

# Papéis Avulsos de Zoologia

Museu de Zoologia da Universidade de São Paulo

Volume 47(23):283-288, 2007

www.scielo.br/paz

ISSN impresso: 0031-1047

ISSN on-line: 1807-0205

## A NEW SPECIES OF *EREYMATERMES* CONSTANTINO (ISOPTERA, TERMITIDAE, NASUTITERMITINAE) FROM THE NORTHEASTERN ATLANTIC FOREST, BRAZIL

ELIANA M. CANCELLO<sup>1</sup>

CAROLINA CUEZZO<sup>2</sup>

### ABSTRACT

*Ereymatermes Constantino* is a nasute genus endemic to the Neotropical region, which included *Ereymatermes rotundiceps Constantino* from the forest of the lower Japurá River, AM, Brazil, and *E. panamensis Roisin* from the Panama Canal area. Herein *Ereymatermes piquira*, a new species from the northeastern Atlantic Forest, is described and illustrated based on the soldier and worker castes. The meaning of the two types of workers ("worker with broad gap" and "worker with narrow gap") and its relation to feeding habits are discussed.

KEYWORDS: *Ereymatermes*, Isoptera, Termites, Nasutitermitinae, Atlantic Forest.

### INTRODUCTION

Four subfamilies have been recognized within Termitidae (Sands, 1972): Apicotermitinae, Macrotermitinae, Termitinae, and Nasutitermitinae. The monophyly of Termitidae is supported by several synapomorphies but none of their subfamilies are well established, not even in the most comprehensive morphological cladistic analysis of Isoptera based on both neuter castes proposed by Donovan *et al.* (2000).

Nasutitermitinae has been characterized by having a well-developed frontal gland, which opens at the tip of a more or less developed frontal tube (Sands, 1965). This subfamily include two recognizable groups of genera, the so-called "mandibulate genera", whose soldiers have well-developed mandibles and a frontal tube that may vary from a very short structure barely projecting above the dorsal surface of the head capsule

(*Syntermes*) to a very long tube (*Rhynchotermes*); and the "true nasute genera", whose soldiers have reduced mandibles and a long frontal tube of variable shape and size, with a small opening.

Despite the great diversity and ecological importance of Nasutitermitinae, the relationships between their lineages are poorly understood, and many systematic problems remain unsolved. For instance, Engel & Krishna (2004) propose to segregate four of the thirteen "mandibulate genera" into a new subfamily, Syntermitinae. Noirot (2001) in their comprehensive comparative anatomy of workers' gut, and by studying a large number of taxa, already affirmed that the "mandibulate" and "true nasute" genera are separated clades. Nevertheless, considering the results of Donovan *et al.* (2000, Fig. 66), Syntermitinae as proposed by Engel & Krishna (*op. cit.*) remains polyphyletic.

1. Museu de Zoologia, Universidade de São Paulo, Caixa Postal 42.494, 04218-970, São Paulo, SP, Brasil. E-mail: ecancell@usp.br

2. CONICET – Instituto Superior de Entomología "Dr. A. Willink", Facultad de Ciencias Naturales e Instituto Miguel Lillo, UNT. Miguel Lillo 205, T4000JFE – San Miguel de Tucumán, Argentina. E-mail: carolinacuezzo@csnat.unt.edu.ar

The so-called “small soil-feeding nasutes”, recognized within the Neotropical “true nasutes”, is a very poorly known group and even the validity of some genera is questionable (Roisin, 1995; Canello & Noirot, 2003). Nevertheless, *Ereymatermes* is a relatively well-defined genus, as recognized from the three castes (soldiers, workers and alates).

Constantino (1991) described the genus *Ereymatermes* to accommodate *Ereymatermes rotundiceps* from the Brazilian Amazonia. This species was collected in a swamp forest at Jaraqui Island, Japurá River, near the county of Maraá, State of Amazonas. Both colonies were found asinquilines of an arboreal nest built by “an undescribed soldierless Apicotermittinae”. Later, Roisin (1995) described *Ereymatermes panamensis* based on three samples collected from the Panama Canal Area, one “from underground chambers” another “from dead wood on forest floor”, and the last “from stump of palm tree”.

Herein we describe *Ereymatermes piquira*, new species, collected in the evergreen rain forest, during the development of the project “Richness and diversity of Hymenoptera and Isoptera along a latitudinal gradient in the Mata Atlântica – the eastern Brazilian rain forest” (Canello *et al.*, 2002), conducted from 2000 to 2005. The termite team, headed by the first author (EMC), has collected many undescribed taxa besides the one described here.

