

THE NEOTROPICAL GENUS
SYNTERMES (ISOPTERA:
TERMITIDAE)

ALFRED E. EMERSON

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INTRODUCTION

THE GENUS *Syntermes* includes a number of large species of termites confined to the South American continent and generally recognized as the most primitive group of the subfamily Nasutitermitinae of the family Termitidae. In spite of the large size, which has attracted the general collector, the subterranean habitat and the tendency of the workers and soldiers to retire under ground when disturbed have resulted in meager collections. This study attempts to bring the taxonomy of the genus up to date and to stimulate further collecting and ecological investigations.

ACKNOWLEDGMENTS

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GENERAL ECOLOGY

Syntermes is confined to the tropical savannas and rain forests of South America (fig. 1). Although this genus or its immediate

generic ancestor must have been in existence before the Cretaceous dispersal of the derived genera *Nasutitermes* and *Subulitermes*, it seems likely that biotic barriers prevented extension of its range. It is also noteworthy that the Pliocene invasion of *Cornitermes* and *Armitermes* into Central America was not accompanied by *Syntermes*.

The species of the genus usually have their nests entirely under the ground, but sometimes they make mounds above the ground. The mounds of *S. snyderi* found at Kartabo, British Guiana, were composed of excavated dirt brought to the surface by the workers and, aside from the openings, did not contain galleries (Emerson, 1938, p. 258). In one case the surface mound of loose dirt was $2\frac{1}{2}$ feet high, $3\frac{1}{2}$ feet long, and 2 feet wide. One large opening was located near the top of the mound. The chambers extended below the surface of the ground about 4 feet and covered an area with a diameter of about 12 feet. The galleries were large and seemed to be simple excavations in the sandy clay soil, although there were small lumps lining the galleries in places which might have been excretions of the termites. In another case the nest was underneath a large Mora tree. The termites had deposited the dirt between the buttressed roots of the tree so that the mound sloped down from the base of the roots and stood 3 feet from the ground level in places. Holes were found at the top of each slope next to the trunk of the tree.

No nests of *S. termitus* were found at Kartabo. Digging $1\frac{1}{2}$ feet below entrance holes on the ground surface failed to disclose nesting galleries. Soldiers and workers were collected from an open trail near small mounds with openings at the top which were probably connected with the underground nest. At another time I saw *S. termitus* soldiers and workers emerge from a hole under leaf debris near the roots of a large dead stump. On one occasion *S. termitus* workers and soldiers were found in a short open trail under leaves on the forest floor at Kartabo, and a queen of fair size was found under a leaf with a few small nymphs, some carried by workers. When disturbed, the workers and a soldier tapped their

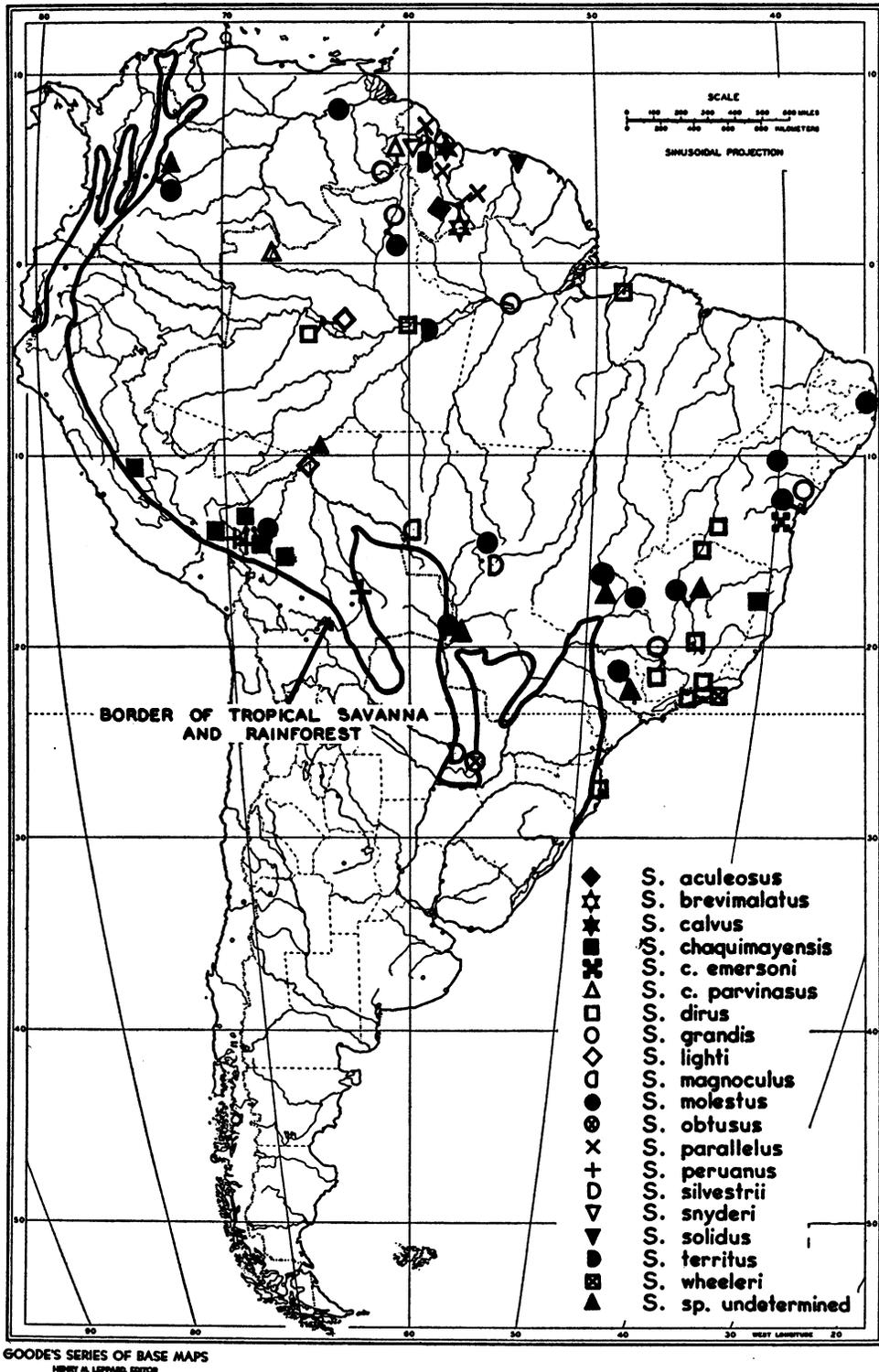


FIG. 1. Distribution of the species of the genus *Syntermes* showing the approximate border of the tropical savanna and rain forest combined. *S. wheeleri* from São Paulo (23°44' S., 46°38' W.), São Paulo, Brazil, was recorded after the map was prepared.

heads rapidly on the dried leaves, making a distinct noise. The soldier tapping was somewhat slower than that of the workers. Gradually all disappeared inside a decayed log of about 4 or 5 inches diameter which was then brought back to the laboratory. The king was later found inside this log. Near the region where I found these termites I had seen a number of workers earlier coming from a hole in the ground. No mound was seen, and it is difficult to understand what the reproductives were doing above the ground. Direct sunlight used when we took moving pictures of the termites killed all of the castes very quickly. Ants of three species were found preying upon the workers in the open trail and were later determined by Dr. W. M. Wheeler as *Neoponera apicalis* Latreille, *Ectatomma quadridens* Fabricius, and *Pheidole biconstricta* Mayr.

Dr. N. A. Weber's field notes concerning the collection of *S. aculeosus* and *S. brevimalatus* from 02°42' N., on the Oronoque River in British Guiana, state: "Nesting in clay at base of tree. Openings one centimeter in diameter leading directly down for a few centimeters to horizontal galleries in top ten to thirty centimeters of soil." These species were found together in the same vial, but the description of the nest probably refers to that of *S. brevimalatus* because more specimens of this species were in the vial.

Dr. Charles Seevers sent me the following field notes: "A large colony of *Syntermes molestus* was located beneath a log in an open field near Villavicencio, Colombia. The physogastric queen and the king occupied a cell on the surface of the ground. When the log was removed, the soldiers very quickly aligned themselves in defensive positions with their heads directed outwards. The workers began retiring into the subterranean galleries, taking with them the immature forms. The king and queen also withdrew very slowly into these galleries but were captured before retirement had been completed. The soldiers, which had been drawn up in close rank around and throughout the colony, completed the withdrawal of the colony after a time."

Dr. J. C. Bradley of Cornell University reports a large mound of *S. chaquimayensis* from the Putamayo region of Peru with a

colony of stingless bees of the genus *Trigona* established in the mound.

All the species of *Syntermes*, as far as is known, collect portions of leaves which they cut out of the dead leaves or pieces of grass and store them in their nests. In the case of *S. snyderi*, I found circular leaf pieces about 1 centimeter in diameter stored in chambers in their nest. I once saw a worker of *S. territus* emerge from a hole in the ground, pick up a fragment of a dead leaf about one-half inch long and return to the hole with the leaf piece held vertically in its mandibles. Bequaert (1925, p. 294) records the leaf-collecting activities of *S. grandis* and *S. molestus* (*S. brasiliensis* synonymous). Silvestri (1903) states that it is his belief that the leaf fragments are used for growing fungus upon which the termites feed. He observed fungus growing on pieces of grass stored by *S. molestus*. During my observations at Kartabo, however, I never saw any sign of fungus-growing behavior by these termites even though I dug some distance into their nests. Fungus gardens of the type found among all species of the Macrotermitinae have never been observed in *Syntermes* nests nor associated with any other South American termite. I am inclined to believe that the fungus growing on the stored grass noted by Silvestri was accidental. The hypothesis that *Syntermes* is not a wood eater but is largely confined to grass and leaves for food conforms to known observations. This enables the genus to live in both rain forests and treeless savannas (fig. 1).

The workers show a distinct dimorphism in every species of the genus I have examined. One type of worker has a large yellowish head, and the other has a distinctly smaller, lighter head. Silvestri (1903) states that the small form stays inside the nest and is adapted for functions in the nests. Both forms of workers, however, were found in the open trails of *S. territus* in the day time at Kartabo. The smaller worker may possibly be an earlier instar of the worker caste.

The soldiers of *Syntermes* have very strong mandibles with which they are able to draw blood by cutting through the skin of the hand. In addition to this means of defense, the frontal gland of the soldiers is probably able to emit a defensive fluid and is the most

primitive in the phylogenetic series which ends in the nasute soldiers with degenerate mandibles. The soldier of *S. snyderi* had a distinctive odor when placed in a closed vial for a time. I was unable to witness much defensive action during normal predation, however. Ponerine ants were able to sting the soldiers so effectively that they could offer no resistance. I also failed to observe any defensive effect of the thoracic spines of the soldiers and workers.

Wheeler (1936) has published a rather extended account of the taxonomy and ecology of the ant *Termitopone* (*Syntermitopone*) *commutata* (Roger), including my field observations taken in the rain forest of British Guiana. This interesting ponerine ant seems to be a termite raider specializing on the species of *Syntermes*. I have witnessed these ants attacking colonies or transporting workers and soldiers of *S. territus*, *S. snyderi*, and *S. calvus* at Kartabo, British Guiana. Dr. W. T. M. Forbes collected this ant carrying a worker of *S. chaquimayensis* at El Campamento, Perene, Peru. Bequaert (1925, 1926) observed raids on *S. grandis* and *S. molestus* (*S. brasiliensis* is considered a synonym) on the savanna of Vista Alegre, Rio Branco, Brazil. Dr. A. Roman observed *T. commutata* transporting workers and soldiers of *S. territus* at Cururuzinho, Rio Autaz, Amazonas, Brazil, on October 22, 1914. Wheeler (1936) lists records of 25 colony raids involving many hundreds of individuals attacking various species of *Syntermes*. The geographical distribution of *T. commutata* coincides quite well with the known distribution of *Syntermes*. It seems reasonable to suppose that further observations will verify the predatory relationship of this species of ant and this genus of termites.

While excavating a nest of *Syntermes snyderi* at Kartabo, I picked up specimens of the ant *Carebara winifredae* Wheeler, which Wheeler later (1922, p. 4) named after my wife, Winifred Jelliffe Emerson. Wheeler

(1936, pp. 176–177, 197–202) discussed the distribution and relationships of the species of *Carebara* which are found in the Indo-Malayan, Ethiopian, and Neotropical regions in the nests of *Acanthotermes*, *Macrotermes*, *Odontotermes*, and *Syntermes*. His record of *S. dirus* in British Guiana (p. 176) is in reality *S. snyderi*. Wheeler classifies the relations of *Carebara* to their host termites under the term "termitolesty." The relationships of *Syntermes* to these genera of the Macrotermitinae are discussed later. Here we find a correlation between taxonomic, ecological, and zoogeographical data, although more information concerning the ecological relationship between *Carebara* and its hosts needs to be gathered before we become convinced of a reciprocal evolution.

SeEVERS (1941) described a genus and species of phorid flies, *Syntermophora microphthalma*, from the nests of *Syntermes molestus* at Villavicencio, Colombia. He also described a new species, *Cryptophora colombiae*, from nests of *S. molestus*. The genotype species of *Cryptophora*, *C. coeca* Borgmeier, was collected from a marching colony of *Syntermes* sp. at Santa Cruz, Goyaz, Brazil. These two genera of flies have been found only with *Syntermes*, but the data are too meager for a reciprocal evolution to be assumed.

Borgmeier (1930) has described a histerid beetle, *Scapolister sternalis*, from the nest of *Syntermes molestus* (*brasiliensis* synonymous) from Campinas, Goyaz, Brazil. Reichen-sperger (1936) described another histerid, *Cossyphodister schwarzmaieri*, from the nest of *Syntermes* sp. from Santa Cruz, Goyaz, Brazil.

Wasmann (1894) described the acanthocerid beetle *Acanthocerus termiticola* from the nest of *Syntermes dirus* from Rio de Janeiro, Brazil. This genus of beetles has been found in other termite nests (*Constrictotermes cavi-frons* at Kartabo, British Guiana), and also from habitats dissociated from termites.

SYSTEMATIC DESCRIPTION

EARLIER AUTHORS, including Hagen (1858a, pp. 107, 108; 1858b, p. 16; 1862, p. 59), Silvestri (1903, p. 47), and Holmgren (1906, p. 544), included species of the genus under the generic name *Termes*. In the post-Linnaean century, *Termes* was virtually synonymous with our present concept of the order Isoptera. Starting with Hagen (1853, 1858a) the old genus *Termes* was subdivided, and gradually the modern generic groups were recognized and named mainly in the works of Wasmann, Silvestri, and Holmgren. The generic concept of the genus *Syntermes* has not been changed since 1910 when it was named by Holmgren (1910, p. 285) with *S. dirus* as the generitype species. Further descriptions and the addition of new species and castes have only substantiated and clarified the concept. The genus would seem to be a natural group of related species, and no necessity has arisen for subdividing it into two or more genera or even into subgenera.

Because the nomenclatural system in taxonomy seems to give an impression of finality to many non-taxonomists, it seems wise to point out from time to time that, as in other sciences, the nomenclature is no better than the correlations of the gathered data it symbolizes and that it changes as new knowledge is gained, particularly if the tentative concepts are based upon meager information. The taxonomy of the genus *Syntermes* has by no means been completed. It was in a comparatively unsatisfactory condition prior to the new studies contained in this paper, and no more can be said than that a little more progress has been made toward the definition of the various species, their geographic distribution, and phases of their ecological relationships. I maintain, however, that this little progress has scientific value and is necessary for the more accurate elucidation of certain broad generalizations of interest to biologists who may never be called upon to determine a species of the genus or who may never see a living specimen in its natural habitat.

There has been some question in the minds of various biologists concerning the reality of the higher taxonomic categories. Kinsey (1936, p. 5) states: "All of the higher cate-

gories are artificial conventions useful for cataloging biologic data, but hardly real either in manner of origin or in their intrinsic qualities. The evolutionary pattern is not that of a 'tree of life' in which the main branches represent ancestral stocks which disappeared as they gave rise by radiate evolution to the species at the ends of the tree. . . . Higher categories are not necessarily groups of similar units (e.g. genera are not groups of similar species), and higher categories are not groups of units with a common origin."

In the following diagnosis of the genus *Syntermes*, I have conformed to the conventional taxonomic tradition of describing the characters which are common to the various species which I and others have included within this genus. These characters are considered homologous, by which we mean that they not only have similar visible patterns but also exhibit in common subtle and complex growth activities during their ontogenetic development—developmental processes which were initiated and influenced by a set of genetic factors or genes highly similar in the various species due to their evolution from a common ancestry. This brief summary of the basic assumptions of taxonomic homology rests upon extensive researches in the fields of genetics, embryology, and physiology which are applicable to this particular case of the genus *Syntermes*, not because of special knowledge of the genetics and physiological development of these termites, but because of the correlation of the data with similar information on organisms more thoroughly studied by geneticists and embryologists. If these basic assumptions are valid, one would expect other types of evidence to point toward the same general conclusions concerning homology. Geographical distribution (fig. 1), ecology, and behavior should be related to phylogeny. The ecological relationships of species of *Syntermes* to the ant *Termitopone* (*Syntermitopone*) *commutata* (Roger), described in the preceding pages, may be cited as an example. Such observations tend to substantiate the objectivity of taxonomic categories. If the genus *Syntermes*

is an "artificial convention useful for cataloguing biologic data, but hardly real either in manner of origin or in intrinsic qualities," *Termitopone commutata* must have extra-sensory perception in reading the minds of termite taxonomists.

Whether the species of this group might be classified further into subgenera or genera, or whether they might be incorporated into a larger genus including the species now assigned to *Cornitermes* depends upon comparative patterns of homologies and the gaps due to extinction. To a certain extent these divisions are arbitrary, and Kinsey is right in emphasizing a degree of subjectivity, but the data still point to the objective reality of genetic and phylogenetic relationships, the symbol of which is the genus or other higher category. It should also be mentioned that the evolution of generic groups and higher taxonomic categories gives us an understanding of the long-term action of evolutionary factors which are valuable in the analysis of the dynamics of evolution, even though speciation still remains the key study of phylogeny.

The arrangement of the species is based upon morphological similarities. Theoretically one should be able to construct a phylogenetic tree of the species within the genus, but in this case the data are not adequate, and such evolutionary associations are merely suggested in the linear order which, however, does not symbolize the multidimensional relationships.

The specific distinctions of the imagoes are more difficult to discover than those of the soldiers, a fact in harmony with the generalization that the imago is a more conservative caste than the soldier. Conversely, the imago may be very useful for the diagnosis of higher taxonomic categories. The result, however, is that the key to the species of imagoes is much less satisfactory for determinations than the key to the soldiers, and it is expected that the discovery of the imagoes of species now described only from soldiers will overlap with some of the specific characters used at present and that larger series will probably show overlaps that are not now included. The key is based upon observed series and is useful only as a preliminary guide for specific determination. I have in my collection two

vials of imagoes with characters that do not fit the key descriptions. They may be new species, imagoes of species known only from soldiers, or even varieties of described species. It seems best to await further specimens before attempting to form a taxonomic judgment. Many of the species based upon the soldier caste seem satisfactory, although greater series and new species will doubtless make it necessary to hunt for new characters and better quantitative data. In some cases the taxonomy must remain quite tentative until more information is gathered.

