12 facets in a row across the greatest diameter. Antennal scape weakly surpassing the occipital corner, when laid back over head as much as possible; basal lobe not enlarged transversely nor very prominent basally or dorsally, its anterior face forming an obtuse angle with the superior face of the slender base of the scape; anterior surface surmounted by small tubercles.

Alitrunk (Figs. 34, 35). Pronotum with an indistinct humeral angle; antero-inferior corner armed with a triangular and flattened spine-like projection; lateral spines long; median projections as two small microtuberculated spines. Mesonotum with the first pair of projections shorter than pronotal lateral ones; second pair represented by short teeth and the third by one or some minute teeth, forming a small and crenulated longitudinal ridge; Mesopleura without hairs; acute triangular projection on superior border of katapisternum. Alitrunk constricted dorso-laterally at the deeply impressed metanotal groove. Basal face of propodeum narrow, laterally delimited by a row of small teeth; propodeal spines longer and slender than promesonotal projections.



Waist and gaster (Figs. 35, 36). Petiole shortly pedunculate, the node proper as long as broad, with one or two pairs of minute dorsal teeth; subpetiolar process vestigial. Postpetiole slightly broader than long, shallowly excavate above; postero-dorsal border straight; postero-lateral corners without projections. Gaster opaque with minute piligerous tubercles randomly distributed on tergum I.

Female and male. Gallardo (1916) described and illustrated properly the sexual castes of this species.

**Material examined:** ARGENTINA, Tucumán: Siete de Abril (Dto. Burruyacu). Córdoba: Barrie Chacabuco. Santa Fé: Villa Guillermina. BRAZIL, Mato Grosso do Sul: Campo Grande. São Paulo: Agudos; Campos do Jordão; Moji-Guaçu (Faz. Campininha), Rio Claro.

**Discussion:** The basal lobe of the antennal scape not enlarged transversely nor very prominent basally or dorsally is the main diagnostic character of *T. pruinosus*. This species is the only in the *Iheringi* group that has triangular frontal lobes.

**Variation:** We did not notice any significant variation in the studied specimens.

**Biology:** Gallardo (1916) made detailed observations on this species, summarized as follow: The nests excavated in hard loamy soil had a circular entrance 3 to 4 mm in diameter, surrounded by a low crater of about 10 cm of diameter. Some nests can have hole a small 5 mm tower around the entrance, built with sticks and very fine earth grains used by the ants to make a funnel with borders curved outwards. The internal structure consists on a vertical and cylindrical duct that leads to a first some 5 cm deep chamber with arched roof and an almost flat floor. The other two spherical chambers were found at 10 to 12 cm (second chamber with 4 to 5 cm diameter) and 30 cm depth (third with 5 to 6 cm diameter). The workers are very timid and show stronger activity at sunset, when 5 or 6 workers leave the nest walking slowly, foraging for caterpillar excrements (*Oeceticus platensis*). Workers in laboratory nest accepted orange pieces as substrate for the fungus. The fungus garden rested on the floor of the chambers, not pending from the chamber roof as in nests of other *Trachymyrmex* species.

**Synonymy:** Santschi (1922) justified the description of the variety *spinosior* on the workers' relative largest size (4.8 to 6mm), bigger mesosomal projections, subtle differences in antennal scape and absence of tubercles on some parts of the head, using five workers from Córdoba (a locality into the distribution of *T. pruinosus* Emery). Although we have not observed any notable difference in the examined specimens, we considered that these differences are not enough to justify the recognition of these specimens as a different species.

## *Trachymyrmex tucumanus* Forel

Figs 37-40

*Acromyrmex* (*Trachymyrmex*) *iheringi* var. *tucumana* Forel 1914:282 (worker; Argentina, Tucumán: Concepción). Bruch 1921:202 (female; nest; Argentina, Córdoba: Alta Gracia).