## MATERIAL AND METHODS

The examined material, an unique sample from Atlantic Forest at the county of Ilhéus, State of Bahia, Brazil, is deposited in the Isoptera Collection of Museu de Zoologia da Universidade de São Paulo (MZUSP).

Morphometric characters used here follow Roonwal (1970): length of head with nasus (LH, n° 12), length of head to apex of postclypeus (LHp, n° 14, but from profile); width of head (WH, n° 17), height of head excluding postmentum (HH, n° 21), width of pronotum (WP, n° 68), and length of hind tibia (LT, n° 85). The length of the gizzard's first folds was measured as the longest distance between an imaginary line at the base of the columnar belt and the outer margin of the pulvillar belt. All the measurements were taken with an ocular micrometer and are presented in millimeters, under the species description.

The digestive tube description and comparisons follow Noirot (1995, 2001) and terms of mandible descriptions follow Fontes (1987a).

The terms “bristles” and “hairs” are used as in Emerson (1925), that is, in a comparative way; “short

hairs” are those visible at 12x magnification and “microscopic hairs” are those visible at 50x magnification.

### *Ereymatermes piquira* Canello & Cuezco, new species

(Figs. 1-4)

*Etymology.* from Tupi, an indian language, “piquirá” means small, short.

*Holotype:* soldier, part of lot nr MZUSP 11292, kept separately and labeled: “MZUSP 11292. BRAZIL. Bahia: Ilhéus, Mata de Esperança (14°47'50"S; 39°03'82"W), 22.V.2001, Yana Teixeira Reis coll.”

*Paratypes:* soldiers and workers of lot nr 11292 (MZUSP) with the same data as the holotype.

*Imago:* unknown.

*Soldier* (Figs. 1A, B): Head capsule oval, in dorsal view, with a slight constriction behind the base of antennae, at the middle of the head considered from the base of the nasus till the rear margin of the head capsule. Dorsal margin of head straight or with a slight depression in the middle, in profile. Long cylindrical nasus, not upturned in profile. Labrum very reduced. Top of head with four bristles at the base of nasus and some scattered ones, plus hairs of different size and orientation, and microscopic hairs denser at the base of nasus. Nasus covered with dense microscopic hairs, becoming longer and conspicuous toward the apex. Postclypeus with a couple of bristles. Labrum with four bristles. Postmentum with at least four bristles on anterior margin. Pronotum with some long bristles on anterior margin and some shorter ones on posterior margin; tergites and sternites with many hairs of different sizes and a row of bristles on the posterior margin, decumbent on tergites and perpendicular to the body on sternites. Antenna with 12 articles, 1<sup>st</sup> the longest, 2<sup>nd</sup> shorter than 1<sup>st</sup> and almost equal to the 4<sup>th</sup>; 3<sup>rd</sup> the shortest; 4<sup>th</sup> almost equal to the 5<sup>th</sup> and 6<sup>th</sup> a little longer than 4<sup>th</sup> or 5<sup>th</sup> and almost as long as the followings. Tibial spurs 2:2:2. Head capsule yellow; nasus yellow-reddish; antenna yellow; pronotum, mesonotum and metanotum yellowish-white; digestive tube visible through abdominal sclerites. Measurements of five soldiers from type-colony are given as range, values for holotype in parentheses: LH: 1.32-1.38 (1.38); LHp: 0.82-0.84 (0.84); WH: 0.64-0.66 (0.66); HH: 0.44-0.46 (0.44); WP: 0.38-0.40 (0.38); LT: 0.66-0.70 (0.66).

*Worker* (Figs. 1C, D): Dimorphic. Worker with narrow gap, most frequent than those of broad gap. Both types of workers have the head capsule rounded with the fontanelle region slightly depressed; postclypeus moderately inflated; antenna with 13 articles. Pronotum shallowly saddle-shaped. Tibial spurs 2:2:2. Head capsule with some erect bristles and numerous hairs of different size and orientation over the entire surface. Postclypeus with two stout erect bristles and several hairs on anterior margin; labrum with at least six bristles. Pronotum with bristles on both margins. Measurements of six workers with narrow gap from type-colony are given as range, values for the unique worker with broad gap in parentheses: WH: 0.64-0.69 (0.69); LT: 0.57-0.61 (0.57); left mandible index: 1.5 (1.4).

