

New locality records for ants in the coffee zone of Cundinamarca, Colombia

Nuevos registros locales de hormigas en la zona cafetalera de Cundinamarca, Colombia

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ABSTRACT

Shade coffee plantations harbor a great diversity of ants that in some cases have not been recorded. Therefore, it is important the information of their distribution both locally and regionally, five new records for the coffee region of Cundinamarca are related here, four species for the subfamily Myrmicinae with: *Protalaridris armata*, *Nesomyrmex pittieri*, *Cyphomyrmex peltatus*, *Strumigenys pariensis* and for the subfamily Proceratinae the species *Proceratium colombicum*.

Keywords: Biodiversity, Formicidae, neotropical region, Quipile, shade coffee

RESUMEN

Los cafetales de sombrero albergan una gran diversidad de hormigas que en algunos casos no han sido registradas. Por lo tanto es importante la información de su distribución tanto local como regional, cinco nuevos registros para la región cafetera de Cundinamarca se relacionan aquí, cuatro especies para la subfamilia Myrmicinae con: *Protalaridris armata*, *Nesomyrmex pittieri*, *Cyphomyrmex peltatus*, *Strumigenys pariensis* y para la subfamilia Proceratinae la especie *Proceratium colombicum*.

Palabras clave: Biodiversidad, Formicidae, neotropical, Quipile, Café de sombra.

The coffee agroecosystem in Colombia is characterized by a high diversity of fauna and flora, located in the equatorial strip of the Neotropical region in the north of South America (Constantino 2020). This is part of the tropical Andes considered a globally critical point (hotspot) (Myers *et al.* 2000). The presence of shade in coffee plantations can promote ecological functions because they attract associated fauna of great importance such as insects (Manson *et al.* 2008). Due to the close relationship between plants and insects, the high percentage of plant endemism in the tropical Andes (about half of the species) suggests a high level of insect diversity and endemism (Larsen *et al.* 2011). Among these insect groups, ants present a high diversity in Colombia with an estimated 1100 species compared to the 3300 species reported in the Neotropical region (Guerrero *et al.* 2018). Highlighting, that in these agroecosystems even though there is strong pressure to increase their productivity or transform to other land uses (Rojas *et al.* 2012). They continue to maintain a great richness of ants (Cepeda *et al.* 2014, Martínez 2018). Where they fulfill important functions as biological predators of the coffee berry borer (Escobar

et al. 2020). They can act as bioindicators (Alonso y Agosti 2000). They improve soil composition (Philpott *et al.* 2010). And regulate the population of arthropods (Gallego-Ropero y Armbrrecht 2005). However, the diversity patterns of ants in coffee landscapes remain poorly understood (Escobar *et al.* 2020). Therefore, there is the possibility of finding new local and regional records, motivating us to continue with this type of work in coffee plantations in Colombia.

MATERIAL AND METHODS

The specimens were collected in December 2016 and 2017 in a pitfall trap and manual collect in a coffee farm in Quipile, Cundinamarca (04.46.13.3N, 074.32.06.8W), which is located 83 km west of Bogotá city, Colombia (Fig. 1). It has an altitude between 1599 and 1702 m.n.s.m, also presents a temperature from 16°C to 18°C and rainfall between 1,000 and 2,000 mm. This place is part of the Premontane damp forest (Rodríguez *et al.* 2006).

The digital images were generated with a Nikon AZ100M multipurpose zoom microscope software with Nikon elements a high-resolution digital camera (Type

DS-U3) and a Leica MC170 HD camera with a Leica 10450528 adapters on a Leica M205 A microscope using a 1x objective. Other digital images were taken from AntWeb (2021). The keys and the diagnosis developed in this work based on the following documents: Lattke *et al.* (2018) for *Protalaridris*, Kempf (1959) for *Nesomyrmex*, Kempf (1966) for *Cyphomyrmex*, Lattke and Goitía (1997) for *Strumigenys* and Baroni Urbani and de Andrade (2003) for *Proceratium*.

RESULTS

Subfamily Myrmicinae:

Protalaridris armata Brown, 1980

Material examined: COLOMBIA, Cundinamarca. Quipile, Vereda Guadalupe Alto, Finca San Miguel. Shade coffee plantation. 04.46.21.7N, 074.32.06.3W.1722m. Pitfall trap.20-December-2016. Martínez.R.1 Worker. ICN100266.Figs, 2A, 2B.