*Acromyrmex* (*Trachymyrmex*) *iheringi* var. *cordovanus* Bruch 1921:202 (worker; Argentina, Córdoba: Alta Gracia) **nov. syn.**

*Trachymyrmex tucumanus* var. *fracticornis* Santschi 1925:164 (worker; Argentina, Santa Fé: Fives Lille) **nov. syn.**

*Trachymyrmex tucumanus* var. *weiseri* Santschi 1925:164 (worker; Argentina, Santa Fé: Fives Lille) **nov. syn.**

*Trachymyrmex tucumanus*: Kempf 1972: 254 (cat.). Brandão 1991: 382 (cat.). Bolton 1995: 421 (cat.).

**Type material:** *T. tucumana* (type) XXI.V.d.3419 Argentina, Tucuman, Chipton col. in NHMB; not examined (Dietz personal communication). Obs. collectors name is Shipton in original description. Syntype workers of the varieties *T. tucumanus* var. *fracticornis* and *T. tucumanus* var. *weiseri* in MZSP; examined.

**Description:** Worker (measurements in mm). TL 3.7-4.2; HL 1.14-1.26; HW 1.02-1.18; IFW 0.62-0.68; ScL 0.85-0.95; TrL 1.40-1.51; HfL 1.26-1.37. Ferruginous to yellowish brown, some specimens with darker gaster. Integument fine and indistinctly shagreened, opaque. Hairs moderately scarce on the body, short and erect or curved on appendages; hook-like mixed with oblique to decumbent hairs on other parts of body.

Head in full face view (Fig. 37) as long as broad (CI 100). Mandible smooth and shining except laterally on base where it is finely transversely striate, and near the masticatory margin, which bears the apical and 6 regularly developed teeth. Frontal lobe sub-triangular, moderately expanded laterad (FLI 58), backwards directed and laterally subdentate; anterior and posterior borders weakly concave. Frontal carina diverging caudad, reaching the apex of scrobe. Front and vertex with small isolated piligerous tubercles. Posterior third of antennal scrobe clearly delimited by the frontal carina but weakly marked by the extension of the preocular ones. Supraocular projection formed by a group of small tubercles. Occipital corner rounded in full-face view, with many small piligerous tubercles. Occiput notched in the middle. Occipital tooth developed as a stout spine-like projection rather microtuberculated (Figs. 38, 39). Inferior occipital corner indistinctly emarginated with weak carina. Eye moderately convex, no more than 12 facets in a row across the greatest diameter. Antennal scape weakly



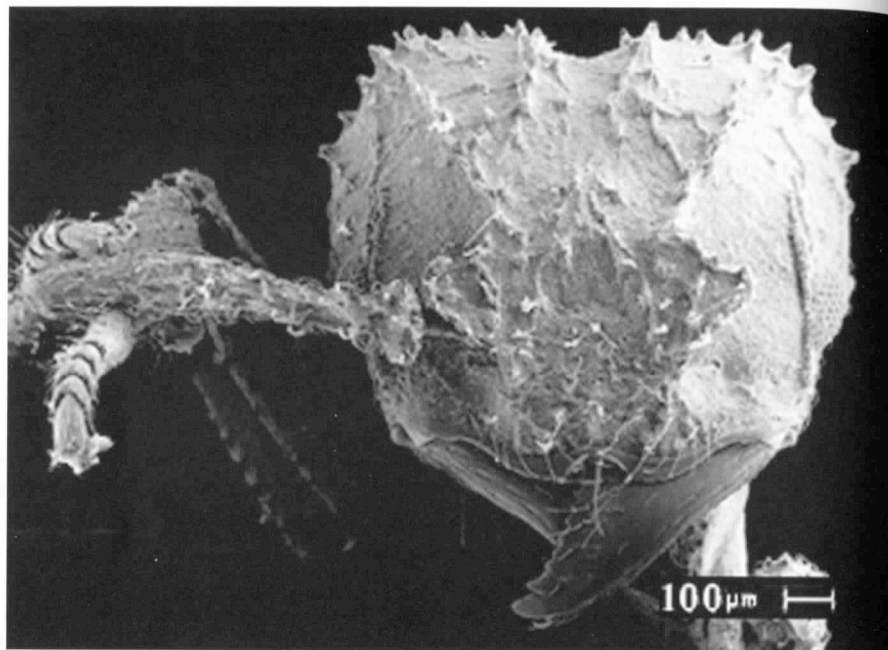


Fig. 37. *Trachymyrmex tucumanus*, worker, Argentina, Tucuman. Head in frontal view.

