



A new species of *Obtusitermes* (Isoptera, Termitidae, Nasutitermitinae) from South America

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Abstract

Obtusitermes Snyder is a genus endemic to the Neotropics, restricted to northern South America and southern Central America. *Obtusitermes panamae* Snyder was described from Quipo, Panama. Herein, we describe *Obtusitermes formosulus*, **n. sp.**, from Venezuela and Trinidad and Tobago, based on the dimorphic soldier and polymorphic worker. These descriptions provide strong evidence that *Parvitermes bacchanalis* Mathews should not be included in *Obtusitermes*.

Key words: Isoptera, Termites, Nasutitermitinae, *Obtusitermes*, *Parvitermes*

Introduction

Termites of the subfamily Nasutitermitinae occur worldwide, being better represented in tropical and subtropical climates. A total of 39 nasutitermitine genera have been recorded in the Neotropics, of which 37 genera are endemic to the region while *Tenuirostritermes* Holmgren is Nearctic and *Nasutitermes* Dudley pantropical. The major areas of nasutitermitine species richness have a patchy distribution in South America. The extent of the distribution of each species as well as its degree of endemism is difficult to establish. Nevertheless, Nasutitermitinae is the best represented subfamily in recent surveys made in Brazil (Bandeira *et al.* 1998; Canello 1996; Constantino 2005; Constantino & Acioli 2006; Reis & Canello 2007).

Obtusitermes Snyder is one of the endemic Neotropical Nasutitermitinae genera. Restricted to northern South America and southern Central America, this genus is found in dead wood and leaf litter on the floor of forests (Snyder 1924; Nickle & Collins 1992). It is a well-defined genus, originally described as a subgenus of *Nasutitermes* by Snyder (1924), and redescribed by Nickle and Collins (1992), and Roisin *et al.* (1996). The single species originally recognized, *Obtusitermes panamae*, was described based on alates and soldiers (Snyder 1924, 1925), and Roisin *et al.* (1996) characterized the coiling gut *in situ* and enteric valve armature of the worker.

Obtusitermes formosulus, **n. sp.**, from Venezuela and Trinidad and Tobago is described herein based on characters of soldier and worker castes.

Material and methods

All examined material is deposited in the Isoptera Collection of Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (MZUSP), the National Museum of Natural History, Washington D.C., USA (USNM) and the American Museum of Natural History, New York, USA (AMNH).

The morphometric characters used in this paper and their correspondence with Roonwal's system (Roonwal 1970) are indicated in parentheses as follows: LH, length of head with nasus (12); LHp, length of head to apex of postclypeus (14, but from profile); WH, width of head of workers and major soldier (17); HH, height of head excluding postmentum (21); WP, width of pronotum (68); and LT, length of hind tibia (85). Because head capsule of the minor soldier is constricted, the maximum width of the head was taken as: the maximum width at the anterior half (WHf) and the maximum width at the posterior half (WHr), both in dorsal view. All measurements (in millimeters) were taken with an ocular micrometer.

The description of the digestive tube follows Noirot (1995, 2001), terms of worker mandibles descriptions are as in Fontes (1987) and left mandible index (LMI) as in Emerson (1960). The terms "bristles" and "hairs" are used in a comparative way: "short hairs" being those visible at 12x magnification and "microscopic hairs" those visible at 50x magnification.

Drawings were made with a camera lucida coupled to a stereomicroscope and compound microscope.

***Obtusitermes formosulus* Cuezco & Canello, new species**

(Figs. 1–5)

Etymology. From Latin "*formosulus*" meaning "pretty".

Holotype: minor soldier, part of lot no. MZUSP 10250, kept separately and labeled: "MZUSP 10250. VENEZUELA, *Sucre*, Parque Nacional de Mochima, 2.xi.1986, E. M. Canello and C. R. F. Brandão coll., field number 76". Field observation: "inside a forest, collected in small wood items in litter, among rocks and in the soil".

