

TWO NEW SOUTH AMERICAN SPECIES OF *MONOMORIUM* MAYR WITH TAXONOMIC NOTES ON THE GENUS

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ABSTRACT

This article describes two new species of *Monomorium* from Brazil. One, *M. delabiei* n. sp. is reminiscent of the genus *Megalomyrmex*, although it lacks the transverse propodeal carina characteristic of that genus. The other, *M. inusuale* n. sp., is even more interesting: given the current concepts in Solenopsidini, it could be treated as a new genus within the tribe due to its distinctive morphological characteristics (mandibular configuration, vestibulate propodeal spiracle, propodeal carinae, micropegs on the last tergum). Broadening the limits of *Monomorium* requires including *Nothidris*, *Phacota* and *Epelysidris* as junior synonyms (syn. nov.). A working key to Neotropical species of *Monomorium* is provided along with taxonomic notes.

Key words: Hymenoptera, Formicidae, Myrmicinae, Solenopsidini, *Monomorium*, *Nothidris*, *Phacota*, *Epelysidris*, Neotropical, key, new species.

INTRODUCTION

Monomorium is one of the most diverse ant genera, with more than 300 described species (Bolton, 1995; Heterick, 2001), the majority of which are Old World, especially Afrotropical. For a long time there were various generic or subgeneric names associated with this genus and related groups (Ettershank, 1966), without critical study of their limits or validity. Ettershank (1966) made the first attempt to classify *Monomorium* and related groups; Bolton (1987) subsequently modified this arrangement in his study of the Afrotropical fauna of the genus. Since then, the only regional studies have been those of DuBois (1986) and Heterick (2001), and our understanding of the monophyly and relationships of the group remains far from adequate. The present work is intended as a modest contribution to this end; it consists of the description of two interesting species attributable to *Monomorium*, with taxonomic notes, synonyms, and an operational key for the Neotropical species.

The species described herein require extending the generic limits of *Monomorium*, or forming bridges among neighboring genera. Among the consequences is that *Nothidris* and *Epelysidris* cannot be sustained as distinct genera, that *Megalomyrmex* is left in a precarious state, and that *Phacota* becomes, once again, a synonym of *Monomorium*.

Heterick (2003) observed that: "*Monomorium sublamellatum* ... pushes back the diagnostic boundaries of the genus *Monomorium*, and cannot be placed at present in existing Australian species-groups of *Monomorium*" (Heterick, 2003). The description of the two new species is fraught with analogous interpretational dilemmas with reference to the Neotropical *Monomorium* fauna, within which perhaps neither is rightly included. Both species may eventually prove to lie outside *Monomorium*. For further analysis of the issue, readers are referred to the discussion.

MATERIALS AND METHODS

Depositories of Material

- BMNH Natural History Museum, London, England.
- CEPLAC Centro de Pesquisas do Cacau, Itabuna, Bahia, Brazil.
- ICN Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá D.C., Colombia.
- LACM Los Angeles County Museum of Natural History, Los Angeles, USA.
- MZSP Museu de Zoologia, Universidad de São Paulo, SP, Brazil.

Terminology

- CI Cephalic index: HW/HL × 100.
- EL Eye length: maximum diameter of the eye.
- GL Gaster length: the maximum length, in lateral view, from the anteriormost point of the gaster to gastral apex.
- HL Head Length: maximum length, in full face view, from the midpoint apex of anterior clypeal margin to midpoint of preoccipital (posterior) margin of head.
- HW Head width: maximum width in full face view.
- PL Petiole length: in dorsal view, from anterior to posterior articulation.
- PPL Postpetiole length: in dorsal view, from anterior to posterior articulation.
- SL Scape length: maximum length of scape, excluding basal condyle, in straight line distance.
- TL Total length: total length of the ant from anterior clypeal margin to gastral apex.
- WL Weber's length: the diagonal length of mesosoma from anterior pronotal margin to basal angle of metapleuron.

Illustrations

Scanning Electron Microscope (SEM) photographs were taken at the University of Alberta in Edmonton. Observations and measurements of pinned specimens were made using a Nikon SMZ 2T stereomicroscope at 80X magnification and a fiber ring lamp. All measurements are in millimeters.

Monomorium Mayr

- Monomorium* Mayr, 1855: 452. Type-species: *Monomorium monomorium* Bolton, 1987: 287.
Phacota Roger, 1862: 260. Type species: *Phacota sichelli* Roger, 1862: 262. Synonym of *Monomorium*:
 Ettershank, 1966: 82. Genus revalidated: Bolton, 1987: 281. **Syn. rev.**
Nothidris Ettershank, 1966: 105. Type-species: *Monomorium latastei* Emery, 1895: 10. **Syn. n.**
Antichthonidris Snelling, 1975: 5. Type-species: *Monomorium denticulatum* Mayr, 1887: 614. Junior
 synonym of *Monomorium*: Heterick, 2001: 361.
Epelysidris Bolton, 1987: 279. Type-species: *Epelysidris brocha* Bolton, 1987: 280. **Syn. n.**

For a full list of synonymies before Heterick (2001) see Bolton (1987: 287-288).

WORKER DIAGNOSIS (after Bolton, 1987: 289; Heterick, 2001: 363-364).

Monomorphic to polymorphic. Minute to moderately large in total length. Mandibles with 4 to 5 teeth. Maxillary palps with 2 to 4 segments. Median clypeal seta present, sometimes displaced or absent. Median portion of clypeus raised, longitudinally bicarinate, the carinae rarely effaced. Frontal carinae absent past frontal lobes. Antennal scrobes absent. Antennae with 11-12 segments and with club of 3 (rarely 4) segments. Eyes present, sometimes reduced. Metapleural glands never bulging or hypertrophied. Metapleural lobes usually small, rounded. Propodeum normally unarmed, sometimes angulated to dentate, rarely with lamelliform process. Propodeal spiracle usually circular and at about midlength of the sclerite, rarely in another position. Petiole pedunculated, the petiolar spiracle usually close to or at node. Sting functional.

