



## RESEARCH ARTICLE - TERMITES

## *Inquilinitermes johnchapmani*, a New Termite Species (Isoptera: Termitidae: Termitinae) from the Llanos of North Central Bolivia

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### Abstract

*Inquilinitermes johnchapmani* is described from soldiers and workers collected in the Llanos de Mojos of Bolivia. This is the fourth and the smallest species of the genus. Unlike its congeners, *I. johnchapmani* is not an inquiline of *Constrictotermes* spp. nests although an association with *Cornitermes snyderi* nests is likely.

### Introduction

Until now, the genus *Inquilinitermes* Mathews (1977) consisted of three neotropical species: *Inquilinitermes fur* (Silvestri, 1901), *I. microcerus* (Silvestri, 1901), and *I. inquilinus* (Emerson, 1925). Previously included in the genus *Termes* (Snyder, 1949), Mathews (1977) consented to erect the genus *Inquilinitermes* for these species on the basis of the absence of the second marginal tooth on the left worker/imago mandible, the poorly developed frontal process of the soldier, and the species' apparent obligate colonization of *Constrictotermes* spp. (Termitidae: Nasutitermitinae) nests (Cunha et al., 2003; Constantino & Acioli, 2006). Apolinário & Martius (2004) report that they found a colony of *Inquilinitermes* cf. *microcerus* in a hollow tree in central Amazonia unassociated with *Constrictotermes*. In all cases however, *Inquilinitermes* soldiers also differ from those of *Termes* by the former's long slender mandibles which are much longer than the head capsule. Herein, I described the fourth and smallest species of *Inquilinitermes*, *I. johnchapmani*.

### Materials and Methods

The distribution map (Fig 1) was created using ArcGIS desktop ver. 10.1 (ESRI, Redlands, CA). Photos in Figs 3, 4, 6, and 8 were taken as multi-layer montages using a Leica M205C stereomicroscope controlled by Leica Application Suite version 3 software. Preserved specimens were taken from 85% ethanol and suspended in pool of Purell® hand sanitizer to position the specimens over a transparent plastic Petri dish background.

The worker enteric valve (Fig 5) and mandible photographs (Fig 7) were taken from slide mounts using PVA medium (BioQuip Products Inc.) and a Leica CTR 5500 compound microscope with phase-contrast optics using the same montage software. Measurements were obtained using an Olympus SZH stereomicroscope fitted with an ocular micrometer. Worker mandible dentition terminology follows that of Sands (1972), and gut sections are named per criteria of Noirot (2001).



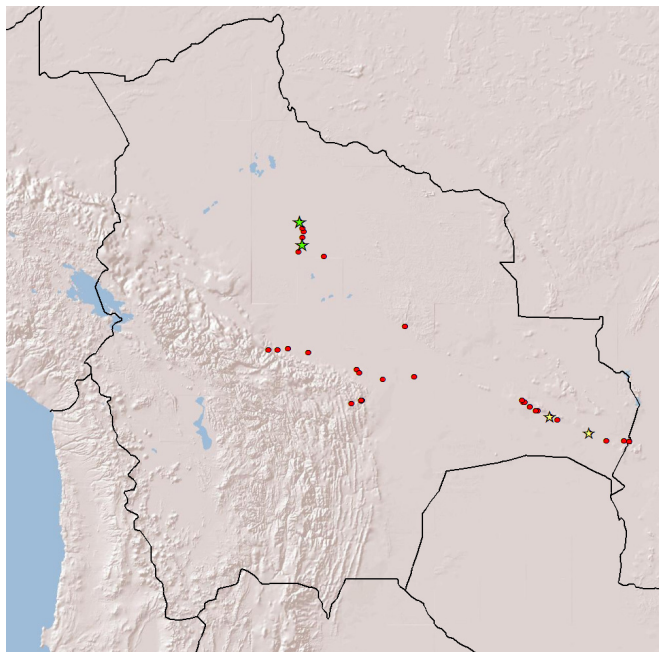


Fig 1. Map of *Inquilinitermes johnchapmani* collection site (green stars), *Constrictotermes cyphergaster* sites (yellow stars), and other 2013 Bolivia termite survey localities (red dots).

*Inquilinitermes johnchapmani*, new species

**Holotype:** soldier in UF sample no. BO423 from BOLIVIA: Hwy. 9 N. Trinidad (14.70207, 64.89097) 155 m elev., 29MAY2013, University of Florida Termite collection, Fort Lauderdale Research and Education Center, Davie, Florida.

