

## ***Technomyrmex* (Formicidae: Dolichoderinae) in the New World: synopsis and description of a new species**

*Technomyrmex* (Formicidae: Dolichoderinae) en el Nuevo Mundo: sinopsis y descripción de una nueva especie

FERNANDO FERNÁNDEZ<sup>1</sup> and ROBERTO J. GUERRERO<sup>2</sup>

**Abstract:** A synopsis of dolichoderine ants of the genus *Technomyrmex* Mayr (Hymenoptera: Formicidae) in the New World is offered including notes, keys, pictures of all known species, and the description of *T. gorgona* **sp. n.** from SW Colombia. This is the first record of the genus from continental South America. Currently *Technomyrmex* comprises six species (two extinct, marked by \*) in the New World: \**T. caritatis* Brandão & Baroni Urbani (Dominican amber), *T. difficilis* Forel (tramp species collected in Washington, Puerto Rico, Antigua and Nevis), *T. fulvus* (Wheeler) (Costa Rica, Panama and Colombia), *T. gorgona* n. sp. (Colombia), the first record for Colombia and South America, \**T. hispaniolae* (Wilson) (Dominican amber) and *T. vitiensis* Mann (tramp species collected in California).

**Key words:** Ants. South America. Taxonomy. *Technomyrmex*.

**Resumen:** Se ofrece una sinopsis de las hormigas dolichoderinas del género *Technomyrmex* Mayr (Hymenoptera: Formicidae), incluyendo notas, claves, fotografías para todas las especies conocidas en el Nuevo Mundo, y la descripción de *T. gorgona* **sp. n.** del SO de Colombia. Este es el primer registro del género para la parte continental de América del Sur. Actualmente, *Technomyrmex* está constituido por seis especies (dos extintas, indicadas con un \*) en el Nuevo Mundo: \**T. caritatis* Brandão & Baroni Urbani (ámbar dominicano), *T. difficilis* Forel (especie introducida recolectada en Washington, Puerto Rico, Antigua y Nevis), *T. fulvus* (Wheeler) (Costa Rica, Panamá y Colombia), *T. gorgona* n. sp. (Colombia), el primer registro para Colombia y América del Sur, \**T. hispaniolae* (Wilson) (ámbar dominicano) y *T. vitiensis* Mann (especie introducida recolectada en California).

**Palabras clave:** Hormigas. América del Sur. Taxonomía. *Technomyrmex*.

### **Introduction**

*Technomyrmex* Mayr (Hymenoptera: Formicidae: Dolichoderinae) is a primarily Old World genus with asymmetrical distribution, with most of the species in Africa and southern Asia, and with a discrete fauna also present in Australia and Madagascar. One extant species described from Panama by Wheeler in 1934 is also known. Shattuck (1992a:160) says about this species: "The occurrence of an apparently native species of *Technomyrmex* in the New World tropics presents an interesting situation because the group is otherwise entirely Old World". This situation changed with the confirmation of the presence of the genus in Miocene Dominican amber (Brandão *et al.* 1999; but see below), suggesting an old presence of the genus in the Neotropics with their withdrawal from these areas in modern times and leading to scattered samples in Panama and Costa Rica. This situation is similar in other groups such as *Leptomyrmex* (Baroni Urbani 1980) and some species *Pheidole* (Baroni Urbani 1995), with ants also known in Dominican amber but otherwise extinct from New World. Bolton (2007) revised the genus and synonymised *T. fulvus* *sublucidus* under *T. fulvus*, and provided a key to New World extant taxa, including two tramp species (*T. difficilis* and *T. vitiensis* in USA), and other two tramp species (not known in New World) potentially to be introduced (*T. albipes* and *T. pallipes*).

Ants sorted by one of us (RJG) from the collections of the Instituto Humboldt (IAvH) and Instituto de Ciencias Natura-

les (ICN) permitted us to confirm the presence of *Technomyrmex* as native and extant in the Neotropics. Being *T. fulvus* found in Colombia and a new species, the genus belongs to the humid low rain forest of south western Colombia.

### **Materials and Methods**

**Measurements and depositories.** All measurements follow Bolton (2007) and were made using a Wild stereomicroscope at 80X magnification with ocular micrometer. All of the following measurements are expressed in millimeters: Total Length (TL). The total outstretched length of the ant from the mandibular apex to the gastral apex. Head Length (HL). The length of the head capsule excluding the mandibles; measured in full-face view a straight line from the mid-point of the anterior clypeal margin to the mid-point of the posterior margin. Head Width (HW). The maximum width of the head behind the eyes, measured in full-face view. Scape Length (SL). The maximum straight-line length of the scape, excluding the basal constriction or neck that occurs just distal of the condyle bulb. Pronotal Width (PW). The maximum width of the pronotum in dorsal view. Weber's Length of Mesosoma (WL). The diagonal length of the mesosoma in profile, from the anteriormost point of the pronotum to the posterior basal angle of the metapleuron.