Comments: Only two species are known in Colombia, one recently described *Protalaridris arhuaca* Guerrero, Lattke & Alpert, 2018 in the Sierra Nevada de Santa Marta and *P. armata*, which is known in Panama, Ecuador, and Venezuela. In Colombia, it known in Chocó and Nariño (Fernández *et al.* 2019).

Nesomyrmex pittieri (Forel, 1899)

Material examined: COLOMBIA, Cundinamarca. Quipile, Vereda Guadalupe Alto, Finca San Miguel, 04.46.20.6N, 074.32.05.7W.1710m. Shade coffee plantation. Manual capture found in tree trunk *Citrus aurantium* L, 1753. 19-April-2017. Martínez. R. 2 workers. ICN100267. Figs, 3A, 3B.

Comments: Known from México, Costa Rica, Nicaragua Panamá (Kempf 1959). In Colombia has been recorded in Cauca (Chacón de Ulloa *et al.* 2014), and Caldas (Fernández *et al.* 1996).

Cyphomyrmex peltatus Kempf, 1966

Material examined: COLOMBIA, Cundinamarca. Quipile, Vereda Guadalupe Alto, Finca Los Naranjitos, 04.46.10.7N ,07432.06.3W.1599. Shade coffee plantation. Pitfall trap. 22-December-2016. Martínez. R. .1 worker. ICN100268. Figs, 4A, 4B.

Comments: This species is very similar to *Cyphomyrmex rimosus* (Spinola, 1851), but these are its differences: no middle pronotal tubercles, a pentagonal impression in the mesonotum, delimited by the four lower welts, postpetiolar mediodorsal always deeper, thin hairs, recovered, not scaly (Kempf 1966).

Known from Costa Rica to Brazil (Rio Grande do Sul). In Colombia: Moni-fue, Leticia, Amazonas (Perez *et al.* 2009). Huila, Putumayo, Quindío, and Vichada (Fernandez *et al.* 2019).

Strumigenys pariensis Lattke and Goitía, 1997

Material examined: COLOMBIA, Cundinamarca.

Quipile, Vereda Guadalupe Alto, Finca los Naranjitos, 04.46.12.7N, 074.32.05. 0W.1585m. Shade coffee plantation. Manual capture around the lower part of the trunk of *C. aurantium*. Pitfall trap. 14-November-2016. Martínez. R. 2 workers. ICN100269. Figs, 5A, 5B.

Comments: Although confused with *S. elongata*, the basal ribbing of the first tergus of the gaster also differs, and it does not extend after the first pair of medium erect hairs (Lattke and Goitía 1997).

This species is known from México, Costa Rica, Honduras, Nicaragua to Venezuela. In Colombia is known without a specific locality (Fernandez *et al.* 2019).

Subfamily Proceratinae:

Proceratium colombicum De Andrade, 2003

Material examined: COLOMBIA, Cundinamarca. Quipile, Vereda Guadalupe Alto, Finca los Naranjitos, 04.46.13.3N, 074.32.06.8W .1593m. Shade coffee plantation. Pitfall trap. 22-December-2016 Martínez. R. .1 queen. NC5SL. Figs, 6A, 6B.

Comments: This is the smallest species of the micrommata clade, is endemic to Colombia; it is known only for the department of Nariño. (Baroni Urbani and de Andrade 2003).

CONCLUSIONS

The coffee plantations of the coffee-growing area of Cundinamarca have the potential as a habitat for ant diversity, therefore it is important to conserve and maintain this type of agroecosystems motivating studies to report new records and possibly new species.

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LITERATURE CITED

- Alonso, L.E. and D. Agosti. 2000. Biodiversity studies, monitoring, and ants: an overview. (pp. 1-8) In: D. Agosti, J.D. Majer, L.E. Alonso y T.R. Schultz (Eds.). *Ants: Standard methods for measuring and monitoring biodiversity*. Smithsonian Institution Press, Washington D.C.
- ANTWEB. 2021. versión 8.60. California Academy of Science. <https://www.antweb.org/> [Review date: 16 April 2021].
- Baroni Urbani, C. and M.L. De Andrade. 2003. The ant genus *Proceratium* in the extant and fossil record (Hymenoptera: Formicidae). *Museo Regionale di Scienze Naturali, Monografie*, 36: 1–492.
- Cepeda-Valencia, J., L. Pérez-Pedraza and F. Fernández. 2014. *Hormigas de hojarasca asociadas a fragmentos de bosque y cafetales de la zona cafetera de Cundinamarca*, 171 registros. [Last accessed: 28-