*Mandibles*: Worker with narrow gap (Fig. 2B): left mandible with cutting edge between apical tooth

apex and M1+2 apex, concave; posterior margin of M1+2 almost straight; third marginal tooth small but distinct; separated from the molar prominence by a V-shaped gap; molar tooth barely visible at the small gap, apex hidden beneath the molar prominence; some weak ridges on the molar prominence, visible by translucence. Right mandible with a very large apical tooth, a small rounded first marginal tooth and a much smaller second tooth; molar plate smooth; and basal notch weakly develop.

Worker with broad gap (Fig. 2A), differs from the “worker with narrow gap” by having at the left mandible an acute angle between apical tooth and M1+2; this last tooth is sharp and larger, with the posterior margin sinuate; a much more conspicuous third marginal tooth; a broader gap between the third tooth and the molar prominence, showing a larger part of the molar tooth; molar tooth larger; at the right

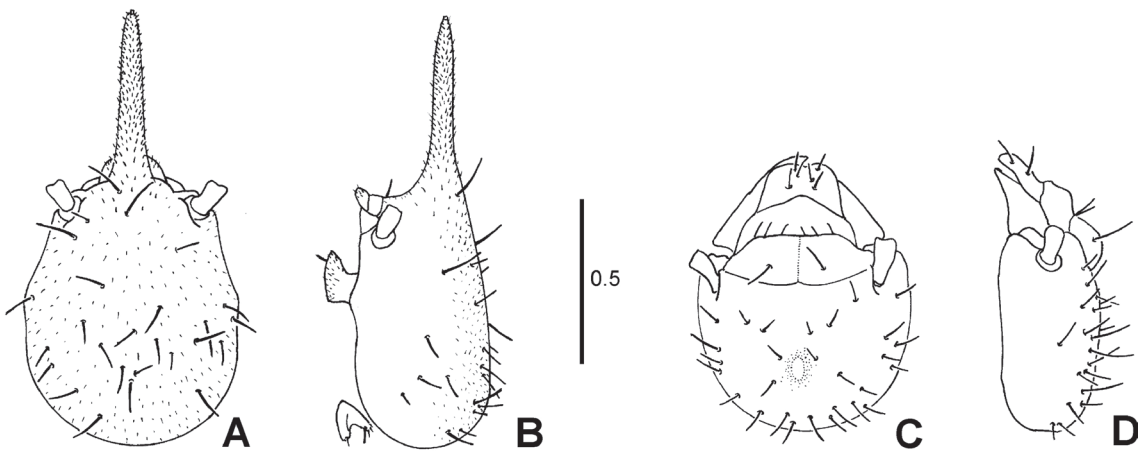


FIGURE 1: *Ereymatermes piquira*, n. sp. Soldier, Holotype: A, head in dorsal view; B, head and pronotum in profile. Worker: C, head in dorsal view; D, head in profile. Scale bar in millimeters.

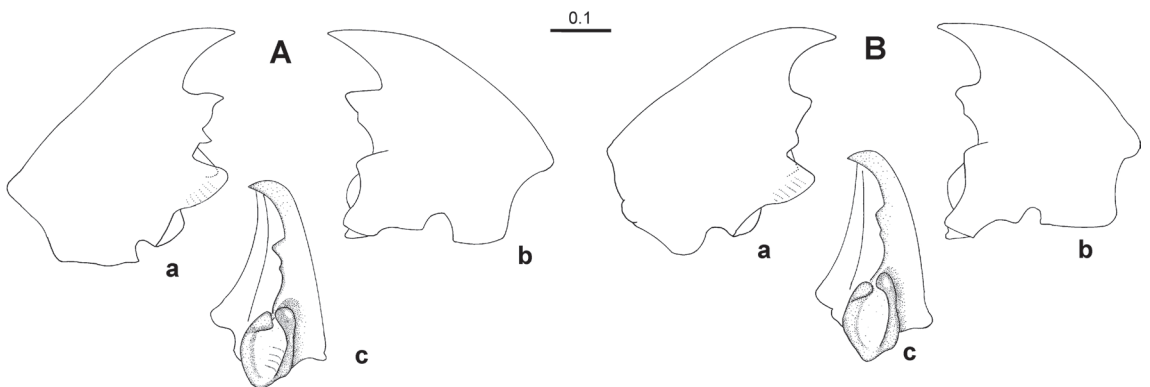


FIGURE 2: *Ereymatermes piquira*, n. sp. Worker: A, mandibles with broad gap: left (a) and right (b), both in dorsal view, and right (c) in frontal view; B, mandibles with narrow gap: left (a) and right (b), both in dorsal view, and right (c) in frontal view. Scale bar in millimeters.

mandible the first marginal tooth is more prominent; and the molar plate have four weakly develop ridges, weaker than those of the molar prominence.