Size may be fairly characteristic of a species or subspecies, particularly in the Termitidae, and it is deemed important to give exact measurements of the specimens studied. When sufficient numbers are available, it would be wise to express the variation in terms of standard deviation from the mean. However, the small numbers of *Syntermes* available for study make this refinement of little value, and I have given only the range and the mean. It is to be expected that further data will extend the ranges so far noted and that different means may be found. Light (1927) has expressed proportions by means of various indices. In some cases such data may prove quite valuable, but I have not found them of sufficient importance in this genus to warrant the extra time involved in measurement. Larger collections may ultimately be studied from this point of view with profit. The male imagoes are somewhat smaller than the females, but I have grouped the measurements in most of the cases. All measurements are in millimeters and are taken by means of an ocular micrometer. Inasmuch as different students have different systems of measurements, I have explained below the points which need clarification.

TERMS

1. The length of the head with mandibles includes the extended mandibles.
2. The length of head to side base of mandibles is the greatest length of the head capsule at the side.
3. The width of the head of the imago includes the eyes.
4. The diameter of the eye is the longest diameter and includes the diameter of the ocular suture.

5. The length of the mandible includes the rounded side condyle projection. This can usually be measured without removing the mandible.

6. The length of the postmentum is the median length of the sclerotized portion. In earlier works this sclerite has often been referred to as the "gula."

7. The length of the pronotum is the length of the middle line and, therefore, is not the maximum length if there are emarginated front or hind borders.

8. The width of the thoracic nota includes the spines when present.

9. The length of the wing from the suture and the length of the scale are taken from the costal border of the suture. If the suture is not mentioned, the wing length includes the scale.

Unless otherwise stated, the determinations of the listed specimens were made by the author and conform to the nomenclature used in this paper. The specimens are deposited in the collection of the American Museum of Natural History unless another repository is given. Other numbers listed, if a repository is not indicated, are the field numbers of the collectors. The author examined all the listed specimens, and the descriptions are based upon this material.

GENUS *SYNTERMES*

- <Genus *Termes* HAGEN, 1858a, pp. 107, 108.
- <Genus *Termes* HAGEN, 1858b, p. 16.
- <Genus *Termes* HAGEN, 1862, p. 59.
- <Genus *Termes* SILVESTRI, 1903, p. 47.
- <Genus *Termes* HOLMGREN, 1906, p. 544.
- = Genus *Syntermes* HOLMGREN, 1910, p. 285.
- = Genus *Syntermes* HOLMGREN, 1911, p. 545.
- = Genus *Syntermes* HOLMGREN, 1912, pp. 11, 45, 46.
- = Genus *Syntermes* SNYDER, 1924, p. 21.
- = Genus *Syntermes* EMERSON, 1925, p. 357.
- = Genus *Syntermes* EMERSON, 1928, p. 406.
- = Genus *Syntermes* WHEELER, 1936, p. 176.
- = Genus *Syntermes* HARE, 1937, pp. 462, 474, 475.

IMAGO (FIGS. 2, 3): Color yellowish brown to dark brown, wing membranes hyaline or brown. Head, pronotum, and wing scales with fairly long, scattered bristles, wing membrane and veins with short hairs and no chitinous punctations. Size large (smallest specimens measure about 27 mm. long with



FIG. 2. Head and pronotum of imago of *Syntermes dirus* (Burmeister), cotype.

the wings). Head oval or egg-shaped, a fairly sharp ridge running diagonally from the front of the eye to the lower base of the mandibles. Eyes relatively small or medium-sized, prom-

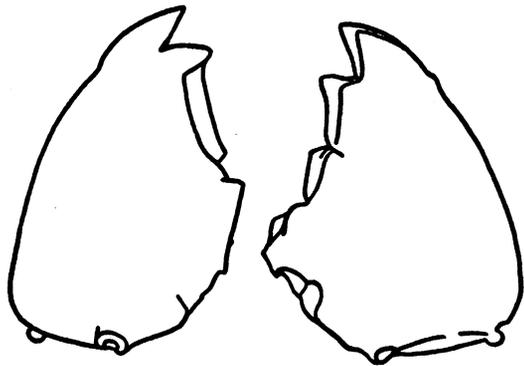


FIG. 3. Mandibles of imago of *Syntermes dirus* (Burmeister), cotype.

inent. Ocelli medium size (smallest 0.27 mm. long), at least one and one-third times their length from the eyes. Fontanelle large (smallest 0.18 mm. long), conspicuous, roundish, lighter or about the same color as the head, depressed or forming a convex plate, with a small light spot immediately anterior to the fontanelle. Arms of the Y-suture visible in favorable light, and sometimes the median suture is also visible. Antennae with 19 to 21 articles. Postclypeus flatly arched with a median longitudinal line, less than half as long as wide. Anteclypeus white, with a V-shaped, darker, sclerotized mark in the middle, the arms curving toward the front lateral margin. Labrum hatchet-shaped (fig. 2) with a thin white anterior lip. The left mandible (fig. 3) with the apical and first marginal tooth roughly similar in size and a long, continuous, even, slightly curved or nearly straight cutting edge between the first marginal tooth and the small second marginal tooth, a blunt notch posterior to the second marginal tooth. (Note: The above homologies of the teeth seem to be a fair assumption from a comparison with the mandibles of the Macrotermitinae which have an acute notch between the first and second marginal teeth.) The right mandible (fig. 3) with an apical tooth slightly larger or nearly the same size as the first marginal tooth, and the second marginal tooth smaller than the first marginal tooth, all notches sharper than a right angle. Pronotum somewhat saddle-shaped, proportionately wide (narrowest about seven-eighths width of head), either somewhat narrower or wider than the head, a frontal lobe with an anterior vertical surface and flat lateral projections which may be sharply pointed or somewhat rounded. Hind margin conspicuously emarginate. Hind margin of mesonotum widely concave with fairly sharp lateral angles (occasionally rounded). Hind margin of metanotum widely concave with fairly sharp or rounded lateral angles. Forelegs with three tibial spines near the apex, and middle and hind legs with two tibial spines near the apex (3:2:2). Tarsi with four articles. Arolium absent. Scales of wings not overlapping the posterior border of the notum. Shape of wings elongate with slightly curved costal and inner margins; with some reticulations between the costal border and the

radius near the tip. Wing suture nearly straight with small undulations. Fore and hind wings with a short R_1 and sometimes R_{2+3} joining the costal border a little beyond the wing suture. R_{4+5} running singly to the tip of the wing where it may be branched. M weak, running roughly medianly between R and Cu , joining R_{4+5} beyond the suture in the hind wing. Cu weak with 14 to 17 branches. Cerci short with two articles. Male and female with styli absent.

SOLDIER (FIGS. 4-12): Color yellow brown, including base of mandibles. Outer portions of mandibles black. Head with many or few hairs or bristles. Head large (width 2.4-7.1 mm.), sides straight or a little curved, parallel or converging toward the front, a longitudinal lateral ridge on each side on the under surface. Frontal tube short, no longer than the diameter of the antennal socket and sometimes hardly projecting above the surface of the head. Two small visible structures or spots making a triangular arrangement with the opening of the frontal gland. Postmentum somewhat constricted in the middle, width of narrowest part over half the width of the widest part. Antennae with 19 to 21 articles. Penultimate article distinctly more than twice as long as wide (5:2). Postclypeus fused with the front, the suture still visible in a favorable light. Anteclypeus white, less than half as long as wide, with two sclerotized, yellowish, diagonal, curved stripes converging at the posterior margin. Labrum three-pointed, with white median tip, and lateral points which are either slightly more than a right angle or sharper (to 60° angle). Mandibles large and powerful, curved or somewhat hooked near the tips, basal light portion quite sharply separated from outer black portion and showing a small but distinct notch at the junction on the outer margin. Left mandible with a marginal tooth from a little less than half to more than half the length of the mandible from the base. Right mandible with a marginal and usually conspicuous tooth which may be almost vestigial (*S. molestus* and *parallelus*). Thoracic nota with sharp lateral spines, except in *S. molestus* in which the nota have somewhat angular sides. Pronotum with median emargination or entire front margin, anterior lobe large and sharply marked from the rest of the

pronotum by angular notches on the margins and in profile rising at a fairly sharp angle from the middle portion. Forelegs with three tibial spines near the apex, and middle and hind legs with two tibial spines near the apex (3:2:2).

WORKER: Head yellow brown or light yellowish white, covered with a few or numerous bristles. Fontanelle fairly large, round and white, as large as, or a little smaller than, the antennal sockets. Y-suture present. Antennae with 19 to 20 articles. Anteclypeus as in the soldier. Postclypeus a little shorter than half its width, with a median line. Labrum hatchet-shaped with a thin white tip. Mandibles similar to those of the imago, uniform in general tooth pattern in all species (see fig. 3). Thoracic nota with sharp lateral spines or without such spines in *S. molestus*.

RELATIONSHIPS: *Syntermes* is the most primitive genus of the Nasutitermitinae (Termitidae) and is closest to the genus *Cornitermes*. The relative primitiveness is indicated by the large size of the imago and soldier, the relatively small frontal tube of the soldier, the 19 to 21 articles in the antennae of the imago and soldier, the proportionately large mandibles of the soldier, the lateral spines or pointed sides of the thoracic nota of the soldier, the three apical spurs on the tibiae of the forelegs, and the short R_1 joining the costal border a little beyond the wing suture.

The closest relative outside of the subfamily Nasutitermitinae would seem to be the genus *Acanthotermes* of the Macrotermitinae. The similarities of *Syntermes* and *Acanthotermes* include what seem to be homologous lateral spines on the soldier mesothorax and metathorax, vestiges of lateral spines on the sides of the prothorax of *Acanthotermes* (these spines are very small on the worker of *Acanthotermes* but are present on most of the species of *Syntermes*), the white tip on the labrum of the soldier in both genera (the tip of the imago labrum has a white lip in *Syntermes* and *Pseudacanthotermes*), the postmentum of the soldier in both genera is not particularly wide in the middle in contrast to the wide postmentum in the higher Macrotermitinae, and both *Syntermes* and *Acanthotermes* possess three spines near the tip of the tibiae of the foreleg and two spines on the tibiae of the other legs (3:2:2).

The more important differences between *Acanthotermes* and *Syntermes* may be summarized as follows:

1. *Syntermes* has no frontal spines on the pronotum in either the imago or the soldier.

2. The major soldier of *Acanthotermes* has no lateral projections of the labrum, although the minor soldier has fleshly lateral projections not sclerotized as in *Syntermes*.

3. *Acanthotermes* has a frontal spine near the opening of the frontal gland and does not possess the frontal tube which is slightly developed in *Syntermes*.

4. *Acanthotermes* possesses trimorphic soldiers compared to the monomorphic soldiers of *Syntermes*. (Note: At least one and probably two of the five types of *Acanthotermes* soldiers described and figured by Sjöstedt [1926] are modifications caused by parasitic fly larvae in the heads.)

5. The left mandible of *Acanthotermes* workers has what appears to be a vestigial second marginal tooth homologous with the second marginal tooth of the imago-worker mandible of the Rhinotermitidae. (This would indicate that the conspicuous second marginal tooth of the left mandible of the worker of *Acanthotermes* is homologous with the third marginal tooth in the Rhinotermitidae; the left worker mandible of *Acanthotermes* is definitely more primitive than that of *Syntermes*.)

6. The reduced teeth on the mandible of the soldier of *Acanthotermes* must be considered more specialized than the toothed mandibles of *Syntermes*.

7. The styli on the male imago of *Pseudacanthotermes* must be considered a more primitive character than their absence in *Syntermes*.

8. *Acanthotermes* is a fungus-growing termite in common with all the genera of the Macrotermitinae, while *Syntermes* does not cultivate fungi in common with all genera of the Nasutitermitinae and other termites.

Inasmuch as each of these primitive genera of the Macrotermitinae and Nasutitermitinae has generalized characters not found in the other subfamily, we must suppose that neither developed directly from the other, but that both are descended from an extinct group possessing the primitive characters of both of these subfamilies.

KEY TO THE SPECIES OF *Syntermes*
IMAGOS

1. Wing membrane brown 2
Wing membrane hyaline 5
2. Pronotum distinctly wider than the head . . . 3
Pronotum distinctly narrower than the head . . . 4
3. Pronotum 4.27–4.77 mm. wide . . . *S. snyderi*
Pronotum 3.72–4.27 mm. wide (fig. 2) . . . *S. dirus*
Pronotum 2.99–3.6 mm. wide. *S. territus*
4. Pronotum 3.6–3.72 mm. wide, 1.58 mm. long
(color of wing not known) . . . *S. peruanus*
Pronotum 2.99–3.6 mm. wide, 1.46–1.67 mm.
long. *S. territus*
Pronotum 2.74–3 mm. wide, 1.38–1.41 mm.
long. *S. parallelus*
5. Pronotum 4.25 mm. wide, diameter of eye
1.19 mm. *S. obtusus*
Pronotum 3.88–4.08 mm. wide, diameter of
eye 1.03–1.15 mm. *S. magnoculus*
Pronotum 3.62–3.72 mm. wide, diameter of
eye 0.97–1.03 mm. *S. grandis*
Pronotum 3.6–3.72 mm. wide, diameter of eye
0.85 mm. (color of wing not known) . . .
. *S. peruanus*
Pronotum 2.41–3.03 mm. wide, diameter of eye
0.71–0.88 mm. *S. molestus*

SOLDIERS

1. Tooth of right mandible comparatively large;
tooth of left mandible definitely projecting
well beyond the apical margin 2
Tooth of right mandible comparatively small
or vestigial; tooth of left mandible not pro-
jecting much beyond the apical margin . . .
. 12
2. Notal spines very large; pronotum 6.61 mm.
wide, nearly as wide as width of head (6.96
mm.); head covered with curly hair (fig. 4) .
. *S. aculeosus*
Notal spines of medium to short length. . . 3
3. Length of left mandible more than half the
width of the head 4
Length of left mandible about half the width
of the head (fig. 11) *S. brevimalatus*
4. Cutting edge of left mandible beyond the
notch not distinctly sigmoid. 5
Cutting edge of left mandible beyond the
notch distinctly sigmoid 6
5. Larger species (width of head 6.58–7.1 mm.;
width of pronotum 5.08–5.79 mm.) . . .
. *S. snyderi*
Smaller species (width of head 6.02 mm.;
width of pronotum 4.13 mm.) (fig. 5) . . .
. *S. magnoculus*
6. Profile of frontal tube showing a shallow angle
with the line of the top of the head; opening
of gland vertical; frontal tube compara-
tively large; sides of head strongly con-
verging toward the front; head covered
abundantly with straight bristles (fig. 6) .
. *S. solidus*
Profile of frontal tube showing a shallow angle
with the line of the top of the head; opening
of gland somewhat upward; head covered
rather abundantly with straight bristles . . 7
Profile of frontal tube not showing any angle
with the line of the top of the head or show-
ing an extremely shallow angle; opening of
gland somewhat upward; head covered with
few to numerous straight bristles; length of
head to side base of mandibles over 5.6 mm.
. 10
7. Large or medium-sized species; width of head
over 5.6 mm. 8
Small species; width of head 4.94–5 mm. . .
. *S. peruanus*
8. Cutting edge of apical tooth of left mandible
not or slightly sigmoid; tip to point of tooth
1.19–1.59 mm.; head thickly covered with
bristles; width of head 6.58–7.1 mm.; length
of left mandible 3.9–4.23 mm.; frontal tube
prominent *S. snyderi*
Cutting edge of apical tooth of left mandible
distinctly sigmoid 9
9. Length of left mandible 4.14–4.37 mm.; width
of head 6.2–7.05 mm.; tip to point of tooth
of left mandible 1.21–1.32 mm.; head with
a number of bristles but not thickly cover-
ed; frontal tube not prominent (fig. 7) .
. . . *S. chaquimayensis* subspecies *parvinus*
Length of left mandible 3.66 mm.; width of
head 6.64 mm.; angle between frontal tube
and top of head in profile comparatively
sharp (135°).
. . . *S. chaquimayensis* subspecies *emersoni*
Length of left mandible 3.47–3.78 mm.; width
of head 5.67–6.32 mm.; angle between fron-
tal tube and top of head in profile flat (160°)
. *S. c. chaquimayensis*
10. Sides of head straight, converging only slightly
toward the front; width of head 5.37–5.79
mm. 11
Sides of head straight, converging markedly
toward the front; width of head 5.61–
6.34 mm.; length of head to side base of
mandibles 5.67–6.39 mm. *S. grandis*
Sides of head a little curved, converging a
little toward the front; width of head 5.92–
6.14 mm.; length of head to side base of
mandibles 6.58–6.77 mm. (fig. 8) . . . *S. lighti*
11. Length of left mandible 3.66 mm. (fig. 9) . .
. *S. hageni*
Length of left mandible 3.23–3.47 mm. (fig. 10)
. *S. wheeleri*
12. Notal spines medium-sized 13
Notal spines short, sides of head parallel or

- slightly converging.15
- Notal spines absent *S. molestus*
- 13. Sides of head slightly converging toward the front14
- Sides of head strongly converging toward the front and nearly straight; opening of frontal tube forward or a little upward with an angle at the junction of the frontal tube and vertex; width of pronotum 3.63–3.84 mm. (fig. 12) *S. calvus*
- 14. Frontal tube elevated above the head at an angle; width of pronotum 3.17–3.23 mm. *S. peruanus*
- Frontal tube hardly elevated above head at anterior margin, posterior portion continuous with the top of head without angle; opening of frontal tube upward at angle of about 45° to the long axis of the head; sides of head nearly straight; width of pronotum 3.66–4.16 mm. *S. silvestrii*
- 15. Width of head 4.21–5.24 mm. *S. territus*
- Width of head 2.97–3.4 mm. *S. parallelus*

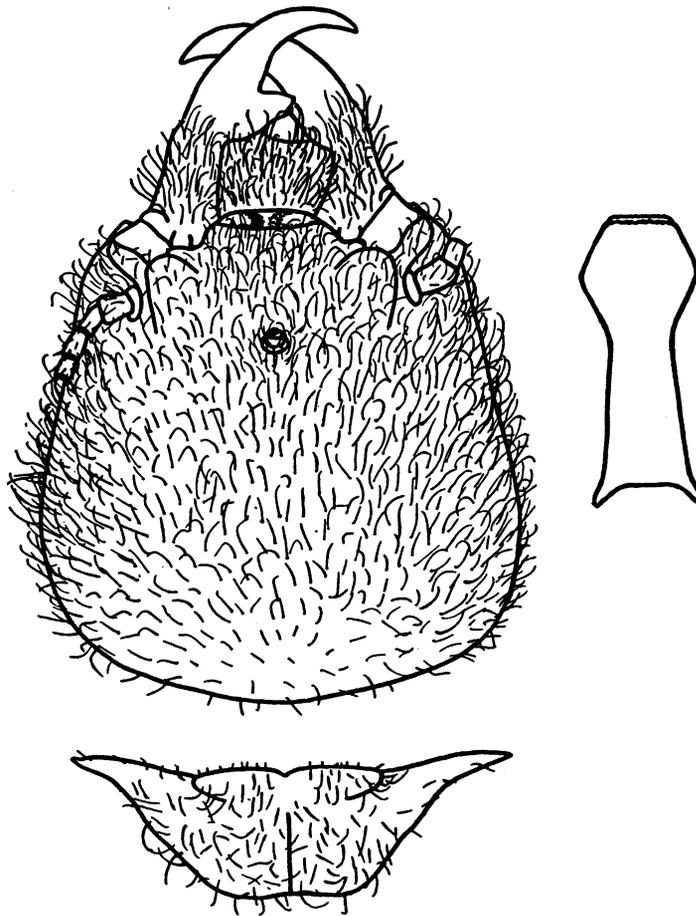


FIG. 4. Head, pronotum, and postmentum of soldier of *Syntermes aculeosus*, new species, holotype.

terior margin, opening of frontal tube forward and nearly vertical to the axis of the head or slightly upward at an angle of 45° or greater; sides of head a little curved; width of pronotum 3.54–4.17 mm. *S. dirus*

Frontal tube hardly elevated above the head at the anterior margin; opening of the frontal tube slightly upward at an angle to the axis of the head; sides of head a little

***Syntermes aculeosus*, new species**

SOLDIER (FIG. 4): Head, labrum, base of mandibles, postmentum, thoracic nota, legs, sternites, and posterior tergites thickly covered with hair, many of the hairs rather delicate and curved, giving a fuzzy appearance. Head stocky, widest behind, sides straight and converging toward the front; frontal

tube wrinkled, forming a flat angle with the vertex, opening forward and slightly upward. Antennae incomplete in specimen, one with 19 articles, subapical articles about 0.18–0.21 mm. wide and 0.47 mm. long. Labrum three-pointed with white tip, all points a little more obtuse than a right angle. Postmentum stocky, narrowest portion about two-thirds the width of the widest portion. Left mandible with a large tooth forming an angle with the apical portion somewhat less than a right angle, apical cutting edge not sigmoid; right mandible also with large tooth which has a broken tip in the specimen. Front margin of pronotum emarginate; lateral spines very robust, thick, and conical. Spines on the mesonota and metanota also robust and conical similar to the prothoracic spines but directed a little posteriorly.

