

SHORT COMMUNICATION

First record of *Ereymatermes rotundiceps* (Termitidae: Nasutitermitinae) as inquiline of *Embiratermes neotenicus* (Termitidae: Syntermitinae) in the Colombian Amazon

Ervin Humprey DURAN-BAUTISTA^{1,2*}, María Fernanda BERMUDEZ^{3,4}, Fernando CELIS-DAZA¹¹ Universidad de la Amazonia, Centro de Investigaciones Amazónicas CIMAZ Macagual Cesar Augusto Estrada González, Programa de Ingeniería Agroecológica, Florencia, Colombia² Grupo de Investigación en Agroecosistemas y Conservación en Bosques Amazónicos – GAIA, Florencia, Colombia³ Universidad de la Amazonia, Grupo de Investigación en Entomología, Laboratorio de Entomología, Florencia, Colombia⁴ Universidad Nacional de Colombia–Sede Medellín, Maestría en Ciencias–Entomología Medellín, Colombia* Corresponding author: ervinduranb@gmail.com; <https://orcid.org/0000-0002-4155-6350>**ABSTRACT**

We report, for the first time, the presence of the termite *Ereymatermes rotundiceps* Constantino, 1991 as an inquiline of the termite *Embiratermes neotenicus* (Holmgren, 1906) in the Colombian Amazon, and provide new morphometric information on the species. Soldiers of *E. rotundiceps* were collected in epigeal nests built by *E. neotenicus* in pastures during the transition from the dry to the rainy season. The association between host and inquiline termites does not seem to be antagonistic, but the relationship between these two species still needs to be clarified.

KEYWORDS: Nasutitermitinae, mounds, Syntermitinae, livestock system, termites

Primer registro de *Ereymatermes rotundiceps* (Termitidae: Nasutitermitinae) como inquilino de *Embiratermes neotenicus* (Termitidae: Syntermitinae) en la Amazonia Colombiana

RESUMEN

Reportamos por primera vez la presencia de la termita *Ereymatermes rotundiceps* Constantino, 1991 como inquilino de *Embiratermes neotenicus* (Holmgren, 1906) en la Amazonia Colombiana y aportamos nueva información morfológica para las especies. Soldados de *E. rotundiceps* fueron recolectados en nidos epigeos construidos por *E. neotenicus* en pasturas durante la transición de la estación seca a la lluviosa. La asociación entre las termitas hospederas e inquilinas parece no ser antagónica, sin embargo, las relaciones entre estas dos especies están aún por esclarecer.

PALABRAS CLAVE: Nasutitermitinae, montículos, Syntermitinae, sistema ganadero, termitas

The genus *Ereymatermes* (Termitidae: Nasutitermitinae) includes three described species: *Ereymatermes rotundiceps* Constantino, 1991, from forests of the lower Japurá River region, Amazonas, Brazil; *E. panamensis* Roisin, 1995, from the Panama Canal area, and *E. piquira* Cancelló & Cuezco, 2007, from the Atlantic Forest. Although the genus was described as related to the other Neotropical genera of soil-feeding nasutes, Cancelló and Cuezco (2007) suggest that they probably do not feed at the end of the humification gradient, based on the morphology of the worker and their subterranean habit.

Ereymatermes is part of a very poorly known group, mainly due to the small size and subterranean habits of some species (Constantino 1991). However, *E. rotundiceps* is known for being an inquiline of nests built by other termite species (Martius 1997). In fact, the type species was collected in arboreal earthen termitaria built by an undescribed soldierless Apicotermitinae (Constantino 1991). Yet no previous records existed of *E. rotundiceps* in mounds built by *Embiratermes neotenicus* (Holmgren, 1906).

The genus *Embiratermes* (Termitidae: Syntermitinae) was proposed by Fontes (1985) including 11 species previously described as *Armitermes*. Currently the genus includes 14

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species (Constantino 2020) of which some seem to live in nests built by other species (Constantino 1992). *E. neotenicus* builds an epigeal mound, with a high proportion of organic matter (Mathews 1977) and is one of the most abundant termite species in the Colombian amazon (Duran-Bautista *et al.* 2020).

