

# TERMITES COLLECTED ON THE MULFORD BIOLOGICAL EXPLORATION TO THE AMAZON BASIN, 1921-1922

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The members of the Mulford Biological Exploration of the Amazon Basin expedition sailed from New York June 1, 1921, for Arica, Chile; the return was by way of Manaus and Para, Brazil, to New York, April 13, 1922. Dr. W. M. Mann, of the Bureau of Entomology, United States Department of Agriculture, collected practically all of the termites taken by this expedition. The headquarters were at: Canamina and Espia, Bolivia—July 14 to August 20; Huachi, Rio Bopi, Bolivia—August 23 to September 25; Rurrenabaque, Bolivia—October 2 to October 24; Lake Rogagua, Bolivia—October 28 to November 9; Rurrenabaque, Bolivia—November 14 to December 20; and Riberalta, Bolivia—January 6 to February 20. Studies and collections were made in various localities along the La Paz, Meguilla, Bopi, Cochabamba, Beni, Negro, Ivon, Madidi and Madeira Rivers.

The appended map (fig. 1) shows the route of this expedition. Seventy-seven species of termites were collected, including 36 new species, representing 26 genera and one new subgenus (*Agnathotermes*), in the families Kalotermitidae, Rhinotermitidae and Termitidae. Of these 26 genera, however, 14 may be considered to be subgenera. The families are represented as follows:

		New Species species
Family Kalotermitidae:		
Genus <i>Neotermes</i> Holmgren.....	2	2
Family Rhinotermitidae:		
Genus <i>Leucotermes</i> Silvestri.....	1	0
<i>Coptotermes</i> Wasmann.....	1	0
• <i>Rhinotermes</i> Hagen.....	4	2
Family Termitidae:		
Genus <i>Syntermes</i> Holmgren.....	2	0
<i>Cornitermes</i> Wasmann (sensu latiori).....	6	1
Subgenus <i>Cornitermes</i> Holmgren (sensu strictore).....	5	1
<i>Labiotermes</i> Holmgren.....	1	0

	Species	New species
Genus <i>Armitermes</i> Wasmann (sensu latiori)-----	9	3
Subgenus <i>Armitermes</i> Holmgren (sensu strictore)-----	7	3
<i>Curvitermes</i> Holmgren-----	1	0
<i>Rhynchotermes</i> Holmgren-----	1	0
Genus <i>Nasutitermes</i> Banks (sensu latiori)-----	25	10
Subgenus <i>Nasutitermes</i> Holmgren (sensu strictore)-----	15	3
<i>Subulitermes</i> Holmgren-----	1	1
<i>Convexitermes</i> Holmgren-----	2	2
<i>Diversitermes</i> Holmgren-----	3	1
<i>Velocitermes</i> Holmgren-----	1	1
<i>Agnathotermes</i> Snyder-----	1	1
<i>Tenuirostritermes</i> Holmgren-----	1	1
<i>Constrictotermes</i> Holmgren-----	1	0
Genus <i>Anoplotermes</i> Fritz Müller (sensu latiori)-----	14	11
Subgenus <i>Anoplotermes</i> Holmgren (sensu strictore)-----	13	11
<i>Speculitermes</i> Wasmann-----	1	0
Genus <i>Cylindrotermes</i> Holmgren-----	1	1
Genus <i>Mirotermes</i> Silvestri (sensu latiori)-----	4	2
Subgenus <i>Mirotermes</i> Wasmann (sensu strictore)-----	1	1
<i>Spinitermes</i> Wasmann-----	3	1
<i>Capritermes</i> Wasmann (sensu latiori)-----	5	3
Subgenus <i>Capritermes</i> Holmgren (sensu strictore)-----	0	0
<i>Neocapritermes</i> Holmgren-----	5	3
Genus <i>Orthognathotermes</i> Holmgren-----	2	1
Genus <i>Microcerotermes</i> Silvestri-----	1	0
Total-----	77	36

The termites collected by Doctor Mann have been compared with descriptions of termites collected by Prof. Nils Holmgren (1906)<sup>1</sup> on the Nordenskiöldi Expedition to South America. Professor Holmgren spent two months in Mojos (Prov. de Caupolican, Bolivia), one month in San Fermin (Province de Caupolican, Bolivia) [most of the collection at San Fermin was lost], and two months in Llinquipata and Chaquimayo (Province de Carabaya, Peru). Among 39 species collected by Holmgren, 26 were new.

<sup>1</sup> 1906. Holmgren, Nils. Studien über südamerikanische Termiten, Zoolog. Jahrbuch. Systematik Geographie und Biologie, vol. 23, pt. 5, pp. 521-676, Jena.

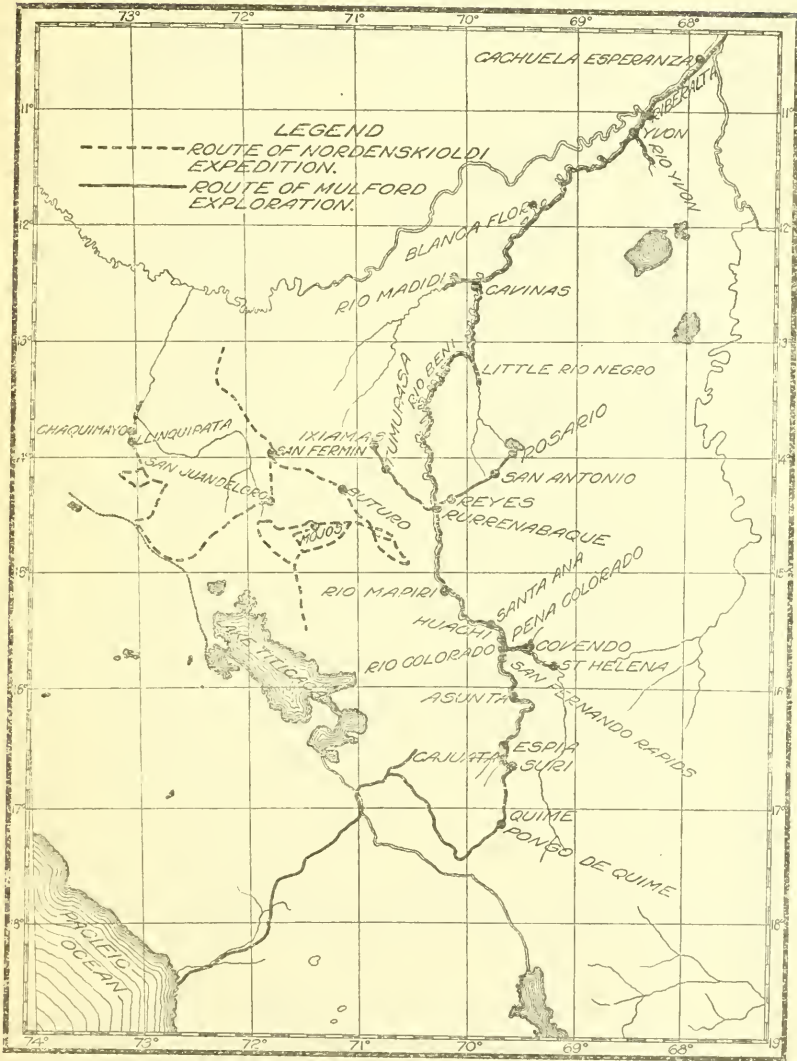


FIG. 1.—MAP SHOWING ROUTES OF THE SWEDISH (NORDENSKIÖLDI) EXPEDITION TO SOUTH AMERICA (BOLIVIA AND PERU), 1904-1905, AND THE MULFORD BIOLOGICAL EXPLORATION OF THE AMAZON BASIN (BRAZIL AND BOLIVIA), 1921-1922. BOUTES OF THESE TWO EXPEDITIONS TRANSFERRED TO MAP OF THE REPUBLIC OF BOLIVIA BY E. IDIAQUEZ (1901). (REPRINTED BY THE INTERNATIONAL BUREAU OF AMERICAN REPUBLICS.) ROUTE OF THE NORDENSKIÖLDI EXPEDITION TRANSFERRED FROM MAP (IN ZOOLOGISCHE JAHRBÜCHER, SYSTEMATIK, GEOGRAPHIE AND BIOLOGIE, VOL. 23, 1906) TO BASE MAP

Of these 39 species collected by Holmgren representing the families Rhinotermitidae and Termitidae, 21 genera are included; of these genera, 12 are considered as subgenera by Holmgren. The families are represented as follows:

Rhinotermitidae:	Species	Termitidae—Continued.	Species
<i>Leucotermes</i> Silvestri-----	1	<i>Nasutitermes</i> —Continued.	
<i>Rhinotermes</i> Froggatt-----	2	<i>Diversitermes</i> Holmgren--	1
Termitidae:		<i>Velocitermes</i> Holmgren--	1
<i>Syntermes</i> Holmgren-----	2	<i>Constrictotermes</i> Holmgren-----	1
<i>Cornitermes</i> (l. s.) Wasmann--	3	<i>Anoptotermes</i> (l. s.) Fritz	
<i>Cornitermes</i> (s. s.) Holmgren-----	2	Müller-----	3
<i>Labiatermes</i> Holmgren--	1	<i>Anoptotermes</i> (s. s.)	
<i>Armitermes</i> (l. s.) Wasmann--	4	Holmgren-----	2
<i>Armitermes</i> (s. s.) Holmgren-----	2	<i>Speculitermes</i> Wasmann--	1
<i>Curvitermes</i> Holmgren--	1	<i>Cylindrotermes</i> Holmgren--	1
<i>Rhynchotermes</i> Holmgren	1	<i>Mirotermes</i> (l. s.) Silvestri--	3
<i>Nasutitermes</i> Banks (l. s.)--	17	<i>Mirotermes</i> (s. s.) Wasmann-----	1
<i>Nasutitermes</i> Holmgren		<i>Spinitermes</i> Wasmann--	2
(s. s.)-----	9	<i>Capritermes</i> (l. s.) Wasmann	3
<i>Subulitermes</i> Holmgren--	2	<i>Neocapritermes</i> (s. s.)	
<i>Convexitermes</i> Holmgren	2	Holmgren-----	3
<i>Rotunditermes</i> Holmgren	1		

The genus *Cylindrotermes* was described by Holmgren and one species only was found in Bolivia. Biological studies of the termites of Bolivia and Peru were also made.

The appended map (fig. 1) shows the route of the Nordenskiöld Expedition, as well as that of the Mulford Exploration.

During 1919, 1920, and 1924 Dr. Alfred Emerson of the University of Pittsburgh made collections of termites at the Research Laboratory of the New York Zoological Society at Kartabo, Bartica District, British Guiana. Through the kindness of Doctor Emerson, I have been able to compare the termites collected by Doctor Mann in Brazil and Bolivia with a fine series of Emerson's manuscript paratypes (before publication). This comparison has enabled me to avoid duplication, has revealed that many species were identical and that the termite fauna of those portions of Bolivia traversed by the Mulford expedition is closely related to that of the vicinity of Kartabo, British Guiana.

The type species of termites from America in the Hagen collection located at the Museum of Comparative Zoology at Cambridge, Mass., were also carefully studied and doubtful species compared. Thanks are due to Dr. S. Henshaw and Mr. N. Banks for this privilege and their helpful courtesy.

Detailed descriptions of the new species, redescrptions of some known species, and lists of the species, giving castes collected, locality and dates, follow herewith; these species are discussed in their taxonomic or systematic order.



## Family KALOTERMITIDAE

## KALOTERMES (NEOTERMES) MAGNOCULUS, new species

*Winged, female adult.*—Head light castaneous-brown, lighter at posterior margin, shining, longer than broad, slight depression and slope to front at epicranial suture, latter plainly outlined to ocelli as is median line, with scattered long hairs. Eyes blackish, very large, not round, close to lateral margin head, and separated from posterior margin by a distance about equal to their long diameter. Ocelli large, elongate, at angle to but close to eye.

Labrum light castaneous-brown, about three-quarters as long as broad, broadly rounded at apex, with long hairs.

Antenna pale yellow-brown, 17 segments, beadlike, pubescent; third segment short, subclavate, slightly longer than second or fourth; fourth, fifth, and sixth segments subequal, small and beadlike; segments become longer and wider toward apex.

Pronotum pale yellow-brown, probably slightly wider than head (corners turned down) not twice as wide as long, slightly emarginate anteriorly and posteriorly, sides rounded, with long hairs.

Legs pale yellow-brown, pubescent, claws *with no pulvillus*.

Wings white, punctate, costal veins yellow-brown, hairs on upper margins and on surface of lower margin, especially near scale; median vein runs close to subcosta, unbranched to apex (except for two indistinct, short, transverse branches to subcosta); subcostal vein with 7 (mostly long) branches to costa; cubitus in about the centre of the wing, slightly nearer to lower margin, with 11 branches to the lower margin. Wing scale 1.0 mm. in length.

Abdomen pale yellow-brown, with long and short hairs.

*Measurements.*—

Length of entire winged adult, 10.75 mm.

Length of entire deilated adult, 7.25 mm.

Length of head, 1.65 mm.

Length of pronotum (where longest, and not at median), 0.85 mm.

Length of hind tibia, 1.0 mm.

Length of anterior wing, 8.3 mm.

Diameter of eye (long diameter), 0.45 mm.

Width of head, 1.35 mm.

Width of pronotum, 1.35+ mm. (turned down).

Width of anterior wing, 2.45 mm.

This may be the winged caste of *N. manni* Snyder described from the soldier caste alone. Lighter colored and smaller than *N. fulvescens* Silvestri, with smaller eye.

*Type locality.*—Huachi, Bolivia.

Described from a single female winged adult collected at the type locality by W. M. Mann in September, 1921.

*Type, winged adult, female.*—Cat. No. 27644, U.S.N.M.

## KALOTERMES (NEOTERMES) MANNI, new species

*Soldier*.—Head light castaneous-brown, not quite twice as long as broad, sides nearly parallel, slightly concave in middle, nearly flat, slight slope and depression at epicranial suture, which forms two lobes by a median division at its apex, with scattered long hairs. Eye spot very small, white, ocellus and trace of frontal gland also visible.

Mandibles dark castaneous-brown to black, fairly elongate and slender, with a high dorsal median ridge, giving a gouge-shaped mandible, incurved at tips; left mandible with two sharp, pointed marginal teeth at apical third, then a broad three-pointed molar (with the central tooth the most prominent) extending to base; right mandible with larger, sharp, pointed tooth at middle and a similar, lower adjoining tooth.

Gula narrow, width at middle one third as wide as at front.

Labrum yellow-brown, slightly broader than long, rounded at apex, with long hairs—two very long hairs at apex.

Antenna yellow-brown, 13–14 segments, pubescent; third segment sub-clavate, but not greatly modified or differing from the other segments, broader but not as long as (or slightly longer than) second segment; fourth segment bead-like, shorter than (or same size as) third segment; fifth segment slightly longer than fourth segment; from sixth segment on, segments become broader and much more elongate (or only slightly longer and more or less bead-like).

Pronotum yellow-brown, margins light castaneous, as wide as head; anterior margin shallowly, angularly concave; posterior margin nearly parallel to anterior margin; sides gradually and angularly slope to posterior, anterior corners higher, posterior margin slightly emarginate; pronotum with long but scattered hairs.

Legs white with tinge of yellow, tibiae and spines light castaneous, femora swollen.

Abdomen dirty grey, with tinge of yellow, with long hairs.

*Measurements*.—

Length of entire soldier, 9.00–10.50 mm.

Length of head with mandibles, 3.50–5.20 mm.

Length of head without mandibles (to anterior), 2.60–3.90 mm.

Length of left mandible, 1.15–1.45 mm.

Length of pronotum, 1.00–1.30 mm.

Length of hind tibia, 1.20–1.50 mm.

Width of head, 1.70–2.20 mm.

Width of pronotum, 1.70–2.20 mm.

Unlike in *K. (N.) castaneus* Burmeister, the hind femora are swollen. Without the winged adult there is difficulty in placing soldiers of certain species of *Kaloterme*s in a subgenus.

*Type locality*.—Near mouth of Mapiri, Bolivia.

Described from a series of soldiers collected with nymphs at the type locality in September, 1921, by W. M. Mann; other specimens of soldiers from Huachi, August; Rio Colorado, September, 1921; Rosario, November, 1921; and Espia, Bolivia, Mann collector.

*Type, soldier*.—Cat. No. 27645, U.S.N.M.

## Family RHINOTERMITIDAE

### Genus RHINOTERMES Hagen

Only seven species of this genus have been previously described from America. The winged adult has the clypeus projected into a small noselike process or horn. There are two types of soldiers, the major strongly mandibulate and the minor with the elongate slender labrum forked at the apex, and fairly long, slender, pointed or vestigial mandibles.

In several new American species the major soldiers have the labrum remarkably elongate (pl. 1). The dimorphism of the soldier caste is very striking, there being marked structural differences between the major and minor soldiers.

#### RHINOTERMES LATILABRUM,<sup>2</sup> new species

*Soldier, major* (pl. 1, fig. 6).—Head straw-yellow, rim of antennal socket darker, labrum yellow-brown, lighter toward apex, base of mandibles yellow, but castaneous brown toward the apex and marginal teeth; head narrows anteriorly, rounded posteriorly, scattered long hairs on head. Labrum elongate as in minor soldier, broadest at base, with long hairs at apex. Mandibles elongate, slender, sharply pointed and incurved at the apex; prominent marginal teeth—as in figure; tips of two teeth broken on right mandible.

Antenna light yellow, 16 segments, with long hairs; third segment slender, subclavate, about same length as second but longer than fourth segment; segments beadlike, become longer and broader toward apex; last segment narrower and subelliptical.

Pronotum straw-yellow, margins darker, saddle-shaped, posterior margin markedly emarginate, anterior margin sharply raised up, rounded and narrowed; few scattered long hairs on posterior margin, few long hairs and more numerous short hairs on anterior margin.

Legs white, with tinge of yellow, fairly elongate, slender, pubescent (hairs long).

<sup>2</sup> In a paper entitled "An Extraordinary New *Rhinotermes* from Panama," in Proc. Biol. Soc. of Washington, vol. 37, pp. 83-6, February 21, 1924, the writer referred to *R. latilabrum* Snyder as *R. intermedius* Snyder MS. Since it has been found that the name *intermedius* is preoccupied, this was later changed to *latilabrum*—emphasizing the relatively broad labrum of the major soldier caste.

Abdomen straw-yellow, with dense long hairs at base tergites, cerci prominent.

*Measurements (major soldier).—*

- Length of entire soldier, 4.10 mm.
- Length of head with mandibles, 1.75 mm.
- Length of head without mandibles (to anterior), 1.05 mm.
- Length of left mandible (base mandibles), 0.80 mm.
- Length of labrum, 0.60 mm.
- Length of pronotum, 0.35 mm.
- Length of hind tibia, 0.85 mm.
- Width of head (at widest point), 1.10 mm.
- Width of labrum (at apex), 0.20 mm.
- Width of labrum (at base), 0.22 mm.
- Width (average) of labrum (at center), 0.20 mm.
- Width of pronotum, 0.70 mm.

*R. latilabrum* Snyder has a broader head, and mandibles have longer, more robust and differently located teeth than in *longilabius* Emerson, as well as a broader labrum and longer and broader pronotum. The antennae have 16 segments whereas in *longidens* Snyder the antennae have only 15 segments, the labrum is broader at the apex than in *longidens*, and the posterior margin of the pronotum more emarginate.

*Soldier, minor* (pl. 1, fig. 9).—Head straw-yellow, margins and rim of antennal socket darker, labrum yellow-brown, broadest at posterior of antennal socket, sides slope gradually and roundedly to posterior margin, where rounded, conical at apex; head and labrum convex in profile; head with three rows of long hairs. Labrum elongate, slender, broadest at apex, with one long hair and dense short hairs on each fork at the apex. Mandibles yellow-brown, long, straight, slender, and sharp pointed (taper towards apex), nearly as long as one half the length of the labrum.

Antenna light yellow-brown, 14 segments, with long hairs; third segment subclavate, longer than second or fourth; fourth beadlike, shorter than second segment; segments become longer and broader toward apex; last segment conical.

Pronotum straw-yellow, darker on margins, saddle-shaped, anterior margin not sharply turned up, narrowed and rounded; pronotum raised up (convex in profile) at middle, sides roundedly slope to posterior margin which is slightly roundedly emarginate; a few long and short hairs on the margins.

Legs white with tinge of yellow, slender and with long hairs.

Abdomen light straw-yellow, with row of long hairs near base of each tergite, cerci prominent.

*Measurements (minor soldier).—*

- Length of entire soldier, 2.90-3.15 mm.
- Length of head with labrum, 1.25 mm.
- Length of head without labrum (to anterior), 0.55 mm.
- Length of labrum (to base of frontal gland), 0.63 mm.



*Measurements (minor soldier)*—Continued.

Length of left mandible, 0.35 mm.

Length of pronotum, 0.32 mm.

Length of hind tibia, 0.62 mm.

Width of head (at widest point), 0.60 mm.

Width of labrum (at base), 0.13 mm.

Width of labrum (at forks at apex), 0.13 mm.

Width of labrum (at center), 0.07 mm.

Width of pronotum, 0.47 mm.

*R. latilabrum* Snyder has a smaller head with fewer hairs and narrower labrum than *longilabius* Emerson (pl. 1, fig. 8); the anterior margin of the pronotum is raised up less sharply than in *longilabius*; the long pointed mandibles distinguish this species from *longidens* Snyder (pl. 1, figs. 1 and 10).

*Type locality*.—Rio Ivon, Bolivia.

Described from one major soldier and a series of minor soldiers, collected with workers at the type locality in February, 1922, by W. M. Mann. A deilated adult of *R. marginalis* Linnaeus was also collected with these specimens.

*Type, major soldier*.—Cat. No. 27646, U.S.N.M.; morphotype minor soldier.

## RHINOTERMES MANNI, new species

*Winged, male adult*.—Head light yellow-brown (golden brown), clypeus somewhat darker, with scattered long hairs, a little longer than broad, sides roundedly slope to posterior margin, which is not transverse (as in *R. taurus* Desneux). Horn (clypeus) outlined by V-shaped grooves which originate at the fontanelle, elongate and broad with a median groove leading from the fontanelle, with a few long hairs anteriorly where rounded and curved down ventrally. Fontanelle hyaline, small round opening located well forward (on a transverse line with the anterior margin of the ocelli).

Eyes black, nearly round, projecting, close to lateral margin of head. Ocelli hyaline, suboval, slightly projecting, separated from eyes by a distance less than their diameter. Anterior to the ocelli are two large transversely placed quarter moon shaped hyaline spots.

Antenna pale yellow (third segment yellow-brown), 20 segments, with long hairs; third segment slender, elongate and markedly subclavate, longer than both the fourth and fifth segments together; from fourth segment on antennae bead-like, segments becoming longer toward apex; last segment slender and subelliptical.

Pronotum same color as head, not twice as broad as long, nearly rectangular, slightly saddle shaped, corners rounded and posterior margin slightly concave, with long hairs on margins.

Wing scale of forewing longer than pronotum, with long hairs, overlaps the base of the hind wing scale, which is shorter than the pronotum.

Wings gray-brown, costal veins golden-brown. In forewing median vein parallel and close to cubital vein, branches and reaches apex of wing in both wings, connected with subcosta by numerous slanting branches; subcosta with a few branches near apex in both wings; cubitus occupies most of the wing area, does not reach apex, with many branches to lower margin of wing. In hind wing median parallel and close to cubitus, branches and reaches apex of wing, more distant from subcosta than in forewing, cubitus does not reach apex of wing, with many branches to lower margin of wing.

Legs yellow, slender, elongate, with long hairs.

Abdomen yellow-brown (golden brown), paler ventrally, with dense long hairs; traces of styli present, cerci fairly elongate.

*Measurements.*—

- Length of entire winged adult, 18.00 mm.
- Length of entire deilated adult, 10.05 mm.
- Length of head, 2.40 mm.
- Length of horn, 0.70 mm.
- Length of pronotum, 1.40 mm.
- Length of hind tibiae, 3.00 mm.
- Length of forewing, 13.05 mm.
- Diameter of eye, 0.62 mm.
- Width of head (at eyes), 2.35 mm.
- Width of pronotum, 2.10 mm.
- Width of forewing, 3.50 mm.