Paratypes. TRINIDAD AND TOBAGO, Mount St. Benedict (10°39'49''N, 61°23'56''W), 27-30.vi.1999, R. Pinto da Rocha coll., soldiers (major, minor) and workers (broad and narrow gap mandibles), MZUSP 11254; "Tobago", Gasparee Isld., 8.iii.1991, J.P.E.C. Darlington coll., soldiers (major, minor) and workers (narrow gap mandibles), USNM 8473. VENEZUELA, *Sucre*, soldiers (major, minor) and workers (narrow gap mandibles) of lot no. MZUSP 10250, with the same data as the holotype; soldiers (major) and workers (narrow gap mandibles) of lot no. MZUSP 10252, field number 74, and same data as holotype.

Imago. Unknown.

Soldier. Dimorphic. Nasus subconical (major soldier) or subcylindrical (minor soldier) in profile. Vestigial mandibles without points. Postclypeus inflated. Labrum short, with anterior margin rounded. Carina from postclypeus through superior margin of antennal insertion. Antenna with 11 articles; 3rd subclavate, longer than 2nd and 4th; 5th to 8th similar in size and shape and 9th to 11th similar in size and shape. Anterior margin of pronotum rounded, not emarginated. Tibial spurs 2:2:2. Nasus dark brown, lighter at apex; anterior half of head capsule yellowish brown, becoming light yellow at rear; antenna yellowish; pronotum, mesonotum and metanotum yellowish.

Major soldier (Figs. 1A, B). Head capsule in dorsal view, with a moderated but clear constriction directly behind base of antennae. Maximum width behind the constriction, at middle of posterior part. Dorsal margin of head in profile, converging toward nasus with no depression or elevation at base of nasus. Nasus and head capsule with scattered microscopic hairs; four erect bristles at base of nasus, plus two erect bristles, some scattered shorter ones, and hairs of various size and orientation at vertex. Nasus with four bristles and short hairs at apex. Postmentum with two rows of bristles on anterior margin, at least four bristles on a front row and two bristles on a back row. Pronotum with microscopic hairs on both anterior and posterior margins; mesonotum and metanotum also with microscopic hairs on posterior margin. Tergites with four erect bristles on posterior margin and decumbent hairs on surface; sternites with a row of long bristles on posterior margin and scattered bristles on surface.

Measurements of six soldiers from lots MZUSP 10250 and 11254 are given as range: LH: 1.14–1.23; LHp: 0.70–0.78; WH: 0.61–0.70; HH: 0.43–0.50; WP: 0.35–0.38; LT: 0.59–0.63.

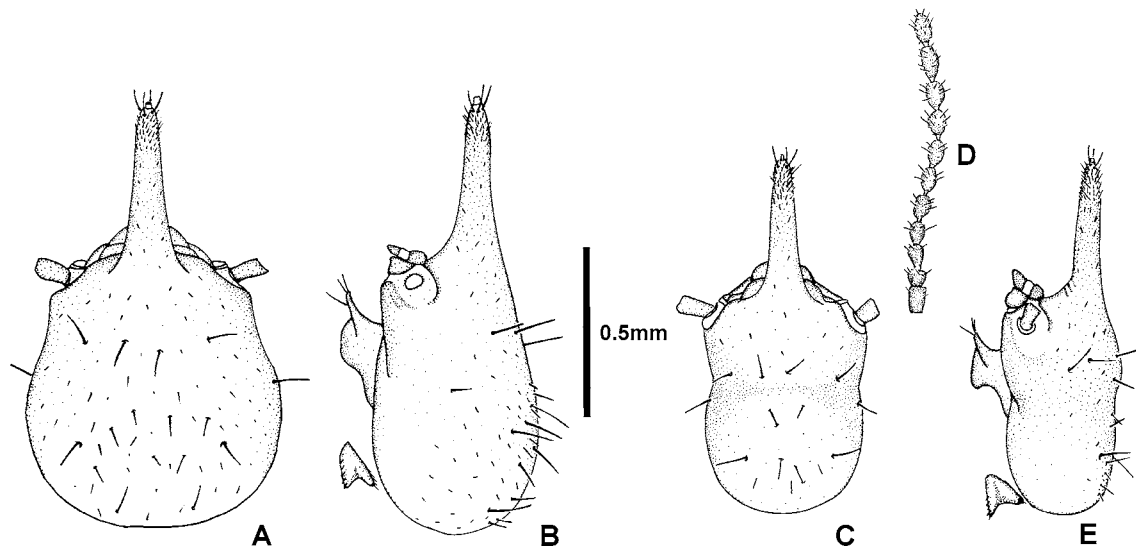


FIGURE 1. *Obtusitermes formosulus*, n. sp. Major soldier: **A**, head in dorsal view; **B**, head and pronotum in profile. Minor soldier, Holotype: **C**, head in dorsal view; **D**, antenna; **E**, head and pronotum in profile.

