



RESEARCH ARTICLE - TERMITES

Chasitermes tupan, a New Species of Apicotermittinae (Blattodea, Termitidae) from the Amazon Rainforest, with Addition to the Diagnosis of the Genus

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Abstract

Most genera of Apicotermittinae described in the Neotropics are still regarded as monotypic. In this paper, we describe a second species for the so far monotypic genus *Chasitermes*: *Chasitermes tupan* sp. nov., discovered in the Amazon Rainforest. The worker is characterized by external features, such as a strongly dilated tibia, and internal features, such as a very dilated first proctodeal segment and long enteric valve seating. The description of this new taxon within the Apicotermittinae emphasizes the diversity of species of this subfamily, which remains largely unexplored in the Neotropics.

Introduction

The past 15 years witnessed the description of many new species and genera of neotropical Apicotermittinae (Blattodea, Isoptera), highlighting the diversity of this group, which remains poorly known (Carrijo et al., 2023). In the Amazon rainforest, Apicotermittinae represents 16 to 47% of species richness (Bourguignon et al., 2016). This rich diversity is represented by the new genera described in just the last three years, *Caputitermes* Almeida-Azevedo et al., 2023, *Chasitermes* Scheffrahn & Carrijo, 2023, *Mangolditermes* Scheffrahn, Carrijo & Castro, 2023, *Hirsutitermes* Scheffrahn, Carrijo & Castro, 2023, *Krecekitermes* Scheffrahn, Carrijo & Castro, 2023, *Ourissotermes* Scheffrahn, Carrijo & Castro, 2023, *Triclavitermes* Ferreira, Carvalho & Vasconcellos, 2025, *Tucupitermes* Almeida-Azevedo, Acioli & Azevedo, 2025 and *Spiralitermes* Almeida-Azevedo & Azevedo, 2026.

The lack of knowledge on this group is largely due to the time and expertise required to study and accurately describe the anatomy and taxonomy of soldierless termites, which has historically limited research on this subfamily (Bourguignon et al., 2010; Almeida-Azevedo et al., 2023; Carrijo et al., 2023). The primary diagnostic features that differentiate these genera are in the digestive tube, including the mesenteric tongue, first proctodeal segment, enteric valve seating, and the enteric valve itself (Rocha et al., 2019). The intricate combination of these characteristics allows the definition and classification of genera and species within Apicotermittinae. The mesenteric tongue can vary in shape, being long (*Mangolditermes* Scheffrahn, Carrijo & Castro), short (*Ourissotermes* Scheffrahn, Carrijo & Castro), or diverticulum-shaped (*Anoplotermes* spp.). The first proctodeal segment may be tubular (*Caputitermes* Almeida-Azevedo) or display pronounced folds in some instances (*Grigiotermes* Mathews



1977; *Chasitermes* Scheffrahn & Carrijo 2023). The shape and size of the enteric valve seating can differ significantly. In comparison, the enteric valve exhibits a wide range of ornamental features that can serve as diagnostic characteristics for genera and species.

The workers in this group feed on organic matter found in the soil or leaf litter (Donovan, 2002; Acioli & Constantino, 2015) and play a vital role in the decomposition and recycling of plant material in tropical forest soils (Jouquet et al., 2011; Bourguignon et al., 2016). However, there is little data on the biology of Apicotermitinae, as they are soil termites. For example, *Chasitermes* Scheffrahn & Carrijo 2023, a soldierless termite described from the island of Trinidad and Tobago, has a diverticulum-shaped mesenteric tongue, a first proctodeal segment with folds and a very long enteric valve seat, and an enteric valve with rectangular lobes and rectangular, fringed scales. Furthermore, this termite has a characteristic kidney-shaped paunch that, until now, has not been recognized as a diagnostic feature of the genus. Therefore, in this study, we describe *Chasitermes tupan* **sp. nov.**, a new soldierless termite species from the Amazon rainforest. Furthermore, we present an enhanced diagnosis of the genus.

