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Número 2

Notes on *Cyranotermes* Araujo, with Description of a New Species (Isoptera, Termitidae, Nasutitermitinae)

Reginaldo Constantino

Número 3

***Anhangatermes macarthuri*, a New Genus and Species of Soil-feeding Nasute Termite from Amapá, Brazil (Isoptera, Termitidae, Nasutitermitinae)**

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Notes on *Cyranotermes* Araujo, with Description of a New Species (Isoptera, Termitidae, Nasutitermitinae).

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ABSTRACT - *Cyranotermes glaber*, a new species of termite from eastern Amapá State, Brazil is described. A key based on the soldier caste is provided for the identification of the three known species of *Cyranotermes*. Drawings of the soldier's head of the three species, the worker's head and mandibles of *C. glaber*, and the enteric valve armature of *C. glaber* and *C. caete* are presented. The nests of *C. glaber* and *C. caete* are described, with drawings of the former.

KEY WORDS: *Cyranotermes*, Isoptera, Termitidae, Nasutitermitinae, termites, taxonomy.

RESUMO - *Cyranotermes glaber*, nova espécie de cupim do Leste do Estado do Amapá, Brasil é descrita. É fornecida uma chave baseada nos soldados para a identificação das três espécies conhecidas de *Cyranotermes*. São apresentados desenhos da cabeça dos soldados das três espécies, da cabeça e das mandíbulas do operário de *C. glaber*, e da armadura da válvula entérica de *C. glaber* e de *C. caete*. Os ninhos de *C. glaber* e de *C. caete* são descritos, com desenhos do primeiro.

PALAVRAS-CHAVE: *Cyranotermes*, Isoptera, Termitidae, Nasutitermitinae, cupins, taxonomia.

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INTRODUCTION

Cyranotermes Araujo, 1970 was described including only one species, *C. timuassu*, a soil-feeding nasute found in the cerrado vegetation of Central and Southeastern Brazil in mounds constructed by other species, mainly *Cornitermes* spp. A second species, *C. caete* Cancelló, 1987, is known only from the forests of the Serra dos Carajás, Pará State, Brazil. The curious nest of *C. timuassu* was described by Mathews (1977) as: "The peculiar nest of this species, made in the mineral soil of termite mounds of other species, consist of a series of flask-like cells (1-2 cm diameter) which the termites enter through a termite-sized hole down the middle of an inwards turned neck with a widened flange at its opening inside the flask". Drawings of the nest of *C. timuassu* may be found in Cancelló (1987).

Based on the morphology of the worker digestive tube, Fontes (1987a) concluded that *Cyranotermes* is "quite distinct from the other 13 genera of soil-feeding nasutes from the Neotropical and Ethiopian Regions", although the worker mandibles are similar to that of the Ethiopian genera *Postsubulitermes*, *Mimeutermes* and *Tarditermes*. The phylogenetic relations of *Cyranotermes* are still unclear.

Here I describe a new species of *Cyranotermes* from Amapá State, Brazil and the nest and enteric valve armature of *C. caete*. A key based on the soldier caste is provided for the identification of the 3 known species of the genus. The terminology used in this paper for the mandibles and digestive tube is the same as Fontes (1987 a,b).

KEY TO THE SOLDIERS OF *Cyranotermes*

1. Head with four bristles on vertex and several ones at tip of nasus (Figs. 1 and 4) *C. timuassu*
 Head without bristles on vertex and with only four bristles at tip of nasus 2
2. Ratio length of nasus / length of head without nasus less than or equal to 1.0. Head capsule rounded from dorsal view (Figs. 2 and 5) *C. glaber*, sp. n.
 Ratio length of nasus / length of head without nasus greater than 1.2; head capsule elongated from dorsal view (Figs. 3 and 6)... *C. caete*

Cyranotermes caete Cancelló
Cyranotermes caete Cancelló, 1987:253-255.

SOLDIER - figs. 3 & 6.

WORKER - enteric valve armature (fig. 12) similar to *C. glaber*, but with smaller swellings.

NEST - I collected the type material of this species. In my field notes the nest is described as interconnected subterranean flask-like cells of 3 cm diameter made of soil. In the notes of lot number MPEG 2444 the nest is described as: "subterranean, rounded cells found at 5 centimeters below ground with 3 to 4 cm diameter and a distance of about 10 centimeters between 2 cells; immature individuals were found but the royal pair was not" (my translation from the Portuguese).