Minor soldier (Figs. 1C–E). Head capsule, in dorsal view, with a conspicuous constriction a little before middle of head, considering from base of nasus to rear margin of head. Anterior part of head capsule, distal to constriction, about as broad as posterior part. Dorsal margin of head, in profile, with a slight hump at the base of nasus, followed by a weak depression. Pilosity following same pattern as major soldier but fewer decumbent bristles at head capsule vertex.

Measurements of six soldiers from lots MZUSP 10250 and 11254 are given as range, followed by values for the holotype in parentheses: LH: 1.01–1.05 (1.05); LH_p: 0.61–0.65 (0.65); WH_{fr}: 0.45–0.48 (0.46); WH_r: 0.45–0.50 (0.49); HH: 0.33–0.36 (0.35); WP: 0.30–0.35 (0.34); LT: 0.59–0.64 (0.60).

Worker (Figs. 2A–D). Two kinds of workers identifiable by morphology of mandibles, head capsule pigmentation, and profile of dorsal surface of head capsule: “minor darker workers” with broad gap mandibles, darker head capsule and dorsal surface of head capsule, in profile, with a concavity at front followed by a hump; and in other category “major lighter workers” with narrow gap mandibles characterized by lighter head capsule, and dorsal surface of head capsule convex in profile. Besides, in the category of “major lighter workers”, there are differences in head capsule size (see measurements). “Minor darker workers” with broad gap mandibles much less frequent than “major lighter workers” with narrow gap mandibles. Differences in head pilosity between “major lighter workers” with narrow gap mandibles and “minor darker workers” with broad gap workers as shown in Figs. 2A–D. Head capsule of “major lighter workers” with scattered erect bristles and numerous hairs; postclypeus with bristles on anterior margin and two stout bristles plus hairs on surface. All workers, major and minor, in dorsal view, with lateral margins of head capsule nearly parallel or converging toward front, and posterior margin rounded; fontanelle region slightly depressed; postclypeus moderately inflated; antenna with 12 articles. Anterior lobe of pronotum more developed than posterior one; anterior margin of pronotum rounded, not emarginated. Tibial spurs 2:2:2. Digestive tube visible through abdominal wall. Pronotum with just a few short hairs on anterior and posterior margins; tergites with short hairs over surface and bristles on posterior margin.

Minor darker worker with broad gap mandibles: measurements of one specimen from MZUSP 11254, WH: 0.69; LT: 0.59; LMI: 0.44.

Major lighter worker with narrow gap mandibles, large size: measurements of five specimens from MZUSP 10250, WH: 0.80–0.85; LT: 0.50–0.53; LMI: 0.44–0.56.

Major lighter worker with narrow gap mandibles, small size: measurements of five specimens from MZUSP 10250 and three specimens from MZUSP 11254, WH: 0.70–0.74; LT: 0.50–0.55; LMI: 0.40–0.56.