Nothidris was created by Ettershank (1966) and further delimited by Snelling (1975), who created *Antichthonidris* to accommodate some species. Bolton (1987:284-285) discussed the traits proposed for the latter, demonstrating their weakness and dubious value as generic-level characters: a vestibulated propodeal spiracle appears to be present in some Australian *Monomorium* species (Bolton, 1987), for instance, as well as in *M. delabiei*. Moreover, the inclusion of *Antichthonidris* in *Monomorium*, as proposed by Heterick (2001), leaves no justification for maintaining *Nothidris* as a separate genus.

Phacota has been a taxonomic problem in the myrmicines, due to its poor description, the disappearance of the type specimen, and the lack of collected material referable to *P. sichelli* (Bolton, 1987), all of which have impeded an evaluation of its taxonomic status. Ettershank (1966) considered this name a junior synonym of *Monomorium*. Bolton (1987) subsequently revived the genus, citing the few attributes that can be retrieved from Roger's (1862) original description; nevertheless, he made explicit his strong suspicion that the putative species is based on a wingless, ergatoid *Monomorium* female, perhaps from the *M. salomonis* group. Both the meager description (e.g., that the gaster is bigger than the head) and the important fact that the species has not been rediscovered in Spain or any other nearby location, are consistent with this interpretation. Given that the European ant fauna can be considered acceptably collected and studied, and in light of the group's importance, samples assignable to *Phacota* would surely have been detected and described by now. According to its description, *Phacota* is characterized by 11-segmented antennae with a 2-segmented club. Some Neotropical *Solenopsis* females possess this combination, but it is an antennal configuration unknown in *Monomorium*, and it is highly probable that the description of the

number of flagellomeres in the antenna and club is erroneous. It would not be the only inadvertent mistake of this type in the history of ant systematics, especially given the size of the ants and the optical resolution possible in the 19th century. It seems of little practical use to maintain a badly-described genus, with no associated type material, and no other collected material, and I recommend that *Phacota* once again be demoted as proposed by Ettershank (1966) until and unless more material is discovered, or the type specimen (in good condition) reappears.

Epelysidris is a monotypic genus of eastern Malaysia, easily separable by the distinctive pair of lobules on the basal border of each mandible, mandibular and clypeal structure, and palpal formula (Bolton, 1987). Although this taxon is undoubtedly monophyletic, its continued recognition as a separate genus would create the same dilemmas that characterize *Antichthonidris*, *Nothidris*, and some others. It is preferable to leave *brocha* as one additional (although highly apomorphic) species within *Monomorium*; I propose here that *Epelysidris* thus be considered a junior synonym of *Monomorium*.

Neotropical species of *Monomorium* (includes recent introductions*).

- M. bidentatum* Mayr, 1887 **comb. rev.** – Chile, Argentina
M. brasiliense Forel, 1908 – Brazil
M. carbonarium Fr. Smith, 1858 – Azores
M. cekalovici (Snelling, 1975) **comb. nov.** – Chile
M. chilensis, **n.name** for *N. bicolor* Ettershank, 1965:55, preoccupied by *M. bicolor* Emery, 1877:368 – Chile
M. cyaneum Wheeler, 1914 – Mexico
M. compressum Wheeler, 1914 – Mexico
M. delabiei **sp.n.** – Brazil
M. denticulatum Mayr, 1887 **comb. rev.** – Chile, Argentina
M. destructor (Jerdon, 1852)* – Widespread
M. ebeninum Forel, 1891 – Caribbean and coastal Mesoamerica
M. floricola (Jerdon, 1852)* – Widespread
M. inquilinum DuBois, 1980 – Mexico
M. inusuale **sp.n.** – Brazil
M. latastei Emery, 1895 **comb. rev.** – Chile
M. marjoriae DuBois, 1986 – Mexico
M. minimum (Buckley, 1867) – Mexico (?) Paraguay (?)
M. monomorium Bolton, 1987* – Barbados
M. pharaonis (Linnaeus, 1758)* – Widespread
M. salomonis (Linnaeus, 1758)* – Widespread
M. subcoecum Emery, 1894 – Caribbean (St. Thomas and Puerto Rico)
M. subopacum Fr. Smith, 1858* – Antigua

Outside the Neotropical fauna the following changes are proposed:

- Monomorium sichelli* (Roger, 1862) **comb. rev.**
Monomorium brocha (Bolton, 1987) **comb. n.**

SPECIES DESCRIPTIONS AND NOTES

Monomorium bidentatum Mayr comb. rev.

Monomorium bidentatum Mayr, 1887: 616 (w, q).

Monomorium (*Notomyrmex*) *bidentatum*: Emery, 1922: 169.

Monomorium (*Notomyrmex*) *bidentatum piceonigrum* Borgmeier, 1948: 468 (w), Kusnezov, 1960: 345 (as junior synonym of *bidentata*).

Notomyrmex bidentatum: Kusnezov, 1960: 345.

Nothidris bidentatus: Ettershank, 1966: 107.

Antichthonidris bidentatus: Snelling, 1975: 5-6 (w, q, m); Wheeler & Wheeler, 1980: 533 (larvae).

Antichthonidris bidentata: Bolton, 1995: 67.

Heterick (2001) synonymized *Antichthonidris* under *Monomorium*, but did not make the appropriate nomenclatural changes in the two species assigned to that genus.

Monomorium brasiliense Forel

Monomorium minutum subsp. *brasiliense* Forel, 1908: 361 (w).

Monomorium monomorium subsp. *brasiliense*: Brandao, 1991: 357.