MATERIAL EXAMINED - BRAZIL. Pará State, Serra Norte, Carajás. Lot number MPEG 3310 in the collection of Museu Paraense Emílio Goeldi, VII.1985, R. Constantino col. (= part of lot number MZUSP 8711 in the collection of Museu de Zoologia da Universidade de São Paulo; paratypes soldiers and workers); nr. MPEG 2444, 26.I.1986, A.G. Bandeira col.

Cyranotermes glaber, sp. n.

TYPE MATERIAL - BRAZIL. Amapá State, Macapá, Parque Zoobotânico. Type colony nr. MPEG 3250 (holotype soldier and paratypes soldiers and workers), 29.X.1989, R. Constantino col.; nr. MPEG 3237 (paratypes soldiers and workers), 28.X.1989, R. Constantino col.; part of lot MPEG 3237 deposited in the collection of Museu de Zoologia da USP under nr. MZUSP 9221 (paratypes soldiers and workers).

IMAGO - Unknown.

SOLDIER (Figs. 2 & 5) - Head capsule rounded from dorsal view, widest in the middle. Nasus conical. Labrum short and wide. Vestigial mandibles without points. Antenna with 13 segments: I the largest one, III larger than II, IV, V and VI, IV the smallest one, V larger than II, VI larger than V, and the following segments about the same length. Anterior margin of pronotum rounded, with very slight incision in the middle. Head capsule without hairs or bristles. Nasus with 4 bristles and a few very

short hairs on tip. Postmentum without bristles. Pronotum with numerous short hairs on anterior margin. Legs with scattered bristles; tibiae with spines (approximately 10). Tibial spurs 2:2:2. Four distal tergites with scattered bristles, and the remainder without bristles. Sternites with scattered bristles on surface and a row of long bristles on posterior margin. Head capsule yellow to orange yellow. Nasus ferruginous orange, darker toward tip. Antennae orange. Pronotum yellow. Tergites and sternites yellowish, transparent.

Measurements (in millimeters) of 10 soldiers from the 2 samples: 1. length of head to tip of nasus 1.80-1.98; 2. length of nasus 0.86-0.99; 3. width of head 0.80-0.86; 4. width of pronotum 0.50-0.53; 5. length of hind tibia 1.18-1.23.

WORKER (Figs. 7-11) - Monomorphic. Head as in Figs. 7 & 8. Antenna with 14 segments. Postclypeus inflated. Head with scattered bristles and some short hairs. Postclypeus with four bristles. Labrum with 8 bristles. Tergites and sternites with hairs and short bristles on surface. Sternites with a row of long bristles on posterior margin. Head, pronotum and legs yellowish white and abdomen transparent. Mandibles as in Figs. 9 & 10. Left mandible index about 1.7. Enteric valve armature well sclerotized, 3 swellings of 1st order alternating with 3 swellings of 2nd order, all with a rigid flange which projects into the lumen of the valve. Margins of the flanges with about 30 spines on swellings of 1st order and about 20 spines on swellings of 2nd order (Fig. 11).

COMPARISONS - *C. glaber* is closely related to *C. caete* as indicated by the similarities of the mandibles and enteric valve armature of their workers and the chaetotaxy of their soldiers. The soldier of *C. caete* is distinguished by its narrower head and proportionally longer nasus and legs. The enteric valve armature of *C. caete* is similar, but the swellings are smaller, with less numerous spines and with less difference between swellings of 1st and 2nd order (Fig. 12). The soldier of *C. timuassu* is easily distinguished by its larger size, the presence of 4 bristles on the top of the head and of more numerous bristles on the tip of the nasus. The worker's mandibles of *C. timuassu* have larger apical teeth (left mandible index about 2.6) and the enteric valve armature has larger swellings, with larger spines.

BIOLOGY - *C. glaber* was collected in disturbed forest of the eastern region of Amapá State. The nests were found under rotten logs, a few centimeters below ground, and consist of a series of interconnected flask-like cells (Figs. 13 & 14) about 5 cm of diameter, with many fine roots. This species, like the others of the genus, is a humus feeder.

ETYMOLOGY - The specific name derives from *glaber* (L., "hairless").

Cyranotermes timuassu Araujo

Cyranotermes timuassu Araujo, 1970:366; Mathews, 1977:239 (redescription); Canello, 1987:251 (nest); Fontes, 1987a (digestive tube); 1987b (imago and worker mandibles).

SOLDIER - figs. 1 & 4.

MATERIAL EXAMINED - BRAZIL. Mato Grosso State, Chapada dos Guimarães. Lot nr. MPEG 3311, 12.II.1976, R.L. Araujo col. (= part of lot nr. MZUSP 6735).