**Digestive tube** (Figs. 3A-F; 4A-B): Gut coiling follows the same generic pattern (Constantino, 1991; Roisin, 1995). Gizzard (G) with a complete weakly sclerotized cuticular armature (hexa-lateral symmetry), without ornamentations (spines, scales); pulvillar belt more developed than columnar belt (Fig. 4A). Length of the folds of first order including the pulvillus, measured on one slide, 0.14-0.15. Mixed segment very small. Malpighian tubules attached on the inner face of the midgut ring in two separated pairs on a small nodule at the junction midgut-hindgut, tubules slightly dilated at their bases. Enteric valve (P2) with a conspicuous armature of six equal triangular swellings (hexa-lateral symmetry). Each swelling has a smooth surface and

its most distal portion is deflected forward in the gut lumen as a strongly sclerotized shield bearing a row of acute spines (Fig. 4B). Each well-sclerotized swelling is preceded by a bulbous unsclerotized one without spines or with one blunt, short spine. P2 in the same axis of paunch (P3), which is divided in two compartments, P3a and P3b (Fig. 3E). P3b as a conspicuous ring, concealing the foregut in dorsal view. P3 separated from colon (P4) by a conspicuous isthmus. P4a and P4b tubular. "U-turn" conspicuously dilated (Fig. 3F).

### Comparisons

The soldier of *Ereymatermes piquira*, n. sp., is distinguished from those of *E. panamensis* and *E. rotundiceps* by its smaller size, its narrower and elongate head capsule with a slight constriction in the middle,