Material and Methods

Samples were collected using entomological tweezers and stored in bottles containing 80% alcohol. The samples were initially deposited in the Laboratory of Systematics and Ecology of Soil Invertebrates, of the National Institute of Amazonian Research, INPA. The holotype, in a bottle separated from the rest of the sample, and paratypes are deposited at the Invertebrate Collection of the National Institute of Amazonian Research. The samples from Colombia were deposited in the Forest Entomological Collection.

Both external and internal characters of the worker caste were described. The specimens were dissected following the method described by Almeida-Azevedo et al. (2023). A total of 15 individuals from each colony were dissected, all of which followed the same pattern of internal characteristics. The terminology of mandibles is based on Fontes (1987), while the description of the digestive tube follows the guidelines established by Noirot (2001). The following morphometric characters were measured for workers, with the numbers in parentheses corresponding to the character measurement codes established by Roonwal's system (Roonwal, 1970), when applicable: LH, length of the cephalic capsule until the apical end of the clypeus (8); WH, maximum width of head (17); LT, length of hind tibiae (85); Width of fore tibia (86); WP, median pronotum width (68); Length of postclypeus (34); Width of postclypeus (35); Fore tibia width: length ratio.

The external and internal morphology was photographed with a Leica DFC295 camera attached to an M205 stereo microscope. The images of the Malpighian tubes and the stomodeal valve were edited using Inkscape version 1.4. The measurements were made with an ocular micrometer attached

to a stereo microscope. Finally, the distribution map was created using the SimpleMappr program (Shorthouse, 2010).

Taxonomy

Chasitermes Scheffrahn & Carrijo, 2023

Type-species. *Chasitermes pax* Scheffrahn & Carrijo

Diagnosis update. Unsclerotized rectangular enteric valve cushions, a tubular extension of seating, a prominent spherical mesenteric tongue, and a paunch with a strong curvature resembling a kidney.

Chasitermes tupan Almeida-Azevedo & Azevedo **sp. n.** (Figs 1, 2 and 3)

Zoobank link. <https://zoobank.org/References/42BB8E10-EB05-4AD7-8A80-5261BC8495D5>

Holotype. Worker, in 80% alcohol, separated in a microtube. Original label: Brasil, Roraima, Amajari, Maracá, L6 1500 (130-135), 3°21'35.3"N 61°27'20"W, Coleta manual, 01-17.ix.2012, C.S Dambros col. The holotype was deposited at the Invertebrate Collection of the National Institute of Amazonian Research – INPA (INPA-ISO 000009) (in a bottle separated from the rest of the sample).

Paratypes. 20 workers of the same colony as the holotype and with the same data as the holotype; were deposited in the Invertebrate Collection of the National Institute for Amazonian Research – (INPA-ISO 000015).

12 workers, original label: Brasil, Roraima, Amajari, Maracá, L5 0500 (230-235), 3°22'8"N 61°26'47.6"W, Coleta manual, 01-17.ix.2012, C.S Dambros col.; was deposited in the Invertebrate Collection of the National Institute for Amazonian Research – (INPA-ISO 000016).

10 workers, original label: Brasil, Roraima, Amajari, Maracá, L6 0500 (80-85), 3°21'35.2"N 61°26'47.7"W, Coleta manual, 01-17.ix.2012, C.S Dambros col.; was deposited in the Invertebrate Collection of the National Institute for Amazonian Research – (INPA-ISO 000017).

20 workers, Colombia, Meta, Cabuyaro, 4.3518; -72.8502 18-XII-2023. O. Pinzón, G. Moreno, G. Mejía col. Inventory number: CEFUD 2023-1063.

Etymology. The epithet originates from “*Tupã*,” which means “spirit of thunder and lightning”, derived from the indigenous Tupi-Guarani word.