Described from a single male winged adult collected by W. M. Mann with major and minor soldiers at Cachuela Esperanza (Beni River), Bolivia, in March, 1922. The winged adult of *R. manni* Snyder is larger and lighter colored than *R. marginalis* Linnaeus and has a larger, differently shaped head and longer, broader horn than *R. taurus* Desneux, but is otherwise very close to *taurus*; *nasutus* Perty should replace *taurus*.

*Soldier, major* (pl. 1, fig. 5).—Head yellow-brown, flat, longer than broad, broadest posteriorly, with scattered long hairs. Fontanelle small with a groove leading from opening to labrum. Labrum yellow-brown, tongue-shaped, as broad as long, with a median groove, tip white, fleshy, broadly rounded, with short hairs. Mandibles black with castaneous-brown (reddish tinge) bases, bowed, with slender incurved tips; left mandible with two sharp marginal teeth near middle, first (upper) larger than second (lower); right mandible with upper tooth near middle, not prominent, parallel to rim, lower tooth prominent, sharp, near base.

Antenna yellow-brown, bead-like, 18 segments, pubescent; second segment short, cylindrical; third segment elongate, subclavate, as long as fourth and fifth segments together; fourth and fifth seg-

ments wedge-shaped; segments become beadlike towards apex; last segment elongate, semielliptical.

Pronotum light yellow-brown, margins darker, anterior margin raised, slightly emarginate, sides slope to anterior margin, which is concave, with long hairs.

Legs light yellow-brown, claws castaneous: slender, pubescent.

Abdomen light yellow-brown, with long, brown (reddish) hairs.

*Measurements (major soldier).—*

Length of entire soldier, 7.0-7.50 mm.

Length of head with mandibles, 4.0 mm.

Length of head without mandibles (to anterior), 2.50 mm.

Length of labrum, 0.70 mm.

Length of left mandible, 1.60 mm.

Length of pronotum, 0.80 mm.

Length of hind tibia, 2.10-2.15 mm.

Width of head, 2.35-2.45 mm.

Width of labrum, 0.70 mm.

Width of pronotum, 1.50 mm.

*Soldier, minor* (pl. 1, fig. 2).—Head light yellow-brown (lighter than in major soldier), lighter on sides and at posterior margin than on vertex, longer than broad, broadest anteriorly (at base of antennal socket where there is a tubercle), sides slope to posterior margin which is rounded, sides slightly concave, head with numerous long hairs. Post clypeus and labrum prolonged into a light castaneous-brown, chitinized rod, forked at the tip ("*gabel nasutus*"), this is narrow at the base and broadens to apex, with a median longitudinal groove, apex emarginate, forks fringed with dense short hairs and few long hairs. At base of this rod is the fontanelle produced into a short truncate tube directed towards the deep groove in the labrum.

Mandibles light castaneous-brown, slender, elongate.

Antenna yellow-brown, bead-like, 16 segments pubescent; third segment subclavate, twice as long as fourth; second longer than fourth; segments become longer and broader to apex.

Pronotum light yellow-brown, darker on margins; anterior margin elevated, sides slope to posterior margin, which is concave, with long hairs.

Legs light yellow, elongate, slender, pubescent.

Abdomen light yellow, with dense, long brown (reddish) hairs.

*Measurements (minor soldier).—*

Length of entire soldier, 5.5-5.55 mm.

Length of head with labrum, 2.20-2.35 mm.

Length of head without labrum (to anterior), 1.40-1.45 mm.

Length of labrum, 0.95 mm.

Length of left mandible, 0.375 mm.

*Measurements (minor soldier)*—Continued.

Length of pronotum, 0.60 mm.

Length of hind tibia, 1.50 mm.

Width of head (at widest portion), 1.05–1.1 mm.

Width of pronotum, 0.85 mm.

This species based on the soldiers has been named after Dr. W. M. Mann; the soldier is close to *R. hispidus* Emerson but is larger, the major soldier has a broader, more hairy head, and broader tooth to left mandible; the minor soldier also has a broader head.

*Type locality*.—Rurrenabaque, Bolivia.

Described from series of major and minor soldiers collected with workers at the type locality in October, 1921, by Dr. W. M. Mann.

*Type soldier*.—Major; morphotypes, male winged adult and minor soldier. Cat. No. 27647 U.S.N.M.

Other localities where this termite was collected are:

Rurrenabaque, Bolivia, October, 1921 (major soldier).

Cachuela Esperanza (Beni River), Bolivia, March, 1922 (winged adult, major soldiers and workers).

A list of described species of the family *Rhinotermitidae*, with localities, dates, and castes, as well as localities other and additional to the type for the described species follows.

## LEUCOTERMES TENUIS Hagen

Rosario, Bolivia, October and November, 1921 (winged, soldiers and workers) with *Anoplotermes pacificus* F. Müller (deälated and workers); Rurrenabaque, Bolivia, November, 1921 (soldiers); October (soldiers and workers); Ixiamas, Bolivia, December, 1921 (soldiers and workers); Tumupasa, Bolivia, December, 1921 (soldiers and workers); Cachuela Esperanza (Beni River) Bolivia, March, 1922 (soldiers and workers); Ivon, Bolivia, February–March, 1922 (soldiers and workers); Huachi, Bolivia, August–September, 1921 (soldiers and workers); Espia, Bolivia (soldiers and workers).

## COPTOTERMES MARABITANUS Hagen

Rurrenabaque, Bolivia, November, 1921 (soldiers and workers); Rio Negro, Bolivia, January, 1922 (soldiers and workers); Rio Ivon, Bolivia, February, 1922 (soldiers and workers with *Armitermes holmgreni* Snyder, soldiers and workers, and *Nasutitermes ephratae* Holmgren (soldiers and workers).

## RHINOTERMES MARGINALIS Linnaeus

Tumupasa, Bolivia, November, 1921. M. R. Lopez (deälated female adult); Rio Ivon, Bolivia, February, 1922 (deälated male adult) with *R. latilabrum* Snyder (major and minor soldier and workers); Ivon, Bolivia, February, 1922 (minor soldier and worker).



RHINOTERMES TAURUS Desneux<sup>3</sup>

Asunto, Bolivia, August, 1921 (major and minor soldiers and workers); Huachi, Bolivia, August–September, 1921 (major and minor soldiers and workers); Rurrenabaque, Bolivia, October, 1921 (also November, 1921, M. R. Lopez), (major and minor soldiers and workers); Cachuela Esperanza (Beni River), Bolivia, March, 1922 (major and minor soldiers and workers); Blanca Flor Beni, Bolivia, January, 1922 (major and minor soldiers and workers); Bon Hora, Rio Madeira, Brazil, March, 1922 (major and minor soldiers and workers).

## Family TERMITIDAE

## SYNTERMES BRAZILIENSIS Holmgren

*Soldier* (pl. 2, fig. 9).—Head yellow-brown (light castaneous), with reddish tinge anteriorly, shining, flatly arched, broadest near base, markedly narrowed toward front, with few scattered, light yellow, long hairs.

Fontanelle near front of head, opening projected into a very short tube (nearly flat, but little raised).

Antenna light castaneous brown, elongate, slender, 19–20 segments, with long pubescence, first segment elongate, cylindrical; second shorter and narrower, sub-clavate; third and fourth segments approximately the same size as second, or with third slightly longer than fourth but shorter than second, variable; fifth slightly longer than fourth; from sixth segment on segments become more elongate and slender; last segment elongate, slender, sub-elliptical.

Labrum light yellow brown, 3-lobed, central hyaline lobe white, fleshy, triangular, tip labrum with long hairs.

Post-clypeus light yellow-brown, not raised up.

Mandibles piceous, shining, elongate, slender, strongly incurved whereas in *S. molestus* Burmeister the mandibles are relatively weakly curved, tips pointed, base reddish-brown, broad, without hairs; left mandible with 2–3 small, somewhat blunt marginal teeth near base (see figure); right mandible with no marginal teeth.

Gula more than half the width of the front at the middle.

Pronotum light yellow-brown, saddle-shaped, without long spines (most unusual in species of *Syntermes*), instead of the spines the sides of the thoracic nota are produced to a blunt point (rudimentary or vestigial spine?) giving a three-cornered appearance, with long hairs.

Legs yellow-brown, elongate, slender, pubescent.

<sup>3</sup> Major soldiers with larger heads but with narrower labrum than *R. marginalis* Linnaeus and less prominent marginal teeth. *R. nasutus* Perty replaces the species *taurus*.

Abdomen dirty-gray, with light-brown tinge, with long, dense hairs.

*S. braziliensis* is a larger species than *molestus* and differs in the relative curving of the mandibles.

The following measurements are based on a series of soldiers from Tumupasa, Bolivia, collected with workers by Dr. W. M. Mann, December, 1921, and on two soldiers collected on November 20, 1907, by D. Haseman, at Bomfin, Bahia, Brazil (Acc. No. 3441, Carnegie Museum, Pittsburgh, Pa.), the latter specimens being kindly loaned to me by Dr. A. Emerson.

*Measurements.*—

	Tumupasa, Bolivia	Bahia, Brazil
Total length of soldier.....	10-11 mm.	11.0 mm.
Length of head with mandibles.....	6.0 mm.	5.5-6.0 mm.
Length of head without mandibles.....	4.2-4.6 mm.	4.4-4.5 mm.
Length of pronotum.....	0.9-1.0 mm.	1.2 mm.
Length of left mandible.....	2.4 mm.	2.6 mm.
Length of hind tibia.....	3.35-3.5 mm.	3.6-3.7 mm.
Width of head (at broadest point).....	3.34 mm.	3.55-3.6 mm.
Width of pronotum.....	1.75-1.85 mm.	2.0 mm.

*S. braziliensis* was described by N. Holmgren in 1911,<sup>4</sup> the description, however, is meager, consisting only of characters used in a key to the species of *Syntermes*. Only the soldier and worker castes are known.

SYNTERMES MOLESTUS Burmeister

*Soldier* (pl. 2, fig. 5).—Head light castaneous brown, slightly reddish anteriorly, shining, flatly arched, broadest near base, slightly narrowed anteriorly, with few scattered, light yellow, long hairs.

Fontanelle near front of head, opening (elliptical) projected into a very short tube, nearly flat (but little raised).

Antenna light yellow-brown, elongate, slender, with long hairs; third segment slightly longer than second, fourth equal to or slightly shorter than second.

Labrum light yellow-brown, 3-lobed, central hyaline lobe triangular, white, fleshy, tip of labrum with long hairs.

Post-clypeus light castaneous-brown, not raised up.

Mandibles piceous, shining, slender (more so than in *braziliensis* Holmgren), base reddish-brown, broad; mandibles relatively weakly curved, incurved at tips; left mandible with 2-3 small blunt marginal teeth near base (hidden by labrum); right mandible with no marginal teeth (pl. 2, fig. 5).

Gula more than half width of the front at the middle.

<sup>4</sup> 1911. Holmgren, N. 1. Bemerkungen über einige Termiten-Arten, Zoolog. Anzeiger, vol. 37, no. 26, pp. 547-8, 13 June.

Pronotum light yellow-brown, darker posteriorly than at front, saddle-shaped, without long spines at the sides; sides of thoracic nota produced into blunt points which are shorter than in *braziliensis*, with long hairs.

Legs yellow-brown, elongate, slender, pubescent.

Abdomen dirty-gray with tinge of yellow, with long dense hairs.

A smaller species than *braziliensis* Holmgren.

The following measurements compare specimens from Cuyabà and Independencia, Parhayba, Brazil.

*Measurements.*—

	<i>S. molestus</i> Burmeister, Cuyabà	<i>S. molestus</i> Burmeister, Independencia
Total length of soldier.....	8.90 mm.	9.50 mm.
Length of head with mandibles.....	4.70 mm.	5.10 mm.
Length of head without mandibles (to tip labrum).....	3.30 mm.	3.70 mm.
Length of head without mandibles (to anterior).....	2.90 mm.	3.30 mm.
Length of pronotum.....	0.90 mm.	0.90 mm.
Length of left mandible.....	1.70 mm.	1.80 mm.
Length of hind tibia.....	2.70 mm.	2.80 mm.
Length of labrum.....	0.60 mm.	0.50 mm.
Width of head (at broadest point).....	2.50 mm.	2.80 mm.
Width of pronotum.....	1.40 mm.	1.50 mm.
Width of labrum.....	0.80 mm.	0.80 mm.

The soldier of *Syntermes molestus* is herewith described and figured for comparison with other species; the winged adult was described in Burmeister in 1839.<sup>5</sup> Silvestri in 1903<sup>6</sup> described and figured the soldier.

Described from a single soldier from Cuyabà, Brazil, and determined by F. Silvestri as "*Termes molestus* Burm"; this specimen with workers was presented to the United States National Museum by Silvestri; this soldier (which was identified by Silvestri) has been compared with a soldier collected with workers by Mann at Independencia, Parahyba, Brazil; this specimen is also now in the collection of the United States National Museum. This soldier had a piece of dead leaf or grass in its mandibles.

SYNTERMES PERUANUS Holmgren

*Soldier* (pl. 2, fig. 8).—Head light castaneous brown, more reddish at front, shining, broad, broadest at base, strongly narrowed anteriorly, flatly arched, with but few scattered long hairs—fewer than in *S. dirus* (Klug) Burmeister, *snyderi* Emerson (pl. 2, fig. 7), or *chaquimayensis* Holmgren (pl. 2, fig. 4).

<sup>5</sup> 1839. Burmeister, H. Handbuch der Entomologie, Neuroptera II, 2, pt. 1, p. 766. Berlin.

<sup>6</sup> 1903. Silvestri, F. Contribuzione alla conoscenza dei termitidi e termitofili dell'America Meridionale Redia, vol. 1, pp. 51-2, pl. 2, figs. 86-8.

Fontanelle opening projected into a very short tube near front of head. Post-clypeus short, not raised. Labrum light castaneous brown, 3 lobed at apex, center lobe hyaline, with long hairs at apex.

Mandibles piceous, shining, elongate, slender, with stout reddish-brown base (few long hairs at the base), incurved and pointed at apex, marginal teeth as in figure. First marginal tooth on left mandible sharp pointed, near middle of mandible; mandibles longer and more slender than in *chaquimayensis*; marginal teeth nearer apex than in *snyderi*; marginal tooth on right mandible about same size as that on the left, just below it—slightly nearer the base.

Antenna reddish-brown, broken, 18+? segments, pubescent; third segment subclavate, longer than second or fourth; segments become more elongate and slender toward apex.

Pronotum yellow-brown with margins reddish, saddle-shaped; lateral spines are shorter than in *dirus*, *snyderi*, or *chaquimayensis*; also those on meso and meta-nota are shorter.

Legs yellow-brown, tibiae darker, elongate, with long hairs.

Abdomen light castaneous brown, densely covered with light yellow, long hairs.

*Measurements.*—

Total length of soldier, 15–17 mm.

Length of head with mandibles, 9.9–10.0 mm.

Length of head without mandibles (to tip labrum), 8.15–8.4 mm.

Length of head without mandibles (to anterior of head), 7.0–7.1 mm.

Length of labrum (to base central hyaline lobe), 1.1–1.2 mm.

Length of pronotum, 1.6 mm.

Length of hind tibia, 6.75 mm.

Length of left mandible, 3.5–3.8 mm.

Width of head (at broadest point), 6.9 mm.

Width of labrum, 1.5–1.6 mm.

Width of pronotum (to tip of spines), 4.45–4.5 mm.

The soldier of *S. peruanus* is close to *S. emersoni* Snyder but is slightly darker colored and the marginal teeth on the mandibles are longer in *peruanus* and are arranged differently and there are other differences in the size of the pronotum and the width of head. The lateral spines on the thorax are longer in *emersoni*.

Described from two soldiers kindly presented to the U. S. National Museum by Dr. A. Emerson from a series in the Carnegie Museum, Pittsburgh, Pa.—Acc. No. 4043 collected on October 9, 1909, at Villa Bella, Bolivia.

The species is known from both winged adults and soldiers and occurs in Peru and Bolivia.



Holmgren's description<sup>7</sup> is very meager, the characters merely being given in a key, hence the species is herewith described for comparison with other *Syntermes*.

Another known species of *Syntermes* collected by Doctor Mann is *Syntermes chaquimayensis* Holmgren, found at Huachi, Bolivia; soldiers and workers.

#### Genus CORNITERMES Wasmann

This genus is close to *Syntermes* Holmgren. In the soldier the frontal tube is better developed than in *Syntermes* but on the other hand the marginal teeth of the mandibles are not so well developed. In 1912, Holmgren divided the genus *Cornitermes* Wasmann into the subgenera *Cornitermes* (*sensu strictore*) Holmgren and *Labiotermes* Holmgren.

In *Cornitermes* (*sensu strictore*) the soldier has a long frontal tube and short, broad labrum, without a sharply defined hyaline apex; mandibles short and broad, left mandible with several fairly well-developed marginal teeth. In *Labiotermes* the soldier has the frontal tube relatively short, labrum long and with a sharply defined hyaline apex; left mandible with few, poorly developed marginal teeth.

The winged sexual adults are separated: *Labiotermes* large eyes and ocelli, latter close to eyes, antennae with 17 segments; *Cornitermes* (*sensu strictore*) medium large eyes and ocelli, latter more separated from eyes, antennae 15 segments. The sexual winged adults of *Cornitermes* show marked differences between the sexes.

#### CORNITERMES (CORNITERMES) BOLIVIANUS, new species

*Winged, female adult.*—Head dark castaneous brown, round fontanelle hyaline, sub-oval raised spot in a depression, larger than an ocellus, with few scattered long hairs. Post clypeus slightly lighter than head, projecting, bilobed. Eye black, large, projecting, not quite round, near lateral margin of head. Ocellus hyaline, sub-oval, upper rim projecting, separated from eye by a distance nearly equal to the long diameter of an ocellus.

Antenna yellow-brown. 15 segments, with long hairs; third segment sub-clavate, slightly longer than second or fourth segments; segments become longer and broader toward apex; last segment slender, sub-elliptical, pointed at apex.

Pronotum same color as head, anterior margin straight, posteriorly slightly emarginate (broadly and roundly), anterior corners high,

<sup>7</sup>1911. Holmgren, N. 1. Bemerkungen über einige Termiten-Arten, Zool. Anzeiger, vol. 37, no. 26, 13 June, pp. 546-8.

sides roundly but gradually narrowed to posterior margin, markings on pronotum similar to those in *C. (C.) acignathus* Silvestri, with dense long hair.

Wings hyaline, costal area golden-yellow-brown, surface with numerous long hairs, margins ciliate. In forewing median nearer to cubitus than to sub-costa, branches down (5-7 sub-branches) before middle of wing, but forked to apex of wing, cubitus with 9-10 branches to lower margin of wing, only extends but a little beyond center of wing. In hind wing fewer sub-branches to median vein and cubitus extends further, has more branches and covers a wider area of the wing.

Legs yellow-brown, tibiae darker, elongate, slender, with long hairs.

Abdomen with tergites same color as head, two hyaline, slightly reni-form markings placed as in *acignathus*, but not as clear, with long hairs near base tergites, cerci not prominent.

*Measurements.*—

- Length of entire winged adult, 17.50 mm.
- Length of entire deilated adult, 8.00 mm.
- Length of head (to tip of labrum), 1.90-2.00 mm.
- Length of pronotum (to anterior corners), 1.05 mm.
- Length of fore wing, 16.50 mm.
- Length of hind tibia, 2.30 mm.
- Diameter of eye (long diameter), 0.50 mm.
- Width of head (at eyes), 1.90 mm.
- Width of pronotum, 1.70 mm.
- Width of fore wing, 4.30 mm.

The winged adult of *C. (C.) bolivianus* Snyder has a wider head and pronotum and the ocelli more distant from the eyes than in *C. (C.) striatus* Hagen; it has smaller eyes than *acignathus* Silvestri and narrower head and pronotum. There are marked differences in the sexual winged adults within the species in the genus *Cornitermes*.

*Soldier.*—Head yellow, darker anteriorly, broadest posteriorly, tapers (narrows) anteriorly, frontal tube slightly darker, elongate, slender and upturned (curved upward), with dense short hairs at apex, head convex in profile, with numerous long hairs. Labrum yellow, broadest in middle, triangularly rounded, apex hyaline, narrowed, with long hairs.

Mandibles blackish, fairly elongate and slender, sharp pointed apices incurved, marginal teeth on left mandible small (pl. 1, fig. 4), no marginal teeth on right mandible.

Antenna light yellow-brown, 15 segments, with long hairs; third segment sub-clavate, shorter than second or fourth segments; segments become longer and broader toward apex, last segment slender, elongate and sub-elliptical.

Pronotum whitish with tinge of yellow, saddle shaped, anterior margin emarginate, posteriorly broadly rounded, with scattered long hairs.

Legs white, tinged with yellow, elongate, slender, with long hairs.

Abdomen dirty gray-white, tinged with yellow, with dense long hairs; cerci prominent.

*Measurements.*—

Length of entire soldier, 5.80–6.30 mm.

Length of head with mandibles, 2.70–3.40 mm.

Length of head to anterior, 2.20 mm.

Length of frontal tube, 0.50 mm.

Length of left mandible, 1.25 mm.

Length of pronotum, 0.60 mm.

Length of hind tibia, 1.65 mm.

Width of head (posteriorly where widest), 1.95 mm.

Width of head (anteriorly), 1.40 mm.

Width of pronotum, 1.05 mm.

The soldier of *C. (C.) bolivianus* Snyder is distinctive due to the small size of the marginal teeth or denticles on the mandibles; the marginal teeth and the emargination or entirety of the anterior margin of the pronotum are excellent specific characters in the soldier caste of *Cornitermes*. *C. bolivianus* has the head tapering anteriorly, an upturned, slender frontal tube, head with dense long hairs, has 15 segments to the antenna, and has the anterior margin of the pronotum emarginate, hence differing from *C. (C.) lespezi* Fritz Müller.

*Type locality.*—Lago Rogagua, Bolivia.

Described from a series of winged adults and soldiers collected with workers at the type locality by M. R. Lopez in November, 1921. Soldiers and workers also collected at Cachuela Esperanza (Beni River) in March by Dr. W. M. Mann.

*Type, winged female, adult.*—Cat. No. 27648 U.S.N.M.; morpho-type soldier.

Other described species of *Cornitermes* were collected, as follows:

CORNITERMES (CORNITERMES) CUMULANS Kollar

Reyes, Bolivia, October, 1921 (soldiers and workers); Ixiamas, Bolivia, December, 1921 (queen, soldiers and workers); Ixiamas, Bolivia, December, 1921 (queen, soldiers and workers, with soldiers and workers of *Leucotermes tenuis* Hagen); Ixiamas, Bolivia, December, 1921 (queen, soldiers and workers, with soldiers and workers of *Nasutitermes (N.) ephratae* Holmgren); Cavinás, Bolivia, February, 1922 (soldiers and workers); Rosario, Bolivia, No. 3, November, 1921 (queen, winged adults, soldiers and workers); Rosario, Bolivia, March, 1922 (soldiers and workers).

CORNITERMES (CORNITERMES) LESPESI Fritz Müller<sup>8</sup>

Cajuata, Bolivia (soldiers and workers); San Fanandr Rapids, Bolivia, August, 1921 (soldiers and workers); Rosario, Bolivia, November, 1921 (queen, soldiers, and workers); Rosario, Bolivia, November, 1921 (soldiers and workers with soldiers of *K. (Neotermes) manni* Snyder and soldier and workers of *Nasutitermes (N.) ephratae* Holmgren); Espia, Bolivia (soldiers and workers); Rurrenabaque, Bolivia, October, 1921 (soldiers and workers); Huachi, Bolivia, September, 1921 (soldiers and workers); St. Helena on Huichi, Bolivia, August, 1921 (soldiers and workers).