Total length	20.00 mm.
Length of head with mandibles	10.34
Length of head to side base of mandibles	7.14
Width of head	6.96
Length of left mandible	4.32
Length of postmentum	3.76
Widest width of postmentum	1.77
Narrowest width of postmentum	1.06
Length of pronotum	2.07
Width of pronotum	6.61
Width of mesonotum	6.23
Width of metanotum	7.33
Length of hind tibia	7.33

LARGER WORKER: I judge this worker to be conspecific with the soldier because of the pilosity, but I cannot be sure of the association. Color similar to soldier; antennae brownish. Pilosity a little thicker than *S. brevimalatus*. Thoracic spines a little thicker than *S. brevimalatus*.

Width of head	3.00 mm.
Width of pronotum	2.59

COMPARISONS: *Syntermes snyderi* soldiers have shorter and straighter bristles. The antennae are less robust, with the subapical articles about 0.17 mm. wide. The mandibles are similar, but the inside edge of the apical portion in *S. snyderi* is sometimes more sigmoid, with a sharper angle at the tooth in the left mandible, and the tip of the left mandible is more hooked. The lateral spines of the thoracic nota are much less robust in *S. snyderi*.

Syntermes magnoculus has a similar-shaped mandible. The size is smaller (head width 6.02 mm.). The notal spines are much smaller (width of pronotum 4.13 mm.). The pilosity is not so abundant or so curly.

Syntermes aculeosus is unique among the described species of *Syntermes* in the type of pilosity and in the enormous size of the thoracic spines. It is closest to *S. snyderi* and *S. magnoculus* in the shape of its mandibles. Although I have only a single specimen, I have no hesitation in describing the individual as belonging to a new species.

DISTRIBUTION (FIG. 1): Oronoque River (02°42' N., 57°25' W.), British Guiana (type locality), 1 soldier (holotype), 1 worker, coll. N. A. Weber, 22.VII.1936, No. 584. The single soldier and worker were found in a vial with *S. brevimalatus*.

Syntermes obtusus Holmgren

Termes grandis SILVESTRI, 1901, p. 4.

Termes grandis SILVESTRI, 1903, p. 49 (imago, workers), p. 116 (biology), pl. 2, figs. 79–83 (imago, worker).

Syntermes obtusus HOLMGREN, 1911, pp. 546, 547 (imago).

Syntermes obtusus SNYDER, 1924, p. 22 (imago).

IMAGO: Antennae with 21 articles. Wings hyaline with yellow brown costal border and radial veins. Membrane hairs absent near the suture on the inner portion, long on the outer margin giving a ciliated appearance and almost disappear on the outer portion.

Length with wings	40.00 mm.
Length without wings	19.50
Length of head to side base of mandibles	3.42
Width of head	4.58
Diameter of eye	1.19
Eye from lower margin of head	0.32
Length of ocelli	0.48
Width of ocelli	0.29
Ocelli from eyes	0.65
Length of fontanelle	0.52
Length of left mandible	2.12
Length of pronotum	2.17
Width of pronotum	4.25
Length of hind tibia	6.33
Length of anterior wing	31.47
Width of anterior wing	7.10

COMPARISONS: *Syntermes magnoculus* is smaller but is very close and could conceivably belong to the same species. The imago is

somewhat larger than *S. grandis* and has larger eyes. These species are quite closely related. Males were compared to males to avoid sexual differences.

DISTRIBUTION (FIG. 1): Villa Rica (25°55' S., 56°27' W.), Paraguay (type locality), 2 imagoes (types), workers, det. N. Holmgren, det. F. Silvestri as *T. grandis*, coll. F. Silvestri, 8.X.1900, Silvestri Coll., Portici.

Syntermes magnoculus Snyder

Syntermes magnoculus SNYDER, 1924, pp. 22, 23 (imago, soldier), pl. 4, fig. 22 (soldier).

IMAGO: Head dark brown. Wing membrane hyaline. Fontanelle yellow, the same color as the ocelli. Front and top of the head with a few long hairs. Fontanelle round, about the same size as the ocelli, in a depression. Antennae with 20 articles. Pronotum with anterior angles not very sharp, angle at the tip greater than a right angle. Pronotum strikingly saddle-shaped with a depressed line near the anterior margin and both sides, but not in the middle.

	MALE	FEMALE
Length with wings	39.50	40.00 mm.
Length of head with mandibles	4.89	—
Width of head	4.14	4.39
Diameter of eye	1.03	1.15
Eye from lower margin	0.29	0.29
Length of ocellus	0.41	0.47
Width of ocellus	0.23	0.35
Ocelli from eye	0.63	0.64
Ocelli from fontanelle	—	0.82
Length of fontanelle	0.44	—
Width of fontanelle	0.35	—
Length of pronotum	1.88	2.01
Width of pronotum	3.88	4.08
Length of hind tibia	6.86	—
Length of anterior wing from suture	31.00	—
Width of anterior wing	6.77	—

COMPARISONS: *Syntermes obtusus* is close and might be the same species. However, the type of *S. obtusus* has a head width of 4.58 mm. and a pronotum width of 4.25 mm.

Syntermes grandis is very close. The pronotal angles are similar, but the frontal lobe of the pronotum of *S. grandis* rises at a sharper angle from the main portion.

SOLDIER (FIG. 5): Head with a few scattered bristles. Sides of head fairly straight

and converging a little toward the front. Anterior edge of frontal tube raised a little above the rest of the head, posterior edge making a flat angle with the vertex, the gland opening forward but not quite vertical to the longitudinal axis of the head. Antennae with 20 articles. Lateral angles of labrum about equal to a right angle, tip white. Left mandible



FIG. 5. Left mandible of soldier of *Syntermes magnoculus* Snyder, topotype.

ble with curved apical cutting edge not sigmoid, with a large first marginal tooth making an angle of about 60° with the apical cutting edge. Front margin of the pronotum emarginate. Notal spines comparatively of medium length.

Length of head to side base of mandibles	6.22 mm.
Width of head	6.02
Length of left mandible	3.90
Widest width of postmentum	1.50
Narrowest width of postmentum	0.96
Length of pronotum	1.89
Width of pronotum	4.13
Width of mesonotum	3.17
Width of metanotum	4.08

COMPARISONS: The closest species seems to be *S. snyderi* which is distinctly larger, has

more bristles on the head, and a more sigmoid apical cutting edge of the left mandible.

DISTRIBUTION (FIG. 1): Chapada (14°10' S., 59°49' W.), Matto Grosso, Brazil (type locality), 1 female (holotype), det. T. E. Snyder, coll. H. H. Smith, X, type No. 14510, M.C.Z.; 1 male (paratype), det. T. E. Snyder, coll. H. H. Smith, X, U.S.N.M.; 1 soldier (topotype), det. T. E. Snyder, VII, M.C.Z.

Syntermes snyderi Emerson

? *Termes dirus* WALKER, 1853, p. 510 (imago, soldier, worker).

Syntermes snyderi EMERSON, in Snyder, 1924, p. 21 (imago), p. 22 (soldier).

Syntermes dirus SNYDER, 1924, pp. 27, 28 (soldier from Kartabo, British Guiana, only).

Syntermes snyderi EMERSON, 1925, pp. 294, 310, 358 (imago, soldier), text fig. 44 (imago, soldier).

Syntermes snyderi SNYDER, 1926, pl. 2, fig. 7 (soldier).

Syntermes dirus WHEELER, 1936, p. 176 (biology, British Guiana only).

Syntermes snyderi WHEELER, 1936, pp. 174, 176, 221 (biology).

Syntermes snyderi HARE, 1937, p. 468 (systematics), fig. 28 (worker and soldier mandibles).

Syntermes snyderi EMERSON, 1938, p. 258 (nest).

IMAGO: Head, pronotum, and sternites orange yellow brown, wings and tergites brown contrasting quite strongly with yellowish regions. Head and pronotum with a few bristles. Wing scales with numerous bristles. Fontanelle round, light, larger than ocelli. Eyes small, prominent, about one-third their length from the lower margin. Ocelli of medium size, over twice their length from the eyes and about midway between the eyes and fontanelle. Antennae with 19 or 20 articles. Pronotum wider than head, anterior angles quite sharp and outturned, the tip about equal to a right angle.

Length with wings	35.00–42.50 mm.
Length of head with mandibles	4.76– 4.88
Length of head to side base of mandibles	2.93– 3.11
Width of head	3.57– 3.92
Diameter of eye	0.71– 0.75
Eye from lower margin	0.26
Length of ocelli	0.32
Width of ocelli	0.23
Ocelli from eyes	0.71
Ocelli from fontanelle	0.71
Length of fontanelle	0.41
Width of fontanelle	0.41

Width of labrum	1.61
Length of postclypeus	0.65
Width of postclypeus	1.76
Length of left mandible	2.25
Length of pronotum	2.01– 2.10
Width of pronotum	4.27– 4.77
Length of hind tibia	6.78– 7.09
Length of anterior wing from suture	30.83
Width of anterior wing	7.33– 7.80

COMPARISONS: The closest species seems to be *S. dirus* which, however, has a narrower pronotum in all the specimens examined. The coloration seems to be quite similar.

SOLDIER: Head, labrum, base of mandibles, postmentum, pronotum, and abdomen covered with a great many straight bristles. Head very large, sides straight and converging somewhat toward the front. Frontal tube with a flat angle where it joins the vertex and distinctly elevated above the head in front, opening nearly vertical to about 45° to the axis of the head. Postmentum stocky, narrowest width about two-thirds of widest width. Antennae with 19 or 20 articles. Left mandible with apical cutting edge somewhat or slightly sigmoid forming an angle with the large prominent tooth of about 60° or a little wider (45° in the Venezuelan specimens). Right mandible with a large marginal tooth forming an angle with the apical cutting edge of about 75°. Front margin of pronotum emarginate or evenly curved. Spines fairly large and of about equal size on the three nota.

	No.	RANGE	MEAN
Length of head to side base of mandibles	2	6.11–6.58	6.35 mm.
Width of head	14	6.58–7.10	6.81
Length of left mandible	13	3.90–4.23	4.13
Length of left mandible from tip to tip of tooth	10	1.19–1.59	1.42
Length of postmentum	1	3.63	—
Widest width of postmentum	1	1.76	—
Narrowest width of postmentum	1	1.12	—
Length of pronotum	1	1.88	—
Width of pronotum	14	5.08–5.79	5.39
Width of mesonotum	1	4.79	—
Width of metanotum	1	5.64	—
Length of hind tibia	3	6.49–6.74	6.60

COMPARISONS: *Syntermes snyderi* seems to be closest to *S. solidus* which has a larger, more prominent frontal tube, a more strongly sigmoid apical cutting edge of the left mandible, and a less projecting marginal tooth.

The Venezuelan form is close to *S. chaquimayensis*, subspecies *parvinasus* which has few bristles and a less prominent frontal tube and a distinct sigmoid apical cutting edge of the left mandible.

The species referred to *S. dirus* from Kartabo, British Guiana, by Snyder (1924) and by Wheeler (1936, p. 176) belongs to *S. snyderi*.

Walker (1853, p. 510) records *T. dirus* from British Guiana. It would seem best to consider this record as a synonym of *S. snyderi* until Walker's specimens are reexamined.

DISTRIBUTION (FIG. 1): Kartabo (06°23' N., 58°42' W.), British Guiana (type locality), 3 imagoes (morphotype and paratypes), 8 soldiers (holotype and paratypes), coll. A. Emerson, V.1919, No. 52; 1 male, 1 female (topotypes), coll. A. Emerson, 2.VI.1924, No. 24.162g and unnumbered vial; 2 soldiers (paratypes), coll. A. Emerson, 5.VIII.1920, M.C.Z. Indians brought me alates at Kartabo which they said were flying on 4.V.1919. Flying alates were observed on 2.VI.1924 at about 6 P.M. Some were observed 100 to 150 feet up in the air.

St. Edward's Mission on the Mazaruni River 2 miles above Kartabo, British Guiana, imagoes, soldiers, workers in stomach contents of a toad, *Bufo typhonius*, coll. by Indians, 6.VI.1924, No. 24.170.

Surinam, 1 soldier, coll. A. Reyne, No. 10; 1 soldier, coll. A. Reyne, No. 13. These soldiers have fewer bristles on the top of the head than the type colony, but portions of the head and pronotum have similar pilosity.

Venezuela, 3 soldiers, from Chicago M.N.H. These Venezuelan forms have a somewhat shorter left mandible than the types, but the variation seems too slight for taxonomic distinction. The angle formed by the tooth in the left mandible is narrower. Future data may indicate subspecific distinction between these forms.

Syntermes solidus, new species

SOLDIER (FIG. 6): Color of specimen black due to preservation. Portions indicate that original color was yellow brown. Head, labrum, base of mandibles, postmentum, thoracic nota, legs, tergites, and sternites rather thickly covered with straight and fairly long

bristles. Head widest behind, sides straight and converging toward the front. Frontal tube comparatively large, not in much of a depression, but front concave and wrinkled, opening of gland vertical to long axis of head. Antennae broken in specimen. Tip of labrum a little more obtuse than a right angle, lateral angles blunt and about equal to right angles. Narrowest portion of postmentum over half the width of the widest portion. Left mandible with a prominent marginal tooth, the angle with the apical tooth less than 45°, the cutting edge of the apical tooth sigmoid. Right mandible with a fairly large tooth forming an angle with the apical portion a little less than a right angle, apical cutting edge only barely suggesting a sigmoid shape. Front margin of pronotum emarginate, lateral spines fairly robust and conical. Mesonotal and metanotal spines also fairly robust and a little smaller than pronotal spines.

Total length	18.00 mm.
Length of head with mandibles	9.21
Length of head to side base of mandibles	6.71
Width of head	6.73
Length of left mandible	3.90
Length of postmentum	3.54
Widest width of postmentum	1.47
Narrowest width of postmentum	0.90
Length of pronotum	2.07
Width of pronotum	5.00
Width of mesonotum	3.80
Width of metanotum	4.63
Length of hind tibia	6.34

COMPARISONS: The species is most closely related to *S. chaquimayensis* from which it differs in its larger frontal tube, more convergent sides of the head, and sharper angle of the notch of the left mandible.

Syntermes snyderi is quite close but has somewhat longer left mandibles, and the tooth of the left mandible extends farther and forms a wide-angled notch.

DISTRIBUTION (FIG. 1): St. Jean (05°22' N., 54°6' W.), Moroni River, French Guiana (type locality), 1 soldier removed from pin (holotype), coll. Le Moulton.

Syntermes chaquimayensis chaquimayensis (Holmgren)

Termes chaquimayensis HOLMGREN, 1906, p. 547 (soldier, workers).

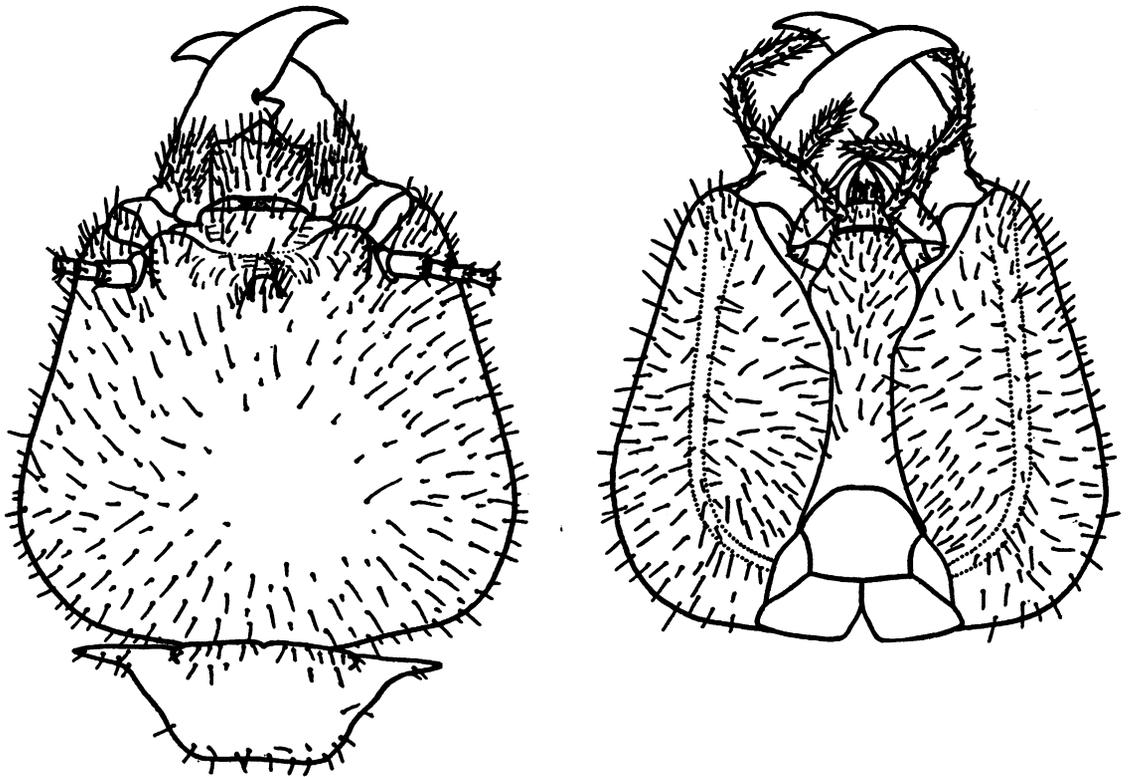


FIG. 6. Dorsal view of head and pronotum and ventral view of head of soldier of *Syntermes solidus* new species, holotype.