Monomorium brasiliense: Bolton, 1995: 260.

Bolton (1987) did not study the type of this species, nor the possibly corresponding native *Monomorium* material. The *Monomorium* native to South America are moderate to large in size; *M. inusuale* and *M. delabiei* are small but with HW greater than 0.60 mm. There is a possibility that *M. brasiliense* might in fact be a tramp species, erroneously described by Forel as a different (subspecific) taxon.

Monomorium cekalovici (Snelling) new combination

Nothidris cekalovici Snelling, 1975: 3 (w); Bolton, 1995: 292.

Monomorium chilensis, new name.

Megalomyrmex bicolor Ettershank, 1965: 55 (w, larva); Kempf, 1970: 359.

Nothidris bicolor: Snelling, 1975: 3; Bolton, 1995: 292.

M. chilensis is the new name proposed for *bicolor*, a name preoccupied by *Monomorium bicolor* Emery, 1877: 368.

Monomorium cyaneum Wheeler

It is not easy to separate *M. cyaneum* from *M. ebeninum* and *M. depressum*. In the syntypes of *M. cyaneum* examined (LACM) the mesopleuron is smooth, whereas the DuBois (1986) diagnosis punctate mesopleura identified as *M. cyaneum*, but other material referable to this species (Mexico, LACM) lacks this attribute. Perhaps there is variability in the character, but the limited material is insufficient to evaluate this possibility. In *M. cyaneum* the propodeum is more weakly angled than in the other two species and supposedly there are 8 or fewer hairs on the mesosoma (DuBois, 1986). The pilosity varies somewhat in samples referable to these three species. *M. cyaneum* and *M. depressum* share a petiole that is slightly curved in frontal view, as well as a petiolar node that is

thicker in lateral view. *M. ebeninum* has a petiole that is flat or weakly concave in frontal view. Thus the problem is how to separate *M. cyaneum* and *M. depressum*. As pointed out above, the punctate sculpturing of the mesopleura does not seem to be universal in *cyaneum* (three syntypes examined, LACM, do not have appreciable sculpturing on the mesopleura). A characteristic of the syntypes and other specimens (from Hatillo, Mexico, LACM) is the presence of a light metallic blue sheen on the entire body (from which the species name derives). A specimen labeled as *cyaneum* (LACM) by DuBois has mesopleural sculpturing but does not have the blue sheen.

Monomorium delabiei, new species

Description

Worker measurements (mm): HW 0.65; HL 0.73; SL 0.53; EL 0.16; WL 1.03; PL 0.36; PPL 0.24; GL 1.00; TL 3.50. Indices: CI 89; SI 82.

Head slightly longer than wide. Sides of head slightly convex, evenly rounded into the posterior border, latter more or less straight with a small medial concavity. Mandibles with four teeth: the apical larger than the others, the subapical separated by a space from the basal teeth. Maxillary palps 2 segmented. Clypeus convex with no trace of carinae, extended posteriorly as smooth and shiny frontal area. Clypeus anteriorly convex. Antenna 12-segmented with club 3-segmented. Frontal carinae short.

Eyes large, well developed, with about 11 ommatidia in the maximum diameter, situated in the middle of the head.

In lateral view mesosoma with promesonotum convex. Metanotal groove deep, well marked. Propodeum unarmed. Declivity of propodeum devoid of transverse carinae. Propodeal spiracle with a thin walled vestibule anteriorly. Metapleural lobes small, rounded. Petiole with short peduncle, node rounded above. Petiolar spiracle at beginning of node. Petiolar ventral process consisting of anterior median keel. In dorsal view postpetiole wider than petiole. In side view postpetiole subcampaniform, with a ventral strong median tubercle, pointed anteriorly. Sting developed.

Entire body smooth and shining. Moderate erect pilosity on head, promesonotum, petiole, postpetiole and gaster, very few on propodeum. Larger hairs about 0.15 mm, those of head shorter. Clypeus with two series of transverse setae, those of anterior margin increasing in size toward the somewhat larger median apical setae. Body brown, most of gaster dark brown.

Queen and male unknown.

Type data: Holotype worker, Brazil, Bahia, Fazenda Amarillina, Guaratinga, 28.vii.1993 (*Pula/Michelli* No. 4675-D) (CEPLAC).

Distribution: Eastern Brazil.

Etymology: This species is named for my friend and colleague Dr. Jacques Delabie, for his continuous supply of interesting ants.

Comments

In *M. delabiei* there are two transverse rows of hairs on the clypeus. In the row on the anterior border, the hairs increase in length from the lateral ones towards the midpoint, where they are longest (although not very much longer than the rest); in other words, there is no single medial hair that stands out, a characteristic typical of the tribe. This is also typical of some *Megalomyrmex*, and

in at least some "*Antichthonidris*" workers, there is no apical medial seta. The clypeus forms a medial convexity with only a very weak trace of carinae. The tentorial pit is more than halfway between antennal receptacles and mandibular base (as in some "*Antichthonidris*"), rather than near the antennal alveolus (as in some Neotropical *Monomorium*). The form of the propodeal spiracle is somewhat similar to that of *Nothidris* (Bolton, 1994: 104), with a visible vestibule preceding anteriorly the spiracle proper: in typical *Monomorium* and *Megalomyrmex* the spiracle is round and without anterior vestibules. The postpetiole has a robust, pointed ventral tubercle, a characteristic apparently not shared with other members of the genus or with *Megalomyrmex*. The absence of the transverse propodeal carina excludes, by definition, the inclusion of this species in the typical *Megalomyrmex*, although the character is not universal within the genus, and can be present in some *Monomorium*.