CORNITERMES (CORNITERMES) SIMILIS Hagen<sup>9</sup>

Rurrenabaque, Bolivia, November, 1921 (soldiers and workers); Ixiamas, Bolivia, December, 1921 (soldiers and workers, with soldiers and workers of *Nasutitermes (N.) ephratae* Holmgren); Blanca Flor, Beni, Bolivia, January, 1922 (soldiers and workers); Cavinás, Bolivia, January, February, 1922 (soldiers and workers); Ivon, Bolivia, February, March, 1922 (soldiers and workers); Cachuela Esperanza (Beni River), Bolivia, March, 1922 (soldiers and workers); St. Helena, Bolivia (soldiers and workers); Bon Hora, Rio Madeira, Brazil, March, 1922 (soldiers and workers).

## CORNITERMES (CORNITERMES) STRIATUS Hagen

Asunto, Bolivia, August, 1921 (soldiers and workers); Tunupasa, Bolivia; December, 1921 (soldier and workers); Canamina, Bolivia, (soldiers and workers); Covendo, Bolivia, (soldiers and workers); Espia, Bolivia (soldiers and workers with *N. (Subulitermes) angusticeps* Snyder); Espia, Bolivia (soldiers and workers).

## CORNITERMES (LABIOTERMES) LABRALIS Holmgren

Cachuela Esperanza (Beni River), Bolivia, March, 1922 (queen, male, soldiers and workers; queen 24 mm. in length, 7.50 mm. in breadth; with *Nasutitermes (N.) ephratae* Holmgren, queen, soldiers and workers; *N. (Agnathotermes) glaber* Snyder, soldiers; *M. (Spinitermes) trispinosus* Hagen, soldiers and workers).

Cachuela Esperanza (Beni River), Bolivia, March, 1922 (queen, soldiers and workers); Cachuela Esperanza, Beni River, Bolivia (soldiers and workers).

<sup>8</sup> *C. lespei* Fritz Müller has more marked small teeth or denticles beyond (toward the apex from) the pointed double marginal tooth on the left mandible than in *C. striatus* Hagen; this termite constructs large mound nests 1 meter in diameter.

<sup>9</sup> Anterior margin of pronotum as a rule more emarginate than in specimens of *C. similis* in the U. S. National Museum determined by F. Silvestri and presented to the Museum by Silvestri.



Genus *ARMITERMES* Wasmann

Holmgren in 1912 divided the genus *Armitermes* into three subgenera—*Armitermes* (sensu strictore) Holmgren, *Curvitermes* Holmgren and *Rhynchotermes* Holmgren; these subgenera are largely based on differences in the mandibles in the winged adult, soldier and worker castes. The subgenus *Armitermes* contains the greatest number of species—namely twelve, *Curvitermes* two, and *Rhynchotermes* three species. All of these species are confined to America. Dr. W. M. Mann collected species in all three subgenera in Bolivia.

The winged adult has the wings usually hyaline. The soldier caste has both mandibles and a nasus and forms a connecting link between the mandibulate and nasutiform types of soldiers.

There seem to be many closely related species or else there is great variation.

*ARMITERMES (ARMITERMES) BENJAMINI*, new species

*Soldier*.—Head light yellow-brown, nasus darker (light castaneous-brown), head broadest near base, only slightly narrowed towards anterior margin, not convex in profile, posterior margin of head rounded, head with few long hairs near anterior margin. Nasus does not extend to tips of mandibles, tapers to apex, where truncate and with short hairs, stouter than in *albidus* Hagen.

Gula elongate, relatively wide at middle.

Labrum yellow-brown, broadly rounded at apex, with long hairs.

Mandibles reddish-brown, yellow at base, elongate, slender but broader than in *albidus*, strongly bowed, but not as much so as in *albidus* Hagen, one short, sharp forward pointing tooth, broad at base, nearer to base than to apex.

Antenna yellow-brown, broken, second segment short, slightly longer than one-half of first segment.

Pronotum yellow, margins darker, saddle-shaped, with dense long hairs.

Legs white with tinge of yellow, pubescent.

Abdomen dirty gray white with yellow tinge, tergites with dense hairs, shorter than those on pronotum and relatively shorter than in *albidus*.

*Measurements*.—

- Length of entire soldier, 5.60 mm.
- Length of head with mandibles, 2.50 mm.
- Length of head with nasus, 2.10 mm.
- Length of head (to anterior), 1.50 mm.
- Length of nasus, 0.70 mm.
- Length of left mandible, 1.10 mm.
- Length of pronotum, 0.35 mm.
- Length of hind tibia, 1.20 mm.
- Width of head (at widest point), 1.35 mm.
- Width of pronotum, 0.70 mm.

Fewer hairs on head and with more taper toward anterior margin than in *percutiens* Emerson.

This termite is named in honor of the family of Edgar Laing Benjamin.

*Type locality*.—Cachuela Esperanza (Beni River), Bolivia.

Described from a single soldier collected at the type locality by Dr. W. M. Mann in March.

*Type, soldier*.—Cat. No. 27649, U.S.N.M.

ARMITERMES (ARMITERMES) HOLMGRENI, new species

*Queen* (first form).—Head dark castaneous-brown, longer than broad, round, tapers anteriorly, as *albidus*, four long hairs at each side of head behind eyes (*A. albidus* Hagen has a hairy head). Fontanelle distinct, linear, one line behind eyes. Eyes black, not quite round, large; ocelli elongate, set obliquely to eyes, from which they are separated by a distance equal to their small diameter. Labrum yellow-brown, tongue-shaped, broader than long, broadest at middle, apex white, with long hairs. Post-clypeus more than twice as broad as long.

Antenna yellow-brown, broken, pubescent; second segment longer than third or fourth; third subclavate, longer than fourth; segments become longer and broader toward apex.

Pronotum castaneous-brown, sides slope toward posterior margin, anterior corners high, emarginate posteriorly and slightly emarginate anteriorly, with long hairs.

Legs yellow-brown, elongate, slender, pubescent.

Abdomen with tergites yellow-brown, pubescent.

*Measurements*.—

- Length of entire queen, 24.0 mm.
- Length of head (to tip labrum), 1.40 mm.
- Length of pronotum, 0.70 mm.
- Length of hind tibia, 1.20 mm.
- Diameter of eye (long diameter), 0.30 mm.
- Width of head, 1.30 mm.
- Width of pronotum, 1.00 mm.
- Width of queen (abdomen), 7.70 mm.

*Soldier*.—Head yellow-brown, nasus light castaneous-brown, head broad, in profile not slightly concave (as in the case in *A.* (*A.*) *albidus* Hagen), head forms nearly a straight line with nasus, posterior of head somewhat oblique, head with few long hairs on posterior. Nasus stouter at base than in *albidus*.

Labrum yellow-brown, conical, with long hairs.

Mandibles reddish-brown, slender, strongly bowed, with sharp incurved points; marginal teeth as in *albidus*.

Antenna yellow-brown, with 14 segments, pubescent; third segment subclavate, longer than second or fourth; fourth shorter than second; segments become longer and broader towards apex; last segment slender and pointed at tip.

Pronotum yellow, darker on margins, saddle-shaped, emarginate anteriorly and posteriorly, with long hairs on margins.

Legs yellowish, elongate, pubescent.

Abdomen dirty gray with dense long pubescence.

*Measurements.*—

Length of entire soldier, 5.55–6.50 mm.

Length of head with nasus, 2.20–2.25 mm.

Length of head without nasus (to anterior), 1.30 mm.

Length of nasus, 0.90 mm.

Length of left mandible, 0.85 mm.

Length of pronotum, 0.45 mm.

Length of hind tibia, 1.40 mm.

Width of head, 1.35–1.40 mm.

Width of pronotum, 0.85 mm.

The queen of *holmgreni* Snyder has a lighter colored, broader, less hairy head than *albidus*.

In the abdomen of one soldier there was a white globular mass 0.50 mm. in diameter just behind the outside base of the metathoracic leg.

A larger soldier than *albidus* with a broader head and stouter nasus.

*Type locality.*—Ivon, Bolivia.

Described from an enlarged first form queen and a series of soldiers collected with workers at the type locality in February, 1922, by Dr. W. M. Mann.

*Type, queen (first form).*—Cat. No. 27650, U.S.N.M.; morphotype, soldier.

ARMITERMES (ARMITERMES) MANNI, new species

*Soldier.*—Head light yellow (straw color), nasus darker yellow-brown, somewhat retort-shaped in lateral view, broadest near base, weakly convex in profile, posterior margin of head somewhat oblique, head with few long hairs on dorsal surface near central and posterior portions. Nasus short, widens near middle then narrows, truncate at apex and with short hairs.

Labrum yellow-brown, with rounded off three-cornered apex, with long hairs.

Mandibles reddish-brown, slender, strongly bowed, with sharp incurved points and with one short, forward pointing tooth near the base.

Antenna yellow-brown, with 14 segments, pubescent; second segment longer than third; third slightly longer than fourth; segments become longer and broader toward apex; last segment elongate, sub-oval and pointed at apex.

Pronotum yellow, margins darker, saddle-shaped, with anterior margin strongly raised up, emarginate anteriorly and posteriorly, margins with dense long hairs.

Legs white with tinge of yellow, pubescent.

Abdomen dirty gray with tinge of yellow, tergites with dense hairs—shorter than those on pronotum.

*Measurements.*—

Length of entire soldier, 4.1–4.5 mm.

Length of head with nasus, 1.35 mm.

Length of head with mandibles, 1.40 mm.

Length of head without mandibles (to anterior), 0.90 mm.

Length of nasus (to anterior head), 0.45 mm.

Length of left mandible, 0.55 mm.

Length of pronotum, 0.30 mm.

Length hind tibia, 0.77 mm.

Width of head, 0.90 mm.

Width of pronotum, 0.50 mm.

Smaller than most species in the subgenus *Armitermes* (*sensu strictore*), near *neotenicus* Holmgren but smaller and with differences in the relative lengths of the second and third segments of the antennae.

*Type locality.*—Cachucla Esperanza (Beni River), Bolivia.

Described from a series of soldiers collected together with workers at the type locality in March, 1922, by W. M. Mann.

*Type, soldier.*—Cat. No. 27651, U.S.N.M.

The following known species of *Armitermes* were also found:

ARMITERMES (ARMITERMES) ALBIDUS Hagen

Cachucla Esperanza (Beni River), Bolivia, March, 1922 (soldiers, workers, and queen—11.3 mm. in length, 2.8 mm. in width, with elongate white egg—termitophile—placed longitudinally near middle of pronotum); (*Nasutitermes*, soldiers and workers, with above termites).

Cachucla Esperanza (Beni River), Bolivia, March, 1922 (soldiers, workers, and queen—23 mm. in length, 5 mm. in width, with white eggs of termitophile on mesonotum and first 3 tergites).

ARMITERMES (ARMITERMES) EUAMIGNATHUS Silvestri

Ixiamas, Bolivia, December, 1921 (soldiers and workers, a few soldiers and workers of *Leucotermes tenuis* Hagen also present).



## ARMITERMES (ARMITERMES) FESTIVELLUS Silvestri

Cavinas, Bolivia, February, 1922 (soldiers with *C. (Cornitermes)*, species).

## ARMITERMES (ARMITERMES) TEEVANI Emerson

Río Madidi, Bolivia, February 1922 (soldiers and workers);  
Ixiamas, Bolivia, December, 1921 (soldiers and workers).

## ARMITERMES (CURVITERMES) ODONTOGNATHUS Silvestri

Reyes, Bolivia, October, 1921 [soldier and workers with *N. (Velocitermes) uniformis* Snyder]; Ixiamas, Bolivia, December, 1921 (soldiers and workers with *M. (Spinitermes) robustus* Snyder, soldiers and workers).

## ARMITERMES (RHYNCHOTERMES) NASUTISSIMUS Silvestri

Reyes, Bolivia, October, 1921 (soldier and workers).

## Genus NASUTITERMES Banks

Species of *Nasutitermes* (*sensu strictore*) have the head of the winged adult more or less broadly oval to round; the post clypeus usually much shorter than half its breadth, usually light colored; segments of antennae usually not elongate; left mandible with first marginal tooth nearly as long as second.

The soldier is usually monomorphic, antennae usually not markedly elongate, 12–14 segments; nasus more or less conical, depression at base of nasus but slight; mandible with point.

The worker with post clypeus always much shorter than half its breadth.

Of all the genera of termites, *Nasutitermes* (*sensu strictore*) has the most species. Some species appear to be variable and to intergrade. N. Holmgren in 1909 established groups for the soldiers of certain similar American species; these groups and his key to American species are valuable aids to work in this genus.

The soldiers of *Nasutitermes* (*sensu strictore*) differ specifically in the length and breadth of the head; whether the profile of the head is straight, slightly convex or concave; size and shape of nasus; number of segments of antenna, relative size of third segment; position and number of bristles on head and presence or absence of pubescence; presence or absence of bristles and pubescence on tergites of abdomen; color; and size of worker.

In some species, the winged adult of *Nasutitermes* (*sensu strictore*) also shows variation. In *N. ephratae* Holmgren the size of the eye varies, sometimes being 0.50 mm. in diameter (long diameter) or smaller; the prominence of the ocelli also varies in some speci-

mens, in some, being much more projecting than in others. In *N. cornigera* Motschulsky the distance of the ocellus from the eye varies; indeed, I considered determining the specimens where the ocellus was closer to the eye than twice its diameter as *N. cayennæ* Holmgren, although the winged adult of this species is unknown; the soldiers of these two species appear to be the same. N. Banks, however, believes these two species may be the same, basing the decision on the soldier caste alone.

Of the 15 species collected by Dr. W. M. Mann, on the Mulford Expedition, only three are new.

NASUTITERMES (NASUTITERMES) ADUNCUS, new species

*Soldier* (pl. 2, figs. 1-2).—Head light castaneous-brown, smooth, shining, in profile nearly a straight line, slightly convex at base of nasus and depression on top of head, flat, dividing into two bulging cheeks or lobes at median line, sides of head slightly asymmetrical. two rows of long hairs, one on raised area at base of nasus, the other near posterior margin, head broadly pear-shaped. Mandibles with elongate sharp points.

Nasus dark castaneous-brown at apex, elongate, conical and robust, apex turned down, aquiline, with long hairs.

Antenna yellow-brown, with 13 segments, with long hairs; third segment elongate, clavate, longer than second or fourth segments; fourth longer than second segment; fifth longer and broader than fourth segment; sixth to ninth segments longer and broader, subequal; tenth to twelfth shorter and narrower, subequal; last segment slender, shorter and sub-elliptical.

Pronotum yellow, anteriorly yellow-brown, saddle-shaped, anterior margin emarginate, with long hairs.

Legs yellowish, tinged with brown, elongate, slender, with long hairs.

Abdomen with tergites yellow, tinged with brown, with a row of long hairs at base tergites and also dense long (but shorter) hairs on tergites; cerci prominent, elongate.

*Measurements.*—

Length of entire soldier, 4.40-4.65 mm.

Length of head with nasus, 2.10-2.15 mm.

Length of head without nasus (to anterior), 1.30 mm.

Length of nasus, 0.80 mm.

Length of pronotum, 0.30 mm.

Length of hind tibia, 1.70 mm.

Width of head, 1.30-1.45 mm.

Width of pronotum, 0.75 mm.

*N. (N.) aduncus* Snyder has a longer and broader head than *surinamensis* Holmgren, fewer hairs on the head and a more robust

nasus; *aduncus* differs from *maximus* Holmgren in its more robust, aquiline nasus, dense hairs on the tergites, but fewer hairs on the head.

*Worker*.—Head castaneous-brown, T-shaped, hyaline marking connecting median line and fontanelle. Antennae light yellow-brown, 14 segments.

*Measurements*.—

Length of entire worker, 5.50–6.00 mm.

Length of head, 2.25 mm.

Width of head, 1.80 mm.

*N. (N.) aduncus* is in the group with large workers (as *maximus* and *surinamensis*).

*Type locality*.—Rurrenabaque, Bolivia.

Described from a series of soldiers collected with workers at the type locality by Dr. W. M. Mann in October, 1921.

*Type, soldier*.—Cat. No. 27652, U.S.N.M.

NASUTITERMES (NASUTITERMES) AURANTIACUS Holmgren

*Queen*.—Head castaneous-brown, with reddish tinge, with dense long hairs. Fontanelle a raised subelliptical spot on vertex. Post clypeus slightly lighter colored than head, slightly over twice as broad as long, with long hairs. Eyes black, not round, projecting, not distant from lateral margin of head. Ocellus small, suboval, separated from eye by a distance equal to the long diameter of an ocellus.

Antenna yellow-brown, broken (10 segments), segments become longer and broader toward apex, with long hairs; third segment short and narrow, ring-like, shorter than second or fourth segments; fourth shorter than second segment.

Pronotum about same color as head, saddle-shaped, sides slope obliquely to posterior margin which is emarginate, with dense long hairs.

Legs yellow, with tinge of brown, with long hairs.

Abdomen with tergites castaneous brown, with grayish tinge, faint spiracular markings and dense long hairs; cerci not very prominent.

*Measurements*.—

Length of entire queen, 19.00 mm.

Length of head (to tip labrum), 1.25 mm.

Length of pronotum, 0.60 mm.

Length of hind tibia, 1.10 mm.

Diameter of eye (long diameter), 0.275 mm.

Width of abdomen of queens, 4.00 mm.

Width of head, 1.00 mm.

Width of pronotum, 0.85 mm.

*N. (N.) aurantiacus* Holmgren is more reddish colored than *N. (N.) minor* Holmgren, has a smaller head, and the smaller ocelli are more distant from the eye.

Described from a single first form queen collected at Rosario, Bolivia, in November, 1921, by W. M. Mann with soldiers and workers associated with *Microcerotermes arboreus* Emerson soldiers and workers in a tree nest; queen hitherto unknown. These specimens are deposited in the collection of the United States National Museum.

NASUTITERMES (NASUTITERMES) CRASSUS, new species

*Soldier*.—Head castaneous-brown (reddish tinge), smooth, shining, with two to three rows of bristles (on the base of the nasus, vertex, and posterior margin—last row sometimes not present), in profile nearly straight except for the elevation at the base of the nasus, head broadly rounded, flat on vertex. Nasus somewhat lighter colored, elongate, not very thick, turned down at apex. Mandibles with sharp points.

Antenna yellow-brown, with 13 segments, middle segments elongate, shorter toward apex, with long hairs; third segment elongate, subclavate, longer than second or fourth segments; fourth longer than second; fifth longer than fourth; last segment slender, shorter and subelliptical.

Pronotum yellow-brown, darker anteriorly, saddle-shaped, not emarginate anteriorly, with long hairs.

Legs light yellow-brown, elongate, slender, with long hairs.

Abdomen with tergites castaneous brown, with reddish tinge, with a row of long bristles at base of each tergite; cerci fairly long.

*Measurements*.—

- Length of entire soldier, 4.00–4.20 mm.
- Length of head with nasus, 1.80–1.90 mm.
- Length of head without nasus (to anterior), 1.25 mm.
- Length of nasus, 0.65 mm.
- Length of pronotum, 0.30 mm.
- Length of hind tibia, 1.45 mm.
- Width of head, 1.30 mm.
- Width of pronotum, 0.80 mm.

*Worker*.—Head castaneous-brown with gray tinge, hyaline markings, median longitudinal line connecting fontanelle with epicranial suture. Antenna 14 segments.

*Measurements*.—

- Length of entire worker, 5.00–5.75 mm.
- Length of head, 1.95–2.00 mm.
- Width of head, 1.65–1.75 mm.



*N. (N.) crassus* Snyder comes in the group with large workers; it does not key down to any known species.

*Type locality*.—Rurrenabaque, Bolivia.

Described from a series of soldiers collected with workers at the type locality by W. M. Mann in October; other specimens collected at Huachi, Bolivia, in September.

*Type, soldier*.—Cat. No. 27653, U.S.N.M.

NASUTITERMES (NASUTITERMES) MINOR Holmgren

*Winged adult*.—Head castaneous brown, with dense long hairs. Fontanelle a slender hyaline slit forming with the epicranial suture a hyaline Y-shaped marking. Post clypeus yellow, slightly less than three times as broad as long, with dense long hairs.

Eye black, not round, projecting, close to lateral margin of head. Ocellus hyaline, large, suboval, projecting, at an oblique angle and close to eye.

Antenna yellow, 15 segments, segments become longer and broader toward apex, with long hairs; third segment subclavate, slightly shorter and narrower than second and fourth segments; fourth shorter than second; fifth shorter than fourth; last segment elongate, narrow and subelliptical.

Pronotum light yellow-brown, saddle-shaped, sides obliquely slope to posterior margin which is emarginate, with dense long hairs.

Meso- and meta-nota broadly emarginate, nearly straight, whereas in *N. (N.) aurantiacus* Holmgren the emargination is more distinct.

Wings dark, smoky dark grey, costal area yellowish, surface densely hairy, margin ciliate; in forewing median vein close to cubitus, entire to apex or unites with cubitus beyond middle of wing and branches (3) to apex; cubitus does or does not reach apex, in about middle of wing, with most branches heavy, apical branches lighter, 11–14 branches or sub-branches to lower margin of wing. Markings between subcosta and median veins.

Legs yellow, elongate, slender, with long hairs.

Abdomen castaneous-brown, with tinge of gray, with prominent spiracular markings and dense long hairs; cerci not prominent.

*Measurements*.—

Length of entire winged adults (males and females), 11.00–13.00 mm.

Length of entire deilated adults, 5.50–7.00 mm.

Length of head (to tip labrum), 1.50 mm.

Diameter of eye (long diameter), 0.375 mm.

Length of pronotum, 0.70 mm.

Length of anterior wing, 10.075 mm.

Length of hind tibia, 1.40 mm.

Width of head (at eyes), 1.30 mm.

Width of pronotum, 1.05–1.10 mm.

Width of anterior wing, 3.10 mm.

*N. (N.) minor* Holmgren has a very distinctive wing venation which however is variable.

Described from a series of winged adults collected with soldiers and workers at Rosario, Bolivia, in November by W. M. Mann, in wood of tree. The winged adult has been hitherto unknown. These specimens are deposited in the collection of the United States National Museum.

This species was also collected at the following localities: Espia, Bolivia (soldiers and workers); Rosario (Lake Rogogua), Bolivia, November, 1921 (soldiers and workers); Rosario, Bolivia, November, 1921 (soldiers and workers in wood of trees).

NASUTITERMES (NASUTITERMES) PILOSUS, new species

*Soldier*.—Head piceous, smooth, shining, nasus lighter (reddish-brown), pear-shaped, nearly straight in profile, elevated at base nasus and concave posterior to elevation; two rows of long hairs, one at base nasus, other on vertex of head. Nasus conical, not elongate or very thick. Mandibles with sharp points.

Antenna brown, 13–14 segments, segments become longer and broader toward apex, with long hairs; if 13 segments, third segment elongate, slender, subclavate, longer than second or fourth segments; fourth shorter than second; fifth longer than fourth or second; if 14 segments, third segment narrow, subclavate, shorter than second or fourth segments; fourth and second segments subequal; fifth slightly shorter or subequal, but sixth longer than fourth segment; last segment slender, short, and subelliptical.

Pronotum castaneous-brown, saddle-shaped; anterior margin darker, not emarginate, with long hairs.

Legs brown, slender, elongate, with long hairs.

Abdomen with tergites dark castaneous brown, with a row of long hairs at the base of each tergite and dense shorter hairs: cerci fairly elongate and prominent.

*Measurements*.—

Length of entire soldier, 3.80–4.00 mm.

Length of head with nasus, 1.55–1.65 mm.

Length of head without nasus (to anterior) 1.00–1.05 mm.

Length of nasus, 0.60 mm.

Length of pronotum, 0.20–0.25 mm.

Length of hind tibia, 1.35 mm.

Width of head, 0.95–1.05 mm.

Width of pronotum, 0.60 mm.

*Worker*.—Head dark colored, piceous, with a hyaline median longitudinal line connecting fontanelle and epicranial suture, with long and dense shorter hairs; antenna with 14–15 segments; tergites of abdomen with long and dense shorter hairs.

*Measurements.*—

Length of entire worker, 4.70–5.02 mm. (Average 4.70.)

Length of head, 1.40–1.65 mm.

Width of head, 1.25–1.35 mm.

*N. (N.) pilosus* Snyder is a dark colored species with tergites of abdomen hairy, and the worker is large and dark; *N. (N.) cayennae* Holmgren, var. *atriceps* Holmgren seems to be close but the description is very meagre.