DISCUSSION

Cyranotermes is a well-defined genus. The shape of soldier head and the very long nasus recalls *Angularitermes*, which is easily distinguished by the points of the mandibles and the numerous bristles on the head. The peculiar nests of the 3 known species are unique and no similar construction is known among Neotropical termites. The nest may be considered as an apomorphic character of the genus.

The incomplete marginal dentition of the worker mandible is similar only to some Ethiopian genera, but an undescribed species (and probably new genus) that I collected in Amapá (lot nr. MPEG 3267) has almost identical worker mandibles and enteric valve armature to *Cyranotermes* though the soldier's head has a much different shape.

C. caete and *C. glaber* seem to be more closely related than either is to *C. timuassu*. This is indicated by the similarities of the mandibles (left mandible index almost identical), the chaetotaxy of the soldiers and the forest habitat. The left mandible index is not a good character for the genus since it is considerably greater for *C. timuassu* than for the other 2 species.

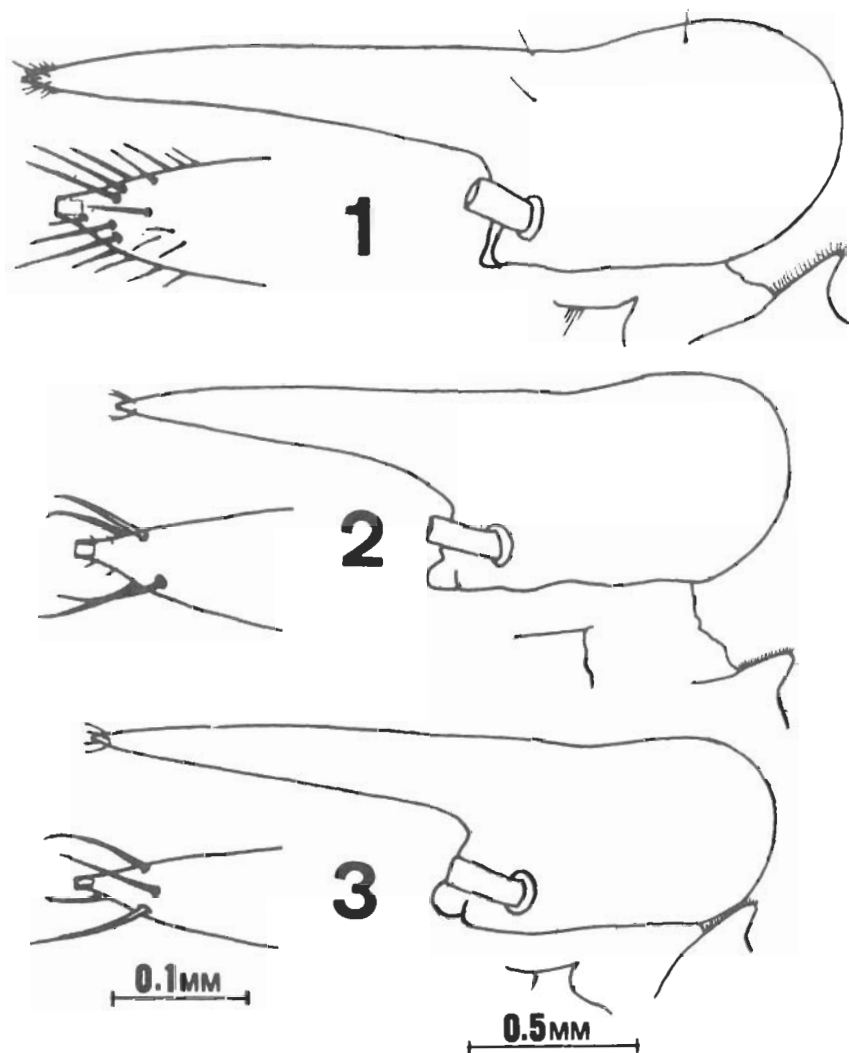
Except for *C. timuassu*, the geographical distribution of the genus is poorly known. *C. caete* and *C. glaber* are known only from the type-localities. The subterranean habit of these 2 species makes difficult to collect them, contributing to their rarity in collections.

ACKNOWLEDGEMENTS

This work was supported by the John D. and Catherine T. MacArthur Foundation through a grant to the Museu Paraense Emílio Goeldi Zoology Department administered by the World Wildlife Fund - US, and the Brazilian National Research Council (CNPq - Conselho Nacional de Desenvolvimento Científico e Tecnológico). E. M. Canello is thanked for providing specimens from the Museu de Zoologia da Universidade de São Paulo and for suggestions on the present work. I would also like to thank the staff of the Museu Costa Lima for help with the field work in Amapá State.