Syntermes chaquimayensis HOLMGREN, 1911, pp. 546-548 (soldier).

Syntermes chaquimayensis SNYDER, 1924, pp. 22, 26 (soldier).

Syntermes chaquimayensis SNYDER, 1926, p. 17 (locality), pl. 2, fig. 4 (soldier).

Syntermes chaquimayensis WHEELER, 1936, pp. 173, 176 (biology).

SOLDIER: Head, base of mandibles, postmentum, thoracic nota, tergites, and sternites covered rather abundantly with bristles, about equal in pilosity to subspecies *parvinasus* (fig. 7). Sides of head fairly straight, converging a little toward the front. Frontal tube lying in a slight depression, opening facing slightly upward at an angle, posterior junction of tube with the head forming a flat angle (about 160°). Antennae with 19 or 20 articles, penultimate article 0.16 mm. wide and 0.41 mm. long. Tip of labrum sharper than a right angle, side points about equal to right angles or slightly more blunt. Narrowest width of postmentum about two-

thirds the widest width. Left mandible with a prominent marginal tooth extending somewhat beyond the apical cutting edge and forming an angle of about 45° to 60° with the apical cutting edge which is sigmoid. Right mandible with a prominent marginal tooth. Front margin of pronotum emarginate or not emarginate. Lateral spines on the thoracic nota comparatively of medium size and about equal in length and thickness on the three segments.

I have included the total length given by Holmgren (1911, p. 548).

LARGE WORKER: Antennae with 20 articles. Width of head 3.41 mm.

COMPARISONS: This species may tentatively be subdivided into three subspecies. There is no doubt that these subspecies are quite closely related, and further samples of the populations from various localities as well as the collection of the reproductives are necessary for the validation or refutation of the suggested categories. The typical subspecies is

SOLDIER	No.	RANGE	MEAN
Total length	5	15.00-18.50	16.70 mm.
Length of head with mandibles	2	8.83- 9.21	9.02
Length of head to side base of mandibles	8	5.73- 6.34	6.08
Width of head	21	5.67- 6.32	5.89
Length of left mandible	7	3.47- 3.78	3.61
Length of postmentum	4	3.20- 3.66	3.49
Widest width of postmentum	5	1.34- 1.71	1.54
Narrowest width of postmentum	5	1.01- 1.09	1.05
Length of pronotum	3	1.83- 1.95	1.89
Width of pronotum	7	4.25- 4.88	4.61
Width of mesonotum	5	3.62- 4.39	3.96
Width of metanotum	5	4.08- 5.00	4.59
Length of hind tibia	4	5.55- 5.85	5.64

very close to *S. chaquimayensis emersoni*, but is a little smaller and has a flatter angle (160°) at the junction of the frontal tube and vertex. *S. chaquimayensis parvinasus* is larger, and the frontal tube is proportionately smaller.

DISTRIBUTION (FIG. 1): Chaquimayo (13°44' S., 70°39' W.), Rio San Gaban Valley, Prov. de Carabaya, Peru (type locality). I have no specimens surely from the type locality but have 3 soldiers (probably cotypes), det. N. Holmgren, locality unknown.

Llinquipata (13°49' S., 70°38' W.), Peru, 2 soldiers (cotype), det. and coll. N. Holmgren, XI.1904.

Perene (10°53' S., 75°12' W.), Peru, 5 soldiers (metatypes), workers, coll. J. C. Bradley, 26.VI. 1920, No. 377.

Huachi (15°36' S., 67°07' W.), Bolivia, 11 soldiers (metatypes), workers, det. T. E. Snyder, coll. W. M. Mann.

Near Philadelphia (17°53' S., 41°19' W.), Brazil, 1 soldier, coll. Hartt and Copeland, Thayer Expedition, M.C.Z. This specimen from eastern Brazil is geographically removed from the Peruvian and Bolivian series and might conceivably be different. Aside from somewhat narrower thoracic nota, however, I am unable to make any distinction and think it best to consider it conspecific until more specimens are available.

The species is also recorded from El Campamento (Col. Perene), Peru; and near Buturu (14°17' S., 68°35' W.) [Tuiche Valley], Cocos Valley, between Rio Azata and Rio Tavara in the Tambopata Valley (Prov. Caupolican), Bolivia.

***Syntermes chaquimayensis*, subspecies
emersoni Snyder**

Syntermes emersoni SNYDER, 1924, pp. 22, 26 (soldier), pl. 4, fig. 20 (soldier).

SOLDIER: Pilosity close to *S. c. chaquimayensis*. There seem to be fewer hairs on the

base of the mandibles than in *S. c. chaquimayensis*. There are fewer hairs on the head in places, but this difference may be due to rubbing. The hairs are stiff and straight as in *S. c. chaquimayensis*. The angle between the posterior portion of the frontal tube and the vertex is about 135° in profile while this angle is flatter in *S. c. chaquimayensis*. The general proportions of the head and the mandible dentation are virtually the same as in *S. c. chaquimayensis*.

Length of head with mandibles (not extended)	9.78 mm.
Estimated length of head with mandibles extended	10.15
Length of head to tip of labrum	8.08
Width of head	6.64
Length of left mandible	3.66
Length of left mandible from tip to point of tooth	1.34
Length of right mandible from tip to point of tooth	1.38
Length of pronotum	2.01
Width of pronotum	5.30
Length of hind tibia	6.52

COMPARISONS: This form was originally described by Snyder (1924) as a separate species, but the morphology is very close to *S. chaquimayensis*. The larger size, slight difference in pilosity, and small difference in the angle between the frontal tube and the vertex may not be characteristic of the populations, but I am tentatively including the form as a subspecies of *S. chaquimayensis* on admittedly very inadequate data.

DISTRIBUTION (FIG. 1): Iguaripe (possibly Aguaripe, 13°08' S., 38°55' W., Bahia), Brazil (type locality), 1 soldier (holotype), det. T. E. Snyder, type No. 25748, U.S.N.M.

Syntermes chaquimayensis, subspecies
parvinasus, new subspecies

SOLDIER (FIG. 7): Head, labrum, base of mandibles, postmentum, thoracic nota, legs, sternites, and tergites covered rather abundantly with straight bristles. Head converging somewhat in front, sides straight. Frontal tube comparatively very small, raised only a little above the vertex at the posterior edge, anterior edge level with the front, opening

the cutting edge of the apical tooth distinctly sigmoid, cutting edge posterior to marginal tooth undulating, a small notch anterior to the basal tooth at the junction of the light and dark portions of the mandible. Right mandible with fairly large marginal tooth which makes an angle with the apical portion a little less than a right angle; the cutting edge of the apical tooth is very slightly convex or nearly straight near the notch. Front margin

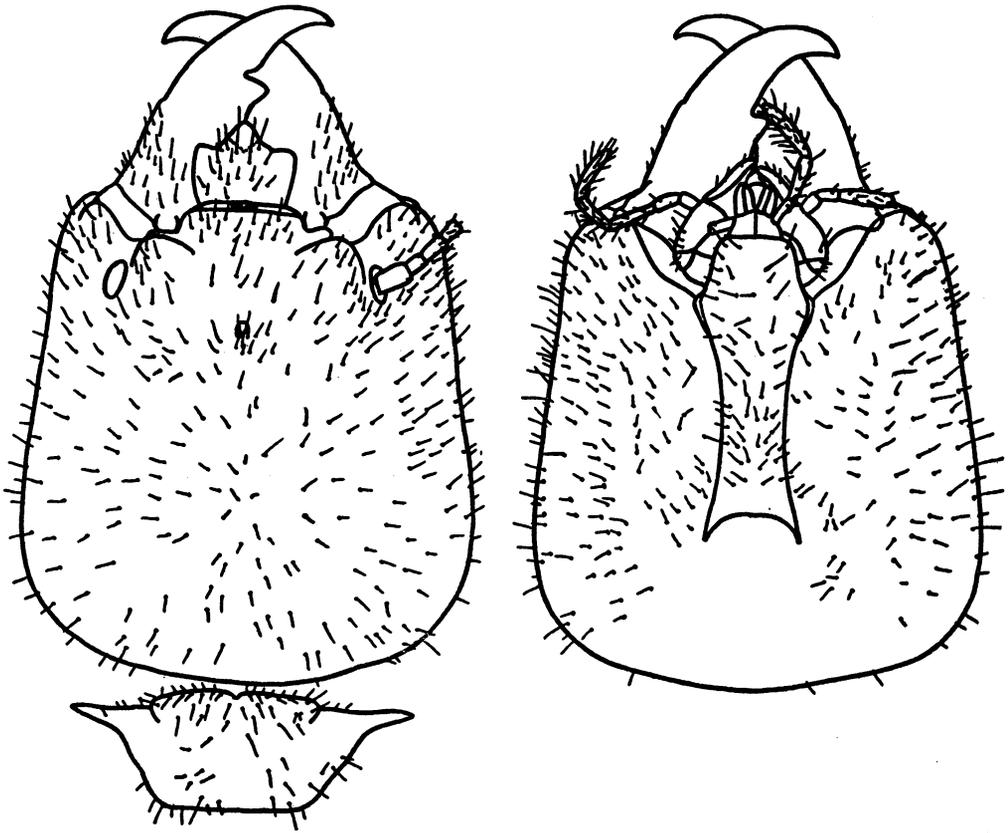


FIG. 7. Dorsal view of head and pronotum and ventral view of head of soldier of *Syntermes chaquimayensis*, subspecies *parvinasus*, new subspecies, holotype.

pointing up at an angle of about 45° . Antennae broken in all specimens examined. Tip of labrum about equal to a right angle or slightly greater or less than a right angle, lateral points about equal to right angles. Narrowest portion of postmentum over half as wide as the widest portion. Left mandible with a large tooth forming an angle with the apical portion of about 45° or slightly less,

of the pronotum emarginate. Lateral spines fairly large, hind margin nearly straight. Lateral spines of mesonota and metanota nearly as large as the pronotal spines.

COMPARISONS: Close to *S. solidus*, but the frontal tube is not so conspicuous and the notch of the left mandible anterior to the first marginal tooth is wider than in *S. solidus*. Close to *S. snyderi*, but the frontal tube is not

SOLDIER	No.	RANGE	MEAN
Total length	4	18.50-20.00	19.00 mm.
Length of head with mandibles	4	9.87-10.34	10.15
Length of head to side base of mandibles	6	6.78- 7.47	7.05
Width of head	8	6.20- 7.05	6.64
Length of left mandible	4	4.14- 4.37	4.21
Length of left mandible from tip to point of tooth	2	1.21- 1.32	1.26
Length of postmentum	6	3.95- 4.27	4.02
Widest width of postmentum	6	1.59- 1.76	1.63
Narrowest width of postmentum	6	0.94- 1.12	1.01
Length of pronotum	6	1.88- 1.99	1.94
Width of pronotum	8	4.93- 5.47	5.17
Width of mesonotum	6	4.27- 4.57	4.43
Width of metanotum	6	5.00- 5.24	5.14
Length of hind tibia	4	4.76- 6.22	5.63

so conspicuous and the head bristles are fewer in *S. c. parvinasus*. The morphological relationship of this form to *S. c. chaquimayensis* is so close that I am tentatively placing it in a subspecies until more data are available. *S. c. chaquimayensis* is smaller in a number of measurements and has a proportionately larger frontal tube. *S. c. emersoni* has a shorter left mandible, and the posterior edge of the frontal tube rises in a steeper angle from the vertex.

DISTRIBUTION (FIG. 1): Rio Waupes (00°00'-02°01' N., 67°00'-72°38' W.), Brazil or possibly Colombia (type locality), 5 soldiers (holotype and paratypes), 190a, Box No. 23.

Ireng River (05°16' N., 60°22'-60°54' W.) to Roraima, Brazil, 3 soldiers (paratypes), VIII.1911, M.C.Z., A.M.N.H. *S. grandis* was in the same vial.

Syntermes grandis (Rambur)

Although all the museum specimens assigned to this species have not been examined by the author (specimens reexamined by me are marked with an asterisk), there is no reason for not assuming that the following synonymy is accurate. Latreille incorrectly determined his species as *Perla fusca* De Geer and placed it in the genus *Termes*. *Perla fusca* DeGeer is a synonym of *Coptotermes testaceus* (Linnaeus), and thus Rambur's subsequent name is valid.

Termes fuscum LATREILLE, 1805a, p. 68 (imago).

Termes fuscum LATREILLE, 1805b, p. 60 (imago).

Termes grandis RAMBUR, 1842, p. 306 (imago).

**Termes decumanus* ERICHSON, 1848, p. 582 (imago).

Termes costatus WALKER, 1853, p. 518 (imago).

Termes grandis WALKER, 1853, p. 519 (locality).

**Termes grandis* HAGEN, 1858a, p. 157 (imago, soldier), pl. 2, fig. 10, pl. 3, fig. 18 (imago).

**Termes grandis* HAGEN, 1858b, p. 22 (imago).

**Syntermes grandis* HOLMGREN, 1911, pp. 546-548 (imago, soldier).

Termes grandis DESNEUX, 1915, p. 8 (location of type).

**Syntermes grandis* SNYDER, 1924, pp. 22, 24, 27 (imago, soldier), pl. 4, fig. 23 (soldier).

**Syntermes grandis* EMERSON, 1925, p. 294 (locality).

**Syntermes grandis* BEQUAERT, 1925, p. 294 (biology).

**Syntermes grandis* WHEELER, 1936, pp. 174, 176 (biology).

IMAGO: Head fairly dark brown with lighter yellowish postclypeus, labrum, and pronotum. Wings hyaline and transparent except for a yellow brown costal border and radial region. Head, pronotum, and wing scales with numerous long bristles. Fontanelle about as long as, or a little shorter than, the length of the ocellus, round, yellowish. Eyes relatively small, oval, and prominent. Ocelli of medium size, closer to the eyes than to the fontanelle. Antennae with 20 articles, the third longer than the second and the second longer than the fourth. Pronotum narrower than the head, somewhat saddle-shaped, anterior angles about equal to, or slightly more than, a right angle, sides curved, hind margin conspicuously emarginate.

Length with wings 39.30 mm.

Length without wings 18.00

Length of head with mandibles 4.63

Length of head to side base of mandibles 3.11

Width of head 4.08- 4.29

Diameter of eye 0.97- 1.03

Eye from lower margin	0.18- 0.29
Length of ocelli	0.35- 0.39
Width of ocelli	0.23- 0.32
Ocelli from eyes	0.59- 0.61
Ocelli from fontanelle	0.68- 0.82
Length of fontanelle	0.29- 0.41
Width of fontanelle	0.23- 0.41
Width of labrum	1.53
Width of postclypeus	1.59
Length of postclypeus	0.65
Length of left mandible	2.03
Length of pronotum	1.95- 2.01
Width of pronotum	3.62- 3.72
Length of hind tibia	6.25
Length of anterior wing scale	2.19
Length of anterior wing from suture	29.89-30.24
Width of anterior wing	6.96- 7.34

COMPARISONS: *Syntermes dirus* has browner wing membranes, somewhat larger fontanelle, smaller eye, ocelli in a more midway position between the fontanelle and eyes, pronotum

SOLDIER	
Length of head to side base of mandibles	
Width of head	
Length of left mandible	
Length of left mandible from tip to tip of tooth	
Length of postmentum	
Widest width of postmentum	
Narrowest width of postmentum	
Length of pronotum	
Width of pronotum	
Width of mesonotum	
Width of metanotum	
Length of hind tibia	

wider than head, and sharper anterior angles of the pronotum.

Syntermes magnoculus is quite close with a little larger fontanelle, pronotum angles the same, but has less of a frontal lobe rising at a flatter angle from the main part of the pronotum.

SOLDIER: Head, base of mandibles, postmentum, pronotum, and abdomen covered with numerous bristles. Head large, sides converging toward the front, fairly straight. Frontal tube virtually without an angle where it joins the vertex and front margin hardly elevated above the head, frontal opening slightly upward from the vertical. Antennae with 20 articles, penultimate article 0.15 mm. wide and 0.38 mm. long. Lateral

angles of labrum blunt, about equal to a right angle. Narrowest portion of postmentum four-sevenths to three-fourths width of widest portion. Left mandible with apical cutting edge sigmoid, marginal tooth projecting well beyond apical cutting edge and forming a notch with an angle of about 45° or a little wider. Right mandible with a prominent marginal tooth forming a notch slightly less than a right angle. Front margin of pronotum slightly emarginate. Thoracic nota with rather short spines.

COMPARISONS: *Syntermes hageni* is quite close, but the head is narrower, the sides are more parallel, the capsule at the ventral mandibular condyle is less rounded, and the prothoracic spines are not so blunt. The thoracic spines of the holotype are a little longer than in the morphotype of *S. grandis*.

Syntermes lighti is quite close, but the head is longer and the sides are more parallel, the

No.	RANGE	MEAN
8	5.67-6.39	6.07 mm.
11	5.61-6.34	5.93
9	3.18-3.66	3.45
8	0.91-1.12	1.04
2	3.29-3.41	3.35
7	1.23-1.40	1.33
7	0.81-0.92	0.86
7	1.46-1.71	1.60
11	3.29-4.10	3.63
8	2.74-3.47	3.10
9	3.23-4.47	3.79
7	5.61-5.88	5.71

mandibles are a little less hooked, the thoracic spines are a little longer, the pronotal spines are sharper, the frontal tube is similar, and the antennal articles are a little longer and thicker.

DISTRIBUTION (FIG. 1): Cayenne (type locality). Rambur erroneously recorded the species from Senegal.

Unknown locality, 1 soldier (morphotype), det. N. Holmgren, det. H. Hagen as *T. grandis*, labeled "Hagen revid, 1856"; 1 soldier, det. T. E. Snyder, coll. P. Rambur, M.C.Z.; 1 soldier, unlabeled but associated with the Erichson imago from British Guiana, Berlin Mus.

British Guiana, 1 imago (cotype of *decumanus*), det. H. Hagen as *T. grandis*, det. W. F. Erichson as *T. decumanus*, coll. R. Schomburgk, No. 2764, Berlin Mus.; 1 female (cotype of *de-*

cumanus), det. H. Hagen as *T. grandis*, det. W. F. Erichson as *T. decumanus*, coll. R. Schomburgk, M.C.Z.

Arabupu (05°00' N., 60°45' W.), Mt. Roraima, Brazil, soldiers, coll. G. H. H. Tate, XII.1927, 4200 feet, G.87, Acc. 29780, A.M.N.H.

Ireng River (05°16' N., 60°22'–60°54' W.) to Roraima, Brazil, soldiers, VIII.1911, M.C.Z., A.M.N.H.

Tapajos River (02°27'–07°27' S., 54°42'–57°55' W.), Brazil, soldiers, VIII, Thayer Expedition, M.C.Z., A.M.N.H.

Vista Alegre (01°35' N., 61°09' W.), Rio Branco, Brazil, 1 soldier, det. T. E. Snyder, coll. J. Bequaert, foraging in daytime.

Santarem (03°30' S., 54°20' W.), Brazil, soldiers, det. T. E. Snyder, coll. Thayer Expedition.

Congonhas (20°54' S., 45°47' W.), Brazil, 1 soldier, det. H. A. Hagen as *T. dirus*, coll. H. Burmeister, M.C.Z.