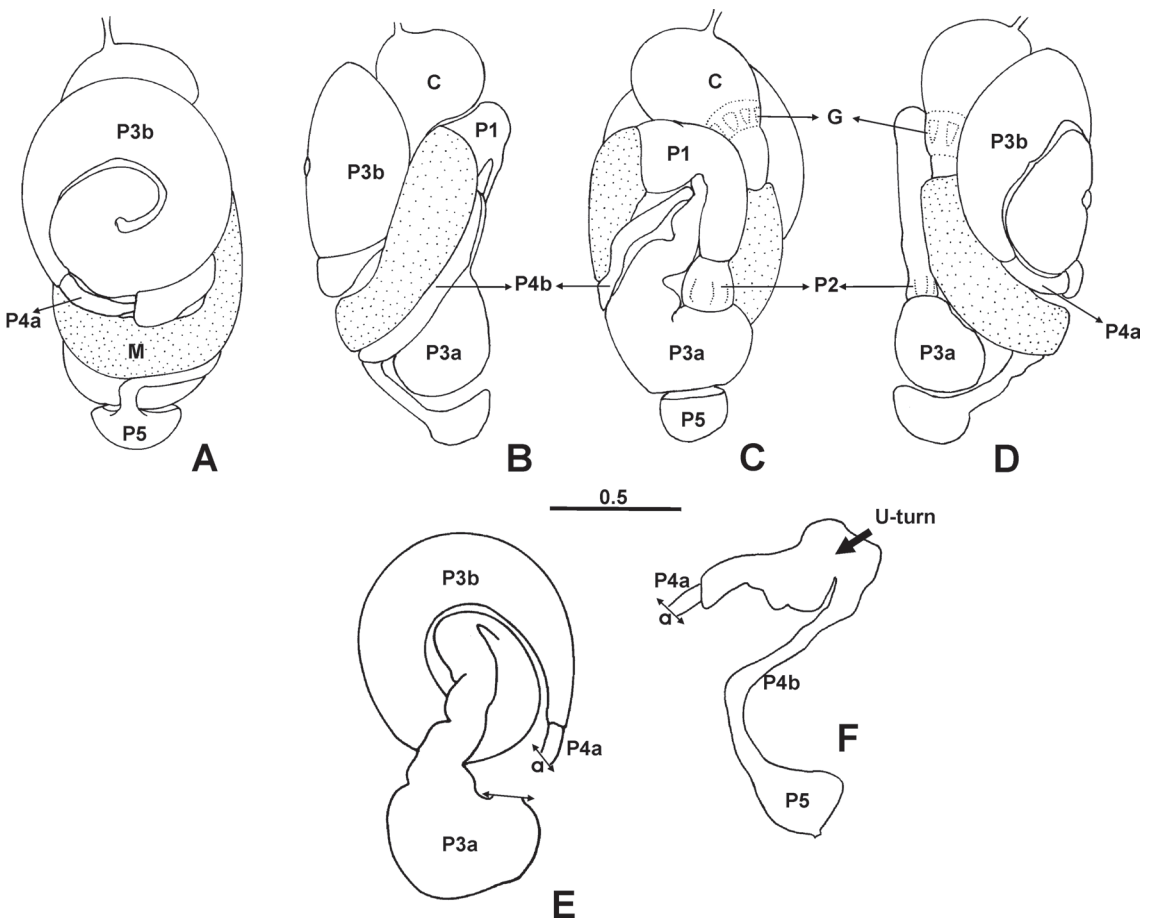


FIGURE 3: *Ereymatermes piquira*, n. sp. Worker digestive tube: A-D, gut in situ respectively from dorsal, right, ventral and left view; E, paunch in ventral view with its two compartments (P3a, P3b); F, colon in right lateral view with its compartments (P4a, P4b), U-turn denoted by a thick arrow. C = crop; G = gizzard; M = mesenteron, stippled; P1 = first proctodeal segment; P2 = enteric valve; P3a = proximal portion of paunch; P3b = distal portion of paunch; P4a = proximal portion of colon; P4b = distal portion of colon; P5 = rectum. Scale bar in millimeters. Malpighian tubules not represented.



along with a longer and slender nasus, not upturned in profile.

The workers are very similar to those of the other species of the genus although in the left mandible of the “worker with narrow gap” the third marginal tooth is smaller, the molar tooth is partially visible between the third tooth and the molar prominence, which is smaller than in *E. panamensis*. In the right mandible the molar plate is smooth, different from that in *E. panamensis* (Roisin, 1995, fig. 14). The “worker with broad gap” differs from *E. rotundiceps* by having the posterior margin of M1+2 sinuate, the third marginal tooth more conspicuous, and by lacking the “extra tooth” (Constantino, 1991) between the third tooth and the molar prominence.

The “U-turn”, conspicuously dilated in *Ereymatermes piquira*, n. sp., was also observed in workers of *E. rotundiceps* deposited at the MZUSP and Fontes (1987b) noticed this character in *Cyranotermes*. Aside from *Angularitermes*, all other genera considered “soil-feeder nasutes” of the Neotropical region have a tubular colon.

In *Ereymatermes piquira*, n. sp., we were not able to observe any variation in worker antennal length as Roisin (1996) did in *Subulitermes* and *Coatitermes*.

## DISCUSSION

The so-called “soil-feeding nasutes” group includes species with small individuals, many of them with subterranean habits and poorly known life histories. In fact, their inclusion in a trophic classification as “soil-feeders” is questionable. Canello & Noiro (2003) discuss this matter, based on the microhabitat where many of these termites have been collected and pointed out that the Neotropical small “soil-feeders” are probably not eating at the end of the humification gradient proposed by Donovan *et al.* (2001). Although the morphology of the digestive tube of *Ereymatermes piquira*, n. sp., as well as the previously known species of *Ereymatermes* shows typical characteristics of soil-feeding termites, the unique sample of this new species was collected in a stand dead trunk, not in the soil. This fact plus the morphology of the worker mandibles indicate that *Ereymatermes* would better fit in the feeding group III of Donovan’s classification (Donovan *et al.*, 2001) while genera such as *Angularitermes*, *Anhangatermes* and *Cyranotermes* would be included in group IV as strict soil-feeders.