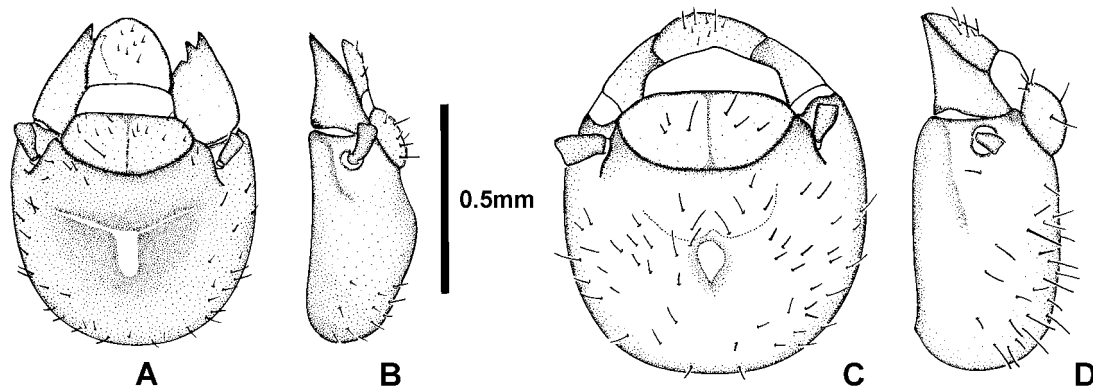


FIGURE 2. *Obtusitermes formosulus*, n. sp. Minor darker worker with broad gap mandibles: **A**, head in dorsal view; **B**, head in profile. Major lighter worker with narrow gap mandibles: **C**, head in dorsal view; **D**, head in profile.

Mandibles (Figs. 3A–B) Major lighter workers with narrow gap (Figs. 2C–D; 3B) having left mandible with apical tooth no more prominent than M1+2; posterior margin of apical tooth concave; acute angle between posterior margin of apical tooth and anterior margin of M1+2; posterior margin of M1+2 almost straight; third marginal tooth distinct, separated from molar prominence by a V-shaped gap; molar tooth barely visible at small gap, apex hidden beneath molar prominence; molar prominence with ridges, visible by translucence. Right mandible with an apical tooth about same size as first marginal tooth, a smaller second marginal tooth with blunt apex; molar plate with five conspicuous and one weakly developed ridges; basal notch well-defined. Minor darker worker with broad gap (Figs. 2A–B; 3A), differing from major lighter workers with narrow gap by having on the left mandible an apical tooth with posterior margin straight; broader gap between third tooth and molar prominence; on right mandible apical tooth having a peculiar posterior margin, second marginal tooth less prominent; molar plate narrower, with four conspicuous and one weakly developed ridges; basal notch less defined.

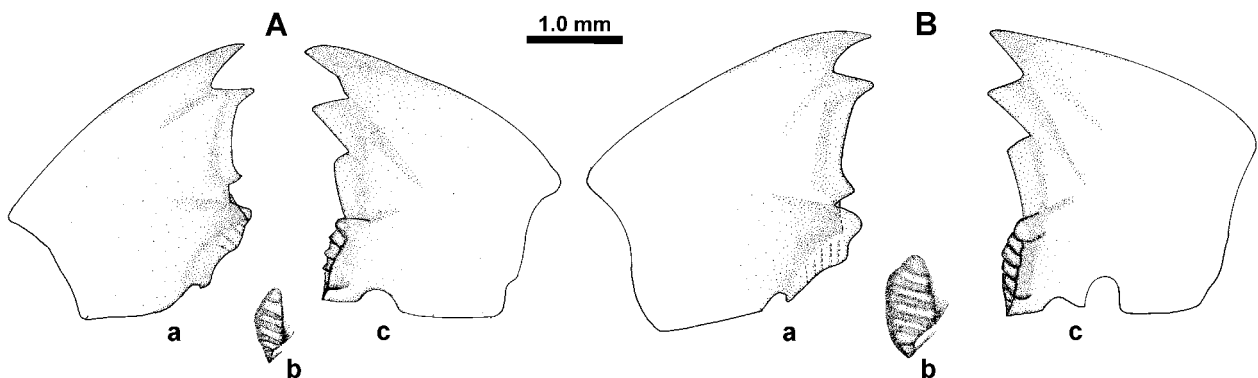


FIGURE 3. *Obtusitermes formosulus*, n. sp. Workers. **A**, Minor darker worker with broad gap mandibles: left (a) and right (c), both in dorsal view, and frontal view of molar plate (b); **B**, Major lighter worker with narrow gap mandibles, minor worker: left (a) and right (c), both in dorsal view, and frontal view of molar plate (b).