surpassing the occipital corner when laid back over head as much as possible; basal lobe transversely enlarged, its lateral projections moderately expanded to both sides; anterior surface surmounted by small tubercles.

Alitrunk (Figs. 38, 39). Pronotum with a marked humeral angle; antero-inferior corner armed with a triangular and flattened spine-like projection; lateral spines long; median projections as two small microscopic spines. First pair of mesonotal projections, although a little stouter, similar to pronotal lateral ones; second and third projections represented by two parallel and longitudinal rows of small tubercles. Mesopleura without hairs; blunt to acute triangular projection on superior border of katepisternum (rarely inconspicuous as in Fig. 38). Alitrunk weakly constricted dorso-laterally at the shallowly impressed metanotal groove. Basal face of propodeum narrow, laterally delimited by a row of small teeth, sometimes inconspicuous; propodeal spines longer and slender than promesonotal projections.

Waist and gaster (Figs. 39, 40). Petiole shortly pedunculate, the node proper as long as broad, with one pair of dorsal bifid teeth; subpetiolar process vestigial. Postpetiole slightly broader than long, shallowly excavated above; postero-dorsal border straight; postero-lateral cor-

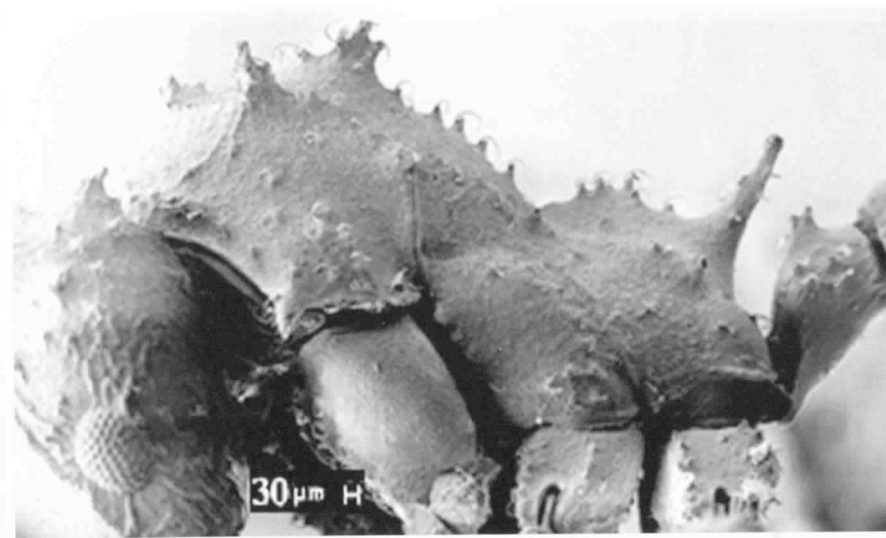


Fig. 38. *Trachymyrmex tucumanus*, worker, Argentina, Tucuman. Habitus in lateral view.