Species diagnosis. Protibia strongly dilated, approximately twice the width of the femur (Fig 1D). Crop small (Fig 2A-D); First proctodeal segment (P1) dilated throughout its entire extension (Fig 2C). Enteric valve seating long and dilated, wider than P4 but thinner than the P1, and visible in dorsal, right, and ventral views (Fig 2A-C).

Imago. Unknown.

Worker. Head capsule yellowish and moderately covered with setae of varying lengths over its entire surface (Fig 1B). Fontanelle conspicuous and whitish (Fig 1B). Post-clypeus

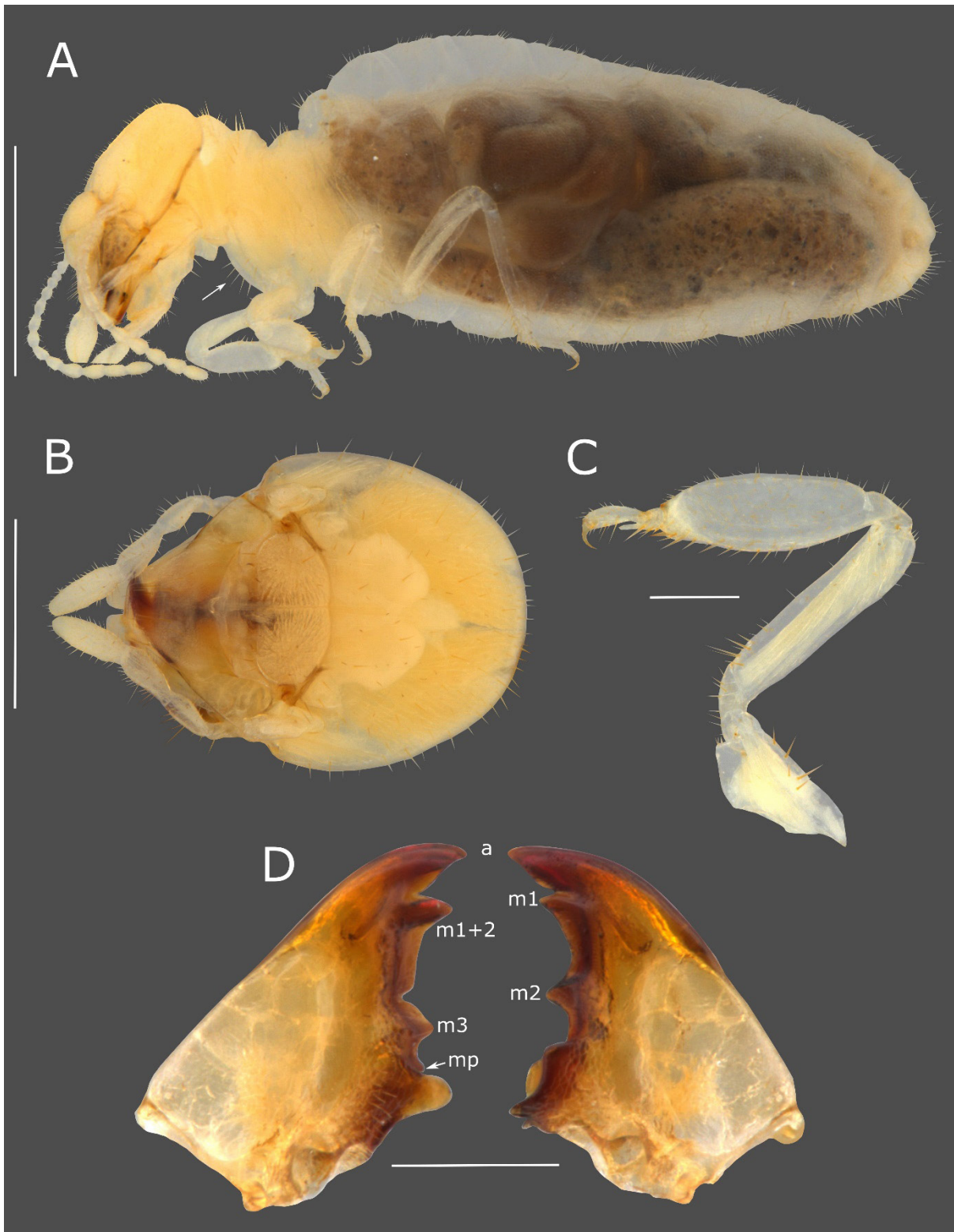


Fig 1. *Chasitermes tupan* sp. nov. A: Habitus, lateral view. B: Head, dorsal view. C: Tibiae and femur, anterior surface. D: Mandibles, dorsal view. Scale bar: A = 1 mm, B = 0.5 mm, C–D = 0.2 mm.

slightly inflated with few bristles of the same thickness as the head capsule. Labrum unilobed with setae that are similar in thickness to those found on the head capsule. Antenna with 13 antennomeres: $I > II = III < IV < \text{the remaining segments}$. Mandibles with very prominent apical teeth in comparison to the other mandibular structures (Fig 1D); left mandible with

apical tooth wider than M1+2; left mandible with triangular M1+2, approximately $3/4$ of the length of the apical tooth; premolar process smaller than M3 (Fig 1D). Right mandible with an apical tooth as long as that of the left but narrower; Length of M1 approximately $1/4$ of the length of the apical tooth; M1 approximately the same size as M2 (Fig 1D).