- 02-2021]. <http://ipt.sibcolombia.net/sib/resource.do?r=unal-002>
- Chacón de Ulloa, P., S. Valdes-Rodriguez., A. Hurtado-Giraldo and C. M. Pimienta. 2014. Arboreal ants of Gorgona National Park (Pacific of Colombia). *Revista de Biología Tropical*, 62(1): 277-287.
- Constantino, L.M. 2020. El control biológico natural. (pp. 36–67). En: Benavides-Machado, P y C.E. Góngora (Eds.). El Control Natural de Insectos en el Ecosistema Cafetero Colombiano *Cenicafé*. Caldas, Colombia. https://doi.org/10.38141/10791/0001_3
- Escobar-Ramírez, S., T. Tschardtke., I. Armbrrecht., W. Torres. & I. Grass. 2020. Decrease in β -diversity, but not in α -diversity, of ants in intensively managed coffee plantations. *Insect Conservation and Diversity*, 13(5):445-455.
- Gallego-Ropero, M.C. y I. Armbrrecht. 2005. Depredation por hormigas sobre la broca del café *Hypothenemus hampei* (Curculionidae: Scolytinae) en cafetales cultivados bajo dos niveles de sombra en Colombia. *Manejo Integrado de Plagas y Agroecología*, 76:32-40.
- Guerrero, R.J., F. Fernández., M.E. Escárraga., L.F. Pérez-Pedraza., F. Serna., W.P. Mackay., Sandoval., V. Vergara., D. Suárez., E.I. García., A. Sánchez., A.D. Meneses., M.C. Tocora and J. Sosa-Calvo. 2018. New records of myrmicine ants (Hymenoptera: Formicidae) for Colombia. *Revista Colombiana de Entomología*, 44(2): 238-259. doi: <https://doi.org/10.25100/socolen.v44i2.7115>
- Fernández, F., E.E. Palacio., W.P. MacKay y E.S. MacKay. 1996. Introducción al estudio de las hormigas (Hymenoptera: Formicidae) de Colombia. (pp. 349-41). En: Andrade MG, Amat García G, Fernández F, (Eds). Insectos de Colombia. Estudios escogidos. Bogotá: *Academia Colombiana de Ciencias Exactas, Físicas y Naturales*. Bogotá D.C.
- Fernández, F., R.J. Guerrero & T. Delsinne. (Eds.). 2019. Hormigas de Colombia. Primera edición. Bogotá. Universidad Nacional de Colombia. Facultad de Ciencias. *Instituto de Ciencias Naturales*, Bogotá D.C.
- Kempf, W.W. 1959. A synopsis of the New World species belonging to the Nesomyrmex-group of the ant genus *Leptothorax* Mayr (Hymenoptera: Formicidae). *Studia Entomologica*, (n.s.) 2: 391-432.
- Kempf, W.W. 1966 [1965]. A revision of the Neotropical fungus-growing ants of the genus *Cyphomyrmex* Mayr. Part II: Group of rimosus (Spinola) (Hymenoptera: Formicidae). *Studia Entomologica*, 8: 161-200.
- Larsen, T. H., F. Escobar and I. Armbrrecht. 2011. Insects of the tropical Andes: diversity patterns, processes and global change, (pp. 228–244). In Herzog, S. K., R. Martínez, P. M. Jorgensen, and H. Tiessen (Eds.). Climate change and biodiversity in the Andes. MacArthur Foundation, Chigago, USA.
- Lattke, J.E., T. Delsinne., G. D. Alpert. and R.J. Guerrero. 2018. Ants of the genus *Protalaridris* (Hymenoptera: Formicidae), more than just deadly mandibles. *European Journal of Entomology* 115: 268–295. doi: 10.14411/eje.2018.027
- Lattke, J.E., W. Goitía. 1997. El género *Strumigenys* (Hymenoptera: Formicidae) en Venezuela. *Caldasia* 19: 367-396.
- Myers, N., R. A. Mittermeier., C. G. Mittermeier., G.A.B. da Fonseca and J. Kent. 2000. Biodiversity hotspots for conservation priorities. *Nature* 403:853-858.
- Manson, R.H., V. Hernández-Ortiz., S. Gallina., K. Mehltreter. (Eds) 2008. Agroecosistemas cafetaleros de Veracruz Biodiversidad, Manejo y Conservación. México. Instituto de Ecología A.C. (INECOL) e Instituto Nacional de Ecología (INE-SEMARNAT). México D.C.
- Martínez, G. R. 2018. Mirmecofauna asociada a cafetales bajo sombra en Quipile, Cundinamarca, Colombia. *Acta Agronómica*, 67(4).461-470.
- Pérez, L.G., G.A. Pérez., C. Echeverri-Rubiano., A.F. Sánchez., J. Durán y L.M Pedraza. (2009). Riqueza de hormigas (Hymenoptera: Formicidae) en Várzea y Bosque de Tierra Firme de la región amazónica colombiana. *Boletín de la Sociedad Entomológica Aragonesa*, 45: 477-483.
- Philpott, S.M., I. Perfecto, I. Armbrrecht y C.L. Parr. 2010. Effects of disturbance and habitat transformation on ant diversity and function. (pp. 137-156) In: L. Lach, C. Parr y K.L. Abbott (Eds.) *Ant ecology*. Oxford University Press, Oxford, UK.
- Rojas, S.A., K.U Hartman and R.M Almonacid. 2012. El impacto de la producción de café sobre la biodiversidad, la transformación del paisaje y las especies exóticas invasoras. *Ambiente y Desarrollo* 16(30):93-104.
- Rodríguez, N., D. Armenteras., M. Morales y M. Romero. 2006. Ecosistemas de los Andes colombianos. Bogotá, Colombia Segunda edición. *Instituto de Investigación de Recursos Biológicos Alexander Von Humboldt*.