Monomorium denticulatum Mayr revised combination

- Monomorium denticulatum* Mayr, 1887: 614 (w, q); Wheeler & Wheeler, 1980: 532 (larvae).
Monomorium denticulatum navarinensis Forel, 1904: 7 (q); Kusnezov, 1960: 347 (as junior synonym of *denticulata*).
Monomorium denticulatum picea Emery, 1906: 120 (w); Kusnezov, 1960: 347 (as junior synonym of *denticulata*).
Monomorium (Notomyrmex) denticulatum: Emery, 1922: 169.
Monomorium (Notomyrmex) denticulatum navarinensis: Emery, 1922: 169.
Monomorium (Notomyrmex) denticulatum inerme Borgmeier, 1948: 469 (worker); Kusnezov, 1949: 432 (as junior synonym of *denticulata*).
Notomyrmex denticulatum: Kusnezov, 1960: 347.
Nothidris denticulatus: Ettershank, 1966: 107.
Antichthonidris denticulatus: Snelling, 1975: 6; Heterick, 2001: 353.
Antichthonidris denticulata: Bolton, 1995: 67.

**Monomorium destructor* (Jerdon)

A widespread tramp species, *M. destructor* is readily recognized by the fine transverse striae on the vertex, as well as the deep metanotal groove.

Monomorium ebeninum Forel

This species is similar to *M. compressum* and, to a lesser extent, to *M. cyaneum*. A characteristic that appears to separate it from similar species is the petiolar profile, which in frontal view is flat to weakly concave.

**Monomorium floricola* (Jerdon)

This is a small adventive Old World species, as is *M. monorium*, with HW less than 0.35 mm. In *M. floricola* the pale mesosoma is in sharp contrast to the darker head and gaster.

Monomorium inquilinum DuBois

Known only from queen and male castes. DuBois (1986) suggests that this species is a social parasite of *M. cyaneum*. Known only from the type locality, between Mexico City and Querétaro, Mexico.

Monomorium inusuale, new species

Figures 1-2

Description

Worker, measurements (mm), holotype (paratypes, n=3): HW 0.48 (0.46-0.48); HL 0.57 (0.57-0.62); SL 0.37 (0.37-0.41); EL 0.03 (0.03); WL 0.72 (0.70-0.72); PL 0.25 (0.25); PPL 0.18 (0.18); GL 0.73 (0.73-0.80); TL 2.58 (2.58-2.61). Indices: CI 84 (74-84); SI 77 (77-89).

Head longer than wide. Sides of head parallel, very slightly wider anteriorly, broadly rounded into the posterior border, which is more or less straight. Mandibles with four teeth: the three apical separated from isolated basal by a large diastema. Maxillary palps 2 segmented. Median lobe of clypeus strong, bicarinate, narrowing posteriorly to narrow strip between frontal lobes. Clypeus with apical median seta and several paracarinal setae. Antenna 12 segmented with strong 3 segmented club; scapes fail to reach the vertexal border. Antennal insertions close together. Frontal carinae and antennal scrobes absent. Eyes reduced to indistinct ommatidia, placed in front of head midline.

In lateral view promesonotum slightly convex. Metanotal groove very deep, well marked. Propodeum unarmed, with a faint cuticular crest, from the meeting point of dorsal and declivity faces, extended and slightly higher, continuous with the small metapleural lobes. Propodeal spiracle circular, opened posteriorly. Bullae of metapleural glands large. Petiole with peduncle and node well differentiated, the node more or less with the sides parallel, dorsum convex. Petiolar spiracle at beginning of node. Petiolar ventral process tooth-like. Postpetiole subcampaniform, with a ventral strong transverse carina. Apical portion of penultimate tergite with four small pegs or teeth, hairs arising from outermost.

Mandibles, most of promesonotum, dorsum of petiole and postpetiole and gaster smooth and shining. Head with longitudinal rugulae mixed with dense foveae. Posterior promesonotum with feeble short rugulae. Most of mesopleura with irregular short longitudinal striae, mixed with fine reticulation. Most of propodeum and sides of petiole and postpetiole densely reticulated. Declivity of propodeum with several fine transverse carinae, the most posterior more marked. Moderate erect pilosity on head, promesonotum, petiole, postpetiole and gaster, very few on propodeum. Scapes with several erect hairs. Larger hairs about 0.15 mm, those of head shorter. Body brown, appendages lighter.

Queen and male unknown.

Type data: Holotype worker, **Brazil**, Bahia, Barrolandia, 16-23.07.1994 (*S. Lacau*) (CEPLAC).

Paratypes, 1 worker, same data as holotype, deposited in ICN; 3 workers, **Brazil**, Amazonas, Benjamin Constant, 21.ix.1962 (*W.L. Brown Jr.*) (MZSP); 2 workers, **Ecuador**, Napo, Limoncocha, 1973 (*M. Rettenmeyer*) (MZSP, BMNH).

Distribution: Ecuador and Brazil.

Etymology: The name refers to the unusual traits of the ant, and the taxonomical difficulties for their generic placement.

Comments

This species presents a series of unusual characters that are interesting in the context of the Solenopsidini, and especially *Monomorium* and its allied genera. The long diastema between the 3 apical teeth and the basal tooth does not appear to be common in the genus or any other close genera.

The same can be said for the much reduced eyes, since large, multifaceted eyes are common in the genus, although some Afrotropical species have reduced eyes (Snelling, personal communication). The narrow carina or propodeal crest that extends down to join the metapleural lobes is reminiscent of *Epelysidris*. The anterior and posterior sides of the petiolar node are more or less straight; in other species in this and neighboring genera, they tend to be rounded. The postpetiole has a strong transverse keel in the ventral part, which is reminiscent of *Adelomyrmex*. The head sculpturing is also unusual, with longitudinal rugules mixed with obvious foveae, a trait which is absent in other Neotropical *Monomorium*. The most outstanding feature is the series of minute teeth or pegs in the last abdominal tergum, from at least the outermost of which arise hairs. This appears to be an autapomorphic structure, absent in other Solenopsidini and probably in Myrmicinae; it is somewhat like the pygidial pegs of Cerapachyinae and *Pachycondyla crassinoda* workers.