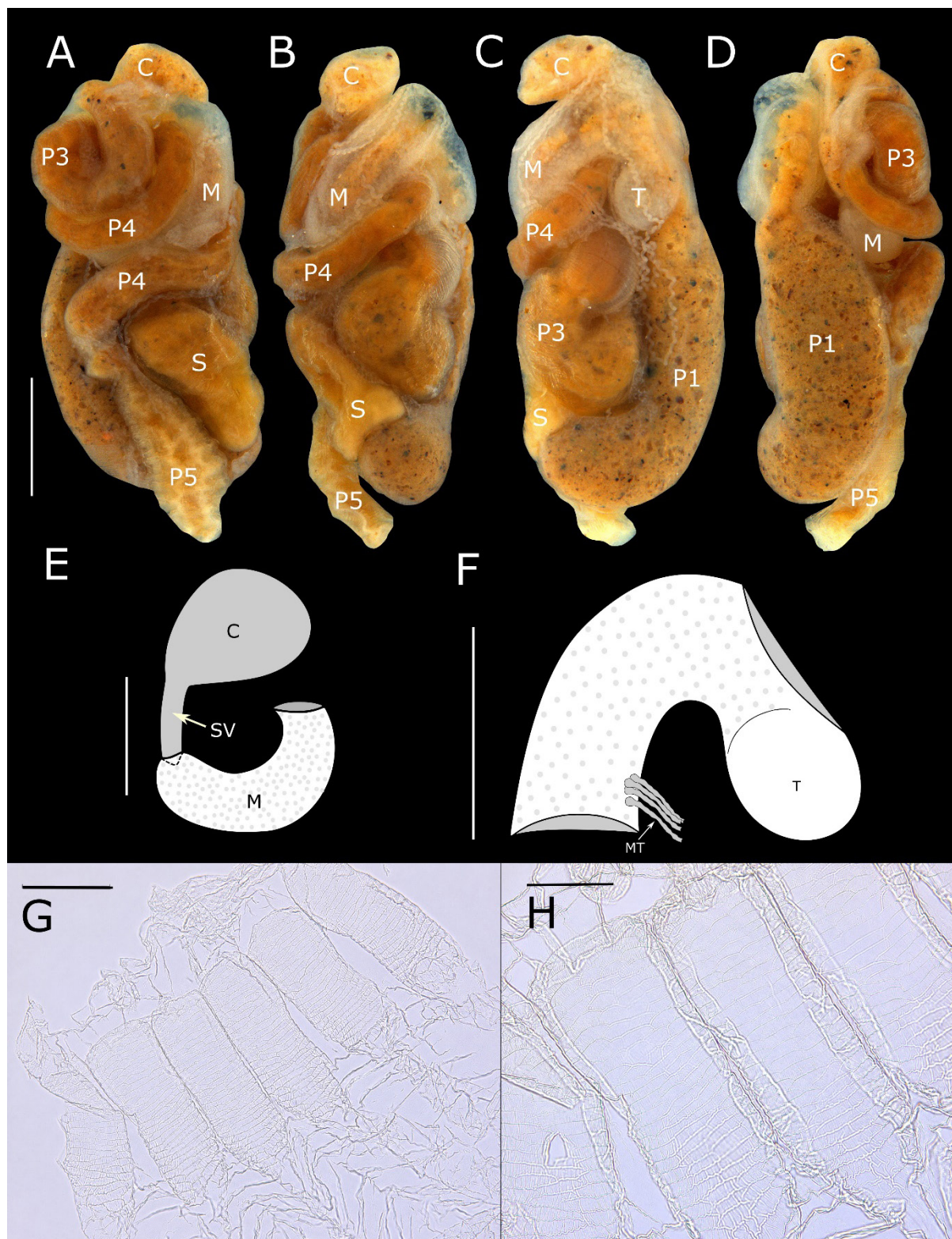


Fig 2. Digestive tube of *Chasitermes tupan* sp. nov. A–D: Digestive tube. A: Dorsal view. B: Right lateral view. C: Ventral view. D: Left lateral view. E: Stomodeal valve. F: Malpighian tubes and Mesenteric tongue. G–H: Enteric valve. C = crop, M = mesenteron, P1 = first proctodeal segment, P3 = paunch, P4 = colon, P5 = rectum; T = tongue; SV = Stomodeal valve; S = Seating. Scale bar: A–F = 0.5 mm, G = 100 μ m, H = 50 μ m.

Thorax whitish, pro- meso- and metanotum each with a long setae along the edges. Protibia strongly inflated about twice the width of the femur (Fig 1C); tibia covered with many setae of varying lengths and thicknesses; tibia with an

irregular row of spines (Fig 1C). Procoxae with a longitudinal row of four to five long setae on the anterior surface (Fig 1A, arrow). Abdomen translucent, tergites and sternites sparsely covered with setae of different sizes. The measurements (in millimeters) of 20 workers are provided in Table 1.



Fig 3. Location of the *Chasitermes tupan* **sp. nov.** and *Chasitermes pax* samples. This figure is in color in the electronic version.

Digestive tube. Crop small and located immediately after the thorax, narrowing toward the gizzard (Fig 2A, D). Gizzard vestigial (Fig 2A). Stomodaeal valve moderately long, approximately the same length as the isthmus, located between the gizzard and the mesenteron (Fig 2D, E). Mesenteron with part of its width covered by P4 in dorsal and right views (Fig 2A, B); mesenteric tongue prominent, covering about half of P1 length (Fig 2C). Four Malpighian tubules with independent insertions and bases close to each other (Fig 2F). P1 begins on the right side of the body in ventral view and connects to P3 on the right side (Fig 2C); P1 greatly dilated, approximately three times the width of P4, visible in ventral and left lateral views (Fig 2C, D); P1 with a strong constriction at its apex, visible in ventral and left views (Fig 2C, D). Enteric valve seating (EVS) very long, approximately half the width of P1, visible in dorsal, right, and ventral views (Fig 2A-C); EVS trilobed. P3 with a strong curvature resembling a kidney (Fig 2B, C). Enteric valve with six rectangular-shaped lobes, not sclerotized, composed of folded or fringed scales (Fig 2G, H).