**Indices.** Cephalic Index (CI). HW divided by HL, x 100. Scape Index (SI). SL divided by HW, x 100. Ocular Index (OI).

<sup>1</sup> Author for correspondence: Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Apartado 7495, Bogotá D.C., Colombia [ffernandezca@unal.edu.co](mailto:ffernandezca@unal.edu.co).

<sup>2</sup> Biologist. Grupo de Investigación en Insectos Neotropicales. Instituto de Investigaciones Tropicales. Universidad del Magdalena. Carrera 32 N° 22-08. San Pedro Alejandrino. Santa Marta, Colombia. [rguerrero@unimagdalena.edu.co](mailto:rguerrero@unimagdalena.edu.co).

Maximum diameter of eye divided by HW, x 100. Eye Position Index (EPI). In full-face view the straight-line length (parallel to the long axis of the head) from the anteriormost point of the eye to the anterior clypeal margin, divided by the straight-line length from the posteriormost point of the eye to the posterior margin, x 100. Dorsal Thoracic Index (DTI). In dorsal view the length from the mid-point of the anterior pronotal margin to the midpoint of the metanotal groove, divided by PW, x 100.

**Depositories of types.** Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Villa de Leyva, Colombia (IAvH), Instituto de Ciencias Naturales de la Universidad Nacional de Colombia, Bogotá D.C. (ICN), and California Academy of Sciences, San Francisco (CAS).

#### Checklist of New World species of *Technomyrmex*

(For diagnosis, taxonomic history and other notes see Bolton (2007); the asterisk indicates extinct species).

#### *Technomyrmex difficilis* Forel, 1892

*Technomyrmex mayri difficilis*: Forel 1892:242 (w).

*Technomyrmex difficilis*: Bolton 2007:47.

This species is separated from others in the New World by morphological traits such as dorsum of head behind posterior margin of eye with a single pair of setae and tarsus of hind leg distinctly lighter than the tibia. It is a tramp species detected in at the zoo in Washington and outdoors in Florida and Puerto Rico (Bolton 2007 and personal communication).

#### *Technomyrmex fulvus* (W. M. Wheeler, 1934)

*Tapinoma fulvum* Wheeler, W. M. 1934:184 (w).

*Tapinoma fulvum sublucidum* Wheeler, W. M. 1934:185. Synonymy in Bolton, 2007.

*Technomyrmex fulvum*: Shattuck 1992a:161.

*Technomyrmex fulvum sublucidum*: Shattuck 1992a:161.

This was the only extant native species of *Technomyrmex* in the New World known previously from Panama (Shattuck 1992a; Bolton 1995) and Costa Rica (Bolton 2007). Its uniform yellow body color immediately distinguishes it from any other native or tramp species that are likely to be encountered in the Nearctic and Neotropical regions. The Chocó record is the first for Colombia and South America for the genus and species.

Material examined: 1 worker. COLOMBIA. Chocó. La Balsa. Bajo Atrato. 07°02'26"N 77°20'16"W. mar-1994. Mendoza, L. [ICN] No. 057.

#### *Technomyrmex gorgona* sp. n.

*Worker measurements.* Holotype (Paratypes, N= 2): TL 3.17 (3.27 – 3.32), HL 0.69 (0.66 – 0.67), HW 0.68 (0.65 – 0.66), SL 0.72 (0.71), PW 0.46 (0.45 – 0.46), WL 0.95 (0.97 – 0.99), CI 99 (98 – 99), SI 104 (106 – 108), OI 32 (36), EPI 56 (55 – 56), DTI 125 (124 – 127).

Head in full-face view with the posterior margin feebly concave in the middle. Outer margin of eye very close to the side of the head. Anterior clypeal margin with median concavity.