The Brazilian specimens are uniform in size and general aspect. Nevertheless, the two Ecuadorian specimens differ somewhat in size and some measurements (slightly shorter dorsal side of the propodeum, for instance) and the visible micropegs of the last tergum are less conspicuous than those of Benjamin Constant, Brazil. These structures are well-developed in the type specimen, from Bahia, but the propodeum is intermediate between the other Brazilian specimens and those from Ecuador. Given that in the other essential characteristics all samples are similar, I prefer to consider these differences as within-species variability, instead of creating a new taxon that might result in a paraphyletic species.

Is *M. inusuale* truly a *Monomorium*? I recently was loaned two interesting myrmicines from CEPLAC. The first of these, a worker from Guaramiranga (Brazil, Ceará) is reminiscent in general form of the Australian *M. sublamellatum*, although without a single apical clypeal seta and clypeus so conspicuously bicarinate. The Brazilian specimen could pass as an unusual *Monomorium*. However, the discovery of a preoccipital carina—supposedly apomorphic in *Rogeria*—could require the inclusion of the species in the latter genus, in spite of the fact that other characteristics do not coincide (Kugler, 1994). Or, alternatively, the Australian species possibly does not belong in Solenopsidini; Heterick (2003) places *sublamellatum* in *Monomorium* by default, since it does not fit in any other genus of the tribe. The paraphyletic nature of *Monomorium* renders it a “basket” or “catch-all” genus. Maybe *sublamellatum*, like this Ceará worker, belongs to Stenammini (Bolton, personal communication).

The second CEPLAC specimen from Bahia (Brazil, S. Jose Victoria, No. 2139, provisionally determined as *Monomorium* sp.) has a general aspect typical of *Monomorium*, the genus to which the Bolton (1994) key leads, if one ignores the absence of the apical clypeal seta (which is variable in Solenopsidini). Nevertheless, as in the above case, this specimen might better be associated with some Stenammini, possibly *Rogeria*, although it is impossible to confirm the preoccipital carina in the unique dry-mounted specimen, and the total absence of color and other traits make it difficult to place in *Rogeria* (as defined by Kugler, 1994).

Bolton (personal communication) suggests that *M. inusuale* might be a member of Stenammini, which was my first suspicion due to the overall resemblance with members of this tribe. The traits of frontal lobes and toruli, as well as clypeal posterior border, places *inusuale* in the Stenammini as diagnosed in Bolton (2003:58). However, the first gastral tergite clearly overlapping the first sternite on ventral surface, and the single medial clypeal seta puts the taxon in the Solenopsidini, again *sensu* Bolton (2003:59–60). Although the solenopsidine tribe group (Bolton 2003:57) may be a monophyletic group, the tribes proposed by Bolton (2003) as Stenammini and Solenopsidini

currently lack synapomorphies. Perhaps the mixed traits of *inusuale*, the Australian species, and the Brazilian specimens referred to above may justify merging the two tribes. On the other hand, moving these taxa from *Monomorium* to Stenammini simply transfers the problem of generic allocation from one tribe to the other.

Bolton (2003) has clarified some of the uncertainties in the systematics of the myrmicines allied to Solenopsidini and Stenammini. However, there are many problems to be resolved only when the limits of the Myrmicine tribes are clearly defined. For these reasons, I think that the only option at the moment is to leave *inusuale* as a member of *Monomorium*.

Monomorium latastei Emery revised combination

Monomorium latastei Emery, 1895: 10 (w); Wheeler & Wheeler 1980: 533 (larva).
Monomorium (Notomyrmex) *latastei*: Emery, 1922: 169.
Nothidris latastei: Ettershank, 1966: 106.

Monomorium marjoriae DuBois

The worker caste of this species is indistinguishable from those of *M. minimum* and *M. wheelorum*. However, *M. marjoriae* is the only species (of these three) recorded for México (DuBois, 1986).

Monomorium minimum (Buckley)

Kempf (1972) recorded this species from Paraguay, following Forel (1917). However, I know of no confirmed records of this species from Paraguay or any other Neotropical country and it is not included in the key below.

**Monomorium monomorium* Bolton

Wilson and Taylor (1967) mention the presence of this Old World species (as *M. minutum* Mayr) from Brazil. However, I know of no confirmed records in the literature. It has also been recorded from Barbados (Kempf, 1972).

**Monomorium pharaonis* (Linnaeus)

Monomorium pharaonis, *M. salomonis* and *M. subopacum* are the only species in the Neotropics with head and mesosoma with fine reticulate-punctate sculpturation and mandibular dorsum with coarse longitudinal rugulae. *M. pharaonis* has two rows of hairs on the head between the vertex and carinae, which distinguishes this species from the other two. *M. pharaonis* is one of the best-known Old World tramp species.

**Monomorium salomonis* (Linnaeus)

The body is sculptured as in *M. pharaonis* and *M. subopacum*. It differs from these by the lack of hairs on the dorsum, and presence of a medial notch in the anterior clypeal margin. It is a widespread species, introduced in the Neotropics.

Monomorium subcoecum Emery

This is a minute, pale ant, with propodeum angles well marked. Mesopleuron sculptured. Body with abundant pilosity. It was described from St. Thomas in the Lesser Antilles, but is found also in Puerto Rico (R. R. Snelling, *pers. comm.*).

Monomorium subopacum (Fr. Smith)

Similar in general form as *M. pharaonis* and the body is without erect hairs; clypeus without the medial notch as in *M. salomonis*. Originally described from the Azores, *M. subopacum* has been recorded from Antigua in the Lesser Antilles (Kempf, 1972).