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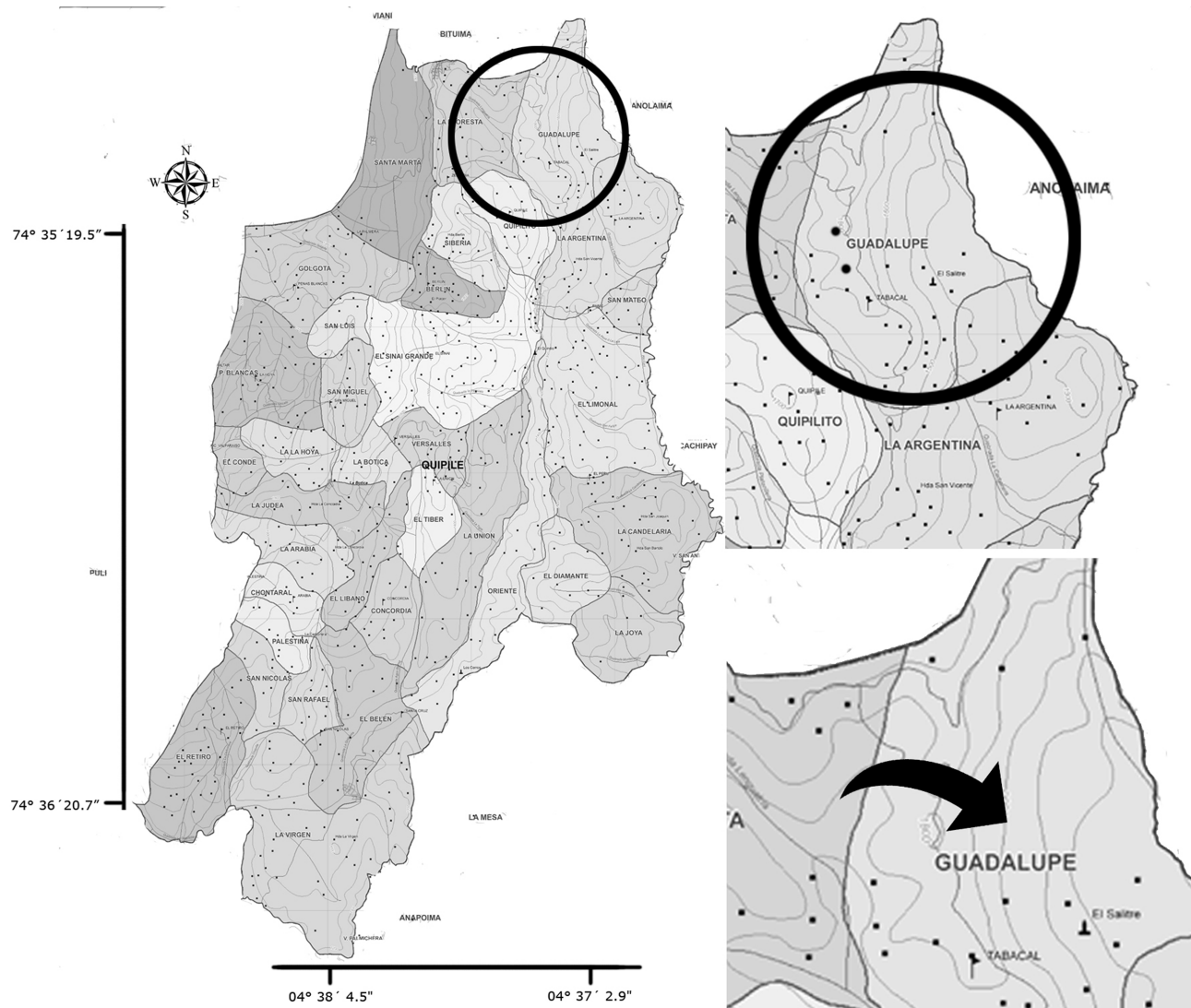