Mesonotum in profile shallowly convex anteriorly and with a steeply sloping declivitous face that extends down to the tuberculiform metathoracic spiracle. Propodeal dorsum convex in profile; dorsum rounded evenly into declivity. Body smooth and shining, except for a fine reticulation in the posterior half of pronotum, dense and fine punctation on the dorsum and sides (mesopleuron) of mesonotum and dorsum of propodeum. Head dorsum in profile entirely lacks setae behind the level of the posterior margin of the eye; dorsum of head with numerous very short spaced erect and suberect setae (less than 0.50 × the maximum diameter of the eye), numerous suberect (0.03 mm) setae between the torulus and the level of the midlength of the eye, anterior clypeus with four hairs, about 0.13 mm each long; pronotum with 2 pairs of long setae, arising from very well-marked pits; Gastral tergites 1 - 4 each with 2 – 4 very long erect setae. Short pubescence on scapes and dorsal (outer) surfaces of middle and hind tibiae usually almost appressed, but slightly elevated in some. Body dark brown. Head and body brown, scape apex, flagellomeres and mandibles lighter.

Material examined: Holotype worker: COLOMBIA. Cauca. Gorgona Island National Park. 02°58'N 78°11'W. 180 m. 01-mar-04-abr-2000. Sharkey, M. [IAvH]. Paratype workers (2 workers): Same data, deposited in ICN, CAS.

*Etymology*: The name *gorgona* refers to the Gorgona National Park, and is given as a noun in apposition.

*Comments and diagnosis.* This is the second extant species of *Technomyrmex* native to the New World is restricted to Gorgona National Park, Cauca, Colombia, a small continental Island in the Pacific Ocean. Its dark brown color, heavy fine punctation on the mesonotum and dorsum of propodeum distinguishes it from *T. fulvus*, the first native species.

#### *Technomyrmex vitiensis* Mann, 1921

*Technomyrmex albipes vitiensis* Mann, 1921:473 (w). Junior synonym of *albipes*: Wilson and Taylor 1967:82.

*Technomyrmex vitiensis*: Bolton 2007:104.

California, USA (Bolton 2007)

#### Tramp species potentially present in the New World

In the key to New World species of *Technomyrmex* presented below, Bolton (2007) added *T. albipes* and *T. pallipes* as two tramp species, inhabiting hothouses in the Palaearctic Region and potentially introduced to New World (as *T. difficilis* and *T. vitiensis*). We include pictures of both species.

#### *Technomyrmex albipes* (F. Smith, 1861)

Tramp species, in hothouses, Palaearctic, potentially to be imported to the New World.

#### *Technomyrmex pallipes* (F. Smith, 1876)

Tramp species, in hothouses, Palaearctic, potentially to be imported to the New World.

#### Fossil species ascribed to *Technomyrmex*

There are two dolichoderine species described from Dominican amber that are ascribed to *Technomyrmex* (Brandão *et al.* 1999). However, Bolton (2007:122) points out that both species



**Figures 1-3.** *Technomyrmex* spp.: **1.** *T. difficilis* worker, A. Head in full face view, B. Body in lateral view. Specimen: CASENT0003175. **2.** *T. fulvus* worker. A. Head in full face view, B. Body in lateral view. Specimen CASENT0173587. **3.** *T. gorgona* n. sp., paratype worker A. Head in full face view, B. Head in lateral view, C. Body in lateral view, D. Body in dorsal view. Specimen CASENT0173586. Photographer: April Nobile.



**Figures 4-6.** *Technomyrmex* spp.: **4.** *T. vitiensis*. A. Head in full face view, B. Body in lateral view. Specimen CASENT0172776. **5.** *T. albipes*. A. Head in full face view, B. Body in lateral view. Specimen CASENT0055965. **6.** *T. pallipes*. A. Head in full face view, B. Body in lateral view. Specimen: CASENT0005970. Photographer: April Nobile.

“lack some critical diagnostic characters of the genus, the absence of which would argue for their exclusion”. Bolton also questioned the classification of *T. hispaniolae* in *Iridomyrmex* or *Linepithema*, leaving both taxa as *incertae sedis* in *Technomyrmex*.

\* *Technomyrmex caritatis* Brandão & Baroni Urbani, 1999  
*Technomyrmex caritatis* Brandão & Baroni Urbani 1999:416 (w) (Figs. 1, 4-6) In Brandão *et al.* 1999.

This extinct species is characterized by long scape, two pairs of setae on clypeus (none central), one pair of long setae on vertex, none on mesosoma. Described from Dominican amber.

\* *Technomyrmex hispaniolae* (Wilson, 1985)

*Iridomyrmex hispaniolae* Wilson, 1985:33 (w) (Fig. 10).

*Linepithema hispaniolae*: Shattuck 1992b:16.

*Technomyrmex hispaniolae*: Brandão *et al.* 1999:414 (Figs. 2-3).