THE LIMITS OF *MONOMORIUM* AND RELATED GENERA

Bolton (1987) characterized the genus and listed its extensive associated synonymy, including new synonymies. This author proposed species groups for the Afrotropical fauna, some of which might be applicable to the fauna outside of Africa. Since then, DuBois (1986) has studied the *M. minimum* species group native in America and Heterick (2001) has revised the Australian fauna, placing *Antichthonidris* Snelling as junior synonym of *Monomorium*.

Monomorium was included within the tribe Solenopsidini by Bolton (1987), citing several traits and giving emphasis to the possession of a single medial apical seta or hair on the anterior margin of the clypeus. This characteristic at times is variable (the seta maybe displaced to one side, or a pair of setae more or less arising from the apical part of the medial clypeus), a feature that is also present in *Adelomyrmex*, *Cardiocondyla*, *Tyrannomyrmex* and some Stenammmini (Bolton, 2003; Fernández, 2003).

Later, Bolton (2003) redefined Solenopsidini and proposed two groups in the tribe: *Solenopsis* genus group (Solenopsidini s.str., as in Bolton, 1987) and *Carebara* genus group, containing most of the former tribe Pheidologetonini. Although it is possible to recognize several monophyletic groupings within the Solenopsidini s.str. (e.g., *Allomerus*, *Solenopsis*), the monophyly of *Monomorium* and allied groups (*Antichthonidris*, *Megalomyrmex*, *Nothidris*, *Phacota*) is not clear. In fact, Heterick (2001) in his revision of the Australia *Monomorium* formally synonymized *Antichthonidris* with *Monomorium*. Bolton (1987) had already warned of the precariousness of this genus and of *Nothidris* Ettershank, names whose validity become feeble upon examination of the group in a worldwide context. *Phacota* Roger was revalidated by Bolton (1987) as a synonym of *Monomorium* (Ettershank, 1966). Unfortunately the type of this group has disappeared and Bolton (1987) suspected that the description might have been based on a wingless ergatoid female.

What are the limits of *Monomorium*?

There has been no phylogenetic study of the Solenopsidini. Kusnezov (1957) discussed some problems in the taxonomy of *Solenopsis* and neighboring groups and Bolton (1987) ventured some possible relationships within the tribe (now *Solenopsis* genus group: see Bolton, 2003). Some groups, e.g., *Anillomyrma* + *Bondroitia*, or *Diplomorium* + *Allomerus*, as well as *Solenopsis* + *Oxyepoecus*, possess distinctive shared morphological traits. Notwithstanding that these groups might be thus be considered monophyletic, the arrangement would leave *Monomorium* and other close genera as paraphyletic. No morphological trait exists, either in workers or sexuals, which would robustly separate *Monomorium* from other solenopsidines. The existence of certain characteristics or sets of characteristics that were seen from a local rather than global perspective favored the creation of many weakly-delimited genera, whose fate has been synonymy. In fact, strict

application of cladistic norms would result in synonymy of all the genera in the tribe, leaving a giant inclusive genus, *Solenopsis*, which would be rejected by the majority of myrmecologists. Even so, the monophyly of this grouping would not be clear, since Solenopsidini still lacks a strong synapomorphy: the apical central clypeal seta is not universal.

Perhaps a moderate solution might be to maintain as valid those groups that can be clearly distinguished from *Monomorium* (*Allomerus*, *Anillomyrma*, *Bondroitia*, *Diplomorium*, *Oxyepoecus* and *Solenopsis*), leaving the rest in a single genus, *Monomorium*. This group is paraphyletic, but can be justified on practical grounds as a provisional arrangement, pending molecular systematics and chemotaxonomy that will probably illuminate relationships not apparent solely on the basis of external morphology. Some studies, for instance, suggest that the defensive chemicals in *Solenopsis* and neighboring groups will be phylogenetically useful traits (Van der Meer, 1986). Although molecular phylogenetic studies are not nearly as compelling as the discipline's followers contend, the joint examination of molecular, chemical and morphological characters will probably be enlightening. This problem is not exclusive to *Monomorium* and its neighbors; it is highly likely that the same situation exists in genera such as *Camponotus* and its neighbors in the tribe Camponotini (Brady *et al.*, 1999) and in the taxa created around *Leptothorax* (Bolton, 2003).

The species *M. inusuale* described here creates an interesting dichotomy. On one hand, it possesses unique features (mandibles with diastema, greatly reduced eyes, propodeal crest, pegs on the penultimate abdominal segment) whose nature might justify the creation of a new genus, as was the case with *Nothidris*, *Antichthonidris* and *Epelysidris*. Nevertheless, given the morphological and behavioral richness of *Monomorium* (Bolton, 1987; Heterick, 2001), it is difficult to justify such strict generic limits. If *Nothidris* or *Epelysidris* are accepted as valid genera, it requires that *M. inusuale* also be considered a separate genus. Nevertheless, by so doing, it would favor the indiscriminate creation of many monotypic genera (or with just a few species) around *Monomorium*. Although such genera might be monophyletic, characterizing them as separate genera might confound the taxonomy of the group. It seems thus more advisable to regard these as monophyletic lineages that have evolved separately, each with unique traits, within *Monomorium*. This is the decision taken recently by Heterick (2003) in placing the highly distinctive *M. sublamellatum* in *Monomorium*, instead of erecting a new monotypic genus to accommodate this species.

To summarize, this work proposes the following: To accept as valid genera within the tribe Solenopsidini those that can be unambiguously distinguished from *Monomorium*: *Anillomyrma*, *Solenopsis* and others. To consider as congeners those genera that cannot be clearly separated from *Monomorium*: *Nothidris*, *Phacota*, *Epelysidris* and perhaps *Megalomyrmex*. This is a practical position, but there are other considerations as well: the phylogeny of the Myrmicinae is barely in its first stages. This means that some genera placed in Solenopsidini (*Anillomyrma*, for instance) might eventually belong to a different lineage, which may restrict the size of the tribe. New morphological, molecular, and chemical characters, as well as the description of the males and females of many of these lineages will perhaps in the future create a firm foundation for understanding the limits and relationships of the components of this interesting tribe.