Figure 1. Location of the farms studied on the upper village Guadalupe in the municipality of Quipile (Cundinamarca, Colombia).

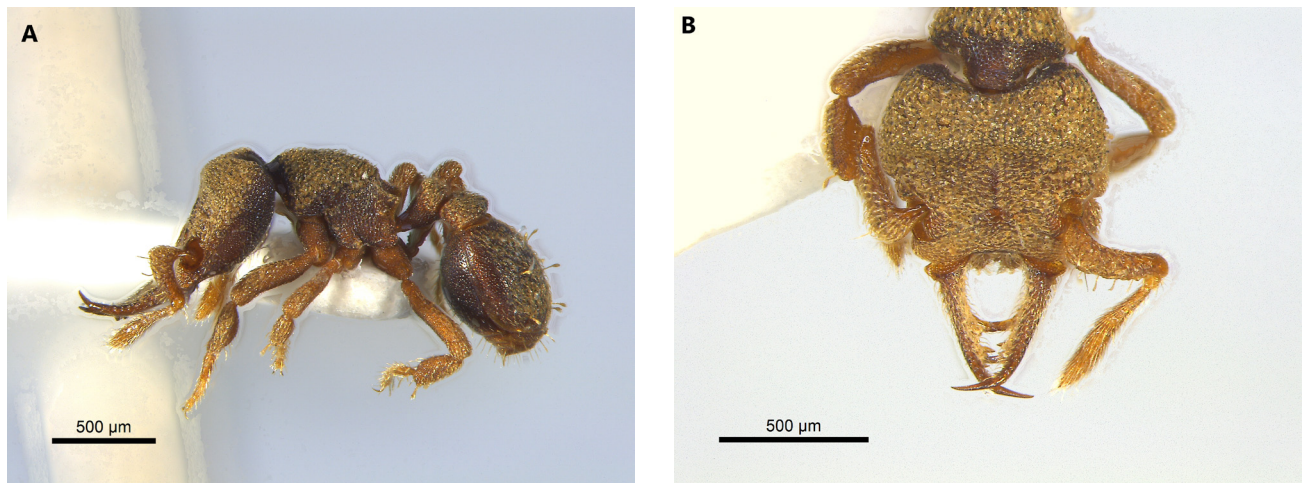


Figure 2. Body profile (A) and head in full-face view (B) of the *Protalaridris armata* worker. Imagen was taken by Camila Tocora ICN.