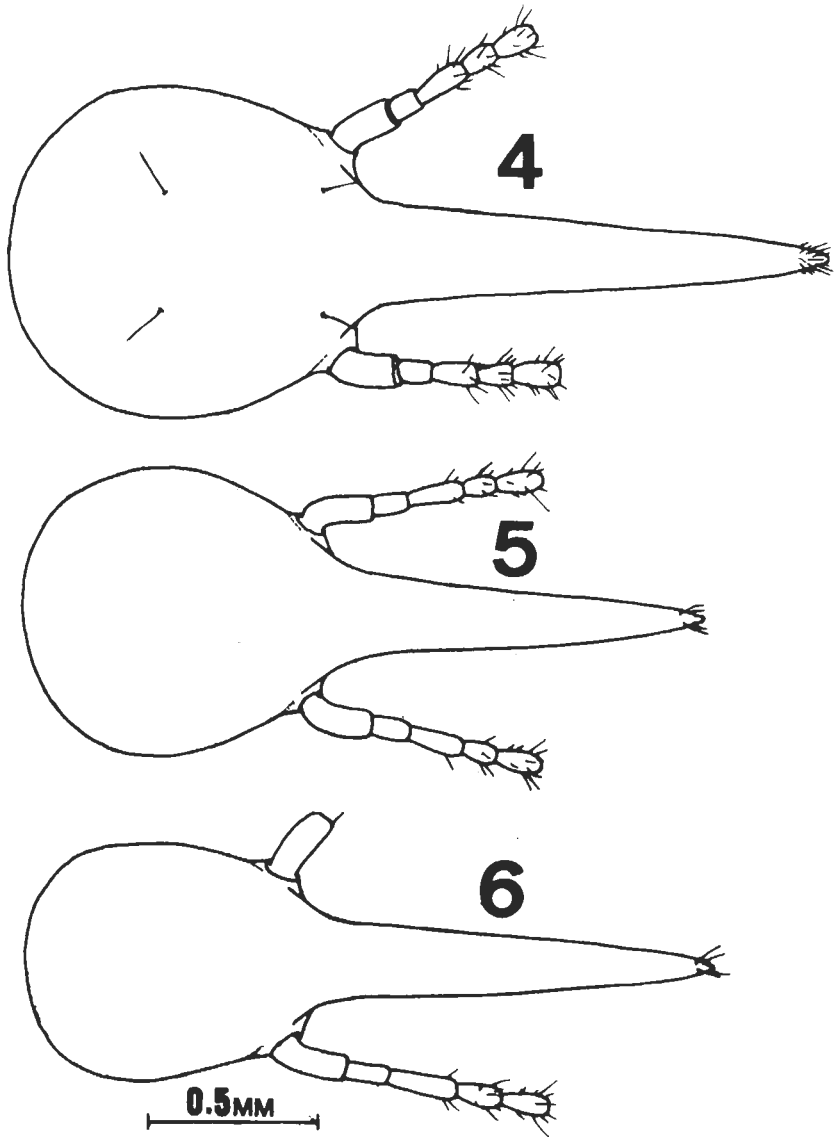
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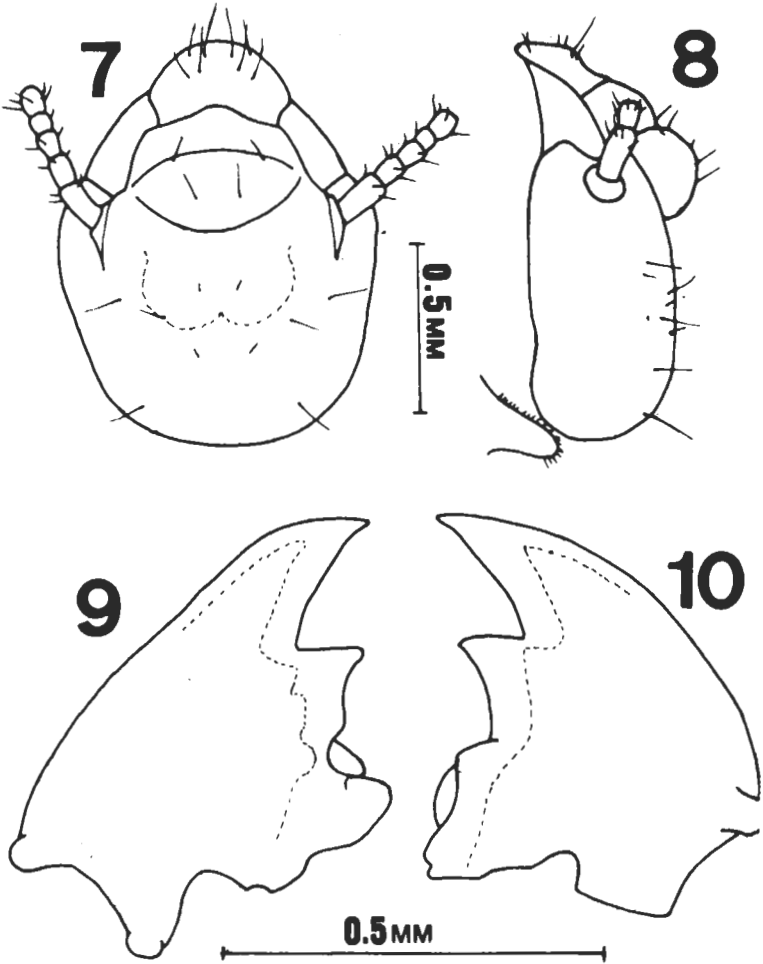
Figures 1-3