Roisin’s (1996) observations on *Coatitermes* and *Subulitermes* strongly suggested that the two morphs

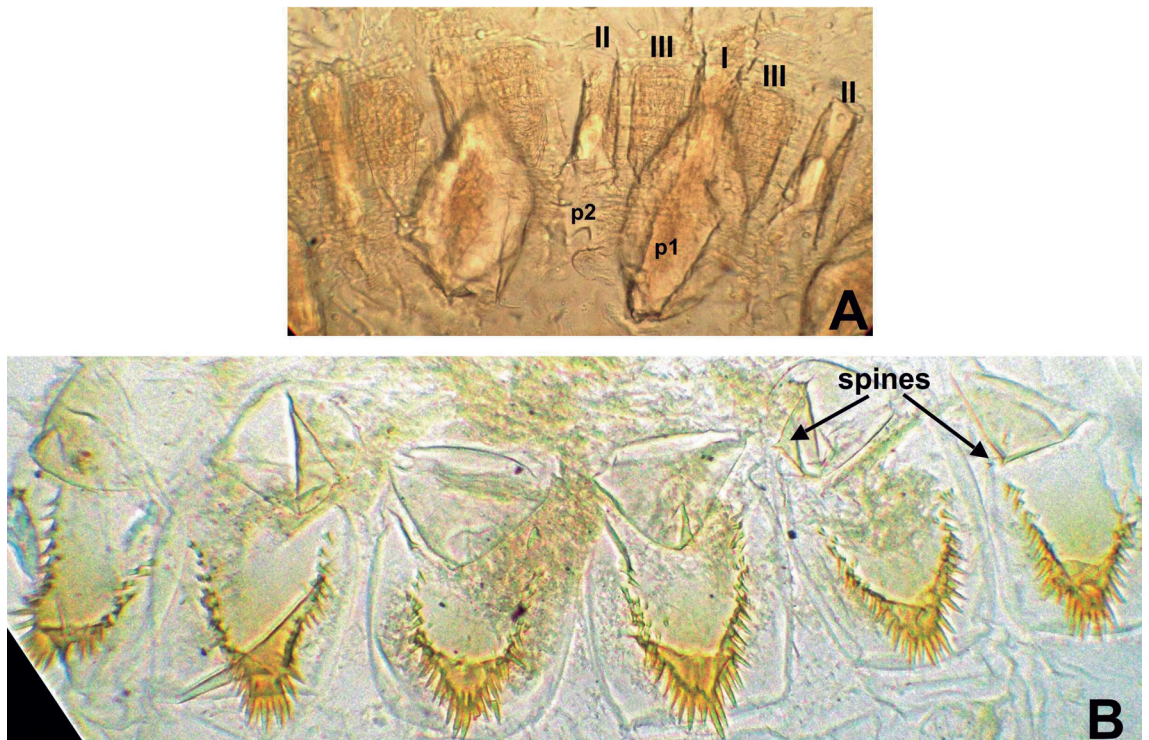


FIGURE 4: *Ereymatermes piquira*, n. sp. A, Worker gizzard armature. I to III, columnar folds of first, second and third order respectively; p1-p2, pulvilli of first and second order. B, Worker enteric valve armature: short spines of the bulbous unsclerotized swellings remarked by arrows.

of workers represent successive instars, being the “narrow gap” the first instar and the “broad gap” the second instar worker. This morphological differentiation does not correspond to sexual dimorphism and both sexes are present among neuters. Canello & Noirot (2003), in agreement with Roisin (*op. cit.*), considered that in all the “strict soil-feedings” species for which the caste development has been studied there is a simplified polymorphism, with only one monomorphic worker instar (reviewed in Roisin, 2000).

We may conclude that *Ereymatermes piquira*, n. sp., is not a “strict soil-feeder”, and does not feed at the end of the humification gradient, a fact also supported by the finding of the two types of workers (“narrow gap” and “broad gap”), as explained above.

## RESUMO

*Ereymatermes Constantino* é um gênero endêmico da região Neotropical e continha as espécies *Ereymatermes rotundiceps Constantino*, descrita da floresta do baixo Rio Japurá, AM, e *E. panamensis Roisin* descrita da área do Canal de Panamá. Aqui, *Ereymatermes piquira*, uma nova espécie da Mata Atlântica do nordeste é descrita e ilustrada a partir de soldados e operários. O significado dos dois tipos de operários (“operário com intervalo amplo” e “operário com intervalo estreito”) e sua relação com hábitos alimentares são discutidos.