KEY TO NEOTROPICAL *MONOMORIUM* WORKERS

This key should be considered a working draft, since it has been constructed based more on the literature than on specimens: Snelling & Hunt, 1976; DuBois, 1986; Bolton, 1994. I have not been able to examine various specimens assignable to some of the species reported for the Neotropical region. It will be of special interest in this context to study the type of *M. brasiliense* and establish its actual status. Observations by users will surely be useful for improving future versions.

- 1 Head and dorsal mesosomal sculpture with longitudinal striations or fine reticulation2
- Head and mesosomal dorsum smooth and shining; any sculpture, if present, reduced5
- 2 Last abdominal tergite with a series of small pegs (Fig. 2); mandibles with four teeth, the apical ones separated from basal by diastema (Fig. 1); Brazil and Ecuador.....*M. inusuale*
- Last abdominal tergite without small pegs; mandibles with different configuration3
- 3 Front of head with several erect hairs forming two rows of about 4 hairs each; mesosoma with several hairs*M. pharaonis*
- Front of head devoid of erect hairs; mesosoma without erect hairs4
- 4 Clypeal margin with medial notch.....*M. salomonis*
- Clypeus without medial notch; Antigua*M. subopacum*
- 5 Maxillary palps with 4 segments; Chile6
- Maxillary palps with fewer than 3 segments8
- 6 Head concolorous with mesosoma; gaster darker; propodeum distinctly angulate in profile or with short sharp teeth7
- Head concolorous with gaster; mesosoma lighter; propodeum rounded in profile*M. cekalovici*
- 7 Propodeum angulate in profile, but without sharp teeth; penultimate antennomere 1.25 – 1.45× longer than wide.....*M. chilensis*
- Propodeum at least sharply angulate, usually with distinct triangular teeth; penultimate antennomere 0.77 - 1.20× longer than wide*M. latastei*
- 8 Head with fine transverse rugulae on vertex*M. destructor*
- Vertex without obvious rugulae9
- 9 Propodeum armed with well developed spines; Chile and Argentina*M. bidentatum*
- Propodeum unarmed or with small spines or angles10
- 10 Head width more than 0.60 mm11
- Head width less than 0.60 mm12
- 11 Clypeus bicarinate; mandibles with 5 teeth; Chile and Argentina.....*M. denticulatum*
- Clypeus feebly bicarinate; mandibles with 4 teeth; Brazil*M. delabiei*
- 12 Mesosoma and petiole clear yellow or at most light brownish, contrasting with dark reddish brown head and gaster.....*M. floricola*
- Mesosoma concolorous at least with either head or gaster.....13
- 13 Propodeum abruptly subangulate in profile; several short parallel, longitudinal rugulae on clypeus; head and body shiny black.....*M. ebeninum*
- Propodeum distinctly rounded in profile or with a pair of short sharp spines at propodeal angles14

- 14 Scape surpassing posterior margin of head by slightly less than length of following segment .
.....*M. marjoriae*
- Scape never surpassing posterior margin of head15
- 15 Propodeum with small spines; clypeus without teeth; eyes reduced to one or two ommatidia; yellowish species; Puerto Rico, Virgin Islands*M. subcoecum*
- Propodeum unarmed, rounded in profile; clypeus with two submedian teeth; eyes multifaceted; body brown to black.....16
- 16 Scape with reclinate hairs; body brown.....*M. compressum* (part)
- Scape with suberect hairs; body blackish brown to black17
- 17 HW equal to or more than 0.38mm; Mexico.....18
- HW less than 0.36mm; introduced in Brazil (?).*M. monomorium*
- 18 Body with metallic bluish reflections; clypeal teeth as long as wide at base.....*M. cyaneum*
- Body without bluish reflections; clypeal teeth stout, wider at base than long*M. compressum* (part)