Cyranotermes - soldier head in profile; tip of nasus in detail.
1. *C. timuassu*; 2. *C. glaber*, sp. n.; 3. *C. caete*.



Figures 4-6

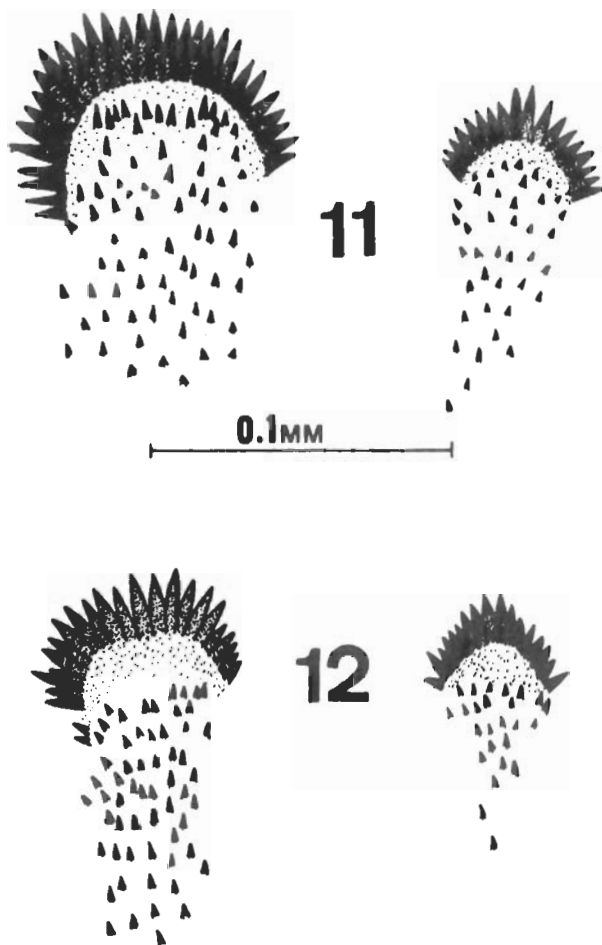
Cyanotermes - soldier head from dorsal view.
4. *C. timuassu*; 5. *C. glaber*, sp. n.; 6. *C. caete*.