This extinct species is characterized by long scape, metanotum longitudinally striate, petiole very long and slender and the presence of one pair of long setae on vertex. This species has been described from Dominican amber fragments.

### Key to the extant *Technomyrmex* workers from the New World (from Bolton 2007)

- 1 Dorsum behind the level of the posterior margin of the eye without setae (head in profile view) (Fig. 3B) ..... 2  
 - Dorsum behind the level of the posterior margin of the eye with one or two pairs of setae (head in profile view) (Fig. 6B) ..... 5
- 2 Head, mesosoma, petiole, gaster, and leg segments entirely yellow to light brownish yellow (Figs. 2A, B); middle and hind coxae may be slightly lighter in shade than the mesosoma; Costa Rica, Panama, and Colombia ..... *T. fulvus*  
 - Head, mesosoma, petiole and gaster brown to black; colour may be more or less uniform or slightly different on separate tagmata, but never entirely yellow; middle and hind coxae the same colour as the mesosoma to distinctly lighter ..... 3
- 3 Mesonotum, mesopleuron, and most of propodeal dorsum with dense and fine puncturation (Fig. 3C); propodeal spiracles protruding (Fig. 3D); SW Colombia ..... *T. gorgona* n. sp.  
 - Mesosoma without dense fine puncturation; propodeal spiracles **not** protruding; tramp species, California (USA) and West Palaearctic ..... 4
- 4 Scape relatively short and promesonotum relatively short and broad, SI 91 - 102, DTI 110 - 124; eye somewhat smaller, OI 24 - 27; with mesosoma in absolute profile, the mesonotal dorsal outline convex more or less evenly rounded (Fig. 5B); in same view the junction of the propodeal dorsum and declivity is blunt; tramp species, no New World records but very widespread and occurs in West Palaearctic hothouses *T. albipes*  
 - Scape relatively long and promesonotum relatively long and narrow, SI 104 - 115, DTI 128 - 141; eye somewhat larger, OI 29 - 32; with mesosoma in absolute profile the mesonotal dorsal outline with a more or less flat anterior section that passes through an obtuse angle to a distinctly more strongly sloped posterior declivity (Fig. 4B); in same view the junction of the propodeal dorsum and declivity sharply defined; tramp species, California (hothouses), USA ..... *T. vitiensis*
- 5 Hind leg tarsus distinctly lighter in colour than the tibia; dorsum of head behind level of posterior margin of eye with a single pair of setae, located about two-thirds the way between the level of the posterior margin of the eye and the posterior margin of the head (Fig. 1B); eyes located somewhat more posteriorly, EPI 72 - 86; tramp species; Florida (outdoors and in houses), Washington (zoo), Puerto Rico, Antigua, Nevis ..... *difficilis*  
 - Hind leg tarsus of the same colour as the tibia; dorsum of head behind level of posterior margin of eye with two pairs of very short, stubby setae; first pair located about two-thirds the way between the level of the posterior margin of the eye and the posterior margin of the head; second pair at the posterior margin (Fig. 6B); eyes located somewhat more anteriorly, EPI 55 - 71; tramp species, no New World records, occurs in West Palaearctic hothouses ..... *T. pallipes*

### Discussion

Initially seen as a biogeographic anomaly (Shattuck 1992a), the finding of two extinct species in Dominican amber (Brandão *et al.* 1999), and the new species described here, confirms the native status of *Technomyrmex* in the New World. *T. fulvus* was previously known only from Barro Colorado Island, Panama, until the recent discovery of scattered samples from tropical rain forests in Costa Rica (Bolton 2007) that proves their status as native (not imported) species to the Neotropics. The identification of *Technomyrmex* is not easy, because of the subtle traits that characterize this genus (as others in the subfamily, Shattuck 1992a), which opens the possibility that many other samples from collections may be awaiting discovery in other countries. This situation is similar to that of the genus *Paedalgus* (now junior synonym of *Carebara*), until recently known to be confined to Old World, but now reported from several native species from Costa Rica to Brazil. Dubovikoff and Longino (2004) also described a new species of the other Old World element, *Bothriomyrmex*, from the tropical rain forest in Costa Rica.

*Technomyrmex* and *Bothriomyrmex* could represent those groups probably widespread in the past and now limited to some scattered forested spots in the Neotropical forests, probably as retreating lineages. *Leptomyrmex*, also present in Miocene times were extinct in the New World, as some other ants taxa (Wilson 1988). Curators and ant collectors must be aware of the presence of interesting genera awaiting to be discovered and published; these must enrich the understanding of the evolution and the biogeography of the Neotropical ants.