**PALAVRAS-CHAVE:** *Ereymatermes*, Isoptera, cupins, Nasutitermitinae, Mata Atlântica.

## ACKNOWLEDGEMENT

We are grateful to Dr. Charles Noirot for his kind agreement to study a termite worker sent by us, and by confirming our first thought on the identity of the material herein described. We also thank Yana Teixeira Reis, who collected the specimens, and two anonymous referees for their useful comments and suggestions on the manuscript. This work was partially supported by the State of São Paulo Research Foundation (FAPESP) within the BIOTA/FAPESP – The Biodiversity comments Virtual Institute Program ([www.biotasp.org.br](http://www.biotasp.org.br)), Proc. 98/05083-0.

## REFERENCES

CANCELLO, E.M.; OLIVEIRA, L.C.M.; REIS, Y.T. & VASCONCELLOS, A. 2002. Termite diversity along the Brazilian Atlantic Forest.

In: XIV International Congress of IUSSI (International Union for the Study of Social Insects), Hokkaido University, Sapporo. *Proceedings*, p. 164.

CANCELLO, E.M. & NOIROT, C. 2003. *Paraconvexitermes acangapua* (Isoptera: Termitidae: Nasutitermitinae), a new genus and new species of the so called «small Neotropical soil-feeding nasutes» from South America. *Annales de la Société Entomologique de France*, 39 (2):187-193.

CONSTANTINO, R. 1991. *Ereymatermes rotundiceps*, new genus and species of termite from the Amazon Basin (Isoptera, Termitidae, Nasutitermitinae). *Goeldiana Zoologia*, 8:1-11.

DONOVAN, S.E.; EGGLETON, P. & BIGNELL, D.E. 2001. Gut content analysis and a new feeding group classification of termites. *Ecological Entomology*, 26:356-366.

DONOVAN, S.E.; JONES, D.T.; SANDS, W.A. & EGGLETON, P. 2000. Morphological phylogenetics of termites (Isoptera). *Biological Journal of the Linnean Society*, 70:467-513.

EMERSON, A.E. 1925. The termites of Kartabo, Bartica District, British Guiana. *Zoologica*, 6:291-459.

ENGEL, M.S. & K. KRISHNA. 2004. Family-group names for termites (Isoptera). *American Museum Novitates*, 3432:1-9.

FONTES, L.R. 1987a. Morphology of the alate and worker mandibles of the soil-feeding nasute termites (Isoptera, Termitidae, Nasutitermitinae) from the Neotropical Region. *Revista Brasileira de Zoologia*, 3(8):503-531.

FONTES, L.R. 1987b. Morphology of the worker digestive tube of the soil-feeding nasute termites (Isoptera, Termitidae, Nasutitermitinae) from the Neotropical region. *Revista Brasileira de Zoologia*, 3(8):475-501.

NOIROT, C. 1995. The gut of termites (Isoptera). Comparative anatomy, systematic, phylogeny. I. Lower termites. *Annales de la Société Entomologique de France*, Nouvelle Série, 31(3):197-226.

NOIROT, C. 2001. The gut of termites (Isoptera). Comparative anatomy, systematic, phylogeny. II. Higher termites (Termitidae). *Annales de la Société Entomologique de France*, Nouvelle Série, 37(4):431-471.

ROISIN, Y. 1995. Humivorous nasute termites (Isoptera: Nasutitermitinae) from the Panama canal area. *Belgian Journal of Zoology*, 125(2):283-300.

ROISIN, Y. 1996. Castes in humivorous and litter-dwelling neotropical nasute termites (Isoptera, Termitidae). *Insectes Sociaux*, 43(4):375-399.

ROISIN, Y. 2000. Diversity and evolution of caste patterns. In: Abe T.; Bignell D.E. & Higashi, M. (Eds), *Termites: Evolution, Sociality, Symbiosis, Ecology*, Kluwer Academic Publishers, Dordrecht, p. 95-119.

ROONWAL, M. L. 1970. Measurement of termites (Isoptera) for taxonomic purposes. *Journal of the Zoological Society of India*, 21(1):9-66.

SANDS, W.A. 1965. A revision of the termite subfamily Nasutitermitinae (Isoptera, Termitidae) from the Ethiopian Region. *Bulletin of the British Museum (Natural History) Entomology*, Supplement, 4:1-172.

SANDS, W.A. 1972. The soldierless termites of Africa (Isoptera: Termitidae). *Bulletin of the British Museum (Natural History) Entomology*, Supplement, 18:1-244.

Recebido em: 21.06.2007

Aceito em: 03.08.2007

Impresso em: 21.12.2007



Publicado com o apoio financeiro do Programa de Apoio às Publicações Científicas Periódicas da USP