Figures 7-10

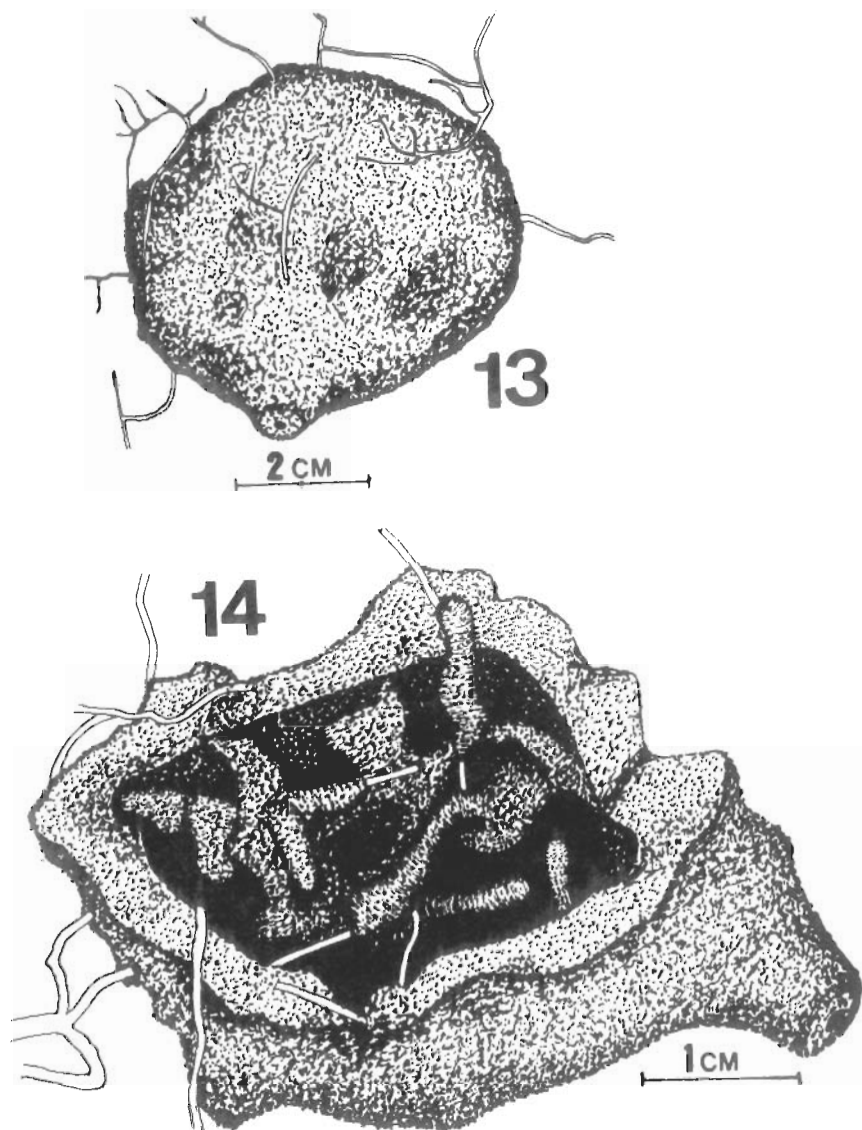
Cyranotermes glaber, sp. n. - worker.

7. head - dorsal view; 8. head - profile; 9. left mandible; 10. right mandible.



Figures 11-12

Cyanotermes - worker: enteric valve armature.
11. *C. glaber*, sp. n.; 12. *C. caete*.



Figures 13-14

Cyanotermes glaber - nest cell.

13. closed cell, showing one opening; 14. opened cell, showing the internal structure.

***Anhangatermes macarthuri*, a New Genus and Species of Soil-feeding Nasute Termite from Amapá, Brazil (Isoptera, Termitidae, Nasutitermitinae)**

Reginaldo Constantino^{1, 2}

ABSTRACT - *Anhangatermes macarthuri*, gen. n., sp. n., collected in the forest of Serra do Navio, Amapá State, Brazil is described. The new genus is related to *Cyranotermes* as shown by the morphology of worker mandibles and digestive tube. Drawings are presented of the soldier's head and the worker's head, mandibles and digestive tube.

KEY WORDS: *Anhangatermes*, *macarthuri*, termites, taxonomy, Nasutitermitinae.

RESUMO - *Anhangatermes macarthuri*, gen. n., sp. n., coletado na floresta da Serra do Navio, Estado do Amapá, Brasil é descrito. O novo gênero é relacionado a *Cyranotermes* Araujo, o que é mostrado pela morfologia das mandíbulas e do tubo digestivo do operário. São apresentados desenhos da cabeça do soldado e da cabeça, mandíbulas e tubo digestivo do operário.

PALAVRAS-CHAVE: *Anhangatermes macarthuri*, cupins, taxonomia, Nasutitermitinae.

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INTRODUCTION

The soil-feeding nasute termites of the Neotropical Region are still poorly known due mainly to the small size and subterranean habits of the majority of the species. They are, in general, rare in collections. Fontes (1979, 1982, 1987a, 1987b) studied this group of termites and erected 4 new genera: *Atlantitermes*, *Araujotermes*, *Agnathotermes* (previously described as a subgenus), and *Coatitermes*. The other genera are: *Angularitermes*, *Convexitermes*, *Cyranotermes*, and *Subulitermes*.

In addition to the subterranean habits, these termites have in common the following: worker mandibles with large apical teeth; molar ridges reduced or absent; soldier mandibles vestigial without points (except *Angularitermes*, which has distinct points); slow-moving soldiers and workers. Although having several common characteristics, the soil-feeding nasutes seem to be a polyphyletic group and the similarities are probably due to convergence related to common habits. Fontes (1987a) recognized 4 distinct patterns in the digestive tube of the 14 Neotropical and Ethiopian described genera of this group.