Digestive tube (Figs. 4A–I; 5A–B). Gut coiling showing a similar generic pattern (Roisin *et al.* 1996). Crop and gizzard (G) not clearly visible in dorsal view (Fig. 4A). Gizzard with a complete weakly sclerotized cuticular armature (hexaradial symmetry), without ornamentations (spines, scales); pulvillar belt more developed than columnar belt (Fig. 5A). Mesenteron short, dorsally extending to right side but not reaching medial line in ventral view. Mixed segment well-developed with a unique mesenteric tongue proximally on the internal face, and distally turning ventral (Fig. 4B). In this way, the mixed segment constitutes an asymmetrical structure. Malpighian tubules attached on a short projection of mesenteric tissue in two pairs

very close together at junction midgut-hindgut on inner face of midgut ring (Figs. 4G–I). Tubules dilated along mixed segment length. Ileum (P1) not dilated, turning back on itself to form a short loop distally on right side of abdomen. Enteric valve (P2) lying beneath P1 dorsally on right side of abdomen, or on a subdivision clearly visible on P3 (Figs. 4E–F). P2 with a weak armature of six spiny areas; minor areas alternating with major ones (Fig. 5B). Paunch (P3) as a pyriform sac, not protruding throughout midgut ring. Dorsal torsion not developed. P3 joined to colon (P4) on left side. P4 tubular, reaching rectum (P5) after passing beneath P1 loop on right side (Figs. 4B, E, F). No apparent differences in digestive tube of different kinds of workers.