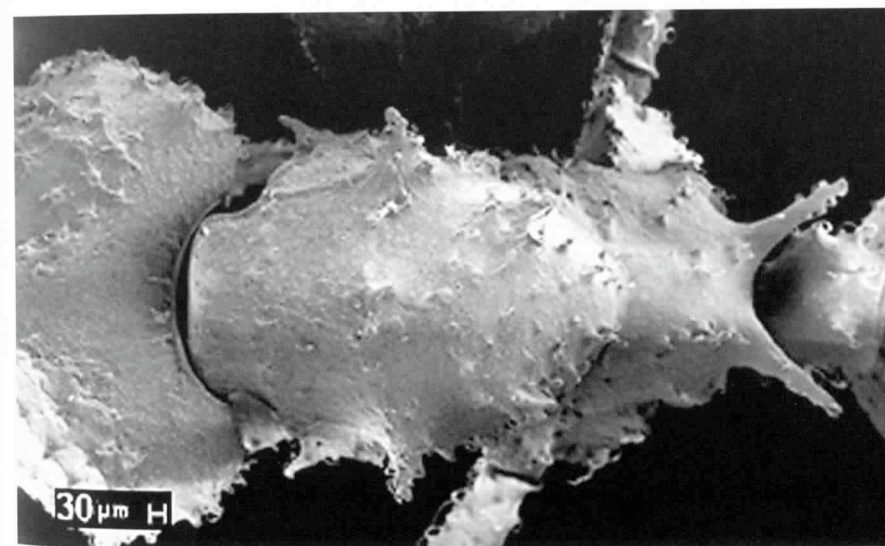


Fig. 39. *Trachymyrmex tucumanus*, worker, Argentina, Tucuman. Habitus in dorsal view.

ners without projections. Gaster opaque with minute piligerous tubercles more or less distributed in four irregular longitudinal series on tergum I.



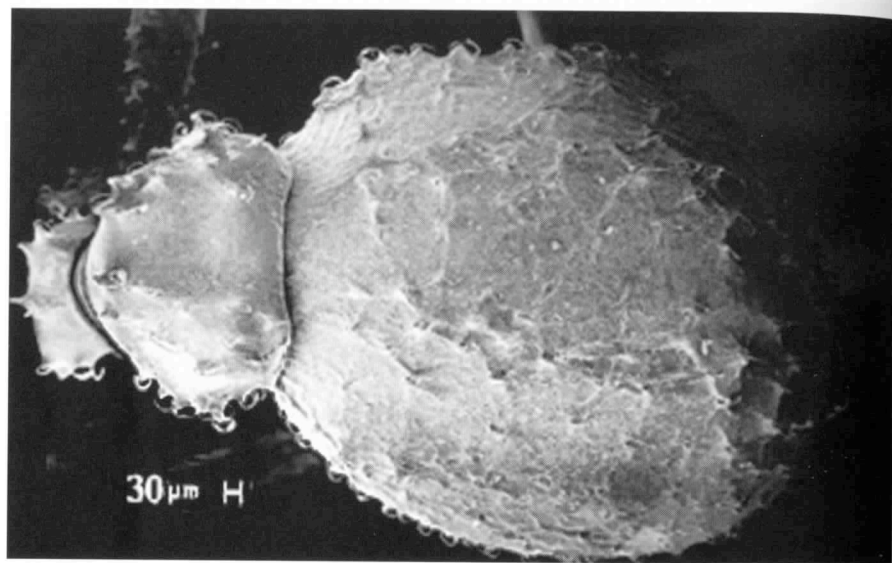


Fig. 40. *Trachymyrmex tucumanus*, worker, Argentina, Tucuman. Waist and gaster in dorsal view.

**Material examined:** ARGENTINA, La Paz: Depto. De San Javier, Cordoba. BRAZIL, São Paulo: Botucatu. URUGUAY: Estanzuela (?). Kusnezov col. # 9035 (no further information).

**Discussion:** This species falls into same dichotomy with *T. holmgreni* in the identification key. Besides differences pointed out in the discussion, *T. tucumanus* has a distinct shape of the antennal scapes lobes, without marked tip.

**Variation:** Except for the slight differences observed in the synonymized varieties, we did not observe any significant variation in the other studied specimens.