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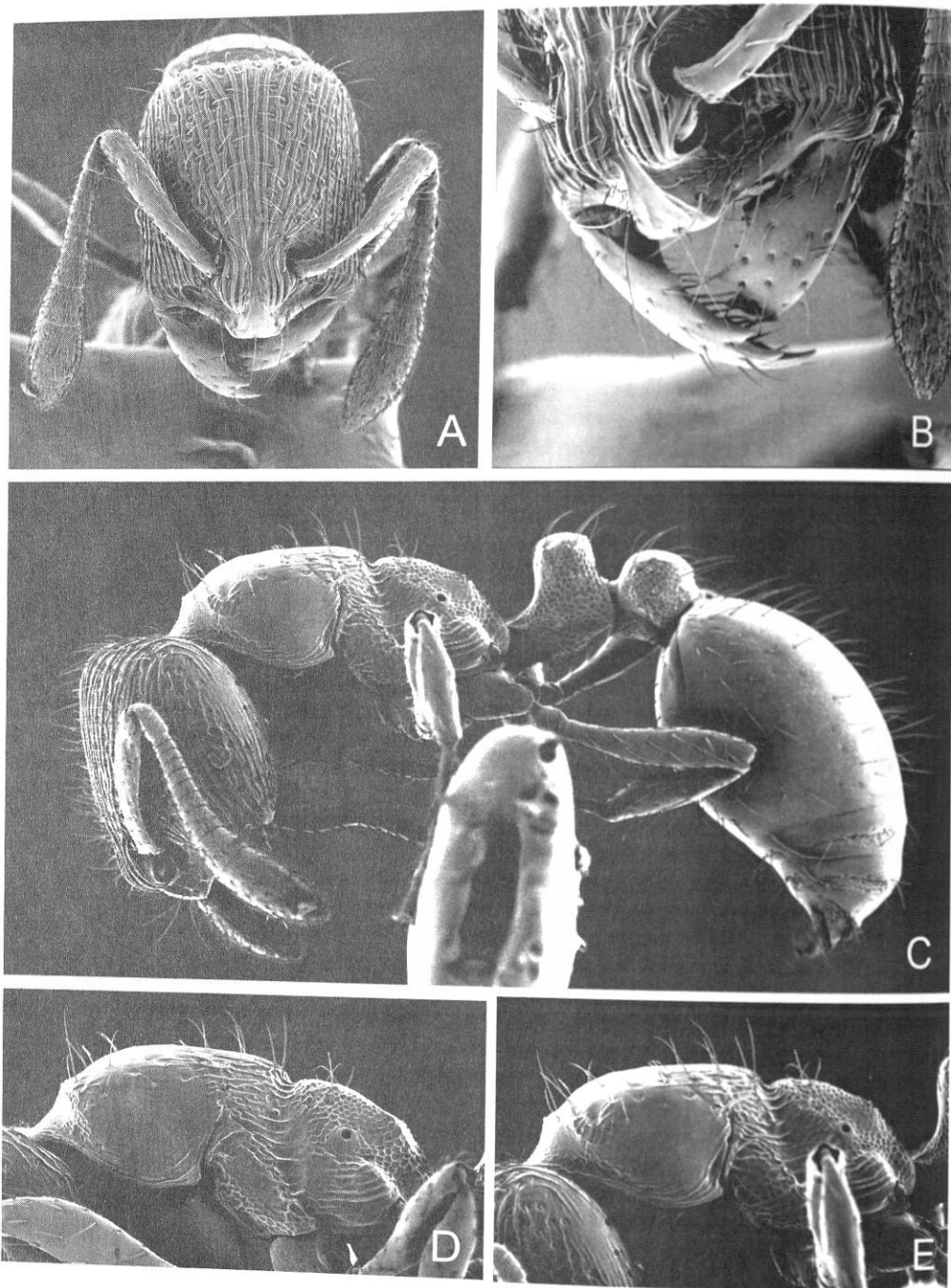


Figure 1. *Monomorium inusuale*. A, head in full face view; B, clypeus in oblique view; C, lateral view of worker; D & E, two lateral views of mesosoma.

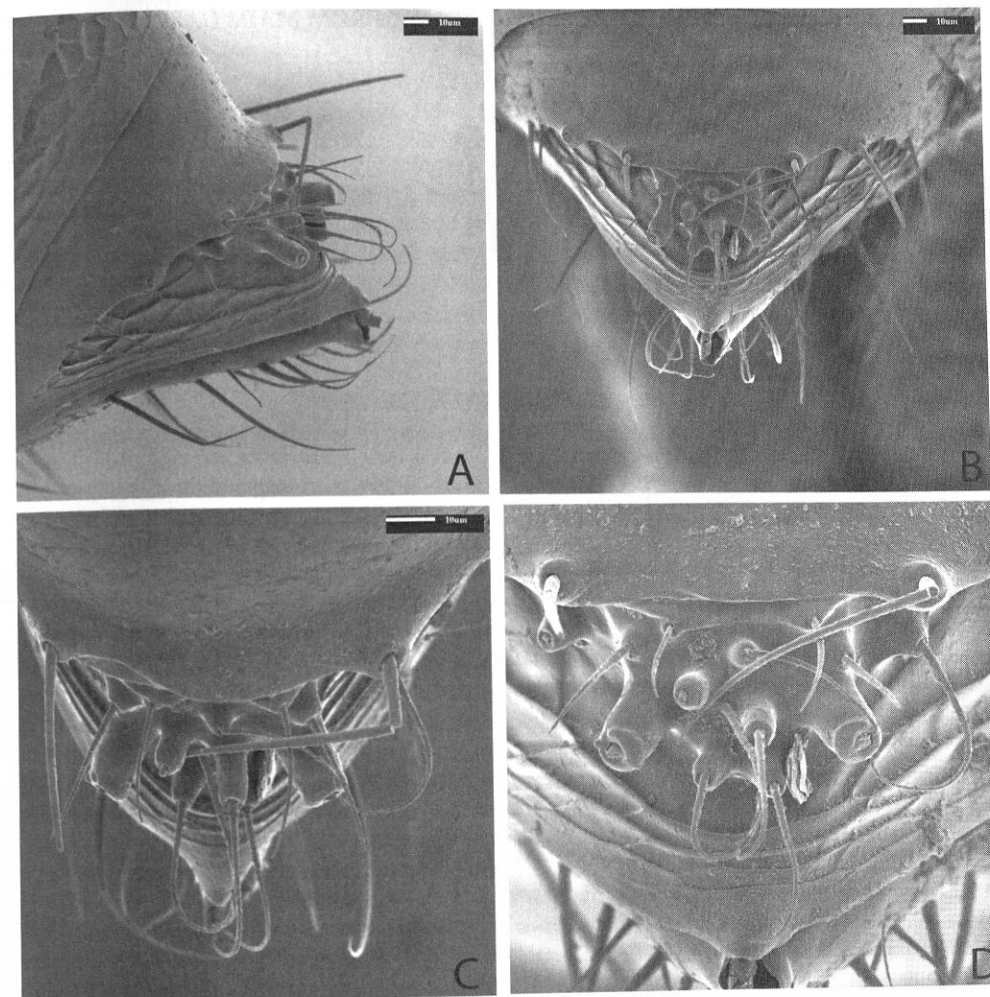


Figure 2. Lateral (A) and dorsal (B-D) views of the last abdominal tergum in *M. inusuale* (Brazil).