Bahia (13°10' S., 38°50' W.), Brazil, 1 male, det. N. Holmgren, 22.II.1903.

Akuriman (not found on map but located in upper Caroni River basin [05°–07° N., 61°30'–

63°20' W.], Bolivar), Venezuela, soldiers, coll. P. J. Anduze, XI.1940.

Syntermes lighti, new species

Syntermes peruanus SNYDER, 1926, p. 15, pl. 2, fig. 8 (soldier).

SOLDIER (FIG. 8): Head, labrum, base of mandibles, postmentum, thoracic nota, legs, tergites, and sternites covered with bristles but comparatively sparse on the head. Head large, widest behind, sides slightly curved and converging somewhat toward the front. Frontal tube very short, posterior edge joining the vertex with an even curve in profile, opening facing upward at an angle. Antennae broken in the specimens before me. Lateral angles of labrum about rectangular, some slightly more and some slightly less than a right angle. Narrowest portion of postmentum about two-thirds width of widest portion. Left mandible with large tooth join-

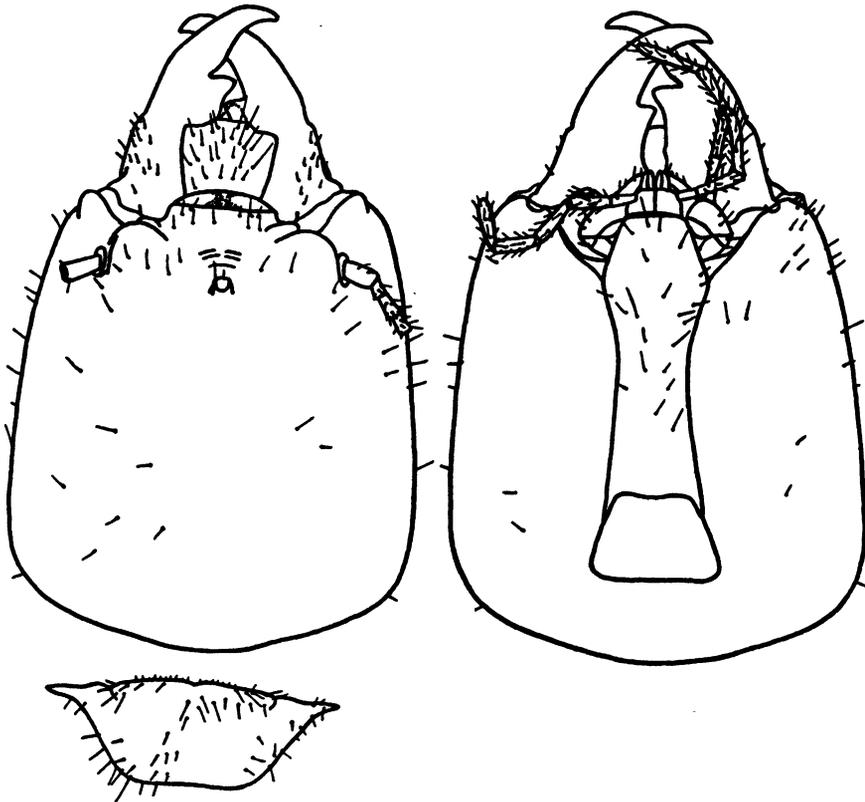


FIG. 8. Dorsal view of head and pronotum and ventral view of head of soldier of *Syntermes lighti*, new species, holotype.

ing apical cutting edge at an angle of about 45°, apical cutting edge sigmoid. Right mandible with large tooth joining apical cutting edge at an angle somewhat less than a right angle. Margin of basal portion of mandible on outer edge about a third of the length of the outer edge from base. Front margin of pronotum slightly emarginate. Lateral thoracic spines comparatively rather small.

SOLDIER (FIG. 9): Head, labrum, postmentum, thoracic nota, legs, tergites, and sternites with bristles, rather sparse on the head and postmentum, short and few on the base of the mandibles. Head fairly large, sides slightly curved and converging only a little toward the front. Frontal tube short, posterior margin joined in even, shallow curve with vertex in profile, opening facing upward at an

	SOLDIER	No.	RANGE	MEAN
Total length		2	17.00-17.50	17.25 mm.
Length of head with mandibles		4	9.39- 9.77	9.59
Length of head to side base of mandibles		5	6.58- 6.77	6.70
Width of head		5	5.92- 6.14	6.05
Length of left mandible		6	3.63- 3.72	3.69
Length of left mandible from tip to point of tooth		4	1.09- 1.23	1.18
Length of postmentum		5	3.38- 3.96	3.74
Widest width of postmentum		6	1.47- 1.59	1.51
Narrowest width of postmentum		6	0.91- 1.06	0.97
Length of pronotum		5	1.71- 1.88	1.79
Width of pronotum		6	3.96- 4.32	4.09
Width of mesonotum		6	3.17- 3.41	3.34
Width of metanotum		5	3.78- 4.21	4.05
Length of hind tibia		4	6.10- 6.58	6.31

COMPARISONS: The closest species is *S. hageni*, which differs especially in the smaller-sized head and the straighter sides of the head. When more collections have been made, it is possible that gradations between these two named species may indicate that they should be placed in subspecific or varietal rank.

Syntermes grandis is also close, but the sides of the head converge more toward the front, and the pronotal spines are less long.

DISTRIBUTION (FIG. 1): Villa Bella (10°27' S., 65°28' W.), Bolivia (type locality), 4 soldiers (holotype and paratypes) removed from pins, det. T. E. Snyder, 1926, p. 15, as *S. peruanus*, coll. J. D. Haseman, 9.X.1909, Acc. 4043, Carnegie Mus., A.M.N.H.

Caicara (03°14' S., 64°49' W.), Brazil, 2 soldiers (paratypes), coll. Natterer, from Vienna Mus., M.C.Z.

REMARKS: I have named this species in honor of Prof. S. F. Light of the University of California whose work has greatly advanced our knowledge of both the taxonomy and physiology of termites.

Syntermes hageni Holmgren

Syntermes dirus, form *hageni* HOLMGREN, 1911, pp. 547, 548 (soldier).

angle of about 45°. Antennae with 20 articles, penultimate article 0.44 mm. long and 0.16 mm. wide. Lateral angles of labrum about equal to a right angle. Narrowest portion of postmentum a little less than two-thirds the width of the widest portion. Left mandible with marginal tooth extending well beyond the apical cutting edge and making an angle of about 45°, apical cutting edge sigmoid. Right mandible with prominent marginal tooth making an angle with apical cutting edge a little less than a right angle. Front margin of pronotum emarginate. Lateral spines of medium size and about of equal size in the three thoracic nota.

Length of head with mandibles	9.30 mm.
Length of head to side base of mandibles	6.20
Width of head	5.37
Length of left mandible	3.66
Length of left mandible from tip to point of tooth	1.22
Length of postmentum	3.78
Widest width of postmentum	1.38
Narrowest width of postmentum	0.82
Length of pronotum	1.68
Width of pronotum	3.96
Width of mesonotum	3.18
Width of metanotum	3.84
Length of hind tibia	6.28

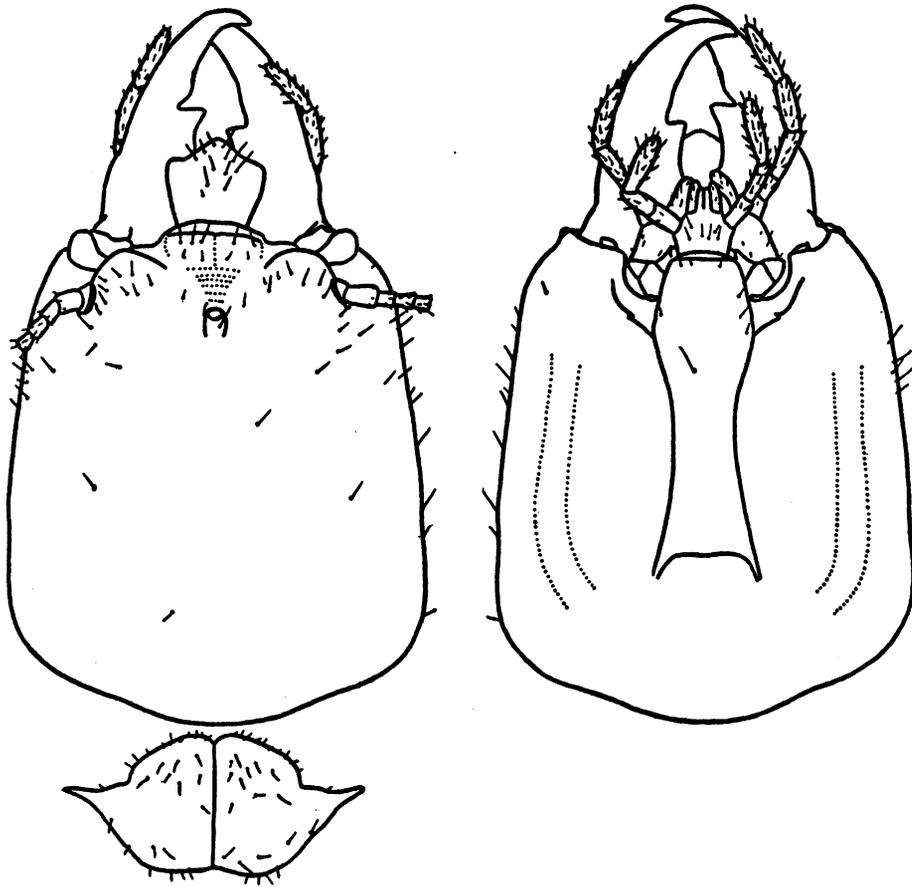


FIG. 9. Dorsal view of head and pronotum and ventral view of head of soldier of *Syntermes hageni* Holmgren, holotype.

COMPARISONS: This species was described, as far as can be determined, from a unique soldier originally from Hagen's collection. This specimen seems to belong to a distinct species. Other specimens determined as this species in the literature belong to other species.

Syntermes wheeleri is close, but the head and mandibles are shorter in proportion to the width of the head.

Syntermes grandis is close, but the head width is greater, the sides of the head converge more toward the front, the bump at the ventral mandibular condyle is less sharp, the pronotal spines are a little less long and are more blunt. The frontal tube and mandibular type are similar.

Syntermes lighti is close, but the head is larger and the sides are more curved. Frontal

tube, mandibular type, and thoracic spines are quite similar.

DISTRIBUTION: Brazil (type locality), 1 soldier (holotype) removed from pin, det. N. Holmgren as "*T. Hageni* n. sp. revid. Hagen 1856, Brazil."

***Syntermes wheeleri*, new species**

SOLDIER (FIG. 10): Head with fairly numerous scattered bristles. Labrum, postmentum, base of mandibles, thoracic nota, tergites, and sternites with numerous bristles. Head with sides slightly curved and converging only a little toward the front. Frontal tube short, posterior margin joined in an even curve with the vertex in profile, anterior portion only very slightly elevated above the head, opening facing upward at an angle of about 45°–60° to the main axis of the head. Antennae with 20 articles, penultimate article 0.15–

0.17 mm. wide. Lateral angles of labrum slightly less to slightly greater than a right angle. Narrowest portion of postmentum about four-sevenths to nine-fourteenths the width of widest portion. Mandibles comparatively somewhat short in relation to width of head, hook at tip comparatively short. Left mandible with a prominent marginal tooth projecting well beyond the border of the apical cutting edge and forming an angle of

about 70° with the apical cutting edge which is distinctly sigmoid. Right mandible with a prominent marginal tooth (0.2 mm. wide from the notch to the tip) making an angle about equal to a right angle with the apical cutting edge. Front margin of pronotum slightly emarginate. Lateral spines somewhat short, a little larger than the mesonotal and metanotal spines.

LARGE WORKER: Color of head similar but a little more variegated than soldier. Head, pronotum, and tergites with numerous bristles. Fontanelle white, about the same size as the antennae sockets. Antennae with 20 articles. Front margin of pronotum slightly or not emarginate. Thoracic nota with sharp lateral spines.

Width of head 3.72–3.96 mm.
Width of pronotum 2.35–2.78

COMPARISONS: I regret the paucity of the material of this form, and the determination as a new species must be considered tentative. The specimens are closer to *S. hageni* than to any other species. I am more confident of the specific distinction of the other species named from few specimens than I am in this case. In view of the range of variation in other forms, however, I think the most probable hypothesis is that the specimens represent a new species or subspecies.

Syntermes hageni differs in having a longer head and mandibles, and sparser distribution of hairs on the head and postmentum. The frontal tube and general mandibular characters are similar in the two species.

DISTRIBUTION (FIG. 1): Rio (probably Rio de Janeiro, $23^\circ 18' S.$, $43^\circ 18' W.$), Brazil (type locality), 1 pinned soldier (holotype), det. H. Bur-

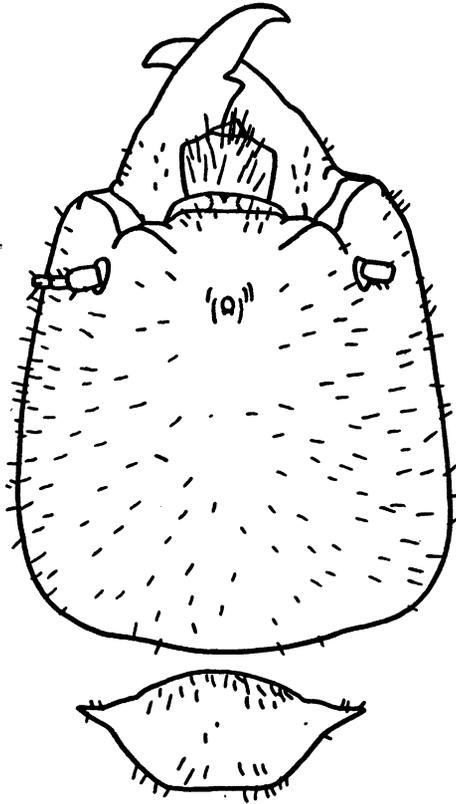


FIG. 10. Head and pronotum of soldier of *Syntermes wheeleri*, new species, holotype.

SOLDIER	No.	RANGE	MEAN
Length of head with mandibles	4	8.36–8.65	8.52 mm.
Length of head to side base of mandibles	5	5.73–6.10	5.86
Width of head	5	5.37–5.79	5.60
Length of left mandible	4	3.23–3.47	3.36
Length of left mandible from tip to point of tooth	4	0.97–1.10	1.05
Length of postmentum	4	3.17–3.54	3.32
Widest width of postmentum	5	1.44–1.58	1.49
Narrowest width of postmentum	5	0.82–1.10	0.94
Length of pronotum	5	1.50–1.64	1.61
Width of pronotum	5	3.45–4.03	3.89
Width of mesonotum	5	2.64–3.70	3.37
Width of metanotum	5	3.25–4.33	4.03
Length of hind tibia	5	4.82–5.30	5.08

meister and H. Hagen as *T. dirus*, type No. 25707, M.C.Z.

São Paulo (Ibirapuéra) (23°44' S., 46°38' W.), São Paulo, Brazil (not included in map which was prepared before this record), 4 soldiers (paratypes) with workers and nymphs, coll. R. L. Araujo, 10.VIII.1944, No. 2322, hill-like nest.

scattered bristles. Labrum, legs, and sternites with bristles, and sternites also with short hairs. Head stocky, nearly quadrangular, sides only slightly converging toward the front and slightly curved; frontal tube short. Antennae with 19 articles, penultimate arti-

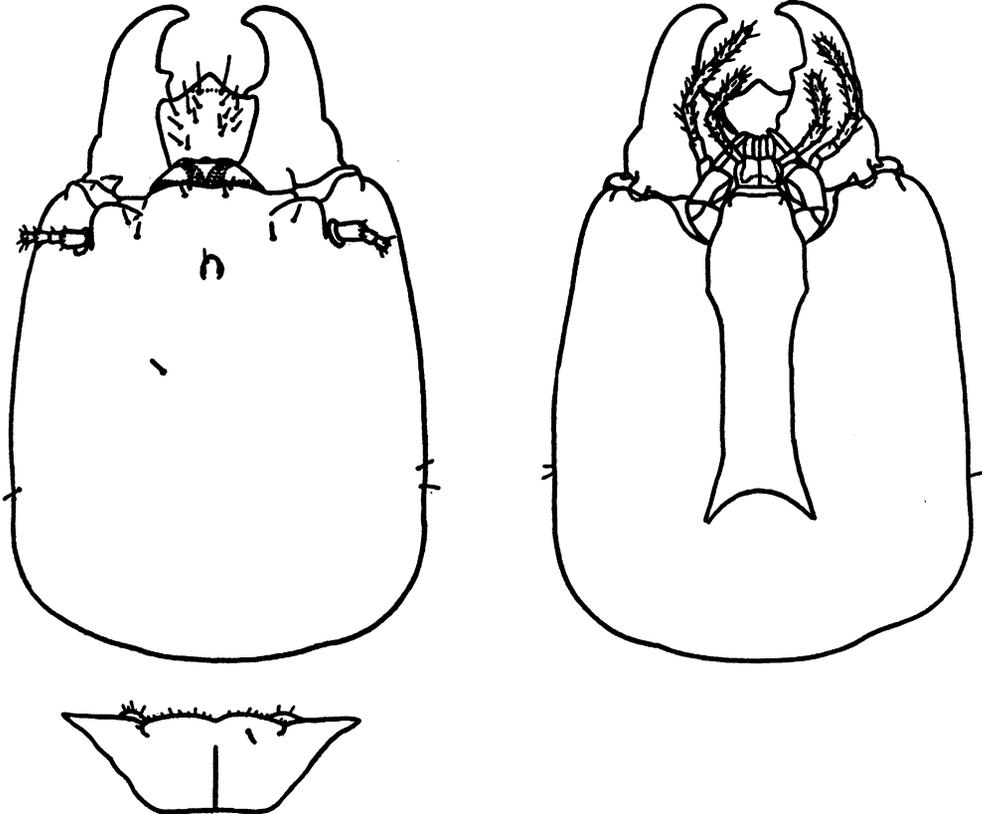


FIG. 11. Dorsal view of head and pronotum and ventral view of head of soldier of *Syntermes brevimalatus*, new species, paratype.

REMARKS: The holotype specimen seems to have been part of the original series of *T. dirus* determined by Burmeister. The other two soldiers of the series conform to other *S. dirus* material.

I have named the species in honor of the late W. M. Wheeler whose personality and achievements were a source of great inspiration to me.

***Syntermes brevimalatus*, new species**

SOLDIER (FIG. 11): Antennae brown and contrasting with yellowish head. Head, base of mandibles, postmentum, thoracic nota, and tergites almost bare with only a few

cle about 0.15 mm. wide. Tip of labrum a little greater than a right angle, side angles about equal to a right angle. Postmentum stocky, only a little constricted in the middle, narrowest portion more than two-thirds width of widest portion. Mandibles comparatively short for this genus, curved. Left mandible with a large marginal tooth, fairly blunt point about equal to a right angle, basal anterior angle slightly greater than a right angle; second marginal tooth quite blunt. Right mandible with a fairly large marginal tooth, the tip greater than a right angle and not forming a sharp angle with the apical tooth, but cutting edge fairly evenly

SOLDIER	No.	RANGE	MEAN
Total length	2	18.00	18.00 mm.
Length of head with mandibles	3	9.68-9.96	9.84
Length of head to side base of mandible	3	7.33-7.43	7.36
Width of head	3	6.39	6.39
Length of left mandible	3	3.17-3.23	3.21
Length of postmentum	2	4.32-4.33	4.33
Widest width of postmentum	2	1.44-1.47	1.46
Narrowest width of postmentum	3	1.00-1.12	1.06
Length of pronotum	3	1.58-1.64	1.61
Width of pronotum	3	4.39-4.63	4.49
Length of hind tibia	2	4.57-4.63	4.60

curved in contrast to the somewhat straight cutting edge of the left mandible just posterior to the hooked tip. Front margin of the pronotum emarginate, hind margin nearly straight or slightly concave, lateral spines of medium size and length. Lateral spines of mesonota and metanota not so large as those of the pronotum, directed laterally or slightly posteriorly.