**Synonymy:** The characters pointed by Bruch (1921) are doubtless of weak taxonomic value (more rusted coloration, flatter tegument, scarcer pilosity, and stouter propodeal spines and petiolar node), as recognized by him in the brief variety description of *cordovanus*: "these differences, although very little accentuated, could correspond to a local variety that I will denominate proviserily *cordovana*." Santschi (1925) also chose the names *fracticornis* and *weiseri* to describe local variations in color, faintly lobated scapes and narrow gaster. Both varieties were collected in the same spot and the morphological differences to *T. tucumanus* are so subtle and do not deserve recognition as a different taxon.

## COMMENTS ON THE DISTRIBUTION PATTERN

The *Iheringi* group species are mostly distributed in the south and southeastern South America below parallel 10 S (Fig. 41); a unique record elsewhere of the very widespread *T. holmgreni* (in eastern Brazilian Amazon in Par  State) needs confirmation. *Trachymyrmex pruinosus* and *T. tucumanus* seem to be more commonly found in the south, while the others species are distributed in a large region, between central and southeastern Brazil; but this pattern also awaits additional sampling to be confirmed.

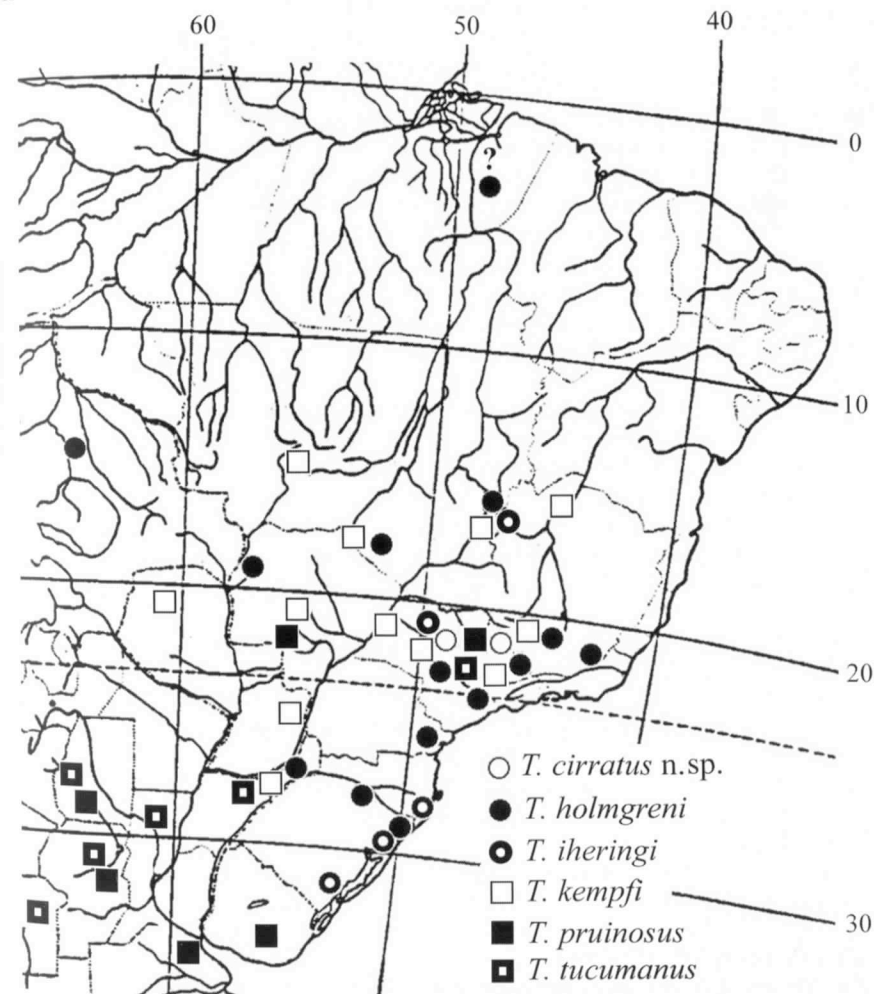


Fig. 41. Geographic distribution of the genus *Trachymyrmex* (Iheringi group).