*Type locality.*—Cachuela Esperanza (Beni River), Bolivia.

Described from a series of soldiers collected with workers at the type locality in March, 1922, by W. M. Mann.

*Type, soldier.*—Cat. No. 27654, U.S.N.M.

Other known species of *Nasutitermes* which were collected are:

NASUTITERMES (NASUTITERMES) BRAZILIENSIS Holmgren

Ixiamas, Bolivia, December, 1921 (soldiers and workers).

NASUTITERMES (NASUTITERMES) CHAQUIMAYENSIS Holmgren

Tumupasa, Bolivia, December, 1921 (soldiers and workers).

NASUTITERMES (NASUTITERMES) CORNIGERA Motschulsky

Cachuela Esperanza (Beni River), Bolivia, March, 1922 (Queen soldiers, and workers); Cachuela Esperanza (Beni River), Bolivia, March, 1922 (soldiers and workers); Huachi, Beni, Bolivia, September, 1921 (queen, soldiers, and workers); Huachi, Bolivia, September, 1921 (winged adults, soldiers, and workers); Huachi, Bolivia, September, 1921 (soldiers and workers); Ivo, Bolivia (soldiers and workers, G. L. Harrington, Col. damaging book); Reyes, Bolivia, October, 1921 (soldiers and workers, M. R. Lopez); Reyes, Bolivia, November, 1921 (deilated male adult, M. R. Lopez); Rio Colorado, Rio Beni, Bolivia, September, 1921 (queen, soldiers, and workers); largest queen 26.50 mm. in length and 6.00 mm. in width); Rio Colorado, Rio Beni, Bolivia, September, 1921 (soldiers and workers); Rosario, Bolivia, November, 1921 (soldiers and workers); Rurrenabaque,<sup>10</sup> Beni, Bolivia, November, 1921 (winged, queen, soldiers, and workers); Rurrenabaque, Beni, Bolivia, October 1921 (winged, soldiers, and workers); Rurrenabaque, Beni, Bolivia, November, 1921 (queens, soldiers, and workers); Rurrenabaque, Beni, Bolivia, October, November, 1921 (queens, soldiers, and workers); Rurrenabaque, Beni, October, 1921 (soldiers and workers); San Bueno Ventura, Rio Beni, Bolivia, December, 1921 (soldiers and workers).

<sup>10</sup> *N. (N.) cornigera* Motschulsky, except the more common *N. (N.) ephratae* Holmgren, was the most common species collected by this expedition, and at Rurrenabaque, Bolivia, it appears to have been most numerous. This termite constructs carton "niggerhead" nests in trees, but also lives in logs, stumps, etc.

## NASUTITERMES (NASUTITERMES) EPHRATAE Holmgren

Cachucla Esperanza (Beni River), Bolivia, March, 1922 (queens, soldiers, and workers); Cachucla Esperanza, Beni, Bolivia, March, 1922 (soldiers and workers); Huachi, Beni, Bolivia, September, October, 1921 (queens, soldiers, and workers); Huachi, Bolivia (No. 11—five queens and three kings, soldiers and workers); Huachi, Beni, Bolivia, September, 1921 (soldiers and workers); Ixiamas, Bolivia, November, December, 1921 (queens, soldiers, workers); Ixiamas, Bolivia, December, 1921 (queen, soldiers, and workers with *Cornitermes (C.) similis* Hagen soldiers and workers); Ixiamas, Bolivia, December, 1921 (winged adults, soldiers, and workers); Ixiamas, Bolivia, December, 1921 (soldiers and workers); Peña Colorado, Upper Beni, Bolivia, September, 1921 (soldiers and workers—N. E. Pearson, Col.); Rio Ivon, Bolivia, February, 1922 (soldiers and workers); Rio Negro, Bolivia, January, 1922 (soldiers and workers); Rosario (Lake Rogagua), Bolivia, November (queen, soldiers, and workers); Rurrenabaque,<sup>11</sup> Beni, Bolivia, September, October, and November, 1921 (queen and king, soldiers and workers; the largest queen being 27.50 mm. in length and 6.50 mm. in width); Rurrenabaque, Beni, Bolivia, September, October, and November, 1921 (queen, soldiers, and workers); Rurrenabaque, Bolivia, September, October, and November, 1921 (soldiers and workers); Tumupasa, Bolivia, December, 1921 (queen, soldiers, and workers); Tumupasa, Bolivia (soldiers and workers).

## NASUTITERMES (NASUTITERMES) MACROCEPHALUS Silvestri

Cachucla Esperanza (Beni River), Bolivia, March, 1922 (soldiers and workers); Ivon, Bolivia, February, 1922 (soldiers and workers); Rio Mautania, Brazil, March, 1922 (queen, soldiers, and workers).

## NASUTITERMES (NASUTITERMES) MAJOR Holmgren

Riberalla, Bolivia, January, 1922 (soldiers and workers).

## NASUTITERMES (NASUTITERMÉS) MAXIMUS Holmgren

Cavinas, Bolivia, February, 1922 (soldiers and workers).

## NASUTITERMES (NASUTITERMES) MINIMUS Holmgren

Ivon, Bolivia, February, 1922 (queen, soldiers, and workers).

## NASUTITERMES (NASUTITERMES) ROTUNDATUS Holmgren

Rio Colorado, Bolivia, September, 1921 (soldiers and workers).

<sup>11</sup> N. (N.) *ephratae* Holmgren was the species most frequently collected by this expedition; it apparently was most common at Rurrenabaque; this species builds carton "niggerhead" tree nests, as well as living in logs and stumps.



## NASUTITERMES (NASUTITERMES) SURINAMENSIS Holmgren

Cachuela Esperanza (Beni River), Bolivia, March, 1922 (soldiers and workers); Ixiamas, Bolivia, December, 1921 (soldiers and workers); Reyes, Bolivia, October, 1921 (soldiers and workers).

## NASUTITERMES (SUBULITERMES) ANGUSTICEPS, new species

*Soldier*.—Head yellow, lighter anteriorly, nasus castaneous, pear-shaped, with only two rows of bristles, one row near anterior, other near posterior of head, also with dense short hairs; nasus elongate, slender, slightly turned up at apex (dorsally). Points of mandibles absent.

Antenna white with tinge of yellow, 12 segments, pubescent. First segment elongate, cylindrical; second shorter; third subclavate, narrower and slightly shorter than second; fourth broader and longer than third; last segment elongate, sub-elliptical.

Pronotum white with tinge of yellow; yellow-brown at anterior margin, saddle-shaped, anterior margin with long hairs.

Legs white with tinge of yellow, elongate, slender, pubescent.

Abdomen dirty gray, with dense short hairs but with few long hairs on dorsum (one row at base each tergite), bristles longer at end of abdomen.

*Measurements*.—

Length of entire soldier, 2.7–3.4 mm. (average 3.2 mm.).

Length of head with nasus, 1.2–1.4 mm.

Length of head without nasus (to anterior), 0.675 mm.

Length of nasus, 0.50–0.52 mm.

Length of pronotum, 0.087–0.1 mm.

Length of hind tibia, 0.575–0.6 mm.

Width of head, 0.48–0.50 mm.

Width of pronotum, 0.32.

*N. (S.) angusticeps* is close to *N. (S.) microsoma* Silvestri but is smaller and has a narrower head.

*Type locality*.—Espia, Bolivia.

Described from a series of soldiers collected at the type locality by W. M. Mann.

*Type soldier*.—Cat. No. 27655, U.S.N.M.

## Subgenus CONVEXITERMES Holmgren

This subgenus of the genus *Nasutitermes* Banks was established by Holmgren in 1912, and is confined to South America. Only five species are as yet known, namely, *convexifrons* Holmgren, *nigricornis* Holmgren, both of Peru, *kartaboensis*, *mazaruniensis*, and *manni* Emerson of British Guiana. The soldier caste is characterized by a short, thick, and conical nasus.

## NASUTITERMES (CONVEXITERMES) PALLIDUS, new species

*Soldier*.—Head, light yellow, straw-colored, nasus reddish-brown, profile of head convex, broadest posteriorly, where margin is rounded, gradually narrowed anteriorly, nasus conical and robust, head with dense long hairs, nasus with dense short hairs. Mandibles with no sharp points.

Antenna light yellow, 11 segments, pubescent; third segment shorter than second or fourth segments; segments after the fourth become longer and broader.

Pronotum white with tinge of yellow, saddle-shaped, about one third as long as broad, with long hairs at margins.

Legs white, with tinge of yellow, not very long, pubescent.

Abdomen dirty gray, with tinge of yellow, with dense short hairs and longer hairs at base of tergites.

*Measurements*.—

Length of entire soldier, 2.45–2.75 mm.

Length of head with nasus, 1.00 mm.

Length of head without nasus (to anterior), 0.60 mm.

Length of nasus, 0.40 mm.

Length of pronotum, 0.10 mm.

Length of hind tibia, 0.47 mm.

Width of head, 0.60 mm.

Width of pronotum, 0.30 mm.

*N. (C.) pallidus* is smaller and has a narrower head than *nigricornis* Holmgren and *convexifrons* Holmgren, *convexifrons* has not the dense long bristles on the head; it is lighter colored and has a broader head than *kartaboensis* Emerson; *pallidus* is lighter colored and has a narrower head than *manni* Emerson, where there are no long dense bristles on the head; it is lighter colored and has a broader head than *mazaruniensis* Emerson and has a more robust nasus, the length of the head to the anterior in *mazaruniensis* is longer than in *pallidus*.

*Type locality*.—Ivon, Bolivia.

Described from a large series of soldiers and workers collected at the type locality in February, 1922, by W. M. Mann. Other specimens collected at Cachuela Esperanza (Beni River) in March.

*Type, soldier*.—Cat. No. 27656, U.S.N.M.

## NASUTITERMES (CONVEXITERMES) PULLICEPS, new species

*Soldier*.—Head dark castaneous-brown, base of nasus darker (blackish-brown), apex lighter with reddish tinge, broadly oval, convex in profile, with few scattered long hairs and dense shorter hairs. Nasus fairly elongate, conical but not very thick even at base, with hairs at apex.

Antenna yellow to light yellowish-brown, 11-12 segments, segments become longer and broader toward apex, with long hairs; third segment (if 11 segments) elongate, clavate, longer than second or fourth; fourth shorter than second segment; if 12 segments, third short, ring-like, shorter than second but subequal with fourth segment.

Pronotum yellow-brown, saddle-shaped, anterior margin short, steep, not emarginate, with short hairs.

Legs yellowish, elongate, slender, with long hairs.

Abdomen with tergites light yellow-brown, with microscopic hairs and a row of long hair at the base of each tergite lacking in the middle of the abdomen; cerci fairly elongate.

*Measurements.*—

- Length of entire soldier, 2.40-2.90 mm.
- Length of head with nasus, 1.10-1.20 mm.
- Length of head without nasus (to anterior), 0.75 mm.
- Length of nasus, 0.40 mm.
- Length of pronotum, 0.12 mm.
- Length of hind tibia, 0.65 mm.
- Width of head, 0.65 mm.
- Width of pronotum, 0.30 mm.

*N. (C.) pulliceps* Snyder is a dark colored, small species, with nasus not robust.

*Type locality.*—Cachuela Esperanza (Beni River), Bolivia.

Described from a series of soldiers collected with workers at the type locality in March, 1922, by Dr. W. M. Mann; with this termite were soldiers and workers of *Armitermes (A.) albidus* Hagen.

*Type, soldier.*—Cat. No. 276657 U.S.N.M.

Subgenus *DIVERSITERMES* Holmgren

Silvestri's remarkable species *diversimiles* was placed in this subgenus of *Nasutitermes* Banks by Holmgren in 1912. Holmgren had found the intermediate soldier caste in Bolivia; the species has been previously known to have only two types of soldiers. The major soldier has an unmistakable large rounded head and the intermediate soldier has a head constricted in the middle, of somewhat of the shape of an hour glass, as in *Velocitermes* Holmgren (pl. 3, figs. 1-4).

This subgenus is confined to South America; two species have been described—*diversimiles* Silvestri and *castaniceps* Holmgren.

*NASUTITERMES (DIVERSITERMES) MELANOCEPHALUS*, new species

*Queen* (first form).—Head blackish, dark reddish-brown near base of antennae, with dense short hairs and quite a few long hairs, wider than in *N. (Diversitermes) diversimiles* Silvestri. **Fonta-**

nelle hyaline, triangular, broader than in (*Velocitermes*) *heteropterus* Silvestri, also the lines of bifurcation at anterior are shorter.

Antenna light castaneous-brown (12 (+ ?) segments, pubescent; third segment slightly darker colored, clavate, elongate as in (*Velocitermes*), as long as fourth and fifth segments together; fourth segment slightly longer than second.

Eyes blackish, fairly large and projecting. Ocelli hyaline, prominent, separated from compound eyes by a distance fully equal to their long diameter.

Labrum white with brownish tinge in center, tongue-shaped; darker colored than in *N. (V.) heteropterus*.

Post-clypeus light castaneous-brown, bilobed, projecting, three times as broad as long.

Pronotum darker castaneous-brown than post-clypeus, slightly raised anteriorly, also slightly emarginate anteriorly and posteriorly, sides slope sharply to posterior margin, which is fairly straight not rounded as in *N. (D.) diversimiles*, with long hairs; meso- and meta-nota lighter in color than pronotum, more elongate than in *diversimiles*, deeply, angularly emarginate posteriorly.

Legs yellow-brown; elongate, slender, pubescent; two elongate white eggs of a beetle (termitophile?) in ventral axis between tibia and femora of left prothoracic leg and one in joint on right fore leg.

Abdomen with tergites same color as meso- and meta-nota, with dense long hairs; sternites lighter colored, with golden-yellow tinge in center, with dense long hairs; abdomen with dense short hairs laterally.

*Measurements.*—

- Length of queen, 16.0 mm.
- Length of head (to tip labrum), 1.45 mm.
- Length of pronotum, 0.80 mm.
- Length of hind tibia, 2.15 mm.
- Diameter of eye, 0.34 mm.
- Width of head (at eye), 1.40 mm.
- Width of pronotum, 1.30 mm.
- Width of abdomen of queen, 3.8 mm.

*N. (D.) melanocephalus* is darker colored and has smaller eyes and shorter pronotum than *N. (Velocitermes) heteropterus*.

*Soldier, major.*—Head dark castaneous-brown to blackish, posterior and sides of posterior lobe of head lighter colored, as is base of antennae; tip of nasus light castaneous; head nasuate, semipear-shaped, not so constricted as *heteropterus*, unlike in *Diversitermes* where widest anteriorly, much wider posteriorly than anteriorly; only two rows of bristles on top of head at base of nasus and on apex of posterior lobe of head, three rows of bristles in *N. (V.) heteropterus* where there is an intermediate row (pl. 3, figs. 1-2).



Antenna castaneous-brown, elongate, 14 segments, slender pubescent; third segment clavate, nearly three times as long as second segment; fourth more than half as long as third; fifth subequal to fourth.

Pronotum lighter castaneous colored on margins than head, saddle-shaped, with long hairs.

Legs yellow-brown, elongate, slender.

Abdomen yellow-brown (lighter colored than in *N. (V.) heteropterus*), two rows of long hairs on tergites, dense long hairs at end of abdomen.

*Measurements (major soldier).—*

- Length of entire soldier, 3.90–4.20 mm.
- Length of head with nasus, 1.75–1.80 mm.
- Length of head without nasus to anterior, 1.20–1.30 mm.
- Length of nasus, 0.60–0.65 mm.
- Length of pronotum, 0.20 mm.
- Length of hind tibia, 1.50–1.55 mm.
- Width of head, 0.95–1.07 mm.
- Width of pronotum, 0.50 mm.

Head larger and darker colored than in *N. (V.) heteropterus*, with only 2 rows of bristles.

One soldier of this type ? is smaller and the head has a more elongate appearance; it is less wide at the base.

*Measurements.—*

- Length of entire soldier, 3.85 mm.
- Length of head with nasus, 1.60 mm.
- Length of head without nasus to anterior, 1.20 mm.
- Length of nasus, 0.50 mm.
- Length of pronotum, 0.20 mm.
- Length of hind tibia, 1.50 mm.
- Width of head, 0.80 mm.
- Width of pronotum, 0.47 mm.

*Soldier, Intermediate.*—Head of same color and with same bristles as major soldier, no wider posteriorly than anteriorly, constricted (pl. 3, figs. 3–4). Antenna 13–14 segments; third and fourth segments clavate, longer than second; second two-thirds as long as third; fourth not as long as third.

*Measurements (intermediate soldier).—*

- Length of entire soldier, 3.8–4.1 mm.
- Length of head with nasus, 1.45–1.55 mm.
- Length of head without nasus to anterior, 1.10–1.20 mm.
- Length of nasus, 0.45–0.55 mm.
- Length of pronotum, 0.20 mm.
- Length of hind tibia, 1.50–1.70 mm.
- Width of head, 0.65–0.70 mm.
- Width of pronotum, 0.50–0.55 mm.

This caste is apparently much more rare than the major and minor soldier castes.

*Soldier, Minor* (pl. 3, figs. 5-6).—Head of same color and with same bristles as major soldier, narrowed more gradually to nasus—more pear-shaped and more constricted. Antenna 14 segments; third and fourth segments longer than second, third twice as long, fourth shorter than third, fifth shorter than fourth.

Legs longer than in *N. (D.) diversimiles*.

*Measurements (minor soldier)*.—

Length of entire soldier, 3.00-3.20 mm.

Length of head with nasus, 1.40-1.55 mm.

Length of head without nasus to anterior, 0.90 mm.

Length of nasus, 0.65-0.70 mm.

Length of hind tibia, 1.20-1.30 mm.

Length of pronotum, 0.15 mm.

Width of head, 0.60-0.70 mm.

Width of pronotum, 0.50 mm.

The minor soldier of *N. (Velocitermes) heteropterus* has 15 segments to the antenna and has a wider head; the bristles are differently placed in *N. (V.) velox* Holmgren.

There is some doubt in which subgenus *melanocephalus* should be placed, or whether a new subgenus should not be established. Although the soldiers have 14 segments to the antenna and are dark colored, they are trimorphic and have relatively short legs, while species of *Diversitermes* have only 13 segments to the antenna and are light colored; nevertheless this species has been included in *Diversitermes*, and not in *Velocitermes*, where the soldiers are dimorphic and the legs are relatively long. It apparently occupies an intermediate position between Holmgren's subgenera *Diversitermes* and *Velocitermes* and this and other data rather indicate that these subgenera are not valid. The post clypeus of the worker is nearly as long as half its breadth. Only two species of *Diversitermes* are known, both being from America; the soldiers have short legs, fairly long in the intermediate and minor types, the hind tibia are shorter than the entire head. The known species of *Velocitermes* have only 2 types of soldiers; only 3 species have been described as yet from America. In *Velocitermes* the third segment of the antenna of the winged adult is elongate and clavate, the soldiers have long legs, the hind tibiae being longer than the entire head.

*Type locality*.—Rosario, Bolivia.

Described from a series collected at the type locality by W. M. Mann in November, 1921; three soldier castes are morphotypes.

*Type, first form queen*.—Cat. No. 27658, U.S.N.M.; morphotypes, soldiers.

Other known *Diversitermes* found on this expedition are:

## NASUTITERMES (DIVERSITERMES) CASTANICEPS Holmgren

Collected at Tumupasa, Bolivia, December, 1921, soldiers (major, intermediate, and minor), workers; soldiers (minor), workers.

## NASUTITERMES (DIVERSITERMES) DIVERSIMILES Silvestri

Espia. Bolivia, soldiers (major, intermediate, and minor), workers; Rio Colorado, Rio Beni, September, 1921, soldiers (major and minor), workers; Rosario, Bolivia, soldiers (major, intermediate and minor), workers; Canamina, Bolivia, soldiers (intermediate and minor), workers; S. Helena (soldiers minor).

## Subgenus VELOCITERMES Holmgren

This subgenus of *Nasutitermes* Banks was established by Holmgren in 1912; only four species have been described, all being from America, namely, *N. (V.) antillarum* Holmgren from San Domingo, *heteropterus* Silvestri from Paraguay and Brazil, *velox* Holmgren from Bolivia and Peru, and *beebei* Emerson from British Guiana. The soldiers are long-legged and rapid moving.

## NASUTITERMES (VELOCITERMES) UNIFORMIS, new species

*Winged adult*.—Head blackish, shining, not much longer than broad, flattish but with slope anteriorly, rounded posteriorly, with dense long hairs. Fontanelle linear, constricted at the middle, two short lines at apex, following the epicranial suture. Eyes blackish, large, not round, close to lateral margin of head. Ocelli large, elongate, separated from eyes by a distance less than their short diameter.

Post-clypeus dark castaneous-(gray) brown, projecting, approximately one third as long as broad, with fairly long hairs.

Labrum yellow-brown, broader than long, broadly rounded at apex, with long hairs.

Antenna yellow-brown, 15 segments, pubescent; third segment subclavate, elongate, not quite twice as long as second segment; fourth segment slightly longer than second; fifth approximately equal to fourth; segments become longer toward apex; last segment slender, shorter and suboval.

Pronotum dark castaneous-brown, lighter colored than head, anterior margin nearly a straight line, slightly raised, corners high, sides rounded and gradually and roundedly slope to posterior margin, which is convex, with dense long hairs.

Meso-notum with posterior margin rounded but angularly and broadly (not deeply) emarginate; meta-notum with posterior margin less emarginate.

Wings markedly white, hyaline, even costal veins opaquely whitish, except near wing scale where there is a yellowish to yellowish-

brown tinge, margins ciliate, surface hairy. Median vein close to and parallel to cubitus, cubitus in about middle of wing area, with 12 branches to lower margin; wing scale hairy, 0.70 mm. in length.

Legs yellow-brown, pubescent.

Abdomen with tergites dark castaneous-brown, with dense short and long hairs; sternites lighter colored with central area yellow-brown.

*Measurements.*—

- Length of entire winged adult, 13.5 mm.
- Length of entire deälated adult, 7.5 mm.
- Length of head (to tip labrum), 1.35 mm.
- Length of pronotum, 0.80 mm.
- Length of hind tibia, 1.85 mm.
- Length of anterior wing, 11.5 mm.
- Diameter of eye (long diameter), 0.35 mm.
- Width of head (at eyes), 1.35 mm.
- Width of pronotum, 1.20 mm.
- Width of anterior wing, 2.80 mm.

Close to *heteropterus* Silvestri but darker colored and with broader head and larger eyes.

*Major soldier* (pl. 3, figs. 9-10).—Head dark castaneous-brown to black, head lighter colored at posterior margin, also at base of antenna, tip of nasus light castaneous; head semipear shaped, markedly constricted at anterior third, nasus forms rounded saddle with head, deeper than in *heteropterus* Silvestri, head broadest posteriorly, narrows anteriorly beyond constriction; three rows of long bristles on head. Nasus elongate, narrow. Mandibles prominent, elongate, narrow.

Antenna light castaneous-brown, 14 segments, pubescent; third segment elongate, slender, subclavate, over twice as long as second segment and longer than fourth segment; fourth segment subclavate, approximately of the same size as the fifth and sixth to ninth segments; tenth to fourteenth segments become gradually shorter; last segment slender and suboval.

Pronotum dark castaneous-brown, saddle-shaped, long bristles on anterior and posterior margins.

Legs yellow-brown, elongate, slender, pubescent, hind tibiae as long as head with nasus.

Abdomen with tergites light castaneous (gray) brown, row of long bristles at base of each tergite; sternites lighter colored with longer bristles, densest at end abdomen.

Major soldier darker than *N. (V.) heteropterus*, nasus at more of an angle to the head; different type of soldier than in *beebei* Emerson where the head is broadest anteriorly; type of soldier also different from that of *velox* Holmgren.



*Measurements (major soldier).—*

- Length of entire soldier, 3.7–4.0 mm.
- Length of head with nasus, 1.60–1.65 mm.
- Length of head without nasus (to anterior), 1.00 mm.
- Length of nasus, 0.65 mm.
- Length of pronotum, 0.20 mm.
- Length of hind tibia, 1.60–1.65 mm.
- Width of head, 0.80–0.85 mm.
- Width of pronotum, 0.50 mm.