As a result of new intensive collecting in the Amazon Region, I have discovered several new taxa of this group of termites. In this paper a new genus and species of soil-feeding nasute from the forests of Serra do Navio, Amapá State, Brazil are described. The terminology used in this paper for the mandibles and digestive tube is the same as Fontes (1987a, 1987b).

Anhangatermes, gen. n.

TYPE-SPECIES - *Anhangatermes macarthuri*, sp. n..

IMAGO - Unknown.

SOLDIER - Head capsule broad and rounded. Nasus conico-cylindrical, long and slender. Labrum short, not visible from dorsal view. Vestigial mandibles without points. Antenna with 13 segments, extending a little beyond tip of nasus. Width of pronotum approximately half the width of the head. Head almost glabrous, with few bristles on vertex and hairs at tip of nasus. Remainder of body with relatively few bristles. Tibial spurs 2:2:2.

WORKER - Monomorphic. Head capsule rounded, widest anteriorly. Postclypeus moderately inflated. Antenna with 14 segments. Head with few bristles. Apical tooth of mandibles well developed with inner margin concave. Left mandible: cutting edge of 1st plus 2nd marginal tooth sinuous; 3rd marginal tooth small; point of molar tooth hidden beneath the

molar prominence; molar prominence large and rounded, without ridges. Right mandible: third marginal tooth vestigial, almost absent; molar plate concave. Abdomen voluminous with sclerites and membranes transparent showing gut contents. Digestive tube: crop voluminous, asymmetrical; gizzard with armature sclerotized, without spines; mixed segment present, shorter than the width of mesenteron; Malpighian tubules insertion as in Fig. 11; first proctodeal segment shorter than mesenteron; enteric valve ventro-laterally placed; armature (Figs. 9-10) with three longitudinal major swellings (swellings of 1st order) alternating with three longitudinal minor swellings (swellings of 2nd order), with large spines arranged in a bowed line and small scattered spines; colon long.

ETYMOLOGY - The generic name derives from the Tupi "Anhangá", a god or spirit of the forest.

COMPARISONS - The soldier of *Anhangatermes* is easily distinguishable from the other genera of Neotropical soil-feeding nasutes by the very broad head and the long and slender nasus. The worker mandibles and digestive tube are similar only to *Cyranotermes*, which has the following distinct characteristics: smaller molar prominence, with the point of molar tooth visible; cutting edge of 1st plus 2nd marginal tooth concave; larger 3rd marginal tooth; no vestige of 2nd marginal on right mandible.

Anhangatermes macarthuri, sp.n.

TYPE MATERIAL - BRAZIL. Amapá State, Serra do Navio (01°00'N 52°04'W). Lot number MPEG 3267 in the collection of Museu Paraense Emílio Goeldi, 02.XI.1989, R. Constantino col. (holotype soldier and paratypes soldiers and workers). Part of the same lot to be deposited in the collection of Museu de Zoologia da Universidade de São Paulo.

SOLDIER (Figs. 1-4) - Head capsule and postmentum orange; nasus ferruginous-orange, darker toward tip; antenna and pronotum orange yellow, sclerites transparent, yellowish. Head with 2 bristles on top; tip of nasus with hairs. Pronotum, mesonotum and metanotum without bristles. Legs with few bristles. Tergites with 4 long bristles on posterior margin; sternites with a row of long bristles on posterior margin and scattered short bristles on surface. Antenna: 3rd segment longer than 2nd, 4th and 5th; 2nd and 4th about the same length; 5th longer than 4th.

Measurements (in millimeters) of 5 soldiers: length of head with nasus 2.33-2.40; length of nasus 1.15-1.22; width of head 1.27-1.32; height of head

excluding postmentum 0.80-0.85; width of pronotum 0.63-0.66; length of hind tibia 1.11-1.22; maximum width of postmentum 0.36-0.38.

WORKER (Figs. 5-15) - Head, antennae and legs pale-yellow. Pronotum yellow-white. Sclerites transparent, yellowish. Head capsule with a row of 4 bristles in the middle and 2 at back; postclypeus with 6 bristles; labrum with 8 bristles. Pronotum with long bristles on margins. Tergites and sternites with a row of long bristles on posterior margin. Sternites with numerous short bristles on surface. Legs with numerous long and short bristles. Antennae: 2nd segment longer than 3rd, 4th and 5th; 3rd and 4th about the same length; 5th longer than 4th.

ETYMOLOGY - The specific name is derived from the John D. and Catherine T. MacArthur Foundation, sponsor of the research that led to the discovery of the new taxon.

BIOLOGY - The single colony was collected from soft soil with no visible structure below a fallen rotten tree trunk in a primary rain forest. This species is a soil and humus feeder and probably has subterranean habits. The soldiers and workers are slow-moving.