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## REFERENCES

- Bolton, B. 1995. A new general catalogue of the ants of the world. Cambridge, Mass.: Harvard University Press, 504 p.
- Brandão, C.R.F. 1991. Adendos ao catálogo abreviado das formigas da região Neotropical (Hymenoptera : Formicidae). Rev. Bras. Entomol. 35:319-412.
- Brandão, C.R.F. 2000. Major Regional and Type Collections of Ants (Formicidae) of the World and Sources for the Identification of Ant Species. p. 172-185. In: Agosti, D., Majer, J., Alonso, L. E. and Schultz, T., (eds). Ants: Standard Methods for Measuring and Monitoring Biodiversity. Biological Diversity Handbook Series. Smithsonian Institution Press. Washington D.C., xx+280 pp.
- Brandão, C.R.F. & A.J. Mayhé-Nunes submitted. A phylogenetic hypothesis for the *Trachymyrmex* species groups, and the transition from fungus-growing to leaf-cutting in the Attini (Myrmicinae). Memoirs of the American Entomological Institute.
- Bruch, C. 1921. Estudios mirmecológicos. Rev. Mus. La Plata 26:175-211.
- Emery, C. 1888 ("1887"). Formiche della provincia di Rio Grande do Sul nel Brasile, raccolte dal dott. Hermann von Ihering. Boll. Soc. Entomol. Ital. 19:352-366.
- Emery 1906 ("1905"). Studi sulle formiche della fauna neotropica. XXVI. Boll. Soc. Ent. Ital. 37:107-194.
- Forel, A. 1893. Note sur les Attini. Ann. Soc. Entomol. Belg. 37:586-607.
- Forel, A. 1914. Formicides d'Afrique et d'Amérique nouveaux ou peu connus. Bull. Soc. Vaud. Sci. Nat. 50:211-288.
- Fowler, H.G. 1982. A new species of *Trachymyrmex* fungus-growing ant (Hymenoptera: Myrmicinae: Attini) from Paraguay. J. N.Y. Entomol. Soc. 90(2):70-73.
- Gallardo 1916. Notas acerca de la hormiga *Trachymyrmex pruinosus* Emery. An. Mus. Nac. Hist. B. Aires 28:241-252.
- Kempf, W.W. 1972. Catálogo abreviado das formigas da região Neotropical. Studia Entomol. 15:3-344.
- Mayhé-Nunes, A.J. & C.R.F. Brandão 2002. Revisionary Studies on the Attine Ant Genus *Trachymyrmex* Forel. Part 1: Definition of the genus and the *Opulentus* group (Hymenoptera: Formicidae). Sociobiology 40(3):667-698.

- Santschi, F. 1922. Myrmicines, Dolichodérines et autres Formicides néotropiques. Bull. Soc. Vaud. Sc. Nat. 54(205):345-378.
- Santschi, F. 1925. Fourmis des provinces Argentines de Santa Fé, Catamarca, Santa Cruz, Córdoba et Los Andes. Com. Mus. Nac. Hist. Nat. B. Aires 2(15):149-168.
- Santschi, F. 1934. Fourmis de Misiones et du Chaco Argentin. Rev. Soc. Ent. Argent. 6(1):23-34.
- Ward, P.S.; B. Bolton; S.O. Shattuck & W.L. Brown Jr. 1996. A Bibliography of Ant Systematics. Univ. California Press, Entomology 116: 1-417.
- Wheeler, W.M. 1907. The fungus-growing ants of North America. Bull. Am. Mus. Nat. Hist. 23:669-807.
- Wheeler, W.M. 1916. Ants collected in British Guiana by the expedition of the American Museum of Natural History during 1911. Bull. Am. Mus. Nat. Hist. 35:1-14.
- Wheeler, W.M. 1925. Neotropical ants in the collection of the Royal Museum of Stockholm. Ark. f. Zool. 17A(8):1-55.