This caste seems to be more common than the minor soldier.

*Minor soldier* (pl. 3, figs. 11–12).—Head dark castaneous-brown to blackish, narrowed more anteriorly than major soldier, same bristles; in general the same shape. Antenna 14 segments; third longer than second or fourth; from fifth to tenth, segments become elongate; from eleventh to fourteenth, shorter.

*Measurements (minor soldier).—*

- Length of entire soldier, 3.35–3.6 mm.
- Length of head with nasus, 1.45–1.50 mm.
- Length of head without nasus (to anterior), 0.90 mm.
- Length of nasus, 0.60 mm.
- Length of pronotum, 0.15 mm.
- Length of hind tibia, 1.45 mm.
- Width of head, 0.70 mm.
- Width of pronotum, 0.40 mm.

Minor soldier darker colored than *beebei* Emerson where there are only two rows of bristles on head and 13 segments to the antenna; in *antillarum* Holmgren there are also only 13 segments to the antenna.

The post clypeus of the worker is nearly as long as half its breadth.

*Type locality.*—Rosario, Bolivia.

Described from a single winged male adult and a series of dimorphic soldiers found together with workers in "termite hills" at the type locality, in November, 1921, by W. M. Mann. A series of winged adults together with dimorphic soldiers and with workers were also collected at Reyes, Bolivia, in October, 1921, by Mann. One soldier of *Armitermes (Curvitermes) odontognathus* Silvestoni was found with these specimens.

*Type, winged male adult.*—Cat. No. 27659, U.S.N.M., morphotypes soldiers.

## Subgenus AGNATHOTERMES, new subgenus

*Soldier.*—Of only one type, contour of the head as in the subgenera *Tenuirostritermes* Holmgren or *Subulitermes* Holmgren, mandibles without points, nasus short and conical as in the subgenus *Convexitermes* Holmgren. Antenna with 11–12 segments. Light-colored species.

*Worker*.—Length of postclypeus nearly one-half its width, in species *aequalis*.

*Genotype*.—*Nasutitermes* (*Agnathotermes*) *glaber* Snyder from Cachuella Esperanza (Beni River), Bolivia.

In this subgenus also may be placed *N.* (*Obtusitermes*) *aequalis* Snyder from Camaguey, Cuba and "*Constrictotermes*" *pallidiceps* Banks from Haiti.

It is believed by the writer that the presence or absence of points on the mandibles is of relatively greater importance in systematic classification than the contour of the head or nasus, but a consideration of the latter as well necessitates a new subgenus for this species.

NASUTITERMES (AGNATHOTERMES) GLABER, new species

*Soldier*.—Head pale yellow, nasus red-brown, head pyriform, constricted back of base of antennae (at anterior quarter of head), broadest posteriorly, slightly convex but nearly straight in profile, with a slight depression at constriction, with scattered very short hairs and a few longer hairs anteriorly and posteriorly. Nasus short, conical, but not very thick, not turned up at tip, with short hairs and longer hairs at apex. Mandibular points absent.

Antenna pale yellow, 11 segments, pubescent; third segment longer than second or fourth; segments become longer and broader toward apex; last segment slender and subelliptical.

Pronotum with margins yellow, saddle-shaped, with short hairs. Legs white, fairly elongate, slender, pubescent.

Abdomen dirty white, with short hairs on tergites, cerci fairly elongate.

*Measurements*.—

Length of entire soldier, 2.70 mm.

Length of head with nasus, 0.90 – 0.95 mm.

Length of head without nasus, 0.55 – 0.60 mm.

Length of nasus, 0.35 mm.

Length of pronotum, 0.10 mm.

Length of hind tibia, 0.57 mm.

Width of head, 0.50 mm.

Width of pronotum, 0.25 mm.

This species *glaber* was first referred to the subgenus *Obtusitermes* Snyder (which contains species with two types of soldiers); however, only one type of soldier, namely the major ? soldier, was found; *glaber* has characters intermediate between the subgenera *Conveaitermes* Holmgren and *Subulitermes* Holmgren. The nasus is short and conical as in *Conveaitermes* but the contour of the head is as in *Subulitermes*. No workers were collected with these soldiers and the species may be a *Tenuirostritermes* or in a new subgenus (*Agnathotermes*): the points of the mandibles are sometimes lacking in species

hitherto included in this subgenus (*Tenuirostritermes*) of Holmgren. The nasus is long and cylindrical in most species of *Subulitermes*, but this species may be in this subgenus.

*Type locality*.—Cachuela Esperanza (Beni River), Bolivia.

Described from 3 soldiers collected at the type locality with *Coronitermes* (*Labiotermes*) *labralis* Holmgren in March, 1922, by W. M. Mann.

*Type, soldier*.—Cat. No. 27660, U.S.N.M.

NASUTITERMES (TENUIROSTRITERMES) LATICEPHALUS, new species

*Soldier* (pl. 3, figs. 7-8).—Head light yellow-brown (straw colored) with longitudinal striae (possibly muscles visible due to light color), broad but short—only slightly longer than broad; somewhat pear-shaped, narrowed and slightly constricted anteriorly, broadest at posterior margin which forms nearly a straight line (where slightly emarginate or divided into two lobes); two rows of bristles on dorsum of head, one row of 4 bristles anteriorly and the other row of 2 bristles posteriorly; head also with dense short hairs. Nasus light castaneous-brown, fairly short, slender, with short hairs. Mandibles prominent, short, sharp points.

Antenna yellow-brown, 13 segments, pubescent; third segment slender, clavate, longer than second or fourth; fourth shorter than second; fifth wider, nearly as long as third; segments become longer and wider toward apex.

Pronotum white, anterior margin yellow-brown, saddle-shaped; with short hairs.

Legs white with tinge of yellow, fairly elongate, pubescent.

Abdomen dirty gray, with tinge of yellow, a row of long bristles on each tergite, also short hairs, many long hairs at end abdomen.

*Measurements*.—

Length of entire soldier, 3.00-3.20 mm.

Length of head with nasus, 1.15-1.20 mm.

Length of head without nasus (to anterior), 0.80 mm.

Length of nasus, 0.40-0.45 mm.

Length of pronotum, 0.11 mm.

Length of hind tibia, 0.75-0.78 mm.

Width of head, 0.70-0.75 mm.

Width of pronotum, 0.35-0.36 mm.

This species is placed in the subgenus *Tenuirostritermes* due to the slight constriction of the head, the mandibles, legs, and the fact that in the worker the post-clypeus is twice as wide as long. The most striking characteristic of this species is its broad head, hence the specific name.

*Type locality*.—Covendo, Bolivia.

Described from a series of soldiers and workers collected by W. M. Mann at the type locality.

*Type, soldier*.—Cat. No. 27661 U.S.N.M.

Subgenus CONstrictOTERMES Holmgren

This subgenus of the genus *Nasutitermes* Banks was established in 1909 by Holmgren to include all species where the nasuti had constricted heads. In 1912, Holmgren restricted the subgenus to include only three American species with nasuti with markedly constricted heads—some of the most striking species of *Nasutitermes*.

The species found in Bolivia by Doctor Mann, namely, *N. (C.) cavifrons* Holmgren, was from a lobed nest on a tree; many other nests, apparently of this species, were nearby.

NASUTITERMES (CONstrictOTERMES) CAVIFRONS Holmgren

Ivon, Bolivia, February, 1922, queen, nasuti, workers.

NASUTITERMES (CONstrictOTERMES) CYPHERGASTER Silvestri

*Soldier*.—Head light castaneous-brown, dark brown to blackish posteriorly and at anterior of basal portion of posterior, wider, lobe of head at point of constriction; front of nasus also black; few long hairs on head.

Antenna light yellow, 14 segments, pubescent; third segment longer than second (but not twice as long); third and fourth segments about same length; fifth longer than third or fourth segments.

Pronotum light yellow, saddle-shaped.

Legs with tibiae yellow, elongate, slender, pubescent.

Abdomen gray-white with tinge of yellow, with long hairs on segments.

*Measurements*.—

Length of entire soldier, 4.80 mm.

Length of head with nasus, 1.85–1.90 mm.

Length of head without nasus (to anterior), 1.35 mm.

Length of nasus, 0.60 mm.

Length of antennae, 2.40 + mm.

Length of pronotum, 0.30 mm.

Length of hind tibia, 1.80–2.0 mm.

Width of head, 1.25 mm.

Width of pronotum, 0.64 mm.

The description is based on soldiers among Sørensen's material under the manuscript name "*reinhardii*" at the Museum of Comparative Zoology, Cambridge, Mass. By a comparison with Silvestri's description of *cyphergaster* (1903), I find that these species are identical. Hence, *Constrictotermes cyphergaster* Silvestri would replace *reinhardii* Sørensen, if the latter had been described. I



have examined Sørensen's paratypes (soldiers and workers) of "*reinhardii*" from Rio Grande, Brazil, in the Museum of Comparative Zoology, and redescribed the type for comparison with other species.

[*Eutermes*] *Microcerotermes strunckii* is the only valid species of the four species described as new by Sørensen in 1884.

#### Genus ANOPLOTERMES Fritz Müller

The winged adults of species of *Anoplotermes* have a very broad head usually densely hairy, with small projecting eyes. Fontanelle indistinct or large and prominent; see key. Ocelli fairly large, more or less distant from eyes. Postclypeus strongly arched, length usually less than half its width. Mandibles elongate, with a large apical tooth. Antennae always with 15 segments; third segment much shorter than the following (exception *A. silvestrii* Emerson).

Pronotum similar to that of species of *Nasutitermes*. Meso and metanota elongate, narrow, with posterior margin more or less deeply emarginate. Wings dark, hairy.

There are marked differences in the sexual, winged adults, between males and females.

In some species of the subgenus *Speculitermes* Wasmann the workers are darkly colored and the fontanelle is large, round, and prominent; the third segment of the antennae of the winged adult usually is large (approximately equal to the fourth)—not small as in *Anoplotermes (sensu strictore)*. These species of *Speculitermes* live in earth nests in the crotches of trees near the ground, whereas some Central American species of *Anoplotermes* usually do not construct earth nests or mounds.

#### KEY TO SOME SOUTH AMERICAN ANOPLOTERMES FRITZ MÜLLER (S. S.) BASED PRIMARILY ON THE FONTANELLE

1. Fontanelle distinct.....	2
Fontanelle indistinct.....	14
2. Fontanelle hyaline.....	3
Fontanelle not hyaline.....	13
3. Fontanelle very large (0.25 mm. in length, 0.20 mm. in width)	
<i>grandifons</i> Snyder	
Fontanelle large, oval, raised.....	4
Fontanelle large, heart shaped.....	<i>turricola</i> Silvestri
Fontanelle large, suboval, wide.....	5
Fontanelle small, subelliptical, narrow.....	8
4. Winged adults large (16.50 mm. in length).....	<i>pacificus</i> Fritz Müller
Winged adults small (11.50 mm. in length).....	<i>rotundus</i> Snyder
5. Winged adults very large (24 mm. in length).....	<i>cingulatus</i> Silvestri
Winged adults large (17 mm. in length).....	<i>abbreviatus</i> Silvestri
Winged adults small.....	6
6. Head broad (1.30 mm. in width).....	<i>punctatus</i> Snyder
Head narrower.....	7

7. Eye large, mandible elongate.....	<i>nigropunctatus</i> Emerson	
Eye small, mandible not elongate.....	<i>bolivianus</i> Snyder	
8. Winged adults large (14 mm. in length).....	<i>meridianus</i> Emerson=	
	( <i>morio</i> Silvestri)	
Winged adults small.....		9
9. Post clypeus less than twice as broad as long.....	<i>clypeatus</i> Snyder	
Post clypeus slightly over twice as broad as long.....		10
Post clypeus nearly, or three times as broad as long.....		12
10. Mandibles elongate, ocellus distant from eye.....	<i>distans</i> Snyder	
Mandibles short, ocellus close to eye.....		11
11. Winged adult 10.25 mm. in length.....	<i>distinctus</i> Snyder	
Winged adult 9 mm. in length.....	<i>banksi</i> Emerson	
12. Head 0.75 mm. in width.....	<i>proximus</i> Snyder	
Head 0.60.....	<i>linearis</i> Snyder	
13. Fontanelle, large suboval plate.....		
Antenna with third segment elongate.....	<i>silvestrii</i> Emerson	
Antenna with third segment not elongate.....	<i>howardi</i> Snyder	
14. Length of winged adult 10 mm.....	<i>indistinctus</i> Snyder	
Length of winged adult 7 mm.....	<i>brevipilis</i> Emerson	

**ANOPLOTERMES (ANOPLOTERMES) BOLIVIANUS, new species**

*Winged, female adult.*—Head castaneous-brown, broader than long (posterior margin to base of post clypeus), with dense long hairs. Fontanelle hyaline, prominent, subelliptical slit on vertex of head.

Eye black, not quite round, small but projecting, close to lateral margin of head. Ocellus hyaline, suboval, upper rim projecting, separated from eye by a distance less than the small diameter of an ocellus.

Post clypeus yellow-brown, projecting, bilobed, slightly over twice as broad as long, with dense long hairs.

Mandibles yellow to castaneous, not very elongate.

Antenna yellow-brown, 15 segments, with long hairs; third segment narrower and shorter than second or fourth segments; fourth shorter than second segment; segments become longer and broader toward apex; last segment narrow, elongate, and subelliptical.

Pronotum much lighter colored than head, yellow-brown, slightly narrower than head, saddle-shaped, sides roundly slope to posterior margin which is nearly straight, but pronotum as a whole is semi-circular.

Mesonotum and metanotum are deeply and angularly emarginate.

Wings gray, costal area golden yellow-brown, tissue finely punctate, margins ciliate. In fore wing median vein nearer to cubitus than to subcosta, with branches or not to apex of wing; cubitus does not quite reach apex with 10–12 branches or subbranches to lower margin of wing.

Legs yellowish with tinge of brown, slender, elongate, with long hairs.

Abdomen with tergites castaneous, with dense long hairs; cerci not prominent.

*Measurements.*—

- Length of entire winged adult, 11–12 mm.
- Length of entire deälated adult, 7.00 mm.
- Length of head (to tip labrum), 1.10 mm.
- Length of left mandible, 0.50 mm.
- Length of pronotum, 0.50 mm.
- Length of hind tibia, 0.85 mm.
- Length of anterior wing, 9.50 mm.
- Diameter of eye (long diam.), 0.20 mm.
- Width of head, 0.95 mm.
- Width of pronotum, 0.90 mm.
- Width of anterior wing, 2.60 mm.

*A. (A.) bolivianus* Snyder is close to *A. (A.) gracilis* Snyder, except that the latter has an indistinct fontanelle and a narrower head.

*Type locality.*—Tumupasa, Bolivia.

Described from three female adults collected at the type locality in December with workers and male winged adults and workers of *Anoplotermes (A.) indistinctus* Snyder; two other female winged adults, topotypes; other localities are—Rosario, Bolivia, March, 1922, deälated female adult with *A. indistinctus* Snyder deälated male adult; also Rosario, October, 1921, deälated female adults.

*Type, female winged adult.*—Cat. No. 27662, U.S.N.M.

**ANOPLOTERMES (ANOPLOTERMES) CLYPEATUS, new species**

*Winged, female adult.*—Head dark castaneous-brown, wider than long (posterior to base of postclypeus), with dense fairly long hairs. Fontanelle a small hyaline subelliptical spot on vertex of head.

Postclypeus yellow brown, bilobed, projecting, less than twice as broad as long, with long hairs.

Eye black, not round, projecting, near lateral margin of head. Ocellus hyaline, suboval, with projecting upper rim, separated from the eye by a distance less than the small diameter of an ocellus, at oblique angle to eye.

Mandible yellow-brown, castaneous at apex, not long.

Antenna yellow-brown, 15 segments, segments becoming longer and broader toward apex, with long hairs; third segment short, narrow, and ring-like, shorter than second or fourth segments; fourth segment shorter than second; last segment elongate, slender, and subelliptical.

Pronotum light yellow-brown, saddle-shaped, subcordate, with T-shaped marking and long hairs.

Meso- and meta-nota with posterior margin deeply and roundedly emarginate.

Wings cloudy gray, costal area yellow brown, surface punctate, with hairs, margins ciliate. Forewing with median vein close to cubitus not branched or with two branches to apex of wing; cubitus with 10-11 branches or subbranches to lower margin of wing does not reach apex; in some wings median vein emerges (loops down) from subcosta at apical two-thirds of wing with two branches to apex, in others, in addition to the two branches to the apex, with two additional branches to the lower margin of the wing—venation inclined to be abnormal.

Legs yellow with brown tinge, with long hairs.

Abdomen with tergites dark castaneous-brown, with dark spiracular markings and dense long hairs; cerci not prominent.

*Measurements.*—

Length of entire winged adult, 10.50-11.00 mm.

Length of entire deilated adult, 5.50-6.00 mm.

Length of head (to tip of labrum), 1.10 mm.

Length of left mandible, 0.45 mm.

Length of pronotum, 0.50 mm.

Length of hind tibia, 0.75 mm.

Length of anterior wing, 9.00 mm.

Diameter of eye (long diameter), 0.20 mm.

Width of head (at eyes), 0.80 mm.

Width of pronotum, 0.65.

Width of anterior wing, 2.60.

*Type locality.*—San Gregorio, Beni, Bolivia.

A distinctive character is the long clypeus.

Described from a series of winged male and female adults collected with workers at the type locality by Dr. W. M. Mann in October, 1921.

*Type, winged, female adult.*—Cat. No. 27669, U.S.N.M.

ANOPLOTERMES (ANOPLOTERMES) DISTANS, new species

*Queen (first form).*—Head light castaneous-brown with reddish tinge, broader than long (posterior to base of postclypeus) with dense long hairs. Fontanelle hyaline a subelliptical spot on vertex of head.

Postclypeus light yellow-brown, a little over twice as broad as long, projecting, bilobed, with long hairs.

Eye black, nearly round, close to lateral margin of head, projecting. Ocellus hyaline, oblong, separated from eye by a distance nearly equal to the long diameter of an ocellus, with projecting upper rim, set obliquely to eye.

Mandible yellow, apex castaneous, elongate.

Antenna yellow tinged with brown, 15 segments, becoming longer and broader toward apex, with long hairs; third segment short nar-



row, ring-like, shorter than fourth or second segments; fourth not quite as long as second; last segment slender, elongate and subelliptical.

Pronotum light yellow-brown, saddle-shaped, subcordate, emarginate posteriorly, with long hairs.

Meso- and meta-nota deeply and angularly emarginate.

Legs yellowish, with long hairs.

Abdomen with tergites yellow-brown tinged with gray, with faint spiracular markings and dense long hairs; cerci not prominent.

*Measurements.*—

Length of entire queen, 14.00 mm.

Length of head (to tip labrum), 1.00 mm.

Length of pronotum, 0.50 mm.

Length of left mandible, 0.55 mm.

Length of hind tibia, 0.80 mm.

Diameter of eye (long diameter), 0.20 mm.

Width of abdomen of queen, 2.00 mm.

Width of head, 0.85 mm.

Width of pronotum, 0.75 mm.

*A. (A.) distans* Snyder has a smaller eye than *A. (A.) gracilis* Snyder and, unlike the latter species, a distinct fontanelle.

*Type locality.*—Rosario, Bolivia.

Described from a first form queen collected with workers in November at the type locality by W. M. Mann.

*Type, first form queen.*—Cat. No. 27663, U.S.N.M.

**ANOPLOTERMES (ANOPLOTERMES) DISTINCTUS, new species**

*Winged, female adult.*—Head castaneous-brown, broader than long (posterior to base of postclypeus) with dense long hairs. Fontanelle hyaline, a distinct suboval spot in a depression at vertex of head. Postclypeus light yellow-brown tinged with gray, bilobed, projecting, twice as broad as long, with long hairs.

Eye black not round, large, projecting, close to lateral margin of head. Ocellus hyaline, oblong, with projecting upper rim, close and at an oblique angle to eye, separated from eye by a distance less than the short diameter of an ocellus.

Mandible yellow, apex castaneous, relatively long.

Antenna light yellow-brown, 15 segments, becoming broader and longer toward apex, with long hairs; third segment short and narrow, ring-like, shorter than fourth or second segments; fourth shorter than second segment; last elongate, slender and subelliptical.

Pronotum light yellow-brown, tinged with gray, saddle-shaped, semicircular, with long hairs.

Meso- and meta-nota broadly and deeply emarginate.

Wings smoky-gray, costal area yellow-brown, margins ciliate, surface punctate and with hairs. Forewing with median vein slightly nearer cubitus than subcosta unbranched with two—three branches to apex of wing or also with three branches to lower margin in addition; cubitus with 9–12 branches or sub-branches to lower margin of wing, occupies but little of wing area (in width).

Legs yellow with tinge of brown, with long hairs.

Abdomen with tergites light castaneous-brown tinged with gray, with spiracular markings and dense long hairs; cerci fairly prominent.

*Measurements.*—

Length of entire winged female adult, 9.80–10.25 mm.

Length of entire winged male adult, 9.00–9.50 mm.

Length of entire deilated female, 6.50–6.75 mm.

Length of entire deilated male, 6.00–6.25 mm.

Length of head (to tip of labrum), 1.10 mm.

Length of left mandible, 0.45 mm.

Length of pronotum, 0.45 mm.

Length of hind tibia, 0.80 mm.

Length of anterior wing of female, 8.25 mm.

Diameter of eye (long diameter), 0.25 mm.

Width of head (at eyes), 0.85 mm.

Width of pronotum, 0.70 mm.

Width of anterior wing of female, 2.30 mm.

*Type locality.*—Rurrenabaque, Bolivia.

Described from a series of winged female and male adults collected at the type locality in October, 1921, by W. M. Mann.

*Type, winged female adult.*—Cat. No. 27664, U.S.N.M.

ANOPLOTERMES (ANOPLOTERMES) GRANDIFONS, new species

*Deilated, female adult.*—Head dark castaneous-brown, broader than long (posterior to base of postclypeus), with dense long hairs and shorter hairs. Fontanelle a very prominent hyaline oblong depression, slightly on a bias, 0.25 mm. in length and 0.20 mm. in width (pl. 1, fig. 3).

Eye black, nearly round, large, prominent and projecting, close to lateral margin of head. Ocellus hyaline, suboval, with projecting upper rim, separated from the eye by a distance equal to its short diameter.

Postclypeus light castaneous, bilobed, projecting, slightly over twice as broad as long, with long hairs.

Mandibles yellow to castaneous at apex, elongate.

Antenna yellow brown, 15 segments, with long hairs; third segment shorter than second or fourth segments, narrow, ring-like; fourth shorter than second segment; segments become longer and broader toward apex; last segment narrow, slender, sub-elliptical.

Pronotum slightly lighter colored than head, saddle-shaped, not twice as broad as long, sides angularly but broadly narrowed to posterior margin, with dense long and short hairs.

Meso- and meta-nota deeply, broadly and roundly emarginate.

Legs yellow with tinge of brown dorsally, with long hairs.

Abdomen with tergites dark castaneous-brown, with dense hairs; cerci not prominent.

*Measurements.*—

Length of entire deälated adult, 9.00 mm.

Length of head (to tip of labrum), 1.60 mm.

Length of left mandible, 0.80 mm.

Length of pronotum, 0.70 mm.

Length of hind tibia, 1.60 mm.

Diameter of eye (long diameter), 0.35 mm.

Width of head (at eyes), 1.40 mm.

Width of pronotum, 1.20 mm.

*Type locality.*—Rosario, Bolivia.

Described from a single female deälated adult collected in termite hills in November, 1921, by Dr. W. M. Mann with *Anoplotermes (A.) pacificus* Fritz Müller.

*Type, deälated, female adult.*—Cat. No. 27665, U.S.N.M.

**ANOPLOTERMES (ANOPLOTERMES) HOWARDI, new species**

*Deälated, male adult.*—Head dark castaneous-brown, broader than long (posterior to base of postclypeus), with dense long and shorter hairs. Fontanelle indistinct, a large oval plate in depression on vertex of head.

Postclypeus dark castaneous-brown, slightly lighter colored than head, over twice as broad as long, bilobed, projecting with long hairs.