DISCUSSION

Anhangatermes is clearly related to *Cyranotermes*. The following characteristics are common to both genera: 1) right mandible without third marginal tooth (a very small vestige in *Anhangatermes*); 2) a very similar mixed segment (see Fontes, 1987a, Fig. 47); 3) enteric valve armature well sclerotized with small and large spines arranged in the same pattern; 4) similar shape and relative size of all parts of the digestive tube; 5) reduced number or absence of bristles and hairs on soldier's head and thoracic nota. The soldier's head of *Anhangatermes* is, however, much different from that of the three known species of *Cyranotermes*.

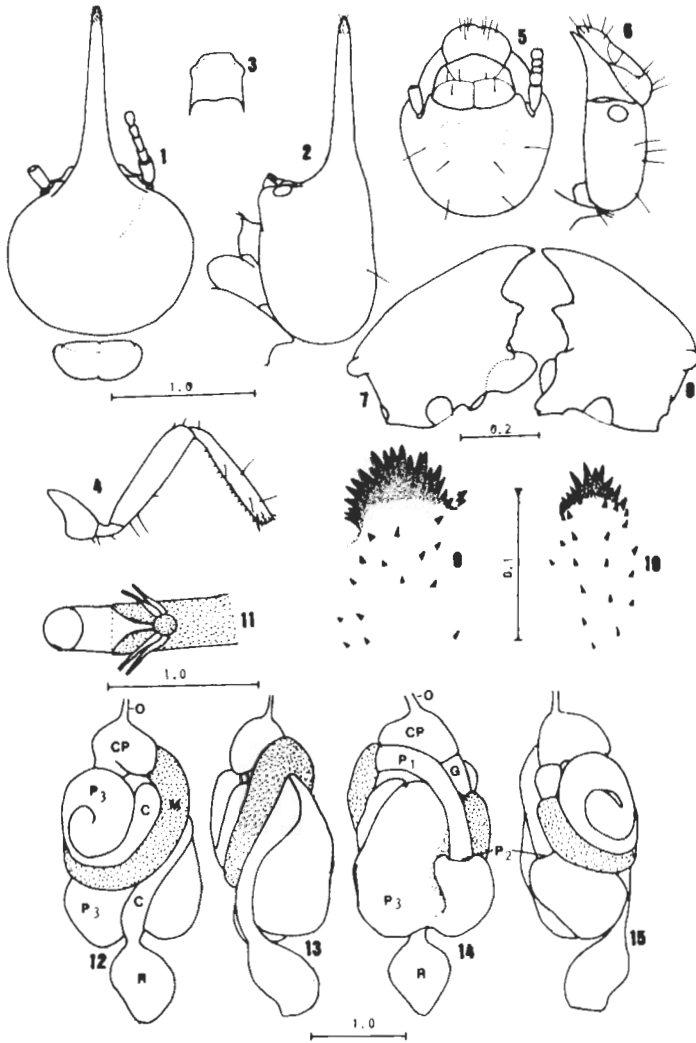
These two genera probably form a monophyletic group, but the relations with other genera remain unclear. The Ethiopian genera *Postsubulitermes*, *Mimeutermes* and *Tarditermes* also have worker mandibles with incomplete marginal dentition, but the gut pattern is distinct (Fontes, 1987a). This similarity in mandible dentition is probably a result of convergence. These questions can be clarified only after a complete study of the group, based on large collections, still unavailable.

ACKNOWLEDGEMENTS

This work was supported by the John D. and Catherine T. MacArthur Foundation through a grant to the Museu Paraense Emílio Goeldi Zoology Department administered by the World Wildlife Fund - US, and the Brazilian National Research Council (CNPq - Conselho Nacional de Desenvolvimento Científico e Tecnológico). I thank the staff of the Museu Costa Lima for help with the field work in Amapá State.

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Figures 1-15

Anhangatermes macarthuri, sp. n.. Soldier: 1. head, dorsal view; 2. head, profile; 3. postmentum; 4. right foreleg. Worker: 5. head, dorsal view; 6. head, profile; 7. right mandible; 8. left mandible. Enteric valve armature: 9. swelling of 1st order; 10. swelling of second order. 11. mixed segment, showing Malpighian tubules insertion. Coiled digestive tube: 12. dorsal; 13. right; 14. ventral; 15. left. O= oesophagus; CP= crop; G= gizzard; M= mesenteron; P1= first proctodeal segment; P2= enteric valve; P3= paunch; C= colon; R= rectum. Scales in millimeters.