In the Colombian Amazon, the presence of *E. rotundiceps* has been reported in different locations without details on the capture method (Castro *et al.* 2021). Here we report, for the first time, the presence of *E. rotundiceps* as an inquiline of *E. neotenicus* and provide new morphometric information for these species.

Sampling was carried out in pastures in El Doncello municipality, Caquetá, Colombia (1° 40'-1°41'N, and between 75°16'-75°17'W). The average temperature in the area is 26 °C, average annual rainfall is 3,540 mm, and 82% relative humidity. Forty-five plots of 20 x 20 m (400 m²) were established. In each plot, all epigeal mounds were counted and geo-referenced. Abandoned mounds were not included. Samples of termites found in the mounds were collected and preserved in 80% ethyl alcohol for subsequent taxonomic identification.

The biological material was deposited in the entomological collection (Colección taxonómica central en líquido) of the Entomology Laboratory of Universidad de la Amazonia (LEUA) and was identified to genus level with the taxonomic key of Constantino (2002) for neotropical termites. Identification at species level was based on soldier caste morphology. For *E. rotundiceps*, we used the type species description (Constantino 1991), and for *E. neotenicus*, the diagnoses by Holmgren (1906) and Emerson (1925).

The following morphometric measurements were taken for nine soldiers of *E. rotundiceps* and 10 of *E. neotenicus*: total length (from nasus apex to posterior margin of the last abdominal tergite); head length with nasus (from nasus apex to head posterior margin); head width (from left cephalic margin to right cephalic margin); pronotum width (between the lateral margins); nasus length (from nasus apex to its base); and hind tibia length (from tibia base to its apex). The head length to post-clypeus apex was measured only for *E. rotundiceps*, and determined the relationships: head length with nasus to head width; head length without nasus to head width; nasus length to head length without nasus; and, specifically for *E. neotenicus*, head length to mandible lateral base and head height.

In addition, only for *E. neotenicus*, we measured head height (from upper margin of vertex to lower margin of postmentum); head length to lateral base of mandible (from upper margin of the vertex to base of the mandibular crease). Only for *E. rotundiceps*, we determined the ratio of head length to head width; between head length at the post-clypeus apex

and head width; and between nasus length and head length without nasus.

Morphological measurements were done with an OLYMPUS SZ61 stereoscope with an ocular micrometer model U-OCMC10/100X and OLYMPUS 110AL2X-2 auxiliary lens. Photographs of the specimens were taken under a stereomicroscope Leica M205A, using a camera Leica DFC450.

A total of 219 mounds were sampled, of which 32 were of *E. neotenicus* and only two were occupied by *E. rotundiceps* as inquiline. We collected a single soldier in the first one, and eight soldiers in the second.

Ereymatermes rotundiceps Constantino, 1991

Diagnostic features. Soldier caste: Total length (average \pm SD) = 4 ± 0.1 mm, which is new morphometric information for the species, as the original description did not include length measurements. Cephalic capsule yellow, 0.86 ± 0.04 mm wide, rounded, without constriction, head top with sparse medium to long bristles and numerous microscopic hairs, head length with nasus = 1.46 ± 0.07 mm, which is shorter than in the original description (Table 1; Figure 1a). Nasus slender, long, cylindrical, yellow-brown and slightly upward oriented in profile, covered with dense microscopic hairs, becoming longer towards the apex (Figure 1b). Small labrum, much wider than long, with rounded sides and forward-oriented. Vestigial mandibles without observable tips. Antenna with 12 segments, pronotum much narrower than head. Tergites and sternites with numerous short bristles on the surface and a row of long bristles on posterior margin. Legs covered with numerous hairs and some bristles, tibial spurs 2: 2: 2 (Figure 1c).