**Paratypes:** Twelve soldiers and many workers in holotype colony; BO422 (1 soldier, workers) same data as holotype colony. BOLIVIA: N. San Pedro on Hwy. 9 (14.21260, 64.94026) 147 m elev., 29MAY2013, BO570, (1 soldier, workers) BO573 (2 soldiers, workers). BO422 and BO573 collected from galleries associated with *Cornitermes snyderi* Emerson, and BO423 collected with *Grigiotermes metoecus* Mathews, a common nest inquiline of *Cornitermes* spp. All samples taken collectively by those mentioned in the acknowledgments.

**Etymology.** This species is named after John Chapman

(1949-2010). John spent his 38-year career with Terminix International and his last 25 years as the company's manager of technical services for wood-destroying organisms. The author interacted with John on many occasions regarding termite identification and control technologies and his absence remains a loss to the pest control industry.

**Imago.** Unknown.

**Soldier.** (Figs 3 and 4; Table 1). Head, in dorsal view, rectangular with rounded corners; about 1.5 times as long as broad with lateral margins parallel and straight or very slightly concave. In dorsal view, frontal tubercle triangulate ending in a nipple-like point; tubercle not projecting beyond genal condyles. Antennae with 14 articles, relative length formula 2=3=4<5. Antennae about same length as mandibles. Pronotum angle about 110°. Each tibia with two proximal spurs although a weaker distal spur may occur on fore tibia of some specimens.

Mandibles about 1.7 times as long as head measured at the genal condyles; becoming very thin at distal two-thirds; slightly bending inwards at midpoint, recurving and straightening in distal one-third; tips hooked about 45° inward. Mandibles nearly symmetrical, left mandible slightly longer with more pronounced basal hump than right; tiny obtuse tooth present on inner basal margin of left mandible, occasionally also present on right mandible.

In lateral view, head capsule ovoid. Frontal tubercle rising about 30° from plane of vertex to midpoint of tubercle, then slanting downward about 10° to form ca. 140° angle; nipple-like tip angled upward; angle formed by frontal face of tubercle and postclypeus near 90°. Labrum with sharp triangular lateral points, frontal margin rather deeply incised.

**Diagnosis.** *Inquilinitermes johnchapmani* is the smallest of the four described congeners and has the most robust frontal process. The nipple-like point of the frontal process is distinctive. Compared with *Termes* soldiers, this and other *Inquilinitermes* spp. have proportionally much longer mandibles relative to head capsule length.

**Worker** (Figs 5-8; Table 1). Head, thorax, and legs nearly white. Postclypeus moderately inflated. Gut contents dark brown; lighter in P3. P1 long; wrapping 360° around rest of digestive coil and covering median of P4 when viewed on

Table 1. Measurements of *Inquilinitermes johnchapmani* soldiers and workers

Measurement in mm	Range	Mean ± S.D.	Holotype
<b>SOLDIERS (n=11 from 4 colonies)</b>			
Head length to apex of tubercle	1.19-1.48	1.37 ± 0.08	1.38
Head length to genal condyle	1.04-1.31	1.23 ± 0.07	1.23
Left mandible length to genal condyle	1.93-2.22	2.11 ± 0.09	2.22
Head length with mandibles*	2.96-3.48	3.34 ± 0.15	3.46
Head height (max. w/o gula)	0.64-0.72	0.68 ± 0.03	0.67
Head width (max.)	0.79-0.86	0.85 ± 0.02	0.84
Pronotum width (max.)	0.57-0.64	0.61 ± 0.03	0.64
<b>WORKERS (n=8 from 4 colonies)</b>			
Head width (max.)	0.67-0.77	0.73 ± 0.03	
Pronotum width (max.)	0.40-0.54	0.45 ± 0.05	

\* = HL to genal condyle + LML to genal condyle.

right side; posterior 1/5 of P1 greatly inflated in volume until reaching constriction at P2. In ventral view, P3 occupying 2/3 of abdomen. Enteric valve armature composed of six spiny cushions, three larger and three smaller, in symmetrical arrangement. Spines consist of hollow cones with pointed tips projecting into lumen of P2; when mounted, spines pushed flat by cover slip.

Mandibles dominated by prominent apical teeth; left mandible with 2nd marginal tooth absent along cutting edge formed by first and third; right mandible with second marginal tooth reduced and forming a weak concavity along posterior margin of first marginal.



Fig 2. Ground cover where *I. johnchapmani* was collected. Mounds are those of *Cornitermes snyderi*.