Eye black, not round, large, projecting, close to lateral margin of head. Ocellus hyaline, suboval, separated from eye by a distance equal to its short diameter, with projecting upper rim, at angle to eye.

Mandible yellow-brown, apex castaneous, elongate.

Antenna yellow-brown, 15 segments, becoming longer and broader toward apex, with long hairs; third segment ring-like, narrower and much shorter than second and slightly shorter than fourth segment; fourth shorter than second segment; last segment elongate, slender, and subelliptical.

Pronotum dark castaneous-brown, slightly lighter colored than head, saddle-shaped, sides angularly rounded to posterior margin, with long hairs, pronotum shorter than in *A. grandifons* Snyder and sides not so broadly rounded to posterior.

Meso- and meta-nota deeply and angularly emarginate posteriorly; in *A. (A.) grandifons* Snyder more broadly roundedly emarginate.

Legs brownish, with long hairs.

Abdomen with tergites dark castaneous-brown, with faint spiracular markings and dense long hairs; cerci fairly prominent.

*Measurements.*—

Length of entire deülated male adult, 9.50 mm.

Length of head (to tip labrum), 1.60 mm.

Length of left mandible, 0.80 mm.

Length of pronotum, 0.75 mm.

Length of hind tibia, 1.60 mm.

Diameter of eye (long diameter), 0.35 mm.

Width of head (at eyes), 1.45 mm.

Width of pronotum, 1.30 mm.

*A. (A.) howardi* Snyder is close to *A. (A.) grandifons* Snyder except for the latter's prominent fontanelle, larger pronotum and more broadly and roundedly emarginate posterior of the meso- and meta-nota. This termite was named in honor of Dr. L. O. Howard, Chief of the Bureau of Entomology, United States Department of Agriculture, who has published several articles on termites and has always been keenly interested in their biology.

*Type locality.*—Rosario, Bolivia.

Described from three deülated male adults collected at the type locality in November, 1921 by W. M. Mann.

*Type, deülated, male adult.*—Cat. No. 27666, U.S.N.M.

ANOPLOTERMES (ANOPLOTERMES) INDISTINCTUS, new species

*Winged, male adult.*—Head castaneous-brown (with reddish tinge), broader than long (posterior to base of post.clypeus), with dense long hairs. Fontanelle indistinct raised spot in a broad depression on vertex of head.

Eye black, small, nearly round, projecting, and prominent, near lower margin of head. Ocellus hyaline, oblong, with projecting upper rim, separated from eye by a distance less than the small diameter of an ocellus.

Post clypeus yellow-brown, projecting, bilobed, slightly over twice as broad as long, with dense long hairs.

Mandibles yellow to castaneous, elongate.

Antenna yellow-brown, 15 segments, with long hairs; third segment small, ring-like, shorter and narrower than second or fourth segments; fourth segment only half as long as second; segments become longer and broader toward apex; last segment elongate, narrow and subelliptical, pointed at apex.



Pronotum much lighter colored than head, yellow-brown, saddle-shaped, not as broad as head, nor twice as broad as long; broadly semicircular, with dense long hairs.

Mesonotum and metanotum deeply, angularly emarginate posteriorly.

Wings gray, costal veins golden yellow, tissue finely punctate, hairy, margins ciliate. Fore wing with median vein slightly nearer to cubitus than to subcostal vein, with several (3-4) branches to apex of wing: cubitus does not reach apex, with 10-11 branches or subbranches to lower margin of wing; occupies less than half the wing area in width.

Legs yellow with tinge of brown, with long hairs.

Abdomen with tergites castaneous-brown, with dense long hairs.

*Measurements.*—

Length of entire winged male adult, 9.50-10.00 mm.

Length of entire deälated adult, 5.50 mm.

Length of head (to tip of labrum), 1.00 mm.

Length of left mandible, 0.70 mm.

Length of pronotum, 0.45 mm.

Length of fore wing, 8.00 mm.

Length of hind tibia, 0.85 mm.

Diameter of eye (long diameter), 0.20 mm.

Width of head (at eyes), 0.85-0.90 mm.

Width of pronotum, 0.70 mm.

Width of anterior wing, 2.20 mm.

*A. (A.) indistinctus* Snyder is close to *A. (A.) gracilis* Snyder, which, however, has a narrower head and larger wings.

*Type locality.*—Tumupasa, Bolivia.

Described from three male winged adults collected with workers at the type locality in December with winged female adults of *A. (A.) bolivianus* Snyder; also a deälated male adult with *bolivianus* at Rosario, in March, 1922.

*Type, winged male adult.*—Cat. No. 27667, U.S.N.M.

Other localities where *A. indistinctus* was collected are:

Rosario, Bolivia, October, 1921 (winged adults and workers); Rio Negro, Bolivia, January, 1922 (queen and workers); Ivon, Bolivia, February, 1922 (two queens and workers); Ivon, Bolivia, February, 1922 (queen and workers); Ivon, Bolivia, February, 1922 (queen, king, and workers); Rosario, Bolivia, March, 1922 (deälated female adult with deälated male adult of *Anoplotermes (A) bolivianus* Snyder).

ANOPLOTERMES (ANOPLOTERMES) LINEARIS, new species

*Winged, female adult.*—Head light castaneous-brown tinged with gray, broader than long (posterior to base of postclypeus). with dense fairly long hairs. Fontanelle hyaline subelliptical slit on

vertex of head. Postclypeus yellow brown, bilobed, projecting, three times as broad as long.

Eye black, not round, relatively large and projecting, close to lateral margin of head. Ocellus hyaline, oblong, with projecting upper rim, relatively large, at oblique angle to and almost touching eye.

Antenna light yellow-brown, 14-15 segments, becoming longer and broader toward apex, with long hairs; third segment short narrow and ring-like, shorter than second or fourth; fourth shorter than second segment; last segment elongate, slender and subelliptical.

Mandibles yellow, apex light castaneous, short.

Pronotum yellow-brown, tinged with gray, saddle-shaped, subcordate, with long hairs.

Meso- and meta-nota deeply and roundedly emarginate.

Wings cloudy gray, costal area yellow-brown, margin ciliate, surface punctate, with hairs. In forewing median vein close to cubitus, branches (2-3 times) to apex; cubitus with 8-9 branches or subbranches to lower margin of wing.

Legs white tinged with yellow, with long hairs.

Abdomen with tergites light castaneous brown, tinged with gray, with spiracular markings and dense fairly long hair; cerci fairly prominent.

*Measurements.*—

- Length of entire winged adult, 7.00 mm.
- Length of entire deülated adult, 4.80-5.20 mm.
- Length of head (to tip of labrum), 0.85 mm.
- Length of left mandible, 0.31 mm.
- Length of pronotum, 0.35 mm.
- Length of hind tibia, 0.55 mm.
- Length of anterior wing, 6.00 mm.
- Diameter of eye (long diameter), 0.175 mm.
- Width of head (at eyes), 0.60 mm.
- Width of pronotum, 0.46 mm.
- Width of anterior wing, 1.80 mm.

A. (*A.*) *linearis* Snyder is the most slender species of *Anoplotermes* known to the author.

*Type locality.*—Tumupasa, Bolivia.

Described from 7 male and female winged adults collected by W. M. Mann at the type locality in December, 1921.

*Type, winged female adult.*—Cat. No. 27668, U.S.N.M.

ANOPLOTERMES (ANOPLOTERMES) PROXIMUS, new species

*Winged, female adult.*—Head castaneous-brown, broader than long (posterior to base of postclypeus), with dense long hairs. Fontanelle hyaline, subelliptical slit on vertex of head. Postclypeus yellow-

brown, nearly three times as broad as long, bilobed, projecting with long hairs.

Eye black, not round, relatively large, projecting, close to lateral margin of head. Ocellus hyaline, suboval, upper rim projecting, close and at an angle to eye, separated from eye by a distance less than the short diameter of an ocellus.

Mandible yellow, castaneous at apex, relatively long.

Antenna light yellow-brown, 14-15 segments, segments becoming longer and broader toward apex, with long hairs; third segment ring-like, short and narrow, shorter than second or fourth segments; fourth segment shorter than second; last segment slender, elongate, and subelliptical.

Pronotum yellow-brown, tinged with gray, lighter colored than head; saddle-shaped, broadly subcordate, with T-shaped marking and long hairs.

Meso- and meta-nota with posterior margins broadly roundedly emarginate.

Wings smoky-gray, costal area yellow-brown, margins ciliate, surface punctate and with hairs. In forewing median vein nearer to cubitus than to subcosta, with two branches to apex of wing and one or two branches to lower margin; cubitus with nine branches or subbranches to lower margin of wing, occupies less than half area of wing (in width).

Legs yellow-brown, with long hairs.

Abdomen with tergites yellow-brown tinged with gray, with spiracular markings and dense long hairs; cerci fairly prominent.

*Measurements.*—

Length of entire winged female adult, 8.50-8.75 mm.

Length of entire winged male adult, 7.75-8.00 mm.

Length of entire deilated female adult, 5.00-5.70 mm.

Length of entire deilated male adult, 4.50-5.30 mm.

Length of head (to tip of labrum), 0.90 mm.

Length of left mandible, 0.40 mm.

Length of pronotum, 0.45 mm.

Length of hind tibia, 0.70 mm.

Length of anterior wing of female, 7.25 mm.

Diameter of eye (long diameter), 0.20 mm.

Width of head (at eyes), 0.75 mm.

Width of pronotum, 0.60 mm.

Width of anterior wing of female, 2.10 mm.

*A. (A.) proximus* Snyder comes in the group where the postclypeus is over twice as broad as long.

*Type locality.*—Tumupasa, Bolivia.

Described from a series of winged female and male adults collected with workers at the type locality by W. M. Mann in December, 1921.

*Type, winged female adult.*—Cat. No. 27670, U.S.N.M.

## ANOPLOTERMES (ANOPLOTERMES) PUNCTATUS, new species

*Queen (first form).*—Head dark castaneous-brown with reddish tinge, broader than long (posterior to base of clypeus), with dense long hairs. Fontanelle a hyaline, prominent, pear-shaped spot on vertex of head.

Eye black, nearly round, large, prominent, projecting, close to lateral margin of head. Ocellus hyaline, suboval, with projecting upper rim; separated from the eye by a distance nearly equal to the long diameter of an ocellus.

Post clypeus light castaneous, projecting, bilobed, twice as broad as long, with long hairs.

Mandibles yellow to castaneous at apex, elongate.

Antenna light yellow-brown, broken (12 segments), with long hairs; third segment short, narrow and ring-like, shorter than second or fourth segments; fourth only about half as long as second segment; segments become longer and broader toward apex.

Pronotum very slightly if any lighter colored than head, saddle-shaped, not as broad as head nor twice as broad as long, broadly semicircular, with dense, long hairs.

Meso- and meta-nota shallowly, angularly emarginate posteriorly.

Legs yellow with tinge of brown, with long hairs.

Abdomen with tergites dark castaneous-brown, with dense long hairs; cerci not prominent.

*Measurements.*—

Length of entire deälated adult, 6.00 mm.

Length of head (to tip labrum), 1.40 mm.

Length of left mandible, 0.70 mm.

Length of pronotum, 0.60 mm.

Length of hind tibia, 1.40 mm.

Diameter of eye (long diameter), 0.27 mm.

Width of head, 1.20–1.30 mm.

Width of pronotum, 1.00 mm.

*A. (A.) punctatus* Snyder is near *A. (A.) hondurensis* Snyder but has a prominent fontanelle; the fontanelle is not as large as in *A. (A.) rotundus* Snyder.

*Type locality.*—Rosario, Bolivia.

Described from a deälated male adult and queen (enlarged, first form) collected with workers at the type locality in October, 1921.

*Type, deälated male adult.*—Cat. No. 27671, U.S.N.M.; morphotype, queen.

## ANOPLOTERMES (ANOPLOTERMES) ROTUNDUS, new species

*Winged, male adult.*—Head castaneous-brown, broader than long (to base of post clypeus,) with dense hairs. Fontanelle a hyaline circular prominent raised spot in an orange rimmed depression on vertex of head—not quite as large as an ocellus.



Antenna yellow, 15 segments, with dense long hairs, segments becoming longer and broader towards apex; third segment shorter than second or fourth segments; fourth shorter than second segment; last segment elongate, slender, subelliptical.

Eye black, nearly round, projecting, close to lateral margin of head. Ocellus hyaline, suboval, with projecting upper rim, separated from eye by a distance equal to its long diameter.

Post clypeus lighter colored than head (yellow-brown,) projecting, bilobed, slightly over twice as broad as long, with dense long hairs.

Mandibles yellow, castaneous at tips, elongate.

Pronotum lighter colored than head, narrower than head, saddle shaped, anterior margin straight, sides angularly slope to posterior margin which is straight, with dense long hairs.

Meso- and meta-nota with posterior margins emarginate.

Wings gray, costal area golden yellow-brown, tissue punctate, margins ciliate. In forewing median vein closer to cubitus than to sub-costa, reaches apex of wing entire or branched; cubitus does not reach apex of wing, with 10-11 branches or sub-branches to lower margin of wing, occupies less than half area of wing (in width.)

Legs yellow with tinge of brown, with long hairs.

Abdomen with tergites castaneous, with dense hairs, cerci not prominent.

#### *Measurements.*—

Length of entire winged male adult, 11.50 mm.

Length of entire deilated, 6.80 mm.

Length of head (to tip of labrum), 1.20 mm.

Length of left mandible, 0.75 mm.

Length of pronotum, 0.65 mm.

Length of hind tibia, 1.40 mm.

Length of anterior wing, 10.00 mm.

Diameter of eye (long diameter), 0.27 mm.

Width of head (at eyes), 1.25 mm.

Width of pronotum, 1.10 mm.

Width of anterior wing, 2.60 mm.

*A. (A.) rotundus* Snyder is distinctive due to the prominent circular fontanelle; otherwise it is close to *A. (A.) hondurensis* Snyder.

*Type locality.*—Rosario, Bolivia.

Described from two male winged adults collected with workers at the type locality in November, 1921, with *Anoplotermes (A.) pacificus* Fritz Müller (winged and workers) and *Capritermes (Neocapritermes) parallelus* Snyder (soldiers and workers).

*Type, winged male adult.*—Cat. No. 27672, U.S.N.M.

The following described species of *Anoplotermes* were also collected:

## ANOPLOTERMES (ANOPLOTERMES) NIGROPUNCTATUS Emerson

Tumupasa, Bolivia, December, 1921 (winged adults and workers with soldiers of *Leucotermes tenuis* Hagen).

## ANOPLOTERMES (ANOPLOTERMES) PACIFICUS Fritz Müller

Rosario, (Lake Rogagua) Bolivia, November, 1921 (winged adults and workers in hills); Rosario, Bolivia, November, 1921 (deallated adults and workers with winged adults and soldiers of *Leucotermes tenuis* Hagen); Rosario, Bolivia, November, 1921 (winged adults and workers with soldiers and workers of *C. (Neocapritermes) parallelus* Snyder and winged adults and workers of *Anoplotermes (A.) rotundus* Snyder.)

## ANOPLOTERMES (SPECULITERMES), species

Cachuela Esperanza (Beni River), Bolivia, March, 1922 (workers only, from earth nest in crotch of tree near the ground); Cachuela Esperanza, Beni, Bolivia (workers).

## Genus CYLINDROTERMES Holmgren

The genus *Cylindrotermes* includes but the single species *nordenskiöldi* Holmgren, described from soldiers and workers collected only once by Holmgren in the stump of a banana tree at Tuiche, Province de Caupolican, Bolivia, May, 1904 (Holmgren, 1906). This genus comes in the *Amitermes* group and is near the genus *Cephalotermes* Silvestri, according to Holmgren (1912).

A new species from Bolivia, *C. brevipilosus*, is herewith described; it is close to *nordenskiöldi* Holmgren but is strikingly characterized by dense short hairs on the head of the soldier.

Species collected by A. Emerson at Kartabo, British Guiana, and determined by Emerson as *nordenskiöldi* may be a new species. Specimens from Barro Colorado Island, Canal Zone, and Rio Chinilla, Canal Zone, Panama, appear to be nearer to Holmgren's type; the head is broader than Emerson's specimens and the mandibles longer and stouter; antennae and pubescence similar.

## CYLINDROTERMES BREVIPILOSUS, new species

*Soldier*.—Head straw-yellow, elongate, sides nearly parallel, narrowed towards posterior, with dense short hairs (but few long hairs); mandibles black with reddish tinge, stout, base yellow-brown, short and curved. The width of the gula at the middle is more than half the width at the front. The labrum is of different shape than in *nordenskiöldi*.

Antenna light yellow, 11 to 12 segments, pubescent; if 12 segments, third segment indistinct, very small; fourth shorter than second

or fifth; in specimens of *C. nordenskiöldi* Holmgren from British Guiana there are plainly 12 segments to the antennae.

Pronotum pale yellow, saddle-shaped, with fairly large, raised up front, anterior margin *not* emarginate (pl. 1, fig. 7).

A comparison was made of one soldier and workers of *brevipilosus* collected by W. M. Mann at Ivon, Bolivia, in February 1922, and soldiers and workers of *nordenskiöldi* ? collected at Kartabo, British Guiana, by Alfred Emerson. The soldier of *brevipilosus* is smaller, has denser, shorter hairs on the head, and shorter, more curved mandibles. A larger portion of the pronotum is raised up and the anterior margin is not emarginate, as is the case in the soldiers of *nordenskiöldi* from Kartabo and Holmgren's description of the type (Holmgren, 1906); the description of the type also states that the head is fairly thickly pubescent; the specimens of *nordenskiöldi* ? from Kartabo have a narrower head than Holmgren's type and may be a new species. Specimens from Panama seem to be nearer to Holmgren's type. The following measurements show these differences:

Measurements <sup>1</sup>	<i>Cylindrotermes brevipilosus Snyder Ivon, Bolivia</i>	<i>Cylindrotermes nordenskiöldi Holmgren Kartabo, B. G.</i>	<i>Cylindrotermes nordenskiöldi Holmgren Barro, Colorado Island, Panama</i>	<i>Cylindro- termes norden- skiöldi Holmgren Tuiche, Bolivia</i>
	Mm.	Mm.	Mm.	Mm.
Length of entire soldier.....	3. 90	4. 60	4. 20-4. 60	3. 90
Length of head with mandibles..	2. 10	2. 10-2. 2	2. 25-2. 35	2. 0
Length of head without man- dibles (to anterior).....	1. 50	1. 55-1. 60	1. 70-1. 75	-----
Length of left mandible.....	. 65	. 62- . 67	. 80	-----
Length of pronotum.....	. 32	. 35- . 37	. 40	. 45
Length of hind tibia.....	. 57	. 55	. 70	-----
Width of head.....	. 80	. 80- . 85	. 95-1. 0	. 90
Width of pronotum.....	. 55	. 58- . 60	. 65	. 70
Length of entire worker.....	3. 0 -3. 7	3. 6 -3. 9	3. 10-3. 50	3. 8
Length of head.....	. 9 -1. 1	. 9 -1. 05	. 90- . 95	1. 0
Width of head.....	. 75- . 85	. 65- . 75	. 85- . 90	. 9
Length of antennae.....	. 85- . 95	. 80- . 90	. 90	1. 0
Width of abdomen.....	. 70- . 95	. 70- . 90	1. 10	1. 2

<sup>1</sup> The worker of *brevipilosus* has denser, longer hairs; both species have 13 segments to the antenna.

*Type locality*.—Ivon, Bolivia. Described from a single soldier and several workers collected by W. M. Mann, in February, 1922, at the type locality.

*Type, soldier*.—Cat. No. 27673, U.S.N.M.

#### Genus MIROTERMES Wasmann

In 1912, Holmgren divided the genus *Mirotermes* Wasmann into several subgenera. Of these subgenera, two were found in Bolivia by Doctor Mann, namely *Mirotermes (sensu strictore)* Holmgren and

*Spinitermes* Wasmann. Soldiers of species of *Mirotermes* flip or snap particles of earth with their elongate mandibles and this method of defense is very effective against ants, etc. Species in this subgenus are widely distributed throughout the world (in the Southern Hemisphere); only six species have been described from America. Only one species (and this new to science) was found in Bolivia.

MIROTERMES (MIROTERMES) BOLIVIANUS, new species

*Soldier*.—Head yellowish, darker anteriorly, narrow, slightly broader anteriorly, sides nearly parallel (slightly concave in middle), broadly rounded posteriorly, truncate anteriorly, an elongate, triangular median frontal process, with pointed upturned tip, markings at base differ from those in *panamaensis* Snyder, head with scattered, fairly long hairs, dense on apex of frontal process.

Labrum white with tinge of yellow, elongate, narrow, concave at middle, with two lateral elongate slender pointed lobes, with long hairs.

Mandibles black, elongate, slender, bowed, incurved at apex, left mandible finely roughened (serrate) at inner margin near apex (as is *M. (M.) panamaensis* Snyder).

Antenna light yellow-brown, 14 segments, pubescent; second segment longer than third which is longer than fourth; from fifth on, segments become longer and broader toward apex; last segment elongate, slender and pointed at tip.

Pronotum white, tinged with yellow, saddle-shaped, slightly emarginate anteriorly and posteriorly, short, sides slope markedly to posterior margin, with long hairs.

Legs white, tinged with yellow, claws brown, elongate, slender, pubescent.

Abdomen dirty-gray-white tinged with yellow, with dense short hairs and row of longer hairs at base each tergite; cerci fairly prominent.

*Measurements*.—

- Length of entire soldier, 4.90 mm.
- Length of head with mandibles, 3.20 mm.
- Length of head to anterior, 1.70 mm.
- Length of left mandible, 1.75 mm.
- Length of pronotum, 0.30 mm.
- Length of hind tibia, 0.80 mm.
- Width of head anteriorly, 0.90 mm.
- Width of head posteriorly, 0.80 mm.
- Width of pronotum, 0.55 mm.

The soldier of *Mirotermes (M.) bolivianus* Snyder has a narrower head and a longer and more pointed frontal process than *M. (M.) panamaensis* Snyder and *hispaniolae* Banks (which is nar-



rower headed than *panamaensis*); *bolivianus* has a longer, narrower head than *nigritus* Silvestri, and a longer and more robust frontal process.

*Type locality*.—Ivon, Bolivia.

Described from a series of soldiers and workers collected at the type locality in March, 1922, by W. M. Mann.

*Type, soldier*.—Cat. No. 27677, U.S.N.M.

#### Subgenus SPINITERMES Wasmann

This subgenus of *Mirotermes* Wasmann is restricted to South America; only four species have as yet been described. Holmgren found one species of *Mirotermes* and two species of *Spinitermes* on the Nordenskiöldi Expedition—all being new. Mann found only one species of *Mirotermes* and but one new and two known species of *Spinitermes* in Bolivia on the Mulford Expedition. Specific characters are found in the remarkable three-pointed frontal process (fig. 2).

#### MIROTERMES (SPINITERMES) BREVICORNUTUS Holmgren

*Soldier* (fig. 2*b*).—Head yellow, paler posteriorly, sides nearly parallel, slightly narrowed anteriorly, central anterior point much larger and more robust than two lateral, small, robust points, forms an acute angle with head, wrinkled and slightly upturned at pointed apex, head with sparse short hairs and scattered long hairs, central and lateral points with dense, long hairs.

Labrum yellow, longer than broad, two lateral points hyaline, elongate, pointed; center not markedly convex, as in *robustus* Snyder, with long hairs.

Gula narrow, more than twice as wide at front as at center.

Mandibles black with reddish tinge, elongate, slender, slightly bowed and incurved at tips.

Antenna white with tinge of yellow, 14 segments, pubescent; third segment shorter than second, approximately the same size as the fourth segment (slightly longer), fifth longer (in the type of *M. (S.) trispinosus* Hagen,<sup>12</sup> the third segment is shorter than the second but longer than the fourth); eleventh to fourteenth slightly shorter and slenderer; last segment slender and pointed at tip.

Pronotum pale yellow, saddle-shaped, anterior very high, anterior margin emarginate, with short and long hairs.

Legs white with tinge of yellow, pubescent.

Abdomen gray with tinge of yellow, with very dense short hairs and two long hairs at base of each tergite, dense long hairs at end abdomen.