Specimens examined: LEUA 13765, 09.iv. 2021, 8 soldiers, Colombia, Caquetá, El Doncello, Village La Granada,

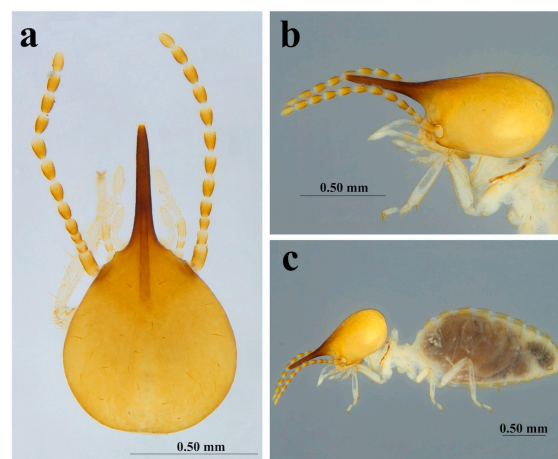


Figure 1. Specimen of *Ereymatermes rotundiceps* collected in a mound of *Embiratermes neotenicus* in a pasture in the Colombian Amazon. A – dorsal view of head; B – specimen lateral view; C – lateral view of head. This figure is in color in the electronic version.

Table 1. Measurements of morphological traits of nine soldiers of *Ereymatermes rotundiceps* and 10 soldiers of *Embiratermes neotenicus* collected in pasture in the Colombian Amazon. Original measurements were taken from Constantino (1991) and Holmgren (1906), respectively.

Morphological trait	Mean	Standard deviation	Minimum	Maximum	Original measurements
<i>Ereymatermes rotundiceps</i>					
Total length (mm)	4.0	0.10	3.93	4.24	Not provided
Head length to post-clypeus apex (mm)	0.98	0.05	0.92	1.08	0.92 - 1.00
Head length with nasus (mm)	1.46	0.07	1.39	1.54	1.54 - 1.62
Head width (mm)	0.86	0.04	0.77	0.92	0.88 - 0.96
Pronotum width (mm)	0.43	0.03	0.36	0.46	0.46 - 0.48
Hind tibia length (mm)	0.80	0.02	0.78	0.83	0.81
Head length with nasus to head width	1.72	0.12	1.50	1.90	1.69 - 1.80
Head length without nasus to head width	1.15	0.07	1.08	1.27	1.04 - 1.09
Nasus length to head length without nasus	0.49	0.10	0.29	0.58	0.62 - 0.69
Nasus length (mm)	0.48	0.08	0.31	0.54	Not provided
<i>Embiratermes neotenicus</i>					
Total length (mm)	5.25	0.48	4.33	5.86	5.00 - 6.50
Head length with nasus (mm)	2.36	0.10	2.23	2.47	2.30
Head length to mandible lateral base (mm)	1.28	0.12	1.05	1.40	Not provided
Head width (mm)	1.32	0.08	1.20	1.44	1.26
Head height (mm)	1.06	0.08	0.95	1.25	Not provided
Pronotum width (mm)	0.76	0.05	0.7	0.8	0.75 - 0.77
Hind tibia length (mm)	0.82	0.11	0.65	0.98	1.12
Nasus length (mm)	0.78	0.05	0.69	0.86	0.85

Farm El Peñón, (1.7055N, -75.2580W), 315 m, coll. E. Duran, id. E. Duran. / LEUA 13766, 09.iv. 2021, 1 soldier, Colombia, Caquetá, El Doncello, Village La Granada, Farm El Peñón, (1.7046N, -75.2587W), 317m, coll. E. Duran, id. E. Duran.

Notes: Soldiers were collected in epigeal mounds built by *E. neotenicus* in pastures of *Brachiaria* spp. and dispersed *Zygia* sp. trees during the transition from the dry to the rainy season.

***Embiratermes neotenicus* (Holmgren, 1906)**

Diagnostic features. Soldier caste: Total length = 5.25 ± 0.48 mm (Table 1). Rectangular cephalic capsule yellow with rounded sides and a few scattered bristles (Figure 2a). Nasus conical, wide at the base, light-brown, not extending beyond the tip of mandibles, extended in dorsal view, slightly convex in profile view, and covered with short hairs at the apex (Figure 2b). Labrum with a rounded triangular tip. Long, strongly curved mandible with an acute anteriorly oriented marginal tooth close to the middle part of mandible. Antennas with 14 segments, pronotum with bristles on the anterior and posterior margin. Abdominal tergites and sternites with scattered bristles on the surface (Figure 2c). We provide new morphometric information on head height and head length to the mandible lateral base, which is not included in the original description of the species.