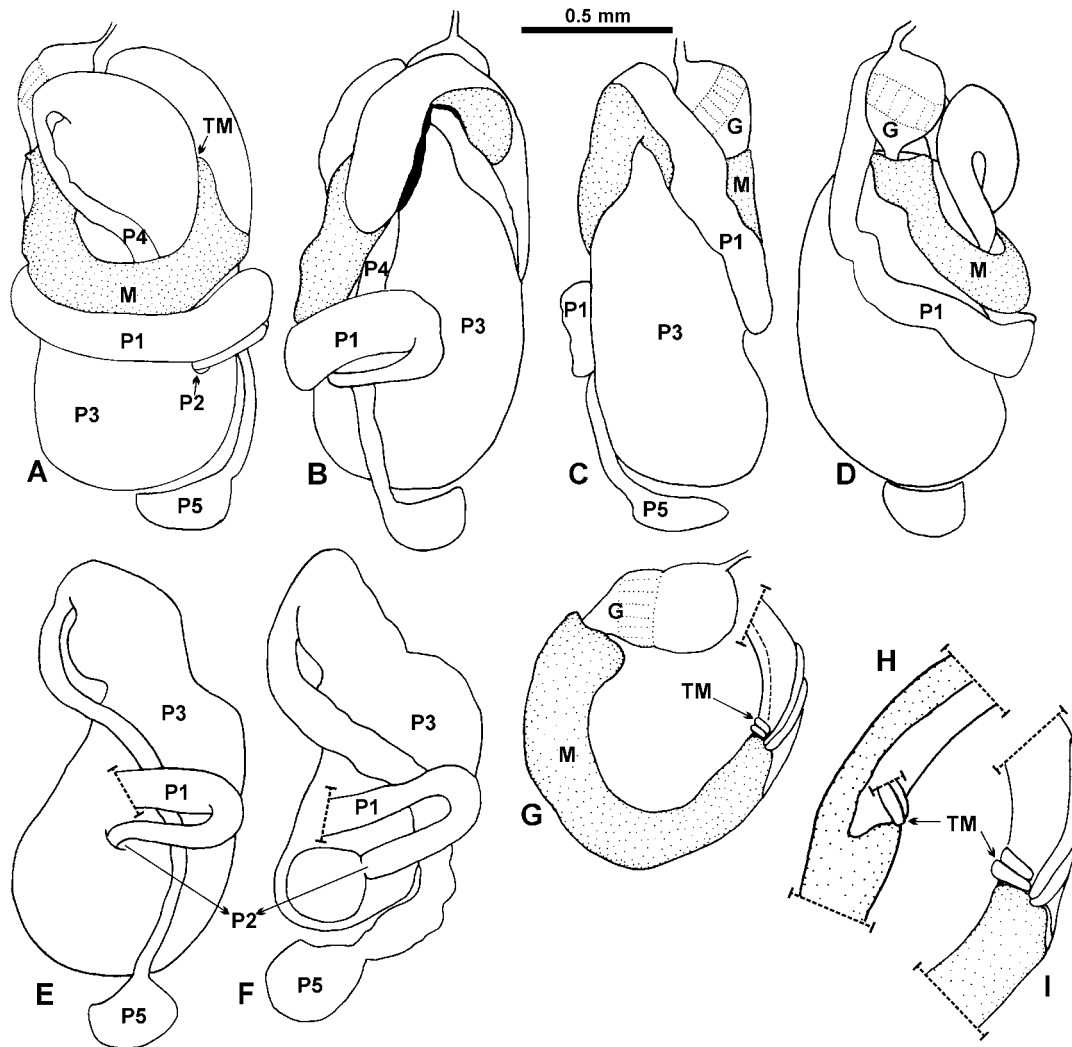


FIGURE 4. *Obtusitermes formosulus*, n. sp. Worker digestive tube, major lighter worker with narrow gap mandibles: **A–D**, gut *in situ* respectively from dorsal, right, ventral and left view; **E**, paunch in dorsal-right lateral view, showing P2 insertion; **F**, paunch in dorsal-right lateral view with a small compartment, showing P2 insertion; **G**, mesenteric arc, gizzard and Malpighian tubules insertion; **I**, mesenteric tongue at internal-lateral face; **H**, junction midgut-hindgut enlarged to show the attachment of Malpighian tubules. C= crop; G= gizzard; M= mesenteron, stippled; P1= first proctodeal segment; P2= enteric valve; P3= paunch; P4= colon; P5= rectum; TM= Malpighian tubules.

Comparisons. The major soldier of *Obtusitermes formosulus* differ from that of *O. panamae* by having a larger head capsule with the dorsal surface, in profile, converging toward nasus with no depressions; vertex outward, in profile; nasus somewhat longer and not or only slightly upturned in profile. Pilosity of head capsule and pronotum distinctly different, being the microscopic hairs and short hairs less abundant. The minor soldier of *Obtusitermes formosulus* has a larger head capsule, with the posterior part about as wide as

the anterior part in dorsal view; dorsal surface of the head capsule in profile, with a slight hump at the base of nasus, followed by a weaker depression; nasus somewhat longer and not or only slightly upturned in profile; and also pilosity of head capsule and pronotum different, being the microscopic hairs and short hairs less abundant. Worker gut of *Obtusitermes formosulus* has a mesenteric tongue which turns ventrally at its distal part; there is a projection of mesenteric tissue on the internal side where the Malpighian tubules are attached, and a minor P1 loop at the right side, not visible ventrally; these characters are different from those figured by Roisin *et al.* (1996, Fig. 1C).

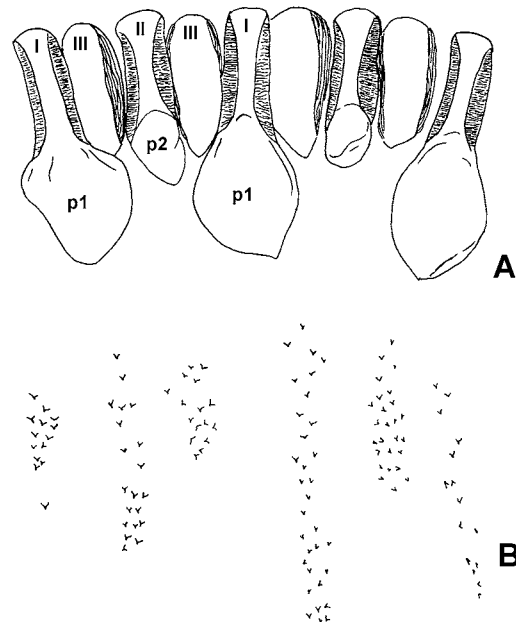


FIGURE 5. *Obtusitermes formosulus*, n. sp. Major lighter worker with narrow gap mandibles. **A**, gizzard armature, I to III, columnar folds of first, second and third order respectively; p1–p2, pulvilli of first and second order; **B**, enteric valve armature.