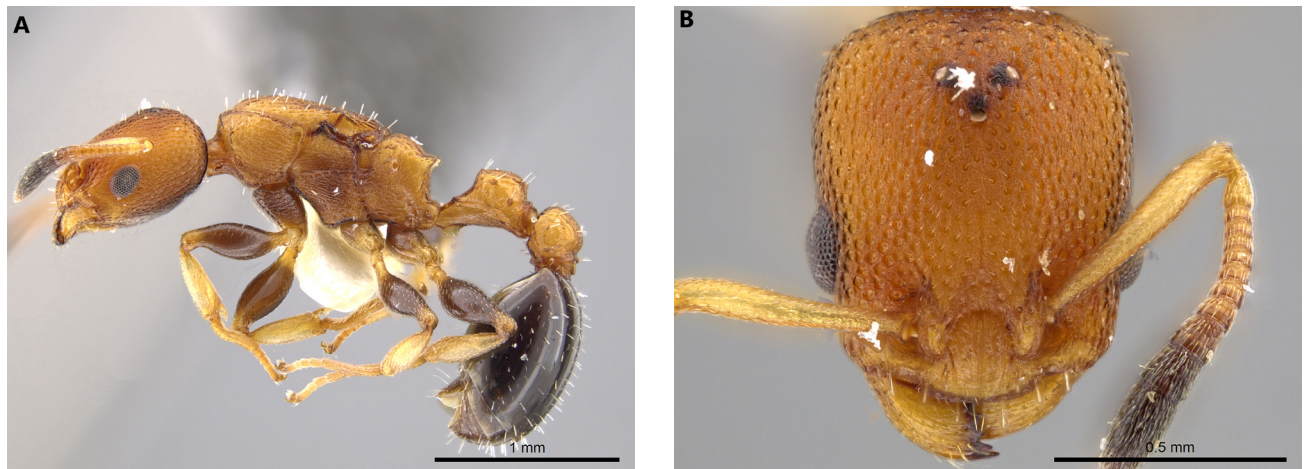


Figure 3. Body profile (A) and head in full-face view (B) of the *Nesomyrmex pittieri* worker. (INBIO CRI01275159). Image by M.pierce, from www.antweb.org.

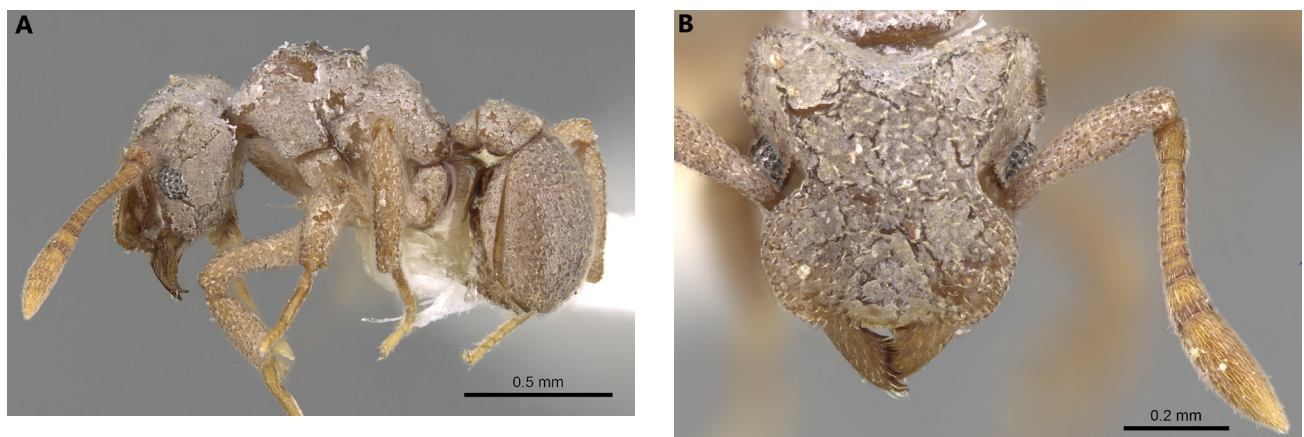


Figure 4. Body profile (A) and head in full-face view (B) of the *Cyphomyrmex peltatus* worker. (CASENT 0281766). Image by Shannon Harman, from www.antweb.org.



Figure 5. Body profile (A) and head in full-face view (B) of the *Strumigenys pariensis* worker. (INBIOCRI001283773). Image by D.J Cox, from www.antweb.org.



Figure 6. Body profile (A) and head in full-face view (B) of the *Proceratium colombicum* queen. Imagen was taken by Instituto ENTOMA.