LARGE WORKER: Color similar to soldier, including the brown contrasting antennae. Head, thorax, and tergites with few scattered bristles. Fontanelle white, smaller than antennae sockets. Antennae with 19 articles. Labrum hatchet-shaped, anterior margin evenly curved. Front margin of pronotum slightly emarginate. Pronotum with a small round or elongate depression in center. Thoracic nota with sharp lateral spines.

Width of head	3.35-3.45 mm.
Width of pronotum	2.40-2.48

COMPARISONS: The soldiers of this species have the shortest mandibles in relation to the width of the head of any described species of *Syntermes*. Also the head is about as bare of hairs and bristles as any species of the genus. The species is so distinct from the others that I do not know which is the most closely related. Possibly when the imago is discovered we may have sufficient characters to form a judgment.

DISTRIBUTION (FIG. 1): On Oronoque River (02°42' N., 57°25' W.), British Guiana (type locality), 3 soldiers (holotype and paratypes) with workers, coll. N. A. Weber, 22.VII.1936, No. 584. Found in a vial with *S. aculeosus*. Weber's field notes are included under general ecology of the genus.

***Syntermes peruanus* Holmgren**

Termes dirus HOLMGREN, 1906, p. 545 (imago, soldier, workers).

Syntermes dirus HOLMGREN, 1909, p. 85 (anatomy).

Syntermes peruanus HOLMGREN, 1911, pp. 546, 548 (imago, soldier).

? *Syntermes bolivianus* HOLMGREN, 1911, pp. 547, 548 (soldier).

? *Syntermes bolivianus* HOLMGREN, 1912, p. 47 (locality).

? *Syntermes bolivianus* SNYDER, 1924, p. 23 (soldier).

Syntermes peruanus SNYDER, 1924, p. 22 (imago, soldier).

IMAGO: Head with scattered long bristles. Fontanelle oval, about as long as the ocelli, light colored and depressed. Eyes relatively small and prominent. Ocelli of medium size, about midway between the eyes and fontanelle. Antennae with 20 articles, the third longer than the second, the second about equal to the fourth. Pronotum narrower than the head, front margin not emarginate, front lateral angles nearly round, very slightly angular, the angle being more obtuse than a right angle, sides curved, hind margin emarginate.

Length with wings (Holmgren, 1911, p. 548)	34.50-40.00 mm.
Length of head to side base of mandibles	2.65
Width of head	3.84
Diameter of eye	0.85
Eye from lower margin	0.24
Length of ocelli	0.38
Width of ocelli	0.24
Ocelli from eyes	0.59
Ocelli from fontanelle	0.59
Length of fontanelle	0.36
Width of fontanelle	0.32
Length of postclypeus	0.53
Width of postclypeus	1.47
Length of pronotum	1.58
Width of pronotum	3.60-3.72
Length of hind tibia	6.10
Length of anterior wing scale	2.07

COMPARISONS: *Syntermes dirus* has the pronotum wider than the head, lateral angles of the pronotum sharper, and eyes smaller with ocelli farther from the eyes. *S. grandis* has a longer pronotum and larger eyes, and the pronotum has sharper lateral angles. *S. magnoculus* has a larger eye, proportionately longer pronotum, and in general is of larger size. *S. molestus* is smaller with the ocelli closer to the eyes than to the fontanelle. *S. obtusus* has a larger eye and is generally larger. *S. parallelus* is a smaller species with sharper pronotal angles. *S. snyderi* has the pronotum wider than the head, and the pronotal angles are much sharper. *S. territus* has a smaller eye, proportionately longer pronotum, and sharper pronotal angles.

SOLDIER: Head, pronotum, and tergites with a number of straight bristles. Head with somewhat convex sides converging slightly toward the front. Profile of head strongly convex. Frontal tube with a very slight angle where it joins the vertex, anterior margin hardly elevated above the head, frontal opening facing upward at an angle of 45–60° from the long axis of the head. Antennae with 20 articles, the fourth barely separated from the third in the two specimens. Lateral angles of labrum about equal to a right angle or a little more obtuse, tip sharper than a right angle. Narrowest portion of postmentum about two-thirds the width of widest portion. Left mandible with first marginal tooth extending somewhat beyond the continuation of the apical cutting edge (less so than in *S. lighti* and more so than in *S. calvus*), apical cutting edge sigmoid, the notch forming an angle of about 45°. Right mandible with a distinct marginal tooth which is not projecting very far from the apical cutting edge (about 0.13 mm.). Pronotum with front margin slightly or distinctly emarginate, lateral spines of medium size and about equal in size to those of the mesonota and metanota.

Length of head to side base of mandibles	5.06–5.24 mm.
Width of head	4.94–5.00
Length of left mandible	3.23
Length of postmentum	3.05
Widest width of postmentum	1.23–1.29
Narrowest width of postmentum	0.88
Length of pronotum	1.40–1.53
Width of pronotum	3.17–3.23
Width of mesonotum	2.56–2.71

Width of metanotum	3.29–3.54
Length of hind tibia	4.69

COMPARISONS: No type specimens of *S. bolivianus* were found in the Holmgren collection in Stockholm. I cannot determine *S. bolivianus* from the meager descriptions and am tentatively placing this species in synonymy with *S. peruanus*. Holmgren separates *S. bolivianus* from *S. peruanus* by the weaker dentation in the mandibles of *S. bolivianus*.

Syntermes dirus (specimen determined by Hagen) is larger, with more bristles on the head; angle of junction between the frontal tube and the vertex is much sharper, but the mandibles are very similar in type. I think that *S. dirus* is the closest relative to *S. peruanus*. *S. chaquimayensis* (cotype) is large, with more abundant bristles on the head, proportionately larger and thicker thoracic spines, and with a proportionately shorter marginal tooth on the right mandible. *S. silvestrii* (autotype from San Bernardino, Paraguay) has proportionately shorter marginal tooth on left mandible, is a larger species, and has no angle between the vertex and frontal tube.

DISTRIBUTION (FIG. 1): Mojos (14°36' S., 68°56' W.), Bolivia, 2 imagoes (white), 1 soldier and workers (cotypes), det. N. Holmgren as *S. dirus*, coll. N. Holmgren; 1 soldier (cotype) labeled as above.

The species is also recorded from Juan del Oro, Tambopata Valley (13°22'–14°58' S., 69°00'–69°55' W.), Peru (type locality); Santa Cruz (17°37' S., 63°16' W.), Bolivia; and Pata (14°34' S., 68°43' W.), Caupolicán, Bolivia.

REMARKS: Holmgren originally recorded his *S. dirus* from the above localities. *S. bolivianus* was later recorded only from south Bolivia. He described *S. bolivianus* from soldiers only, so it is presumed that the vial containing imagoes, a soldier, workers, and nymphs in my collection from Mojos, Bolivia, are cotypes of *S. peruanus*.

Syntermes dirus (Burmeister)

Klug is usually considered as the author of this species, but no published description from his pen has been found, and consequently the species should be assigned to Burmeister. It would be necessary to examine all the original material in various collections before the following synonymy could be veri-

fied. In some cases I have been able to examine some old collections including specimens determined by Burmeister, Perty, Rambur, and Hagen, but I am by no means sure of other portions of the synonymy. Hagen examined many of these old determined specimens, and he was a careful and meticulous taxonomist who laid an excellent foundation for our present knowledge of the classification of termites. However, he made a few errors, and all his material needs further examination and comparison in the light of recent investigations. Latreille's type of *Termes spinosum* is reported present in the Selys Longchamps collection in Brussels. If this finally proves to belong to *S. dirus*, the name of the species should revert to the earlier name. However, I hesitate to use Latreille's name without re-examining his specimens.

In the following synonymy an asterisk denotes specimens reexamined by me:

? *Termes spinosum* LATREILLE, 1805a, p. 70 (soldier).

? *Termes spinosum* LATREILLE, 1805b, p. 63 (soldier).

Termes fatale PERTY, 1830, p. 127 (imago), pl. 25, fig. 8 (imago).

* *Termes flavicolle* PERTY, 1830, p. 128 (imago), pl. 25, fig. 11 (imago), fig. 13 (soldier).

* *Termes dirus* BURMEISTER, 1839, p. 766 (imago).

Termes from Brazil, WESTWOOD, 1840, p. 12 (imago), fig. 58, 1-11 (imago).

Termes obscurum BLANCHARD, 1840, pl. 47, fig. 1.

* *Termes costatus* RAMBUR, 1842, p. 305 (imago).

* *Termes dirus* RAMBUR, 1842, p. 307 (imago).

? *Termes cephalotes* RAMBUR, 1842, p. 309 (soldier).

? *Termes dirus* WALKER, 1853, p. 510 (imago, synonymy).

? *Termes dubius* WALKER, 1853, p. 521 (imago).

? *Termes cephalotes* WALKER, 1853, p. 521 (imago).

* *Termes dirus* HAGEN, 1858a, p. 151 (imago, soldier, worker), pl. 2, figs. 16, 17 (imago), pl. 3, fig. 17 (imago). [Part.]

* *Termes dirus* HAGEN, 1858b, p. 21 (imago).

* *Termes dirus* HAGEN, 1862, pp. 83-85 (imago, soldier, worker), pl. 4, figs. 1-8 (imago).

Termes spinosus WASMANN, 1897, p. 139 (synonymy).

Termes spinosus DESNEUX, 1904, p. 38 (synonymy), pl. 2, fig. 8, 8a, 8b (imago, soldier, worker).

* *Syntermes dirus* HOLMGREN, 1911, pp. 545-548 (imago, soldier).

Termes spinosus DESNEUX, 1915, p. 8 (synonymy).

Syntermes dirus SNYDER, 1924, p. 21 (imago), p. 22 (soldier), p. 24 (imago), p. 27 (soldier from Brazil only).

	IMAGO	No.	RANGE	MEAN
Length with wings		3	39.00-43.00	40.33 mm.
Length without wings		1	16.50	—
Length of head with mandibles		1	4.76	—
Length of head to side base of mandibles		5	2.76- 3.11	2.99
Width of head		17	3.45- 3.88	3.70
Diameter of eye		8	0.71- 0.74	0.72
Eye from lower margin		4	0.29- 0.35	0.31
Length of ocelli		5	0.23- 0.35	0.30
Width of ocelli		4	0.19- 0.23	0.21
Ocelli from eyes		6	0.61- 0.71	0.66
Ocelli from fontanelle		6	0.56- 0.74	0.66
Length of fontanelle		5	0.37- 0.53	0.44
Width of fontanelle		5	0.38- 0.53	0.44
Length of labrum		2	0.90- 1.21	1.05
Width of labrum		2	1.45- 1.56	1.50
Length of postclypeus		3	0.71- 0.79	0.75
Width of postclypeus		3	1.53- 1.62	1.58
Length of left mandible		1	2.12	—
Length of pronotum		11	1.87- 2.06	1.92
Width of pronotum		17	3.72- 4.27	3.99
Length of hind tibia		3	5.98- 7.19	6.46
Length of anterior wing scale		3	2.32- 2.35	2.34
Length of anterior wing from suture		7	28.58-34.22	31.86
Width of anterior wing		8	6.96- 8.08	7.58

* *Syntermes hageni* SNYDER, 1924, p. 22 (soldier), p. 28 (soldier), pl. 4, fig. 21 (soldier).

Termes spinosus HANDLIRSCH, 1930, p. 847, fig. 894 (soldier).

IMAGO (FIGS. 2, 3): Head yellow brown; postclypeus and labrum slightly lighter than the head; pronotum slightly lighter than the head, sometimes with dark markings; wings brown. Head with a few scattered bristles; pronotum with bristles on the anterior and posterior margins and a few on other parts; wing scales with medium long bristles. Fontanelle larger than the ocelli, round, white. Eyes relatively small, prominent. Ocelli of medium size, about midway between the eyes and fontanelle. Antennae with 20 articles, the third as long or longer than the second, the second longer than the fourth. Pronotum wider than the head, somewhat saddle-shaped with a vertical front surface in the middle covered with short bristles, anterior angles about equal to, or slightly sharper than, a right angle, sides curved and hind margin conspicuously emarginate.

COMPARISONS: The closest imago is that of *S. snyderi* which is somewhat larger (pronotum width 4.27–4.77 mm.).

SOLDIER: Head, base of mandibles, postmentum, and pronotum covered rather abundantly with bristles. Head large, sides fairly straight, converging a little toward the front. Frontal tube raised above the rest of the head, the anterior and posterior portions about equally long, the opening nearly vertical or pointed upward at an angle of about 45° to the axis of the head, an angle between the vertex and frontal tube in profile. Antennae with 20 articles. Lateral angles of the labrum more obtuse than a right angle.

Narrowest width of postmentum about three-fourths of the widest width. Left mandible with prominent marginal tooth a little wider than the apical cutting edge. Apical cutting edge distinctly sigmoid. Angle between tooth and apical cutting edge about 30–45°. Right mandible with a relatively small prominent marginal tooth, about 0.15–0.18 mm. wide from the base of the notch. Front margin of pronotum emarginate or fairly evenly curved. Lateral spines of medium length. Lateral spines of mesonota and metanota about equal in size to the pronotal spines.

COMPARISONS: In no case am I sure that the soldiers examined were found with reproductives. An imago and a soldier from Burmeister's material in the Museum of Comparative Zoölogy have the same label and may have been collected from the same colony. There is some variation among the examined soldiers in the size of the pronotal spines and in the teeth of the mandibles, which may prove to be characteristic of subspecies, but for the present I am not attempting to subdivide the species on the basis of the few specimens available for study.

Syntermes peruanus cotypes are smaller; the frontal tube is not so large, particularly the anterior projecting portion; and the head has fewer bristles.

Syntermes silvestrii has shorter marginal teeth in both mandibles, a shorter frontal tube, and shorter thoracic spines.

Syntermes calvus has more strongly converging sides toward the front, somewhat fewer bristles, and with proportionately longer apical teeth in both mandibles.

These four species seem to be quite closely related.

SOLDIER	No.	RANGE	MEAN
Length of head with mandibles	3	8.05–8.65	8.32 mm.
Length of head to side base of mandibles	9	5.43–6.16	5.75
Width of head	14	5.00–6.61	5.48
Length of left mandible	11	3.06–3.79	3.34
Length of left mandible from tip to point of tooth	7	1.04–1.35	1.15
Length of postmentum	4	3.03–3.41	3.25
Widest width of postmentum	10	1.29–1.53	1.40
Narrowest width of postmentum	8	0.82–1.00	0.91
Length of pronotum	8	1.58–1.83	1.72
Width of pronotum	13	3.54–4.17	3.97
Width of mesonotum	11	2.93–3.49	3.10
Width of metanotum	11	3.66–4.39	4.09
Length of hind tibia	7	4.51–5.79	5.30

DISTRIBUTION (FIG. 1): Rio (probably Rio de Janeiro, 23°18' S., 43° 18' W.), Brazil (type locality), 1 imago (cotype), det. H. Burmeister and H. Hagen as *T. dirus*, coll. v. Olfers, No. 2763, Berlin Mus.; 4 imagoes (cotypes and probably the original Klug material), No. 3628 from the Berlin Mus.; 1 female (cotype), det. H. Burmeister and H. Hagen as *T. dirus*, M.C.Z.; 2 soldiers (probably from the type series, although Burmeister did not describe the soldier caste), det. H. Burmeister and H. Hagen as *T. dirus*, M.C.Z.

Brazil (no other locality mentioned), 1 imago, det. M. Perty as *T. flavicollis*, redet. N. Holmgren as *S. dirus*, Munich Mus.; 1 male, 1 female, 1 soldier, det. H. Hagen as *T. dirus*, coll. Winthem, type No. 204 (not sure these are Burmeister types), M.C.Z.; 1 female (possibly the type of *T. costatus*, although Rambur, 1842, records the species from Cayenne), det. P. Rambur as *T. costatus*, det. H. Hagen as *T. dirus*, coll. P. Rambur, type No. 419, M.C.Z.; 1 male, det. P. Rambur as *T. dirus*, coll. P. Rambur, M.C.Z.

Unknown locality, 1 imago (metatype), det. N. Holmgren, coll. Tschudi, 1863; 1 soldier, det. N. Holmgren, det. H. Hagen as *T. dirus*, labeled "Hagen revid. 1856"; 1 soldier, det. H. Hagen as *T. dirus*, from Berlin Mus.; 2 soldiers, Perty's Coll., Munich Mus. One of these seems to be a typical *dirus*, but the other is larger with a larger tooth in the right mandible and may possibly not be conspecific, although I have included it in the table of measurements.

Corcovado (not located on map), Rio, Brazil, 1 soldier, det. H. Hagen as *T. dirus*, M.C.Z.

Entre Rios (22°08' S., 43°15' W.), Rio de Janeiro, Brazil, 1 soldier, det. T. E. Snyder (1924, p. 28) as *S. hageni*, coll. J. D. Haseman, 4.VI.1908, Carnegie Mus. Acc. No. 3564, A.M.N.H.

Mang (possibly Manga, 14°45' S., 43°56' W.), central Brazil, 1 imago (metatype), det. N. Holmgren, coll. R. Fischer, 3.XI.1913, from Kaiser Wilhelm Inst., Berlin-Dahlem.

Barro Alto (not located on map but possibly Barra, 15°40' S., 46°35' W., or Barra, 17°05' S.,

44°40' W.), Minas Geraes, Brazil, 1 soldier, coll. José Blaser, 31.XI., M.C.Z.

Iguassu (probably Ituassu, 13°24' S., 43°10' W.), Bahia, Brazil, 3 soldiers, coll. A. Roman, 29.VII.1924 (1), 31.VII.1924 (2).

Manaos (03°06' S., 60°00' W.), Amazonas, Brazil, 1 imago (metatype), coll. A. Roman, 9.XI.1923, flying; 1 imago, coll. T. C. Fletcher, received 19.I.1863, from M.C.Z.

Surinam, 1 male, det. H. Hagen as *T. dirus*, coll. Thorey, M.C.Z. The wings seem a little more hyaline than the other *S. dirus* on pins. This specimen could conceivably be the imago of *S. calvus*, but I am classifying it as *S. dirus* for the present.

Walker (1853, p. 510) records the species from Para (01°35' S., 48°30' W.), Rio de Janeiro (23°18' S., 43°18' W.), and the interior of Brazil. Hagen (1858a, p. 151) records the species from Minas Geraes, Caiçara (03°14' S., 64°49' W.), Rio, Congonhas (20°54' S., 45°47' W.), and Lagoa Santa (19°41' S., 43°57' W.), Brazil, and also from Guiana. Desneux (1915, p. 8) records *Termes spinosus* from Tijucca (probably Tijucas, 27°15' S., 48°38' W.), Santa Catharina, Brazil.