<sup>12</sup> Emerson's specimens of *trispinosus* from British Guiana have the fourth segment longer than the second or third segments and narrower head; they probably represent a new species.

*Measurements.*—

- Length of entire soldier (to tip of mandibles) 6.30 mm.  
 Length of entire soldier (to central point), 2.40 mm.  
 Length of head with mandibles, 3.10 mm.  
 Length of head (to tip of central point), 2.35 mm.  
 Length of head without mandibles (to tip of labrum), 2.35–2.40 mm.  
 Length of head without mandibles (to anterior), 2.00 mm.  
 Length of central spine, 0.45 mm.  
 Length of left mandible, 1.70 mm.  
 Length of pronotum, 0.30 mm.  
 Length of hind tibia, 1.00 mm.  
 Width of head (at posterior), 1.25–1.35 mm.  
 Width of pronotum, 0.75 mm.

Lighter colored and with the two lateral points slightly more robust and the central point less robust than in a soldier of *M. (S.) brevicornutus* from Coxipo, Cuyabà; head and central point longer than in *robustus* Snyder; head narrower than that of *trispinosus*

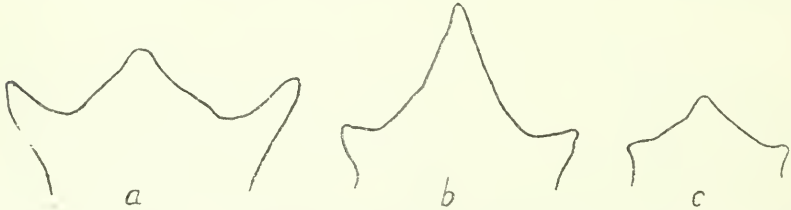


FIG. 2.—CONTRASTING DORSAL VIEWS OF THREE FRONTAL PROCESSES ON HEADS OF SOLDIERS OF THREE AMERICAN SPINITERMES; NOTE THAT THE PROCESSES ARE SLIGHTLY ASYMMETRICAL. *a.* SOLDIER OF MIROTERMES (SPINITERMES) ROBUSTUS SNYDER. (IXIAMAS, BOLIVIA, DECEMBER, 1921.) *b.* SOLDIER OF MIROTERMES (SPINITERMES) BREVICORNUTUS HOLMGREN. (ROSARIO, BOLIVIA, NOVEMBER, 1921.) *c.* SOLDIER OF MIROTERMES (SPINITERMES) TRISPINOSUS HAGEN. (CACHUELA ESPERANZA, BENI RIVER, BOLIVIA, MARCH, 1922.) (FIGS. 3*a*, *b*, AND *c* CAMERA LUCIDA, ALL DRAWN TO THE SAME SCALE)

Hagen (pl. 2, figs. 3 and 6), and head and central point longer (compared with type) (fig. 2*c*); head wider than in *nigrostomus* Holmgren; mandibles larger than in *gracilis* Holmgren—where the anterior middle of the labrum is concave.

Described from two soldiers collected with workers at Rosario, Bolivia, in November, 1921, by W. M. Mann (No. 5). These soldiers may represent a new species which is close to *S. brevicornutus* Holmgren.

## MIROTERMES (SPINITERMES) ROBUSTUS, new species

*Soldier* (fig. 2*a*).—Head yellow-brown, darker anteriorly, robust, narrowed toward anterior margin, three elongate and robust blunt points at anterior margin, the two lateral points are elongate and approach the central point in size as in *M. (S.) trispinosus* Hagen; the central point forms an acute angle with the head; head with sparse short hairs and a few longer hairs, anterior points with dense long hairs.

Labrum yellow-brown, elongate, longer than broad, two lateral points hyaline, elongate, slender, labrum convex in center, with long hairs.

Gula broad in middle, more than half width at front.

Mandibles black, elongate, slender, slightly bowed and incurved at apex, longer than width of head.

Antenna yellow-brown, 14 segments, pubescent; third segment subclavate, shorter than second or fourth, from fifth to ninth longer, toward apex (10–14) segments shorter and narrower, last segment pointed at tip.

Pronotum white with tinge of yellow, saddle-shaped, with a few long and short hairs, emarginate anteriorly (hardly emarginate in *trispinosus* Hagen).

Legs white with tinge of yellow, pubescent.

Abdomen dirty-gray with tinge of yellow, with dense short hairs, longer hairs toward end and on sternites.

*Measurements.*—

Length of entire soldier (to tip of mandibles), probably 6.0(?) mm.  
(5.25 mm. with mandibles closed.)

Length of entire soldier (to tip of central point), 5.2 mm.

Length of head with mandibles, 3.1 mm.

Length of head (to tip of central point), 2.05 mm.

Length of head without mandibles (to tip of labrum), 2.20 mm.

Length of head (to anterior): 1.60 mm.

Length of central spine, 0.40 mm.

Length of left mandible, 1.70 mm.

Length of pronotum, 0.25 mm.

Length of hind tibia, 0.95 mm.

Width of head (at posterior), 1.50 mm.

Width of pronotum, 0.80 mm.

Close to *trispinosus* (compared with type), head wider but shorter than in *trispinosus*, hind tibiae shorter; smaller than *brevicornutus* Holmgren (= *brevicornis* Silvestri), the anterior points more robust, central point forms more of an angle to the head; head wider than in *nigrostomus* Holmgren; head wider and mandibles longer than in *gracilis* Holmgren, where labrum is concave in center.

*Type locality.*—Ixiamas, Bolivia.

Described from two soldiers collected with workers at the type locality in December, 1921, by W. M. Mann; soldiers and workers of *Armitermes* (*Curvitermes*) *odontognathus* Silvestri were collected with these soldiers.

*Type, soldier.*—Cat. No. 27678, U.S.N.M.

The described species of *Spinitermes* collected by Mann on the Mulford expedition is *Mirotermes* (*Spinitermes*) *trispinosus* Hagen found at Cavinás, Bolivia, February, 1922 (soldier with *Corni-*

termes, species); Cachuella<sup>13</sup> Esperanza (Beni River), Bolivia, March, 1922 (soldier with *Cornitermes (Labiotermes) labralis* Holmgren).

Subgenus NEOCAPRITERMES Holmgren

This subgenus of the genus *Capritermes* Wasmann was established by Holmgren in 1912; all the contained species are from America, except one from Africa (namely *N. alienus* Von Rosen).

In *Neocapritermes* the winged adult has the first tooth of the mandibles not larger than the second; antennae with 17 segments; meso- and meta-notum broad posteriorly, radius of fore wing present; the soldier lacks the fontanelle.

In *Capritermes (sensu strictiore)* Wasmann the winged adult has the first tooth of the mandibles larger than the second; antennae 14-15 segments; meso- and meta-nota strongly narrowed posteriorly; radius lacking; the soldier has the fontanelle present.

Eight species of *Neocapritermes* have been previously described from America.

The asymmetrical mandibles are used in flipping themselves away from enemies, or snapping particles of earth! *Mirotermes* Wasmann has the same habit, and this is an effective method of defense against ants, etc. *N. planiceps* Emerson, a remarkable flat-headed species described from British Guiana, has been found in Bolivia by Doctor Mann.

CAPRITERMES (NEOCAPRITERMES) BRAZILIENSIS, new species

*Soldier* (fig. 3c).—Head light yellow-brown, light castaneous-brown anteriorly, distinct longitudinal median line reddish-brown, narrow, sides nearly parallel, slightly convex, head slightly depressed at center; frontal gland white, elongate, sub-oval depression between epicranial suture and longitudinal median line; with short and scattered long hairs. Mandibles black, reddish brown at bases, elongate, twisted asymmetrically and left mandible longer than right. Labrum yellow-brown, trilobed at apex, twisted to follow curving of mandibles.

Antenna dark yellow-brown, 15 segments, pubescent; third segment more deeply colored and wider than adjacent segments, bead-like; second cylindrical, longer than third; fourth subclavate about same length as second; segments 7-12 elongate; last segment elongate, slender and pointed at apex.

Pronotum light yellowish, margins darker, saddle-shaped with long hairs.

<sup>13</sup> With smaller lateral spines or points than in the specimen from Cavinás; may be a new species.



Legs pale yellowish, tibiae darker, elongate, slender, pubescent. Abdomen dirty gray, with tinge of yellow, with dense long yellow-brown hairs.

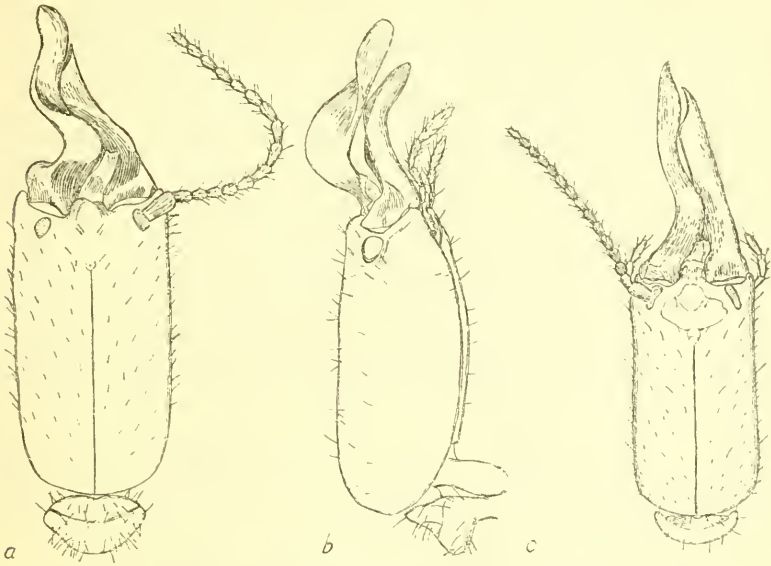


FIG. 3.—CONTRASTING VIEWS OF SOLDIERS OF NEW NEOCAPRITERMES. *a*. DORSAL VIEW OF HEAD AND PRONOTUM OF THE SOLDIER OF CAPRITERMES (NEOCAPRITERMES) HOPKINSI SNYDER SHOWING TWISTED MANDIBLES. *b*. LATERAL VIEW OF HEAD AND PRONOTUM OF THE SOLDIER OF CAPRITERMES (NEOCAPRITERMES) HOPKINSI SNYDER SHOWING TWISTED MANDIBLES. *c*. DORSAL VIEW OF HEAD AND PRONOTUM OF THE SOLDIER OF CAPRITERMES (NEOCAPRITERMES) BRAZILIENSIS SNYDER; NOTE NARROW HEAD AND TWISTED MANDIBLES

#### Measurements.—

- Length of entire soldier, 8.25–8.50 mm.
- Length of head with mandibles, 5.50–5.60 mm.
- Length of head without mandibles (to anterior), 2.85–3.00 mm.
- Length of left mandible, 2.60–2.80 mm.
- Length of pronotum, 0.55 mm.
- Length of hind tibia, 1.35–1.40 mm.
- Width of head, 1.50–1.60 mm.
- Width of pronotum, 0.90–0.95 mm.

*C. (N.) angusticeps* Emerson is larger than *braziliensis* Snyder, has a wider head and a bilobed labrum; *braziliensis* differs from *C. (N.) opacus*, subspecies *parvus* Silvestri in having a longer head and longer mandibles, in pubescence on head, and only has 15 segments to antennae, whereas *parvus* has 16 segments.

*Type locality*.—Rio Mautania, Brazil.

Described from four soldiers collected with workers at the type locality in March, 1922, by W. M. Mann.

*Type, soldier*.—Cat. No. 27634, U.S.N.M.

## CAPRITERMES (NEOCAPRITERMES) HOPKINSI, new species

*Soldier* (figs. 3 a and b).—Head light yellow-brown, with reddish-brown tinge anteriorly, sides head not parallel but head broader anteriorly than posteriorly, pale reddish-brown longitudinal median line ends at frontal gland which is a pale reddish-brown point at the apex of the epicranial suture, head with scattered long hairs, most numerous anteriorly. Mandibles black, relatively short and broad, bowed and bent downward at about middle, asymmetrical, left longer than right. Labrum light yellow-brown, elongate, narrowed toward apex and bilobed—middle of apex concave and sides prolonged into points. The gula is slender at the middle.

Antenna dark yellow-brown, 16 segments, pubescent; third segment shorter than second or fourth segments, third and fourth being bead-like; fifth segment broader and longer than fourth; from sixth segment to twelfth segments become longer and broader and are subclavate; segments thirteenth to sixteenth narrower and shorter; last segment pointed at apex.

Pronotum light yellow, darker at margins, saddle-shaped, markedly emarginate anteriorly and slightly posteriorly, anterior margin not steeply raised up, with long hairs.

Legs with yellowish tinge, elongate, slender, pubescent.

Abdomen dirty gray with tinge of yellow, with reddish-brown, dense, long hairs.

*Measurements.*—

Length of entire soldier, 9.75–10.25 mm.

Length of head with mandibles, 5.5–6.0 mm.

Length of head without mandibles (to anterior), 3.55–3.6 mm.

Length of left mandible, 2.25 mm.

Length of hind tibia, 1.45–1.50 mm.

Length of pronotum, 0.75 mm.

Width of head at anterior (where broadest), 1.90 mm.

Width of head at posterior, 1.65–1.70 mm.

Width of pronotum, 1.10 mm.

*C. hopkinsi* is close to *C. (N.) talpa* Holmgren but differs from the description in larger size, in not having sides of head parallel, relatively longer mandibles, fourth segment of antennae much smaller than second, and emarginate anterior margin of pronotum. Named in honor of Dr. A. D. Hopkins, Forest Entomologist of the Bureau of Entomology since 1902.

*Type locality.*—Ivon, Bolivia.

Described from two soldiers collected with workers at the type locality in February 1922, by W. M. Mann.

*Type, soldier.*—Cat. No. 27675, U.S.N.M.

## CAPRITERMES (NEOCAPRITERMES) PARALLELUS, new species

*Winged, female adult.*—Head fuliginous (dark brown with a little black), longer than broad, rounded posteriorly; epicranial suture depression on frontal slope; with a few scattered long hairs. Fontanelle a black, raised, round spot, larger than an ocellus, center hyaline. Eye blackish, not round, large and projecting, very near lateral margin of head. Ocellus hyaline, elongate, upper rim projecting, separated from eye by a distance greater than the small diameter of an ocellus.

Post-clypeus slightly lighter colored than head, bilobed, projecting. Labrum yellow-brown, tongue-shaped.

Antenna yellow-brown, 17 segments, with long hairs; third segment very small, ringlike, not a third as long as second which is subclavate; fourth slightly longer; from fifth on, segments become longer and broader; last segment elongate, slender, subelliptical.

Pronotum same color as head, slightly raised anteriorly where margin is nearly straight, sides roundedly slope to posterior margin which is emarginate; with dense short and scattered longer hairs.

Wings hyaline, slightly smoky, costal veins yellow-brown, margins ciliate, surface with sculpturing similar to that described for *C. (N.) opacus* Hagen by Silvestri. Fore wing with median nearer to cubitus and branched to apex of wing; cubitus and sub-branches take up most of wing area, does not reach apex, with 9–10 branches to margin of wing. Hind wing with median near cubitus and branched to apex of wing, cubitus takes up less wing area, with 9–12 branches and sub-branches to margin of wing.

Legs yellow-brown, tibiae dark brown, slender, with long hairs.

Abdomen with tergites same color as head, with dense short hairs and longer hairs near base each tergite, cerci prominent.

*Measurements.*—

Length of entire winged adult, 15.50 mm.

Length of entire deilated adult, 9.50–10.00 mm.

Length of head, 1.90 mm.

Length of pronotum, 0.80 mm.

Length of fore wing, 13.00 mm.

Length of hind tibia, 1.80 mm.

Diameter of eye (long diameter), 0.45 mm.

Width of head (at eyes), 1.65–1.75 mm.

Width of pronotum, 1.40–1.45 mm.

Width of anterior wing, 3.50 mm.

*C. (N.) parallelus* Snyder is a smaller species than *C. (N.) opacus* Hagen, has a hyaline fontanelle and larger ocelli which are nearer to the eyes.

*Soldier*.—Head yellow (lighter colored than *opacus*), sides parallel (slightly convex in middle), head slightly narrower anteriorly (narrower head than *opacus*), rounded posteriorly, truncate anteriorly, an orange, median, longitudinal impression extending from posterior margin to frontal gland and base of epicranial suture; with scattered, long hairs. Gula with sides parallel, broader in middle than in *opacus*.

Labrum yellow, elongate, narrow, trilobed at apex, narrowed at base, follows outline of left mandible, long hairs at apex.

Mandibles black, left longer than right, broad even at apex, right slightly pointed at apex beyond curve where it fits into the left mandible, left doubly curved, right nearly straight; mandibles shorter but of same general shape as in *opacus*.

Antenna light yellow-brown, 16 segments, with long hairs; third segment only slightly longer than second (in *opacus* nearly twice as long); fourth segment shorter than third; segments become longer and broader to apex; last segment elongate, narrow, sub-elliptical.

Pronotum white tinged with yellow, saddle-shaped, anterior margin broadly rounded, markedly emarginate, sides roundedly slope to posterior margin which is nearly straight; with dense long hairs.

Legs white, tinged with yellow, elongate slender, pubescent.

Abdomen dirty gray-white, tinged with yellow, with dense long hairs; cerci prominent.

*Measurements*.—

Length of entire soldier, 9.00–10.00 mm.

Length of head with mandibles, 5.50 mm.

Length of head to anterior, 3.00–3.10 mm.

Length of left mandible, 2.50 mm.

Length of pronotum, 0.60 mm.

Length of hind tibia, 1.45 mm.

Width of head posteriorly, 1.80–1.90 mm.

Width of head anteriorly, 1.70 mm.

Width of pronotum, 1.10 mm.

*C. (N.) parallelus* Snyder is a lighter colored, smaller species than *opacus*; there are also differences in antennal segmentation. Compared with specimens of *opacus* determined by F. Silvestri. Silvestri's *opacus*, variety *parvus*, is not described with sufficient detail for purposes of comparison, the soldier is smaller than *parallelus*; *parvus* may be merely a biological variety of *opacus*.

*Type locality*.—Rosario (Lake Rogogua), Bolivia.

Described from a series of winged female and male adults, soldiers and workers, collected at the type locality by W. M. Mann.



*Type, female, winged adult.*—Cat. No. 27676, U.S.N.M.; morphotype, soldier.

This termite was also collected as follows:

CAPRITERMES (NEOCAPRITERMES) PARALLELUS Snyder

Rosario (Lake Rogogua), Bolivia, October, 1921 (soldiers and workers); Rosario, Bolivia, November, 1921 (soldiers and workers); Rosario, Bolivia, November, 1921 (winged adults, soldiers, and workers); Rosario, Bolivia, November, 1921 (soldiers and workers with winged adults of *Anoplotermes (A.) pacificus* Fritz Müller and *rotundus* Snyder in termite hills); Cavinás, Bolivia, February, 1922 (soldiers and workers); Ivon, Bolivia, February, 1922 (soldiers and workers).

CAPRITERMES (NEOCAPRITERMES) VILLOSUS Holmgren

*Soldier.*<sup>14</sup>—Epicranium of head yellow-brown, light castaneous-brown anteriorly and at sides, longitudinal, depressed median line reddish-brown, head broadest posteriorly, narrows towards anterior, frontal gland at end of median line in V-shaped depression (epicranial suture), head with dense, reddish, short hairs, few scattered longer hairs.

Labrum castaneous-brown, broadest at apex, trilobed.

Antenna light castaneous-brown, 16 segments, pubescent; third segment subclavate, longer than second and fourth segments; segments from fifth to eleventh elongate and wide; segments from twelfth to sixteenth shorter and narrower; last segment slender and pointed at apex.

Pronotum light yellowish, margins light castaneous-brown, saddle-shaped, with long hairs on margins, markedly emarginate anteriorly and emarginate posteriorly.

Legs light yellow-brown, elongate, slender, pubescent, claws castaneous-brown.

Abdomen light yellow brown, with dense, long, yellowish hairs.

*Measurements.*—

Length of entire soldier, 16.50–16.75 mm.

Length of head with mandibles, 10.50–10.75 mm.

Length of head without mandibles (to anterior), 5.90 mm.

Length of left mandible, 5.20 mm.

Length of pronotum, 1.00–1.10 mm.

Length of hind tibia, 3.40–3.50 mm.

Width of head, 4.80–4.90 mm.

Width of pronotum (at widest portion), 2.85–2.90 mm.

<sup>14</sup> Description agrees with soldier as figured by N. Holmgren, fig. Qc, p. 558, Zoolog. Jahrbüch, vol. 23, 1905–6, Jena, but these soldiers are larger.

These soldiers are larger than the specimens of *villosus*, collected by Holmgren in Peru, and may be a new species. Doctor Mann collected the two soldiers from which the above description was made with workers at Uniao, Lower Rio Madeira, Brazil, in March, 1922. These specimens are deposited in the collection of the United States National Museum.

Another known species of *Neocapritermes* which was also collected is the very striking, flat-headed *Capritermes* (*Neocapritermes*) *planiceps* Emerson, found at Cavinás, Bolivia, soldiers and workers, February, 1922; Cachucla Esperanza (Beni River), Bolivia, soldiers and workers, March, 1922. This termite was first found in British Guiana.

#### Genus ORTHOGNATHOTERMES Holmgren

Species of the genus *Orthognathotermes* are restricted to America. Only four species have been described, three from South and one from Central America. The elongate mandibles of the soldier are not asymmetrical as in *Capritermes* Wasmann and *Neocapritermes* Holmgren; but are also bowed in the middle (with knees).

#### ORTHOGNATHOTERMES BREVIPILOSUS, new species

*Soldier*.—Head yellow-brown, darker (light castaneous-brown) anteriorly, but lighter posteriorly, widest at middle, sides convex, wider posteriorly than anteriorly, tapers to anterior margin, above upper borders of antennal sockets flattened tubercles. Head with eye spots? back of tubercles not very prominent; with scattered long hairs and numerous (dense) short hairs.

Labrum yellow-brown, broader than long, weakly 3 lobed, central lobe largest, almost conical, with long hairs.

Mandibles black, bases reddish-brown, elongate, bowed in middle, with marginal tooth at the bend; strongly incurved at the tips.

Antenna yellow-brown, 15 segments, pubescent; second segment shorter than fourth; third segment shorter than second or fourth; from fourth segment on segments become longer and broader; toward apex, however, segments become shorter and narrower.

Pronotum yellowish, saddle-shaped, anteriorly emarginate, with dense long hairs.

Legs yellowish, claws brown, legs elongate, pubescent.

Abdomen dirty gray-white with tinge of yellow, with dense long hairs.

#### *Measurements*.—

Length of entire soldier, 8.50–8.75 mm.

Length of head with mandibles, 5.0–5.75 mm.

Length of head without mandibles (to tip of labrum), 3.3–3.5 mm.

Length of head without mandibles (to anterior), 3.05 mm.

*Measurements—Continued.*

- Length of left mandible, 2.65–2.80 mm.
- Length of pronotum, 0.35–0.40 mm.
- Length of hind tibia, 1.55 mm.
- Width of head (at widest portion), 2.2–2.3 mm.
- Width of pronotum, 1.40 mm.

*O. brevipilosus* Snyder is near *O. macrocephalus* Holmgren but is larger, has dense short hairs on the head, and the sides of the head are convex; *brevipilosus* has a shorter, narrower head than *orthognathus* Silvestri, with narrower mandibles and tubercles, as well as dense short hairs (lacking in *orthognathus*); *brevipilosus* is larger and has a broader, more hairy head than *wheeleri* Snyder; *brevipilosus* is larger than *globicephalus* Silvestri.

*Type locality.*—Rosario, Bolivia.

Described from a series of soldiers collected at the type locality, with workers in November, 1921, by W. M. Mann.

*Type, soldier.*—Cat. No. 27674, U.S.N.M.

Another species of this genus collected is *Orthognathotermes macrocephalus* Holmgren, found at Rosario, Bolivia; soldier in termite hills.

#### Genus MICROCEROTERMES Silvestri

The genus *Eutermes* was founded in 1849 by Heer for several fossil winged termites; one of these species, *E. debilis*, according to Hagen, was from gum copal. Hagen examined the type and identified it with a living species from Porto Rico. N. Banks (1920) examined one of Hagen's specimens from Porto Rico and states that it is a *Microcerotermes* allied to *M. strunckii* Sörensen. Banks selected *E. debilis* Heer as type of *Eutermes* Heer. *Eutermes* Heer would then replace *Microcerotermes*.