Specimens examined: LEUA 14028, 09.iv. 2021, 7 soldiers, 7 workers, Colombia, Caquetá, El Doncello, Village

La Granada, Farm El Peñón, (1.7055N, -75.2580W), 315 m, coll. E. Duran, id. E. Duran. / LEUA 14029, 09.iv. 2021, 3 soldiers, 8 workers, Colombia, Caquetá, El Doncello, Village La Granada, Farm El Peñón, (1.7046N, -75.2587W), 317 m, coll. E. Duran, id. E. Duran.

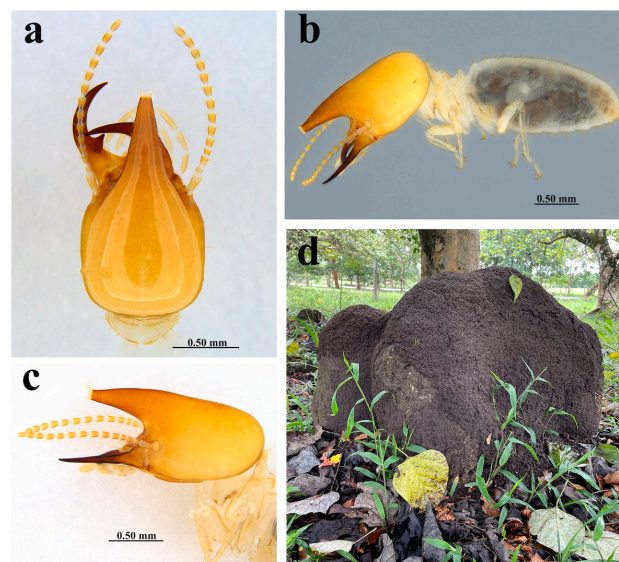


Figure 2. Specimen of *Embiratermes neotenicus* collected in a pasture in the Colombian Amazon. A – dorsal view of head; B – specimen lateral view; C – lateral view of head; D – epigeal mound of *E. neotenicus*. Mound dimensions: height = 0.20 m; width = 0.44 m; base perimeter = 1.29 m. This figure is in color in the electronic version.

Notes: Soldiers were collected in epigeal mounds (Figure 2d) in pastures of *Brachiaria* spp. and dispersed *Zygia* sp. trees during the transition from the dry to the rainy season.

The little information for the Colombian Amazon region indicates a high diversity of termites (Castro et al. 2021; Duran-Bautista et al. 2020). The presence of *E. neotenicus* and *E. rotundiceps* had already been reported in this region by Castro et al. (2021), but no co-habitation between these two species had been observed.

Embiratermes neotenicus builds an epigeal mound of variable shape, sometimes at the bases of trees with a uniform internal structure consisting of abundant, wide and interconnecting galleries, separated by rather thick walls and with high organic matter content (Mathews 1977; Constantino 1992). These characteristics would favor the presence of other termite species, as in the mounds of *Cornitermes cumulans* (Kollar, 1832) (Marins and DeSouza 2008; Costa et al. 2009) or *Labiotermes labralis* (Holmgren, 1906) (Hellemans et al. 2019), where other termite species were observed feeding on wall and floor material. Yet the presence of inquiline species is unusual in *E. neotenicus* (Mathews 1977).

We do not have evidence that *Ereymatermes* were feeding on the *Embiratermes* mound structure, and this association between host and inquiline termites does not seem to be antagonistic. This is in agreement with current evidence that inquiline termites frequently exhibit peaceful behavior towards their hosts, avoiding rather than taking part in open conflict (Hugo et al. 2020). Nevertheless, the relationships between these two species needs to be clarified in further studies.

Our morphometric data for head width and length, nasus length, and pronotum width coincide with other authors (Constantino 1991; Roisin 1995), and we provide new measures not included by these authors, who only mentioned that *Ereymatermes* species are small in size, without providing information on total length.

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