Fig 3. Dorsal, lateral and ventral view of *Inquilinitermes johnchapmani* soldier head.

**Diagnosis.** Presumed to be the smallest workers among three other congeners based on size of soldier caste in each. Unlike *Termes* spp., this and other *Inquilinitermes* spp. lack a second marginal tooth on the left mandible, however enteric valve armature is very similar to that of *Termes* (Miller (1991), Sands (1998)) with the exception of *T. hispaniolae* (Banks) in which pads are adorned with thickly sclerotized spines (Scheffrahn unpubl. obs.). Like *I. johnchapmani*, Constantino (2002) reports a 2:2:2 tibial spur formula which he uses to distinguish the genus from *Termes* (3:3:2 or 3:2:2).

## Discussion

The currently known habitat for *I. johnchapmani* is the Mamoré subregion of the Llanos de Mojos in Depto. Beni, Bolivia (Fig 1). This biome is characterized by a pronounced wet/dry season (1300-2000 mm precipitation/yr) and encompasses a patchwork of floodplains, savannas with palm stands, and gallery forests (Hamilton et al. 2004). Our two roadside collection sites of *I. johnchapmani* were dominated by epigeal mounds built by *Cornitermes snyderi* (Fig 2). Some trees had



Fig 4. Soldier of *Inquilinitermes johnchapmani* showing the frontal process (antennae removed).

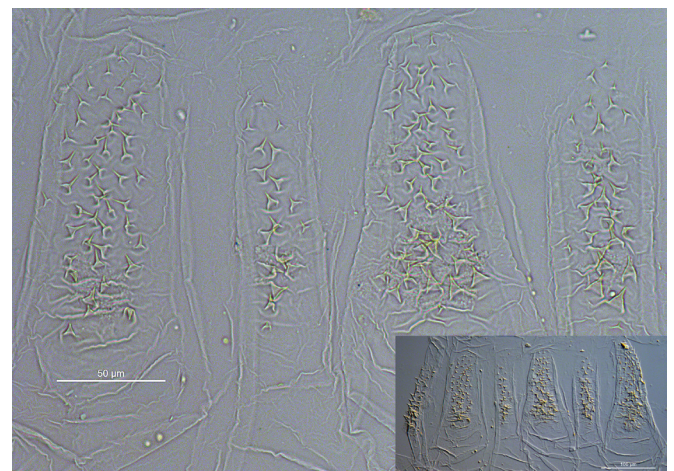


Fig 5. Enteric valve armature of *Inquilinitermes johnchapmani*. Inset showing arrangement of all six pads.



Fig 6. Lateral view of worker of *Inquilinitermes johnchapmani*.

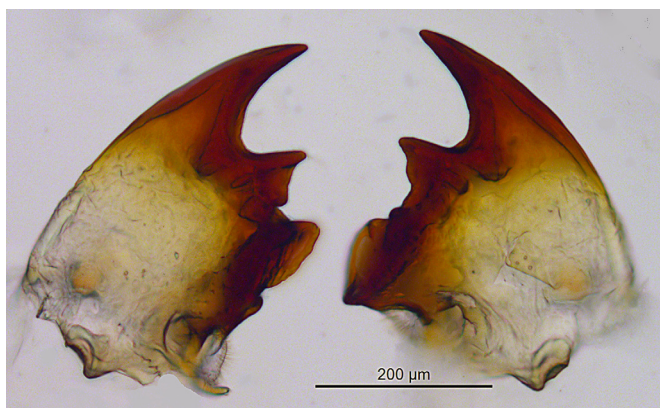


Fig 7. Worker mandibles of *Inquilinitermes johnchapmani*.

been cleared from the area in recent time. Much of the habitat, including our collection sites, were grazed by cattle. We collected 128 colony samples of termites (some with multiple species) from the two *I. johnchapmani* sites. During our survey expedition (Fig 1), the nearest collection of *Constrictotermes*, *C. cyphergaster* (Silvestri), was taken 712 km to the south-east (-18.46413, -59.47732, Aguas Calientes) in the Llanos de Chiquitos, a humid subregion of the Gran Chaco (Fig 1). The workers of *I. johnchapmani* resemble soil-feeding termites as they lack fat bodies found in sympatric cellulose feeders like *Termes*, presumably because of its feeding habit inside *C. snyderi* nests.

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Fig 8. Worker abdomen of *Inquilinitermes johnchapmani* with integument removed. C = crop, M = mesenteron, MS = mixed segment, MT = malpighian tubules, P1-P5 = protodeal segments 1-5.

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