Syntermes silvestrii Holmgren

Termes dirus SILVESTRI, 1901, p. 4.

Termes dirus SILVESTRI, 1903, p. 48 (soldier, workers), p. 115 (biology), pl. 2, figs. 75-78 (soldier, workers), pl. 6, fig. 298 (biology).

Syntermes silvestrii HOLMGREN, 1911, pp. 546, 548 (soldier).

Syntermes silvestrii HOLMGREN, 1912, pp. 19, 47, text fig. 4 (soldier mandibles), pl. 2, fig. 14 (soldier).

Syntermes silvestrii SNYDER, 1924, p. 23 (soldier).

SOLDIER: Head, base of mandibles, labrum, postmentum, thorax, and abdomen with numerous bristles. Sides of head converging only a little toward the front, fairly straight. Frontal tube very short, without an

SOLDIER	
Length of head to side base of mandible	
Width of head	
Length of left mandible	
Length of postmentum	
Widest width of postmentum	
Narrowest width of postmentum	
Length of pronotum	
Width of pronotum	
Width of mesonotum	
Width of metanotum	
Length of hind tibia	

No.	RANGE	MEAN
6	5.85-6.49	6.08 mm.
6	5.45-5.95	5.77
5	3.17-3.66	3.42
2	3.17-3.47	3.32
4	1.35-1.61	1.49
4	0.85-1.00	0.94
6	1.60-1.92	1.73
6	3.66-4.16	3.95
6	2.76-3.67	3.13
6	3.47-4.33	3.79
6	5.06-5.75	5.29

angle between the vertex and the frontal tube anterior margin hardly elevated above the head, opening upward at about an angle of 45° . Antennae with 20 to 21 articles. Lateral angles of labrum blunter than a right angle. Narrowest portion of postmentum about two-thirds the width of the widest portion. Left mandible with marginal tooth extending about to the continuation of the apical cutting edge which is sigmoid, angle of notch less than 45° . Right mandible with blunt and rather short marginal tooth. Pronotum with front margin slightly or not emarginate. Thoracic spines medium size.

COMPARISONS: Originally described by Silvestri as *Termes dirus*, this species was recognized and described by Holmgren. *S. silvestrii* is closest to *S. dirus*, but there is no angle between the vertex and the frontal tube. *S. peruanus* is smaller and has a slight angle between the frontal tube and the vertex in profile, and the left mandible has a proportionately longer marginal tooth. *S. territus* is smaller, the sides of the head are more

parallel, the mesonotal and metanotal spines are shorter, the dentation of the mandibles is similar, but the tips of the mandibles are more curved and the head is a little less hairy.

DISTRIBUTION (FIG. 1): Coxipo ($15^\circ 30'$ S., $56^\circ 00'$ W.), Cuyabá, Matto Grosso, Brazil (type locality), 1 soldier (cotype), det. F. Silvestri as *T. dirus*, redet. N. Holmgren as *S. silvestrii*, coll. F. Silvestri, 6.IX.1900, Silvestri Coll., Portici.

San Bernardino ($25^\circ 19'$ S., $57^\circ 16'$ W.), Paraguay, 3 soldiers (autotypes), det. N. Holmgren, coll. K. Fiebrig.

Paraguay, 1 soldier (autotype), det. N. Holmgren, coll. K. Fiebrig, No. 26.

S. Sofia (not located on map), Argentina, 1 soldier, coll. Reimoser, 20.V.1908, from Vienna Mus.

Syntermes calvus, new species

SOLDIER (FIG. 12): Antennae not much darker than head. Head, thoracic nota, and tergites with a few bristles. Head with sides fairly straight, converging toward the front, hind margin slightly angular. Frontal tube short, in a small depression in the head, open-

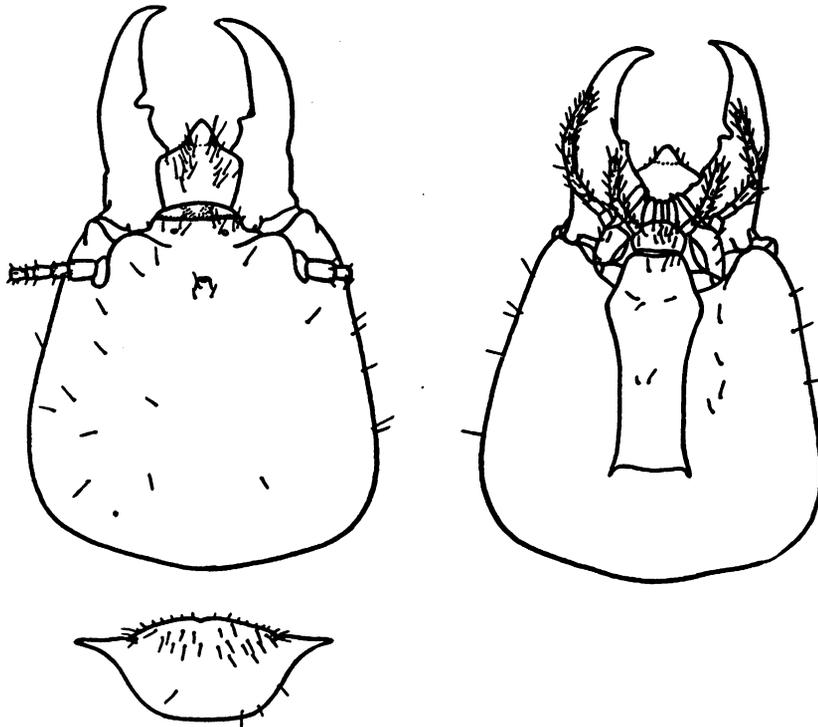


FIG. 12. Dorsal view of head and pronotum and ventral view of head of soldier of *Syntermes calvus*, new species, holotype.

ing forward or a little upward with an angle at the junction of the frontal tube and vertex. Antennae with 19 to 20 articles, subapical articles about 0.15 mm. wide. Tip of labrum sharper than a right angle, side angles greater than a right angle. Postmentum curved in cross section, narrowest portion more than two-thirds the width of the widest portion. Mandibles proportionately long, somewhat curved and hooked a little near the tip. Left mandible with a notch just in front of the first marginal tooth, the angle of the notch about 45°, the tip of the tooth sharper than a right angle, another smaller and wider notch about

COMPARISONS: The soldier is closer to *S. dirus* than to any other described species. *S. dirus* has more bristles on the head, the sides are not so strongly converging, and the frontal tube is more prominent and is not sunk in as much of a depression. The mandibles and notal spines are quite similar.

DISTRIBUTION (FIG. 1): Kartabo (06°23' N., 58°42' W.), British Guiana (type locality), 2 soldiers (holotype and paratype), coll. A. Emerson, 19.IV.1924, colony under log; 1 soldier, workers (paratype), 29.III.1924, No. 24.83, under log on ground; 1 soldier (paratype), 13.VII.1924, found in jaws of worker ant, *Termitopone commutata*

	SOLDIER	No.	RANGE	MEAN
Total length		4	17.50-19.00	18.25 mm.
Length of head with mandibles		4	7.99- 8.27	8.11
Length of head to side base of mandibles		4	5.24- 5.61	5.41
Width of head		5	4.94- 5.30	5.10
Length of left mandible		5	3.25- 3.40	3.30
Length of left mandible from tip to point of tooth		5	1.15- 1.35	1.27
Length of postmentum		5	3.05- 3.29	3.15
Widest width of postmentum		5	1.41- 1.53	1.45
Narrowest width of postmentum		5	0.98- 1.07	1.02
Length of pronotum		5	1.64- 1.77	1.72
Width of pronotum		5	3.63- 3.84	3.77
Length of hind tibia		4	5.00- 5.24	5.15

halfway between the first marginal tooth and the base and a fairly sharp tooth-like projection just anterior to the molar plate. Right mandible with anterior angle of marginal tooth slightly greater than a right angle, the tip of the tooth about equal to a right angle or less. Front margin of pronotum slightly emarginate, hind margin nearly straight in center with evenly curved angles. Lateral spines not very long, tip 0.76 mm. from the angle at the junction with the anterior lobe. Lateral spines of mesonota and metanota narrower than the pronotal spines.

LARGE WORKER: Color a little lighter than the soldier. Head, pronotum, and tergites with a few bristles. Fontanelle white, smaller than antennae sockets. Antennae with 20 articles. Labrum hatchet-shaped with curved margins and rounded angles. Front margin of pronotum very slightly emarginate, an elongated pit in the center of the pronotum. Thoracic nota with sharp lateral spines.

Width of head	3.60 mm.
Width of pronotum	2.74

(Roger), No. 24.235; 1 soldier (paratype), 6.IX.1920, found in jaws of worker *T. commutata*, No. 316, paratype No. 25708, M.C.Z.; 1 soldier (paratype), workers, 18.VI.1924, No. 24.178, from stomach contents of the lizard, *Ameiva ameiva*.

Syntermes territus Emerson

Syntermes territus EMERSON, in Snyder, 1924, p. 22 (imago), p. 23 (soldier).

Syntermes territus EMERSON, 1925, pp. 310, 359 (imago, soldier), text fig. 45 (imago, soldier).

Syntermes territus WHEELER, 1936, pp. 173, 174, 176, 189 (biology).

IMAGO: Head dark brown with yellow brown streaks, postclypeus and labrum yellow brown, pronotum similar color to head, portions of wing scales darker than general pronotal color, wings brown, tergites dark brown, sternites yellow brown. Head and pronotum with a few scattered bristles. Wing scales with a number of bristles. Fontanelle yellowish, depressed, round, smaller than antennal sockets. Eyes small, less than half their diameter from the lower margin. Ocelli of medium size, midway between the eyes and

fontanelle. Antennae with 19 to 20 articles. Pronotum about as wide as, or slightly narrower or wider than, the head, with slightly emarginate front margin, lateral angles bluntly pointed forming an angle equal to, or greater than, a right angle, sides rounded, posterior margin emarginate.

wings. *S. dirus* is larger, with proportionately wider pronotum.

SOLDIER: Head, base of mandibles, postmentum, and pronotum moderately covered with numerous bristles. Head with sides slightly convex or straight, converging only a little toward the front or parallel. Frontal

IMAGO	No.	RANGE	MEAN
Length with wings	4	32.00-35.00	33.00 mm.
Length of head with mandibles	3	3.75- 3.90	3.81
Length of head to side base of mandibles	1	2.56	—
Width of head	17	3.05- 3.50	3.26
Diameter of eye	7	0.53- 0.68	0.62
Eye from lower margin	3	0.21- 0.29	0.24
Length of ocelli	1	0.29	—
Width of ocelli	1	0.19	—
Ocelli from eyes	2	0.53- 0.62	0.58
Ocelli from fontanelle	2	0.53- 0.62	0.58
Length of fontanelle	2	0.29	—
Width of fontanelle	2	0.29- 0.35	0.32
Width of labrum	1	1.29	—
Length of postclypeus	1	0.47	—
Width of postclypeus	1	1.49	—
Length of pronotum	31	1.47- 1.67	1.54
Width of pronotum	17	2.99- 3.60	3.26
Length of hind tibia	2	4.49- 4.76	4.63
Length of anterior wing from suture	2	24.44-25.38	24.91
Width of anterior wing	3	6.00- 6.29	6.16

COMPARISONS: *Syntermes snyderi* is larger, with proportionately wider pronotum. *S. peruanus* is larger and has a larger eye. *S. parallelus* is close, the only difference being the slightly smaller size and a pronotum 1.38-1.41 mm. long. *S. obtusus* is larger and has hyaline wings. *S. molestus* has hyaline wings, the eye is a little larger, and the ocelli are farther from the fontanelle than from the eyes. *S. magnoculus* is larger, with a much larger eye. *S. grandis* is larger and has hyaline

tube forming a flat angle with the vertex, opening nearly vertical to the long axis of the head. Postmentum with narrowest portion about three-fifths the width of the widest portion, narrowest portion with straight or slightly concave sides. Tip of labrum forming a right angle, and lateral angles somewhat less than right angles. Antennae with 19 articles, penultimate article 0.14 by 0.32 mm. Left mandible with first marginal tooth projecting only slightly beyond the apical cutting

SOLDIER	No.	RANGE	MEAN
Length of head with mandibles	1	8.27	— mm.
Length of head to side base of mandibles	4	5.18-6.22	5.79
Width of head	13	4.21-5.24	4.81
Length of left mandible	5	2.80-3.19	3.00
Length of postmentum	1	3.54	—
Widest width of postmentum	1	1.26	—
Narrowest width of postmentum	1	0.76	—
Length of pronotum	1	1.52	—
Width of pronotum	13	2.99-3.68	3.44
Width of mesonotum	1	2.86	—
Width of metanotum	1	3.47	—
Length of hind tibia	3	4.15-4.37	4.22

edge which is sigmoid, angle of notch about 45°. Right mandible with small, blunt marginal tooth. Thoracic nota with small but sharp lateral spines. Front margin of pronotum emarginate.

COMPARISONS: *Syntermes dirus* has marginal teeth in the mandibles more prominent. *S. parallelus* has more slender mandibles and is smaller.

DISTRIBUTION (FIG. 1): Kartabo (06°23' N., 58°42' W.), British Guiana (type locality), 1 imago (morphotype), soldiers (holotype and paratypes), coll. A. Emerson, 1919; king, queen, soldiers (topotypes), 5.IV.1924, No. 24.93a; 2 dealates, 2.VI.1924; 1 imago, 2.VI.1924, No. 24.162c; imagoes, 2.VI.1924, No. 24.162d; soldiers (paratypes), 23.VIII.1920, No. 257; 1 soldier (paratype), 18.X.1920, No. 428, M.C.Z., from colony raided by *Termitopone commutata* recorded by Wheeler, 1936. Alates with workers and soldiers were brought in by Indians on 29.IV.1919 and 4.V.1919. Flying alates were collected 14.VI.1919 and 2.VI.1924.

Cururuzinho, Rio Autaz (03°25' S., 58°50'–60°05' W.), Amazonas, Brazil, 1 soldier, workers, coll. A. Roman, 22.X.1914, with *T. commutata* in the same vial. This soldier has somewhat longer spines on the thorax than the British Guiana types and topotypes but is otherwise very close.

Syntermes parallelus Silvestri

Syntermes parallelus SILVESTRI, 1923, p. 318 (imago, soldier, worker), pl. 15, figs. 1–10 (imago, soldier, worker).

Syntermes parallelus SNYDER, 1924, p. 22 (imago), p. 23 (soldier).

Syntermes colombianus SNYDER, 1924, pp. 23, 29 (soldier), pl. 4, fig. 24 (soldier).

Syntermes parallelus EMERSON, 1925, pp. 310, 361 (imago, soldier), text fig. 46 (imago, soldier).

IMAGO: Head and pronotum dark brown. Wings brown. Ocelli proportionately small, twice their length removed from the eyes. Fontanelle yellowish, depressed and round. Antennae with 19 articles. Pronotum nearly as wide as the head with blunt lateral angles more than a right angle, side margin rounded and hind margin emarginate.

	RANGE
Length with wings	27.50–29.00 mm.
Length of head to side base of mandibles	2.29
Width of head	2.89–3.15
Diameter of eye	0.57–0.63
Length of ocelli	0.27–0.29

Ocelli from fontanelle	0.56–0.57
Ocelli from eyes	0.53–0.56
Length of fontanelle	0.29–0.35
Width of fontanelle	0.23–0.33
Length of left mandible	1.68
Length of pronotum	1.38–1.41
Width of pronotum	2.74–3.00
Length of hind tibia (after Silvestri)	4.00
Length of anterior wing	20.88
Width of anterior wing	5.42–5.80

COMPARISONS: The imago is very close to *S. territus* but is a little smaller.

SOLDIER: Head brownish yellow, covered with short hairs, sides straight and almost parallel. Frontal tube short. Antennae with 19 articles. Left mandible with first marginal tooth about even with an extension of the apical cutting edge. Right mandible with a small obtuse tooth about two-fifths the length of the mandible from the base. Notal spines rather short.

	RANGE
Length of head with mandibles	6.34–6.80 mm.
Length of head to side base of mandibles	4.08–4.28
Width of head	2.97–3.40
Length of left mandible	2.44–2.62
Length of pronotum	1.10–1.22
Width of pronotum	2.19–2.36
Length of hind tibia	2.93–3.50

COMPARISONS: There seems to be little doubt that *S. colombianus* Snyder is a synonym of *S. parallelus*. I can detect no differences of specific importance. The cotype of *S. parallelus* has rather concave sides of the head, while all other specimens from British Guiana have slightly convex sides as in the type specimen of *S. colombianus*. The measurements all seem within the expected limits of variation. The drawing of *S. colombianus* in Snyder, 1924, is quite accurate except that the angles between the lateral and central points of the labrum are not so sharp in the specimen as in the drawing and the right mandible is not so curved at the tip as in the drawing.

This species differs from most of the other species in its small size and comparatively parallel straight sides of the head of the soldier. The closest relatives are probably *S. dirus* or *S. territus*, from which it differs markedly.

DISTRIBUTION (FIG. 1): Canister Falls (04°54' N., 58°30' W.), Demerara River, British Guiana (type locality), 1 soldier (cotype), 1 worker, det. F. Silvestri, coll. A. A. Abraham (Cattle Trail Survey).

Kartabo (06°23' N., 58°42' W.), British Guiana, 1 imago, coll. A. Emerson, 2.VI.1924, No. 24.162c, flying; parts of 6 imagoes, 9 soldiers, workers, 6.VI.1924, coll. A. Emerson, from the stomach of a toad, *Bufo typhonius*, No. 24.169.

Oronoque River (02°42' N., 57°18'-57°26' W.), British Guiana, 1 soldier, coll. N. A. Weber, 21.VII.1936, No. 583, in the jaws of a ponerine ant, *Pachycondyla crassinoda* (Latreille).

Colombia, 1 soldier (holotype of *S. colombianus*), det. H. A. Hagen as *T. dirus*, det. T. E. Snyder as *S. colombianus*, coll. Winthem, type No. 14511, M.C.Z.

BIOLOGICAL NOTES: The ant *Pachycondyla crassinoda* was found by Neal Weber carrying a soldier of *S. parallelus*. This ant was observed by me at Kartabo collecting workers of a species of *Termes* (formerly called *Mirotermes*) from a disturbed nest. The ants took many termites and stuffed them in their mandibles. On April 11, 1924 (No. 24.229), I also found this ant carrying a roach in its mandibles. Thus there is evidence that this species of ant does not confine its diet to termites.

Syntermes molestus (Burmeister)

Termes molestus BURMEISTER, 1839, p. 766 (imago).

Termes molestus WALKER, 1853, p. 513 (imago).
Termes molestus HAGEN, 1858a, p. 159, pl. 3, fig. 19 (imago).

Termes molestus HAGEN, 1858b, p. 22 (imago).
Termes molestus SILVESTRI, 1901, p. 4 (locality).
Termes molestus SILVESTRI, 1903, pp. 51, 116 (imago, soldier, workers, biology), text fig. 10 (wings), pl. 2, figs. 84-85 (imago), figs. 86-88 (soldier), pl. 6, fig. 299 (food).

Syntermes molestus HOLMGREN, 1911, pp. 547, 548 (imago, soldier).