Biological Notes. Workers were collected at the Maracá Ecological Station (Fig 3). The vegetation in this area is characterized by Open Ombrophilous Forest, Seasonal Deciduous Forest, Seasonal Semideciduous Forest, as well as “Buritizais”, wetlands, and small patches of Savanna. In Colombia (Fig 3), workers were manually collected in a relic gallery forest of the Orinoquia region. No additional biological data from the collections are available.

Comparisons

The new species described in this paper belongs to the genus *Chasitermes*, as it exhibits all the diagnostic characteristics of the genus. The new species, *C. tupan* **sp. nov.**, shares similarities with the only other species described in the genus,

Chasitermes pax Scheffrahn & Carrijo 2023, particularly in the internal morphology of the gut. Both species have a globular mixed segment, the first proctodeal segment with a constriction immediately after its connection to the mesenteron, an extremely long enteric valve seating (EVS), and a paunch with a strong curvature resembling a kidney. Until this paper, this feature was only described for this genus within Neotropical Apicotermitinae. The paunch shape was not included in the generic and specific diagnoses of *Chasitermes*, but it can be observed in both species. Therefore, we added this characteristic and updated the genus diagnosis.

Regarding the differences between *C. tupan* **sp. nov.** and *C. pax*, the former species has a more strongly inflated anterior tibia than the latter. The P1 of the new species is significantly more inflated than in *C. pax* and is more similar to the inflated P1 of *Grigiotermes* species. However, the EVS of *C. tupan* **sp. nov.** is long, expanded, and trilobed, whereas the valve lacks the armature present in *Grigiotermes*.

Table 1. Measurements (mm) of *Chasitermes tupan* **sp. nov.** workers.

Parameter (mm)	Maximum	Minimum	Mean of 15 workers
Length of head to lateral base of mandibles	0.85	0.73	0.81
Maximum head width	0.87	0.8	0.85
Length of hind tibia	0.78	0.6	0.7
Length of postclypeus	0.29	0.19	0.24
Width of postclypeus	0.53	0.36	0.45
Length of fore tibia	0.63	0.53	0.6
Width of fore tibia	0.26	0.19	0.22
Fore tibia width: length ratio	0.41	0.35	0.36
Number of individuals	20		

Discussion

Chasitermes tupan **sp. nov.** is described from Maracá, in the state of Roraima, Brazil, and Cabuyaro, Colombia, whereas *C. pax* was described from the island of Trinidad. This island has many described species of Apicotermittinae found across the Neotropical region. These include *Aparatermes silvestrii* (Emerson, 1925), *Aparatermes thornatus* Pinzon & Scheffrahn, 2019, *Mangolditermes curveileum* Scheffrahn, Carrijo & Castro, 2023, *Hirsutitermes kanzakii* Scheffrahn, Carrijo & Castro, 2023, *Ruptitermes krishnai* Acioli & Constantino, 2015, and *Anoplotermes* spp. Therefore, it is a place with high soil termite diversity.

Chasitermes tupan **sp. nov.** displays several distinct external and internal morphological features when compared with *C. tupan*, including a strongly dilated anterior tibia and first proctodeal segment. Additionally, it has notable internal characteristics, including a greatly dilated first proctodeal segment, a long enteric valve seating, and a paunch with a pronounced curvature resembling a kidney. This last feature can serve as a diagnostic for the genus *Chasitermes*. Together, these traits confirm that *C. tupan* **sp. nov.** is a new species from the Amazon Forest.

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Authors' Contributions

R.A.-A.: conceptualization, methodology, investigation, writing-original draft, writing-review & editing.

R.A.-A.: conceptualization, methodology, editing, investigation, writing-original draft, writing-review & editing.

T.F.C.: writing-original draft, writing-review & editing.

O.P.F.: writing-original draft, writing-review & editing.

J.W.M.: writing-original draft, writing-review & editing.

All authors gave final approval for publication.

Declaration on Conflict of Interest

The authors declare no conflicts of interest.

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