Comparisons with *Parvitermes bacchanalis* Mathews. *Parvitermes bacchanalis* soldier does not resemble that of *Obtusitermes* as Fontes (1998) had affirmed. First, the soldier of *P. bacchanalis* differs by having vestigial mandibles with points, while *Obtusitermes* soldier mandibles are vestigial without points. The soldier of *P. bacchanalis* has a head capsule with a stronger constriction near the antennal insertion, antenna with 13 antennomeres, postclypeus not inflated, nasus thinner, and a uniform pattern of coloration (see Mathews 1977, pg. 177–179, Figs. 130, 131, 154). Although either taxa could be understood as wood-feeders (or litter-feeders that feed on wood items in litter), it is possible to recognize some differences in their worker mandibles. Also, the worker gut coiling does not resemble that of *Obtusitermes*. In *P. bacchanalis* (see Fontes 1998, pg. 381, Figs. 101–104) the mesenteric tongue extends dorsally; P3 protrudes through the mesenteric arc, dorsal torsion well-developed; P1 leads to the right side and then turns to the left, passing below the mesenteric arc to reach P2; P4 with a conspicuous "U-turn".

Remarks. Issa (2000) mentioned *Obtusitermes* n. sp. for two localities of Venezuela (Uverito, Canaima). Also, Adamson (1937) and Scheffrahn *et al.* (2003) indicated another record of a new species for Trinidad and Tobago, and Constantino (2002) provides figures of *Obtusitermes* sp. (major and minor soldier, Figs. 121–124). Dr. Scheffrahn, who was one of the reviewers of this text, has affirmed that the material from Issa (2000) and Scheffrahn *et al.* (2003) match the description of *Obtusitermes formosulus*. Dr. Constantino also state that those figures (Constantino 2002, Figs. 121–124) were of *Obtusitermes formosulus*. One of us (CC) has examined samples of *Obtusitermes* from Adamson Collection deposited at the AMNH and it was possible to confirm that the record of Adamson (1937) is *Obtusitermes formosulus* as well.

Discussion

The internal relationships of the Neotropical Nasutitermitinae are still uncertain, and even the subfamily (*sensu* Grassé 1986) is not supported as monophyletic in recent cladistic analysis (Donovan *et al.* 2000; Inward *et al.* 2007; Legendre *et al.* 2008). Likewise, some taxa recognized among Nasutitermitinae are in an uncertain position. One example is *Parvitermes bacchanalis*, which has been treated by several authors. Fontes (1987, 1998) proposed transfer *P. bacchanalis* to *Obtusitermes*. Roisin *et al.* (1996), through a comparison with other species included in *Parvitermes* from the Greater Antilles, concluded that it would be “fully justified” to remove *P. bacchanalis* from *Parvitermes*, although they considered its transfer to *Obtusitermes* as dubious. Constantino (1998, 2002) treated both genera separately. We have studied *P. bacchanalis* type material housed in the MZUSP collection, along with other samples determined as the same genus from different localities in Brazil and we intend to keep working on these samples. For now, we propose maintaining the species *P. bacchanalis* in another genus but not *Obtusitermes*, as there are enough differences as we described above considering the soldier and worker external morphology and worker’s digestive tube. Thus, we hope to solve the question of the identity of *P. bacchanalis* at least in part, showing that it is not congeneric with *Obtusitermes*.

Inward *et al.* (2007) included *Obtusitermes* as part of an unsolved clade together with *Atlantitermes* (two species), *Coatitermes*, *Cyranotermes*, *Velocitermes*, and *Subulitermes*. In our ongoing investigation of some of these genera, we believe that there is strong morphological and “developmental pathway” evidence that does not support the clade obtained by Inward *et al.* (2007). We agree with Roisin *et al.* (1996) in considering that *Obtusitermes* could be related to *Caribitermes*, *Parvitermes* and probably also *Antillitermes*. Through the measurements taken here for taxonomic purposes we recognize within *Obtusitermes formosulus* different types of workers but we have not been able to determine if the observed polymorphism is associated with sexual dimorphism as has been observed in other nasutitermitine genera.

Acknowledgments

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