Syntermes brasiliensis HOLMGREN, 1911, pp. 547, 548 (soldier).

Syntermes molestus SNYDER, 1924, pp. 22, 24 (imago), p. 23 (soldier).

Syntermes brasiliensis SNYDER, 1924, p. 23 (soldier).

Syntermes MS species of Emerson, SNYDER, 1924, p. 22 (imago).

Syntermes brasiliensis BEQUAERT, 1925, p. 294 (biology).

Syntermes molestus SNYDER, 1926, pp. 14, 15, pl. 2, fig. 5 (soldier).

Syntermes brasiliensis SNYDER, 1926, p. 13, pl. 2, fig. 9 (soldier).

Syntermes brasiliensis WHEELER, 1936, pp. 174, 176 (biology).

IMAGO: Head, pronotum, and tergites yellowish brown. Labrum, postclypeus, and sternites more yellowish. Wings hyaline and transparent except for yellow brown costal border and radial veins. Head, pronotum, and wing scales covered sparsely with fairly long straight bristles. Ocelli above the level of the

	No.	RANGE	MEAN
Length with wings	6	26.00-33.00	29.92 mm.
Length of head with mandibles	2	3.41- 3.66	3.54
Length of head to side base of mandibles	5	1.94- 2.44	2.12
Width of head	9	2.82- 3.35	2.99
Diameter of eye	11	0.71- 0.88	0.75
Eye from lower margin	8	0.10- 0.23	0.15
Length of ocelli	8	0.29- 0.35	0.33
Width of ocelli	8	0.21- 0.26	0.23
Ocelli from eyes	8	0.35- 0.48	0.42
Ocelli from fontanelle	7	0.47- 0.59	0.54
Length of fontanelle	7	0.18- 0.47	0.31
Width of fontanelle	7	0.15- 0.42	0.27
Length of postclypeus	1	0.50	—
Width of postclypeus	1	1.23	—
Width of labrum	1	1.15	—
Length of pronotum	8	1.26- 1.50	1.39
Width of pronotum	8	2.41- 3.03	2.72
Length of hind tibia	6	3.66- 4.47	4.18
Length of anterior wing scale	1	1.69	—
Length of anterior wing from suture	7	21.19-27.07	25.13
Width of anterior wing	7	5.51- 6.96	6.29

top of the head in profile. Fontanelle yellowish white to brownish yellow, about the same length as the ocelli, round and depressed or with a convex plate. Eyes relatively of medium size and comparatively close to lower margin of head. Ocelli of medium size, closer to the eyes than to the fontanelle, about twice the width of the ocelli from the eyes. Antennae with 20 articles, the third longer than the second, the second longer than the fourth. Pronotum a little narrower than the head, front margin entire, anterior angles rounded, with a median anterior lobe, and sides slightly curved and converging toward the hind margin which is emarginate in the middle. Side posterior angles of mesonotum sharp or rounded and of metanotum rounded.

COMPARISONS: These imagoes differ from each other somewhat in size and in possessing either a fontanelle depression or a fontanelle convex plate. The variation in the fontanelle may occur within the same vial as in the case of imagoes from Ciudad Bolivar, Venezuela. I am unable to discover consistent differences which would require subdivision into two or more species. The species was described from the imago alone from Bahia. Soldiers from Bahia in my collection conform closely to the description of *S. brasiliensis* which I consider a synonym.

SOLDIER	
Length of head with mandibles	4
Length of head to side base of mandibles	8
Width of head	8
Length of left mandible	7
Length of postmentum	4
Widest width of postmentum	6
Narrowest width of postmentum	6
Length of pronotum	6
Width of pronotum	8
Width of mesonotum	7
Width of metanotum	6
Length of hind tibia	6

SOLDIER: Head, postmentum, thoracic nota, and abdomen with a number of straight bristles. Head converging strongly or slightly toward the front, the sides fairly straight or slightly concave in the middle. Frontal tube extremely short, hardly more than a tiny ridge around the opening of the frontal gland. Narrowest portion of the post-

mentum about two-thirds to three-fourths the width of the widest portion. Antennae with 19 or 20 articles, penultimate article 0.11–0.15 mm. wide and 0.23–0.35 mm. long. All points of labrum less than a right angle or lateral points more than right angle. Mandibles long or fairly long, somewhat hooked to strongly hooked at the tip, in some cases the tip pointing at right angles to the axis of the mandible. Left mandible with a small notch anterior to the first marginal tooth forming about a 22–45° angle, and notch posterior to the first marginal tooth forming a right angle or slightly greater than a right angle. First marginal tooth projecting to a line continuous with the apical cutting edge. Right mandible with marginal tooth barely visible. Pronotum with a comparatively large frontal lobe, front margin slightly emarginate. Lateral angles of nota not prolonged into spines, but usually angular. Mesonotum sometimes with rounded sides.

COMPARISONS: The variation of the soldiers in this species is quite great, particularly in the length of the curved hooks in the mandibles in different localities. It may well be that more extensive collections will indicate subspecific populations or even specific differences. However, the gradations in the specimens before me are so slight from one

No.	RANGE	MEAN
4	4.88–6.34	5.61 mm.
8	3.06–4.39	3.57
8	2.42–3.72	2.87
7	1.76–2.70	2.25
4	2.13–2.97	2.67
6	0.71–0.85	0.78
6	0.53–0.62	0.55
6	0.88–1.17	1.02
8	1.39–2.02	1.64
7	1.24–2.03	1.63
6	1.65–2.41	2.09
6	2.65–3.72	3.07

colony to another that I feel it is best at present to treat them all as a single species. The characters are consistent within colonies and in large series, although different colonies from the same locality are not always a perfect match.

The cotype soldiers of *S. brasiliensis* Holmgren seem closely related to the Bom

Fim, Bahia, specimens of *S. molestus* in my collection, and I regard these forms as variants of the same species, although this hypothesis may be disproved as larger series are obtained. Specimens from Villavicencio, Colombia, seem to be almost identical with the cotypes of *S. brasiliensis*; with the Bom Fim, Bahia, specimens; with the Vista Alegre, Rio Branco, Brazil, specimens; with the Tumupasa, Bolivia, specimens; and with the Akuriman, Venezuela, specimens. The Villavicencio specimens differ from those from Paracatu, Minas Geraes, in having a shorter anterior portion of the postmentum in front of the widest part and in having the notch in front of the first marginal tooth of the left mandible forming an angle of 45–60°. Also the tip of the labrum of the Villavicencio form is wider, the point forming a right angle or slightly less. Otherwise large series from these two colonies match quite well. Soldiers from Independencia, Parahyba, Brazil, are a little smaller than the Villavicencio specimens and are without concave sides, the frontal tube is a little more prominent, but the mandibles are similar. The labrum of the Independencia soldier has the middle point narrower at the base and is similar in proportions but smaller than the Paracatu soldiers. A single soldier from Cuyabá, Brazil, has slightly convex sides of the head and is similar in shape to the soldiers from Independencia, but the mandibles have longer hooks. Soldiers from Mte. Sociedad, Paraguay, and Guarany, São Paulo, are very close to Barro Alto, Minas Geraes, specimens but are much smaller than the Villavicencio soldiers, the sides of the head are only slightly converging and are somewhat convex, the mandibles have comparatively short hooks, and the labrum is similar to that of the Independencia soldiers. Soldiers from Corumbá, Matto Grosso, are smaller than soldiers from Independencia, the tips of the mandibles are proportionately less curved, and the side angles of the metanotum are less sharp. The Corumbá specimens are very close to those from Mte. Sociedad. These smaller soldiers from southern localities with straighter mandibles seem to agree with Holmgren's description of *S. molestus*, while the larger soldiers with more curved mandibles from the region of the type locality of *S. molestus* agree with his description of *S.*

brasiliensis. If the species is ultimately divided into subspecies, *S. brasiliensis* would still seem to be a synonym of the typical subspecies.

DISTRIBUTION (FIG. 1): Bahia (13°10' S., 38°50' W.), Brazil (type locality), 1 imago (cotype), det. H. Burmeister and H. A. Hagen as *T. molestus*, coll. Gomez, No. 2765, Berlin Mus.; 1 male (topotype), det. H. Holmgren, coll. Fruhstorfer.

Bom Fim (10°25' S., 40°10' W.), Bahia, Brazil, 1 soldier, coll. J. D. Haseman, 20.XI.1907, Carnegie Mus. Acc. No. 3441, A.M.N.H.

Amazonas, Brazil, 1 male, det. H. A. Hagen, as *T. molestus*, coll. Saunders, XII, M.C.Z.

Unknown locality, 1 soldier (probably cotype of *S. brasiliensis*), det. N. Holmgren as "*Syntermes* n. sp.," from Holmgren's Coll.

Vista Alegre (01°35' N., 61°09' W.), Rio Branco, Brazil, soldiers, workers, det. T. E. Snyder as *S. brasiliensis*, coll. J. Bequaert, 6.IX.1924, "foraging in daytime—savannah."

Paracatu (17°05' S., 46°55' W.), Minas Geraes, Brazil, 1 female, 1 soldier, det. R. G. Temple as *S. brasiliensis*, coll. T. Ivanauskas, 1931, from the Brit. Mus.

Barro Alto (not located on map), Minas Geraes, Brazil, 1 soldier, coll. José Blaser, XI.1931, M.C.Z.

Lassance (17°43' S., 44°35' W.), Minas Geraes, Brazil, 4 imagoes, coll. J. C. Bradley and Harris, 12.XI.1919, 13.XI.1919, 9–19.XI.1919.

Independencia (06°48' S., 35°33' W.), Parahyba, Brazil, soldiers, workers, det. T. E. Snyder, coll. W. M. Mann.

Corumbá (19°07' S., 57°50' W.), Matto Grosso, Brazil, 1 imago, 5 soldiers, det. F. Silvestri as *T. molestus*, coll. F. Silvestri, 27.IX.1900, Silvestri Coll., Portici.

Cuyabá (13°35' S., 56°10' W.), Brazil, 1 soldier, workers, det. F. Silvestri as *T. molestus*, coll. F. Silvestri, VII–IX.1900. The species is also recorded in the literature from Coxipo (15°30' S., 56°00' W.), Cuyabá, Brazil.

Guarany (21°25' S., 48°06' W.), São Paulo, Brazil, 9 soldiers, workers, coll. Jayme V. Pinheiro, II.1943 (dealates in same vial belong to an undetermined species of *Syntermes*).

Mte. Sociedad (not located on map), Paraguay, soldiers, workers, coll. Ternetz, 1895, from Basel Mus.

Tumupasa (13°59' S., 67°48' W.), Bolivia, soldiers, workers, det. T. E. Snyder as *S. brasiliensis*, coll. W. M. Mann, XII.1921.

Villavicencio (04°17' N., 73°43' W.), Meta, Colombia, king, queen, soldiers, workers, coll. C. H. Seevers, 16.VII.1938, No. 14; soldiers, workers, coll. C. H. Seevers, 24.VII.1938, No. 28.

Ciudad Bolivar (08°7' N., 63°56' W.), Venezuela, imagoes, coll. P. J. Anduze, 22.VII.1940.

Akuriman (not located on map but in upper Caroni River basin [05°–07° N., 61°30'–63°20' W.], Bolivar), Venezuela, soldiers, workers (2 vials), coll. P. J. Anduze, XI.1940.

Borgmeier (1930) records the species from Campinas (16°45' S., 49°15' W.), Goyaz, Brazil. The specimens were determined by T. E. Snyder as *S. brasiliensis*.

OTHER RECORDS OF *SYNTERMES*

Syntermes sp. Reichensperger (1936, p. 230), from Santa Cruz (17°21' S., 48°18' W.), Goyaz, Brazil.

Syntermes sp. Dealates, Guarany (21°25' S., 48°06' W.), São Paulo, Brazil, coll. Jayme V. Pinheiro, II.1943 (soldiers and workers in the same vial were determined as *S. molestus*, but these

dealates do not conform to the description of this species).

Syntermes sp. Wings, workers, Urucum (19°13' S., 57°35' W.), Matto Grosso, Brazil, 19.VIII.1926, coll. K. P. Schmidt, "large brown earthen nest," Emerson Coll.

Syntermes sp. near *grandis*. Imagoes, Lassance (17°43' S., 57°35' W.), Minas Geraes, Brazil, 12.XI.1919, coll. Harris, Emerson Coll.

Syntermes sp. A single pinned soldier in poor condition in the M.C.Z. labeled "Marurú. April." (Locality not located on map.) This species is probably new but is in such poor condition that it should not be named. The hairs on the head are thick and curly as in *S. aculeosus*, but the spines, although large, are not so large as in *S. aculeosus*, and the mandibles are quite different.

Syntermes sp. Workers only, Villavicencio, Meta, Colombia, coll. C. H. Seevers.

Syntermes sp. Workers only, Madeira Mamore (09°43' S., 65°22' W.), Peru.

BIBLIOGRAPHY

BEQUAERT, J.

1925. *Neotermes* injurious to living guava tree, with notes on other Amazonian termites. *Ent. News*, vol. 36, pp. 289–294.

1926. The medical report of the Hamilton Rice seventh expedition to the Amazon. Cambridge, Harvard University Press, p. 183.

BLANCHARD, E.

1840. In Castelnau, F., *Histoire naturelle des insectes*. Paris, vol. 3, 672 pp.

BORGMEIER, TH.

1930. Eine neue termitophile Histeridengattung aus Brasilien. *Zool. Anz.*, vol. 88, pp. 33–39.

BURMEISTER, H.

1839. *Handbuch der Entomologie: Neuroptera*. Berlin, vol. 2, order 2, pp. 757–768.

DESNEUX, J.

1904. *Isoptera*, fam. Termitidae. *Genera Insectorum*, fasc. 25. Brussels, 52 pp.

1915. *Isoptera: Collections zoologiques du Baron Edm. de Selys Longchamps*. Brussels, fasc. 3, pt. 3, pp. 1–10.

EMERSON, A. E.

1925. The termites of Kartabo, Bartica District, British Guiana. *Zoologica*, vol. 6, pp. 291–459.

1928. Termites of the Belgian Congo and the Cameroon. *Bull. Amer. Mus. Nat. Hist.*, vol. 57, pp. 401–574.

1938. Termite nests—a study of the phylogeny of behavior. *Ecol. Monogr.*, vol. 8, pp. 247–284.

ERICHSON, W. F.

1848. *Insecten*. In Schomburgk, R., *Reisen in Britisch-Guiana*. Leipzig, vol. 3, pp. 553–617.

HAGEN, H. A.

1853. Hr. Peters berichtete über die von ihm gesammelten und von Hrn. Dr. Hermann Hagen bearbeiteten Neuropteren aus Mossambique. *Ber. K. Preussischen Akad. Wiss. Berlin*, 1853, pp. 479–481.

1858a. *Monographie der Termiten*, part 2. *Linnaea Ent.*, vol. 12, pp. 1–342.

1858b. *Catalogue of the specimens of neuropterous insects in the collection of the British Museum*, part 1, *Termitina*. London, 34 pp.

1862. *Neuroptera, Termitina*. In Peters, W. C. H., *Naturwissenschaftliche Reise nach Mosambique*. Berlin, vol. 5, pp. 57–89.

HANDLIRSCH, A.

1930. *Isoptera oder Termiten*. In Kükenthal, W., and Krumbach, T., *Handbuch der Zoologie*. Berlin and Leipzig, vol. 4, pp. 840–858.

HARE, LAURA

1937. Termite phylogeny as evidenced by soldier mandible development. *Ann. Ent. Soc. Amer.*, vol. 37, pp. 459–486.

- HOLMGREN, N.
 1906. Studien über südamerikanische Termiten. Zool. Jahrb., Abt. Syst., vol. 23, pp. 521-676.
 1909. Termitenstudien I. Anatomische Untersuchungen. K. Svenska Vet.-Akad. Handl., vol. 44, no. 3, pp. 1-215.
 1910. Das System der Termiten. Zool. Anz., vol. 35, pp. 284-286.
 1911. Bemerkungen über einige Termiten-Arten. *Ibid.*, vol. 37, pp. 545-553.
 1912. Termitenstudien III. Systematik der Termiten. Die Familie Metatermitidae. K. Svenska Vet.-Akad. Handl., vol. 48, no. 4, pp. 1-166.
- KINSEY, A. C.
 1936. The origin of higher categories in Cynips. Indiana Univ. Publ. Sci. Ser., no. 4, 334 pp.
- LATREILLE, P. A.
 1805a. Histoire naturelle générale et particulière, des crustacés et des insectes. Paris, vol. 13, pp. 51-70.
 1805b. Nouveau dictionnaire d'histoire naturelle. Paris, vol. 22, pp. 49-63.
- LIGHT, S. F.
 1927. A new and more exact method of expressing important specific characters of termites. Univ. California Publ. Ent., vol. 4, pp. 75-88.
- PERTY, M.
 1830. Delectus animalium articulorum Brasiliam. Munich, pp. 127-128.
- RAMBUR, P.
 1842. Histoire naturelle des insectes Neuroptères. Paris, pp. 300-309.
- REICHENSPERGER, A.
 1936. Beitrag zur Kenntnis der Myrmecophilen- und Termitophilenfauna Brasiliens und Costa Ricas IV. Rev. Ent., vol. 6, pp. 222-242.
- SEEVERS, C. H.
 1941. New termitophilous Diptera from the neotropics. Publ. Field Mus. Nat. Hist., zool. ser., vol. 24, pp. 175-193.
- SILVESTRI, F.
 1901. Nota preliminare sui Termitidi sudamericani. Boll. Mus. Zool. Anat. comp. Torino, vol. 16, no. 389, 8 pp.
 1903. Contribuzione alla conoscenza dei Termitidi e Termitofili dell' America meridionale. Redia, vol. 1, pp. 1-234.
 1923. Descriptiones Termitum in Anglorum Guiana. Zoologica, vol. 3, pp. 307-321.
- SJÖSTEDT, Y.
 1926. Revision der Termiten Afrikas 3. Monographie. K. Svenska Vet.-Akad. Handl., vol. 3, no. 1, pp. 1-419.
- SNYDER, T. E.
 1924. Descriptions of new species and hitherto unknown castes of termites from America and Hawaii. Proc. U. S. Natl. Mus., vol. 64, art. 6, pp. 1-40.
 1926. Termites collected on the Mulford biological exploration to the Amazon basin, 1921-1922. *Ibid.*, vol. 68, art. 14, pp. 1-76.
- WALKER, F.
 1853. List of the specimens of neuropterous insects in the collection of the British Museum, part 3, Termitides. London, pp. 501-529.
- WASMANN, E.
 1894. Kritisches Verzeichniss der myrmecophilen und termitophilen Arthropoden mit Angabe der Lebensweise und mit Beschreibung neuer Arten. Berlin, 231 pp.
 1897. Termiten von Madagaskar und Ostafrika. Abhandl. Senckenbergische Naturf. Gesellsch., vol. 21, pp. 137-182.
- WESTWOOD, J. O.
 1840. Introduction to the modern classification of insects. London, vol. 2, pp. 5-17.
- WHEELER, W. M.
 1922. Neotropical ants of the genera Carebara, Tranopelta and Tranopeltoides, new genus. Amer. Mus. Novitates, no. 48, pp. 1-14.
 1936. Ecological relations of ponerine and other ants to termites. Proc. Amer. Acad. Arts and Sci., vol. 71, pp. 159-243.