However, I agree with C. Fuller (1924) that there is considerable doubt as to the ability of Hagen to determine that dried specimens are the same specifically as the fossil specimen. Species of *Microcerotermes* are difficult enough to determine where fresh material is available. Hence, I am referring species to the genus *Microcerotermes* Silvestri, which formerly I placed in the genus *Eutermes* Heer. Instead of using the name *debilis* Heer for living species, I am referring certain American specimens to *arboreus* Emerson and until the identity of *debilis* Heer can be established, ignoring this species and discarding *Eutermes*.

The winged adults of species of *Microcerotermes* have the head more or less elongate, with oval parallel sides; the eyes are relatively small and set parallel to the sides of the head; the ocelli are small and are more or less distant from the eyes. The fontanelle is often indistinct. The antennæ have 14–15 segments and the third segment is shorter than the second.

The pronotum is relatively small, much narrower than the head. The wing membrane is plainly hairy and the cubital vein runs out somewhat before the tip.

The soldiers have the mandibles set well in from the lateral margins of the head and the inner margins of the mandibles are denticulate.

The genus is well distributed throughout the world and contains numerous species.

Only one species, namely [*E.*] *M. arboreus* Emerson, was found on the Mulford Expedition; *bouvieri* Desneux, *exiguus* Hagen, and *strunckii* Sörensen are other American species. The localities where this termite was collected are:

[EUTERMES] MICROCEROTERMES ARBOREUS Emerson

Cachuela Esperanza (Beni River), Bolivia, March, 1922 (queen, soldiers and workers); Rosario, Bolivia, November, 1921 (soldiers and workers with *Nasutitermes* (*N.*) *aurantiacus* Holmgren (queen, soldiers and workers in tree nest); Rurrenabaque, Bolivia, October, 1921 (queen, soldiers and workers—3 series); Rurrenabaque, Bolivia (No. 5, winged adults, queen, soldiers and workers); San Gregorio, Beni, Bolivia, October, 1921 (queen, soldiers and workers); St. Helena, Bolivia (soldiers and workers).

LIST OF KNOWN AND NEW SPECIES OF TERMITES COLLECTED BY THE MULFORD EXPEDITION TO BRAZIL AND BOLIVIA, 1921-1922

BRAZIL

KALOTERMITIDAE (0)

RHINOTERMITIDAE (1)

Described species	Number
<i>Rhinotermes taurus</i> Desneux----- (= <i>nasutus</i> Perty)	1

TERMITIDAE (4)

	New species	Number
<i>Cornitermes</i> ( <i>C.</i> ) <i>similis</i> Hagen--		1
<i>Nasutitermes</i> ( <i>N.</i> ) <i>macrocephalus</i> Silvestri-----		1
<i>Capritermes</i> ( <i>Nocapritermes</i> ) <i>vil-</i> <i>losus</i> Holmgren-----		2
	<i>Capritermes</i> ( <i>Neocapritermes</i> ) <i>braziliensis</i> , new species-----	1
Total-----	Total-----	5
Total-----	Grand total-----	5

BOLIVIA

KALOTERMITIDAE (2)

	New species	Number
<i>Kalotermes</i> ( <i>Neotermes</i> ) <i>magnoculus</i> , new species-----		1
<i>Kalotermes</i> ( <i>Neotermes</i> ) <i>manni</i> , new species-----		1
		2



## BOLIVIA—Continued

## RHINOTERMITIDAE (6)

Described species	Number
<i>Leucotermes tenuis</i> Hagen-----	
<i>Coptotermes marabitanus</i> Hagen--	
<i>Rhinotermes marginalis</i> Linnaeus--	<i>Rhinotermes latilabrum</i> , new species-----
<i>Rhinotermes taurus</i> Desneux-----	<i>Rhinotermes manni</i> , new species--
4	2

## TERMITIDAE (67)

<i>Syntermes braziliensis</i> Holmgren	
<i>Syntermes chaquamayensis</i> Holmgren	
<i>Cornitermes (C.) cumalans</i> Kollar	<i>Cornitermes (C.) bolivianus</i> , new species
<i>Cornitermes (C.) lespesi</i> Fritz Müller	
<i>Cornitermes (C.) similis</i> Hagen	
<i>Cornitermes (C.) striatus</i> Hagen	
<i>Cornitermes (Labiotermes) labralis</i> Holmgren	
<i>Armitermes (A.) albidus</i> Hagen.	<i>Armitermes (A.) benjamini</i> , new species.
<i>Armitermes (A.) cuamignathus</i> Silvestri.	<i>Armitermes (A.) holmgreni</i> , new species.
<i>Armitermes (A.) festivellus</i> Silvestri.	<i>Armitermes (A.) manni</i> , new species.
<i>Armitermes (A.) tcevani</i> Emerson.	
<i>Armitermes (Curvitermes) odontognathus</i> Silvestri.	
<i>Armitermes (Rhynchotermes) nasutisimus</i> Silvestri.	
<i>Nasutitermes (Nasutitermes) aurantiacus</i> Holmgren.	<i>Nasutitermes (Nasutitermes) aduncus</i> , new species.
<i>Nasutitermes (Nasutitermes) brazilensis</i> Holmgren.	<i>Nasutitermes (Nasutitermes) crassus</i> , new species.
<i>Yasutitermes (Nasutitermes) chaquimayensis</i> Holmgren.	<i>Nasutitermes (Nasutitermes) pilosus</i> , new species.
<i>Nasutitermes (Nasutitermes) cornigera</i> Motschulsky.	
<i>Nasutitermes (Nasutitermes) ephratae</i> Holmgren.	
<i>Nasutitermes (Nasutitermes) macrocephalus</i> Silvestri.	
<i>Nasutitermes (Nasutitermes) major</i> Holmgren.	
<i>Nasutitermes (Nasutitermes) maximus</i> Holmgren.	
<i>Nasutitermes (Nasutitermes) minimus</i> Holmgren.	
<i>Nasutitermes (Nasutitermes) minor</i> Holmgren.	
<i>Nasutitermes (Nasutitermes) rotundatus</i> Holmgren.	
<i>Nasutitermes (Nasutitermes) surinamensis</i> Holmgren.	
	<i>Nasutitermes (Subulitermes) angusticeps</i> , new species.
	<i>Nasutitermes (Convexitermes) pallidus</i> , new species.

## BOLIVIA—Continued

## TERMITIDAE (67)—continued

- Nasutitermes (Diversitermes) castaniceps* Holmgren.  
*Nasutitermes (Diversitermes) diversimiles* Silvestri.
- Nasutitermes (Constrictitermes) cavi-  
frons* Holmgren.  
*Anoplotermes (Anoplotermes) nigro-  
punctatus* Emerson.  
*Anoplotermes (Anoplotermes) paci-  
ficus* Fritz Müller.
- Anoplotermes (Speculitermes)*, species.
- Mirotermes (Spinitermes) brevicornu-  
tus* Holmgren.  
*Mirotermes (Spinitermes) trispinosus*  
Hagen.  
*Capritermes (Neocapritermes) plani-  
ceps* Emerson.
- Orthognathotermes macrocephalus*  
Holmgren.  
*Microcerotermes arboreus* Emerson.
- Nasutitermes (Convexitermes) pulli-  
ceps*, new species.  
*Nasutitermes (Diversitermes) melano-  
cephalus*, new species.  
*Nasutitermes (Velocitermes) uni-  
formis*, new species.  
*Nasutitermes (Agnathotermes) glaber*,  
new species.  
*Nasutitermes (Tenulrostritermes) lai-  
icephalus*, new species.
- Anoplotermes (Anoplotermes) bolivi-  
anus*, new species.  
*Anoplotermes (Anoplotermes) clypea-  
tus*, new species.  
*Anoplotermes (Anoplotermes) distans*,  
new species.  
*Anoplotermes (Anoplotermes) distinc-  
tus*, new species.  
*Anoplotermes (Anoplotermes) grandif-  
ons*, new species.  
*Anoplotermes (Anoplotermes) how-  
ardi*, new species.  
*Anoplotermes (Anoplotermes) indis-  
tinctus*, new species.  
*Anoplotermes (Anoplotermes) line-  
aris*, new species.  
*Anoplotermes (Anoplotermes) proxi-  
mus*, new species.  
*Anoplotermes (Anoplotermes) punc-  
tatus*, new species.  
*Anoplotermes (Anoplotermes) rotun-  
dus*, new species.
- Cylindrotermes brevipilosus*, new  
species.  
*Mirotermes (M.) bolivianus*, new  
species.  
*Mirotermes (Spinitermes) robustus*,  
new species.
- Capritermes (Neocapritermes) hop-  
kinsi*, new species.  
*Capritermes (Neocapritermes) paral-  
lelus*, new species.  
*Orthognathotermes brevipilosus*, new  
species.

## BOLIVIA—Continued

## TERMITIDAE (67)—continued

	Described species	New species	Total
	Number	Number	
Total			
Kalotermitidae.....	0	2	2
Rhinotermitidae.....	4	2	6
Termitidae.....	36	31	67
Grand total Bolivia.....	40	35	75
Grand total Bolivia and Brazil.....	41	36	77

EXPLANATION OF PLATES <sup>15</sup>

## PLATE 1

Contrasting views of soldiers of striking American *Rhinotermes* and of soldiers of a new *Cornitermes* and *Cylindrotermes*.

- FIG. 1. Dorsal view of head and pronotum of major soldiers of *Rhinotermes longidens* Snyder to show elongate labrum and marginal teeth of mandibles.
2. Dorsal view of head and pronotum of minor soldier of *Rhinotermes manni* Snyder to show shape of head, labrum, and mandibles.
3. Dorsal view of head of winged adult of *Anoplotermes* (*Anoplotermes grandifons* Snyder to show large fontanelle (slightly on a bias). (Camera lucida.)
4. Dorsal view of mandibles of soldier of *Cornitermes* (*Cornitermes bolivianus* Snyder to show lack of prominent marginal teeth. (Camera lucida.)
5. Dorsal view of head and pronotum of major soldier of *Rhinotermes manni* Snyder to show normal short labrum and marginal teeth of mandibles.
6. Dorsal view of head and pronotum of major soldier of *Rhinotermes latilabrum* Snyder to show elongate, broader labrum and marginal teeth of mandibles. (Note that large marginal tooth of right mandible is broken.)
7. Dorsal view of head and pronotum of the soldier of *Cylindrotermes brevipilosus* Snyder showing short pubescence and mandibles.
8. Dorsal view of head and pronotum of major soldier of *Rhinotermes longilabius* Emerson to show elongate labrum and marginal teeth of mandibles.
9. Dorsal view of head and pronotum of minor soldier of *Rhinotermes latilabrum* Snyder to show elongate, broad labrum and elongate mandibles.
10. Dorsal view of head and pronotum of minor soldier of *Rhinotermes longidens* Snyder to show extended slender labrum and absence of mandibles.

<sup>15</sup> All the free-hand drawings were made by Miss E. T. Armstrong, while the camera lucida sketches were made by the author.

## PLATE 2.

A new *Nasutitermes*, contrasting views of soldiers of *Syntermes* and the soldier of a *Spinitermes*.

- FIG. 1. Dorsal view of soldier of *Nasutitermes* (*Nasutitermes*) *aduncus* Snyder to show shape of head and nasus; note head is slightly asymmetrical. (Camera lucida.)
2. Lateral view of soldier of *Nasutitermes* (*Nasutitermes*) *aduncus* Snyder to show shape of head and large, robust, aquiline nasus. (Camera lucida, same scale as dorsal view.)
  3. *Mirotermes* (*Spinitermes*) *trispinosus* Hagen. Soldier. Dorsal view of head and pronotum to show mandibles and three anterior processes. (Specimen collected at Cachuela Esperanza, Beni River, Bolivia, in March, 1922.)
  4. Dorsal view of head and pronotum of *Syntermes* *chaquamayensis* Holmgren to show marginal teeth of mandibles and spines on thorax.
  5. Dorsal view of head and pronotum of *Syntermes* *molestus* Burmeister to show mandibles without prominent marginal teeth and lacking prominent spines on thorax. (View of left mandible inset.)
  6. *Mirotermes* (*Spinitermes*) *trispinosus* Hagen. Soldier. Lateral view of head and pronotum to show mandibles and three anterior processes. (Specimen collected at Cachuela Esperanza, Beni River, Bolivia, in March, 1922.)
  7. Dorsal view of head and pronotum of *Syntermes* *snyderi* Emerson to show marginal teeth of mandibles and spines on thorax.
  8. Dorsal view of head and pronotum of *Syntermes* *peruanus* Holmgren to show marginal teeth of mandibles and spines on thorax.
  9. Dorsal view of head and pronotum of *Syntermes* *braziliensis* Holmgren to show mandibles without prominent marginal teeth and lacking prominent spines on thorax.

## PLATE 3.

Soldiers of three subgenera of *Nasutitermes* Banks

*Nasutitermes* (*Diversitermes*) *melanoccephalus* Snyder

- FIG. 1. Soldier (major) dorsal view of head and pronotum.
2. Soldier (major) lateral view of head and pronotum.
  3. Soldier (intermediate) dorsal view of head and pronotum.
  4. Soldier (intermediate) lateral view of head and pronotum.
  5. Soldier (minor) dorsal view of head and pronotum.
  6. Soldier (minor) lateral view of head and pronotum.

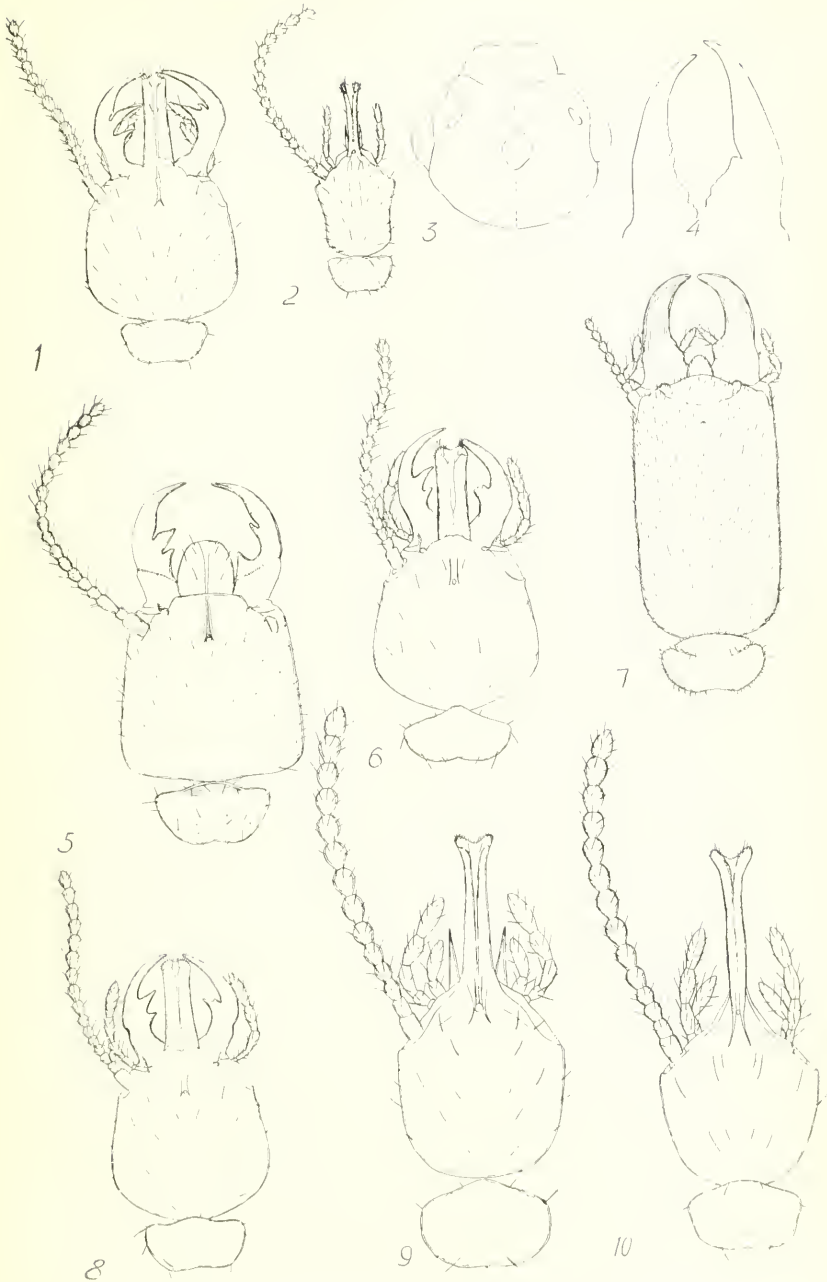
*Nasutitermes* (*Tenuirostritermes*) *laticeps* Snyder

- FIG. 7. Soldier dorsal view of head and pronotum.
8. Soldier lateral view of head and pronotum.

*Nasutitermes* (*Vlocitermes*) *uniformis* Snyder.

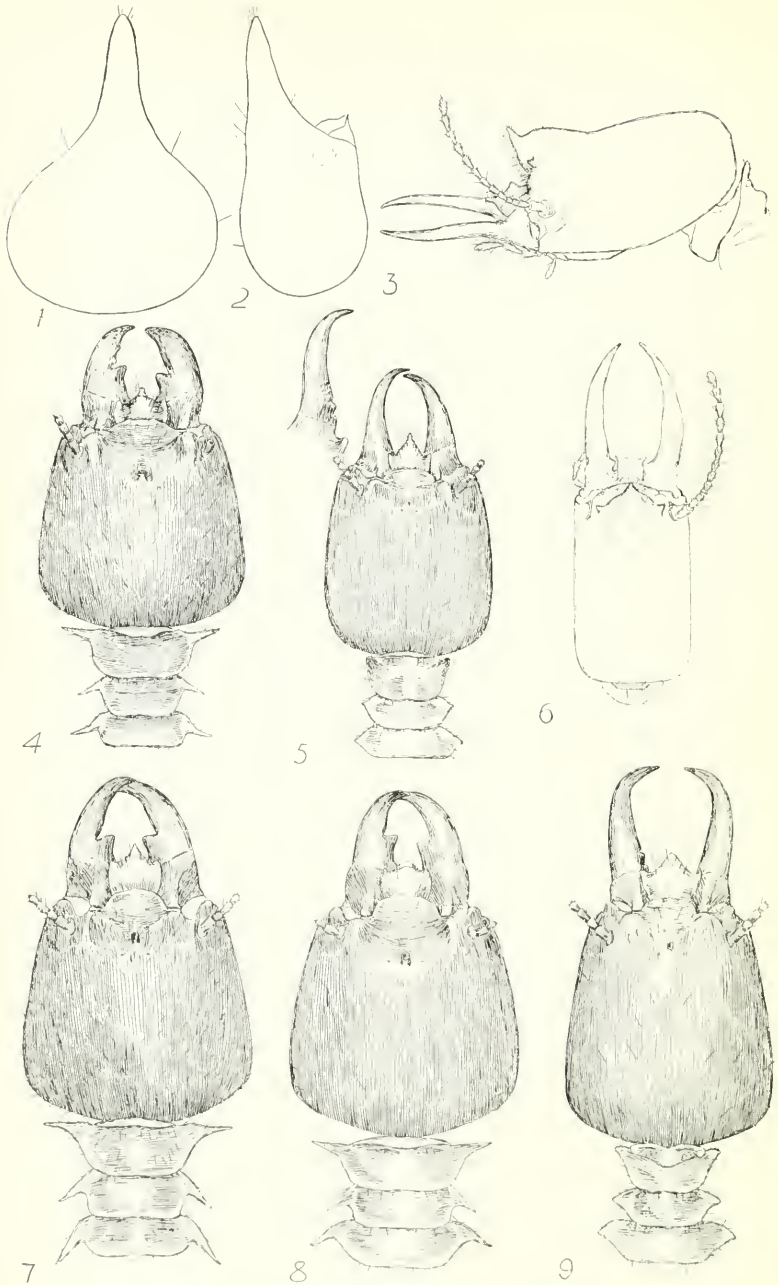
- FIG. 9. Soldier (major) dorsal view of head and pronotum.
10. Soldier (major) lateral view of head and pronotum.
  11. Soldier (minor) dorsal view of head and pronotum.
  12. Soldier (minor) lateral view of head and pronotum.





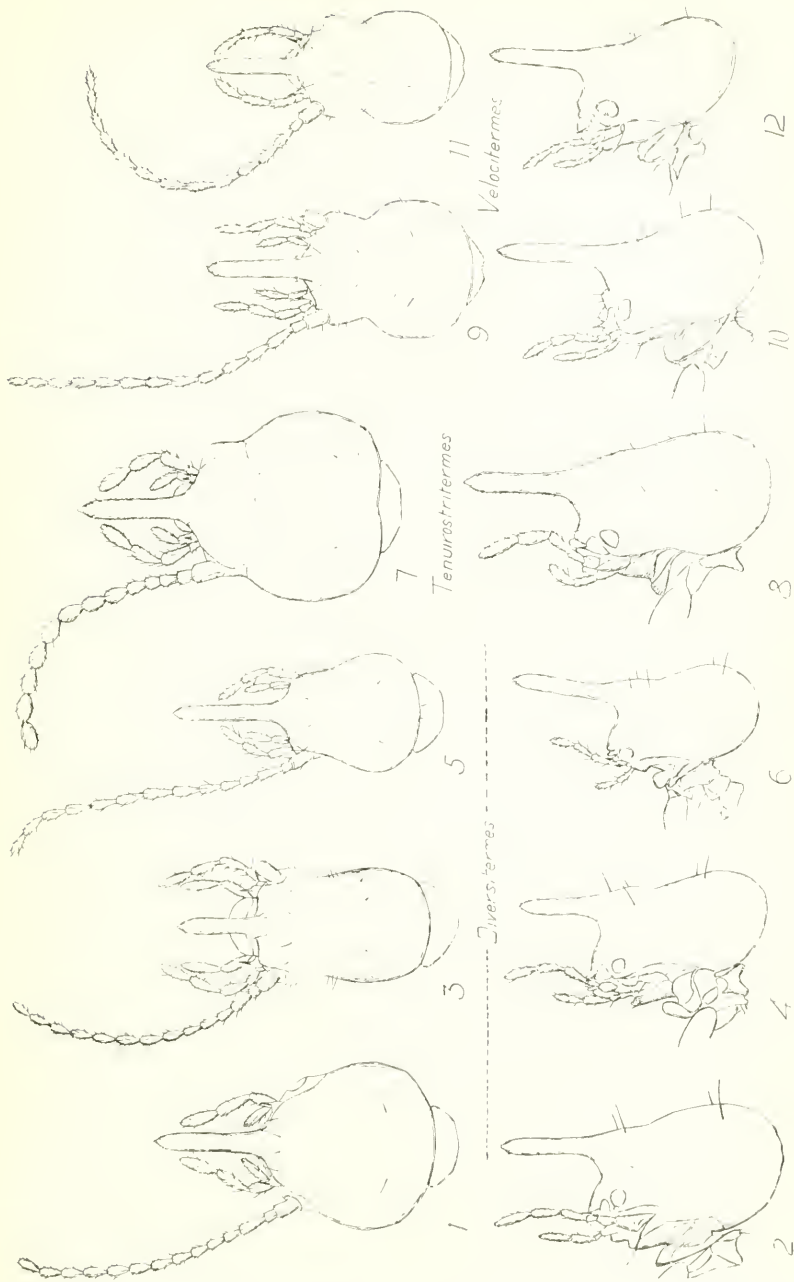
SOLDIERS OF RHINOTERMES, CORNITERMES, AND CYLINDROTERMES

FOR EXPLANATION OF PLATE SEE PAGE 75



SOLDIERS OF NASUTITERMES, SYNTERMES, AND SPINITERMES

FOR EXPLANATION OF PLATE SEE PAGE 76



SOLDIERS OF NEW DIVERSITERMES, TENUIROSTRITERMES, AND VELOCITERMES

FOR EXPLANATION OF PLATE SEE PAGE 76