### Acknowledgements

To Mónica Ospina and Diego Perico (Instituto Humboldt), Carlos Sarmiento (ICN) for the loan of material, and Brian L. Fisher for the permission of the use of excellent colour pictures. Brian Fisher and April Nobile take the pictures of *T. fulvus* and *T. gorgona* n. sp. Thanks to Barry Bolton for advice and providing information from the revision of *Technomyrmex* and to help us with English writing. Julio Valle (University of Magdalena) edited pictures. Carlos Sarmiento and Claudia Martínez help with last minute corrections and two image editing. This work was supported by Jóvenes Investigadores Program of Colciencias -University of Magdalena agreement # 122 to RJGF and partially supported by NSF Grant No. DEB No. 9972024 to M. Sharkey (University of Kentucky) and Brian Brown (LACM). Thanks also to Dr. Mike Sharkey for reading and improving the MS.

### Literature cited

- BARONI URBANI, C. 1980. The first fossil species of the Australian ant genus *Leptomyrmex* in amber from the Dominican Republic. Stuttgart Beiträge zur Naturkunde Serie B. 62: 1-10.
- BARONI URBANI, C. 1995. Invasion and extinction in the West Indian ant fauna revisited: the example of *Pheidole* (Amber Collection Stuttgart: Hymenoptera, Formicidae. VIII: Myrmicinae, partim.). Stuttgart Beiträge zur Naturkunde Serie B. 222: 1-20.
- BOLTON, B. 1995. A new general catalogue of the ants of the world. Harvard University Press, 504 p.
- BOLTON, B. 2007. Taxonomy of the dolichoderine ant genus *Technomyrmex* Mayr (Hymenoptera: Formicidae) based on the

- worker caste. Contributions of the American Entomological Institute 35 (1): 1-150.
- BRANDÃO, C. R. F.; BARONI URBANI, C.; WAGENSBERG, J.; YAMAMOTO, C. I. 1999. New *Technomyrmex* in Dominican amber (Hymenoptera: Formicidae), with a reappraisal of Dolichoderinae phylogeny. Entomologica Scandinavica 29: 411-428.
- DUBOVIKOFF, D. A.; LONGINO, J. T. 2004. A new species of the genus *Bothriomyrmex* Emery, 1869 (Hymenoptera: Formicidae: Dolichoderinae) from Costa Rica. Zootaxa 776: 1-10.
- FOREL, A. 1892. Histoire naturelle des Hyménoptères. Deuxième partie. Les formicides. Supplément au 28e fascicule. In: Grandidier, A. Histoire physique, naturelle, et politique de Madagascar, 20 (2): 229-280.
- MANN, W. M. 1921. The ants of the Fiji Islands. Bulletin of the Museum of Comparative Zoology at Harvard College 64: 401-499.
- SHATTUCK, S. O. 1992a. Generic revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae). Sociobiology 21 (1): 1-181.
- SHATTUCK, S. O. 1992b. Review of the dolichoderinae ant genus *Iridomyrmex* Mayr with descriptions of three new genera (Hymenoptera: Formicidae). Journal of Australian Entomological Society 31: 13-18.
- SMITH, F. R. 1876. Preliminary notice of new species of Hymenoptera, Diptera, and Forficulidae collected in the Island of Rodríguez by the naturalists accompanying the Transit-of-Venus Expedition. Annals and Magazine of Natural History (4) 7: 447-451.
- SMITH, F. R. 1861. Catalogue of the hymenopterous insects collected by Mr. A. R. Wallace in the Islands of Ceram, Celebes, Ternate, and Gilolo. Journal of the Proceedings of the Linnean Society, Zoology 6: 36-48.
- WHEELER, W. M. 1934. Neotropical ants collected by Dr. Elisabeth Skwarra and other. Bulletin of the Museum of Comparative Zoology at Harvard College 77 (5): 160-240.
- WILSON, E. O. 1985. Ants of the dominican amber (Hymenoptera: Formicidae). 3. The subfamily Dolichoderinae. Psyche 92: 17-37.
- WILSON, E. O. 1988. The biogeography of West Indian ants (Hymenoptera: Formicidae), pp. 214-230. En: Liebherr, J. (ed.). Zoogeography of Caribbean Insects, Cornell University Press.
- WILSON, E. O.; TAYLOR, R. W. 1967. The ants of Polynesia (Hymenoptera: Formicidae). Pacific Insect Monographs 14: 1-109.

Recibido: 7 feb 2008, • Aceptado: 22-abr-2008.