

American Museum Novitates

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CENTRAL PARK WEST AT 79TH STREET, NEW YORK 24, N.Y.

NUMBER 1987

MARCH 1, 1960

New Genera on the *Subulitermes* Branch of the Nasutitermitinae from the Ethiopian Region (Isoptera, Termitidae)¹

BY ALFRED E. EMERSON²

The present paper is the second in a series of taxonomic articles dealing with the termites of the Belgian Congo collected by the author in 1948 (Emerson, 1959). Type specimens are deposited in the American Museum of Natural History, and duplicate paratypes have been exchanged with numerous institutions in various parts of the world.

The author has attempted to place the termite fauna of central Africa in its evolutionary, geographic, and ecologic perspective (Emerson, 1928, 1951, 1953, 1955, 1956a, 1956b, 1959, 1960). The new genera described in this article are all confined to the Ethiopian zoogeographical region, but the basic stock from which they arose is postulated, on circumstantial evidence, to have originated in the Neotropical region

¹ Financial assistance for the collection and study of these termites was furnished by the New York Zoological Society, for study in the Belgian Congo (1948); the Belgian American Educational Foundation (Fellow, 1948); the Dr. Wallace C. and Clara A. Abbott Memorial Fund of the University of Chicago; and the National Science Foundation (Grant G-3266, 1957). Assistance in the field was given by M. Fl. Jurion, Directeur Général de l'Institut National pour l'Étude Agronomique du Congo Belge at Yangambi at the time of my visit; Mrs. Patrick Putnam, in charge of Camp Putnam at the time of my visit; and the late Winifred Jelliffe Emerson, who made many collections during our travels in the Belgian Congo. Assistance in the preparation of the manuscript and in comparative studies of termites in European museums was given by my wife, Eleanor Fish Emerson.

² Research Associate, Department of Insects and Spiders, the American Museum of Natural History, and Professor of Zoology, the University of Chicago.

during the first half of the Cretaceous period. The primitive genera of the subfamily Nasutitermitinae with mandibulate soldiers are all confined to the Neotropical region. Two major branches, the *Nasutitermes* branch and the *Subulitermes* branch, independently gave rise to genera possessing nasute soldiers with functionless vestigial mandibles. These advanced convergent forms seem to have dispersed over northern tropical land connections in early Cretaceous times to give rise to endemic genera in each tropical zoogeographical region following the establishment of climatic and geographical barriers to termite dispersal (Emerson, 1955, 1960) during the mid-Cretaceous and early Tertiary to mid-Tertiary periods.

Prior to the collection in 1948 of four new genera described in the following pages, two genera on the *Subulitermes* branch, *Eutermellus* Silvestri (1912) and *Mimeutermes* Silvestri (1914), were known to occur in Africa, but their phylogenetic relationships were not understood until Ahmad (1950) used the imago-worker mandible for phylogenetic interpretation. Sands (1956) has recently described an additional species of *Mimeutermes*. Fuller (1922, p. 115) described a species under the name "*Subulitermes hainesi*" from South Africa, but an examination of the type specimens by the present author shows that the species is surely on the *Nasutitermes* branch of the subfamily and is most probably based on a minor soldier of *Trinervitermes*, to which genus it is now tentatively assigned. Sjöstedt (1926, p. 310) referred to this species as "*Eutermes Hainesi* (Fuller)," and Snyder (1949, p. 339) referred to the same species as "*?Subulitermes hainesi* Fuller."

Most of the genera of the *Subulitermes* branch in the Old World possess diminutive nasute soldiers. All seem to nest below the surface of the soil or in mounds constructed by other genera of termites. For these reasons these termites are not collected so often as the larger and more conspicuous termites, and in addition it is likely that many of the species are rare in comparison with other groups. Particularly in South and Central America, however, some of the species on the *Subulitermes* branch are abundant both as individuals and as colonies, and the primitive genera have comparatively large mandibulate soldiers.

So far as is known, most of the genera of the *Subulitermes* branch are inhabitants of the soils of tropical rain forests, although a few species and a few genera may be confined to the drier grassland soils.

It is the opinion of the author that only rarely can biotic significance be attached to the association of two or more species of termites in the same nest. Mounds of termites are attractive to colonizing pairs,

probably because of the physical factors in the microniche (Emerson, 1956a). Calaby (1956) has discussed and reviewed the associations of inquiline species of termites. Host-specific inquiline termites exist, but such associations are rare, and the majority of reported associations of different species of termites are not true cases of biotic dependence. No true socially parasitic termites exist analogous to the socially parasitic wasps, bees, and ants.

VERRUCOSITERMES, NEW GENUS

= Genus *Verrucositermes* EMERSON, 1955, p. 515 (no description).

TYPE SPECIES: *Verrucositermes tuberosus*, new species.

IMAGO (FIG. 1): Head rather thickly covered with hair of medium length and also with a few scattered bristles longer than the hair. Pronotum, tergites, and sternites fairly thickly covered with medium long hairs. Head roundly oval. Eye proportionately large and almost touching the lower border of the head. Ocellus large, about two-thirds of its width from the eye. Fontanelle visible as a long light streak, with

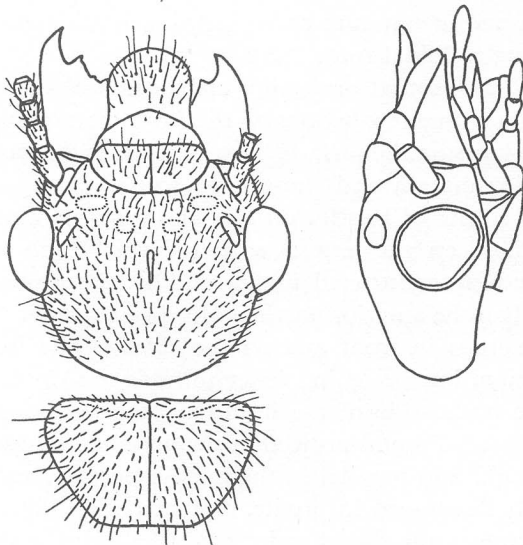


FIG. 1. Head and pronotum from above and head from the side of the morphotype imago (king) of *Verrucositermes tuberosus*, new species.

a slight depression immediately posterior to it. Antenna broken (more than 13 articles). Postclypeus a little shorter than half of its width (0.15 mm. long and 0.32 mm. wide). Pronotum with sides converging

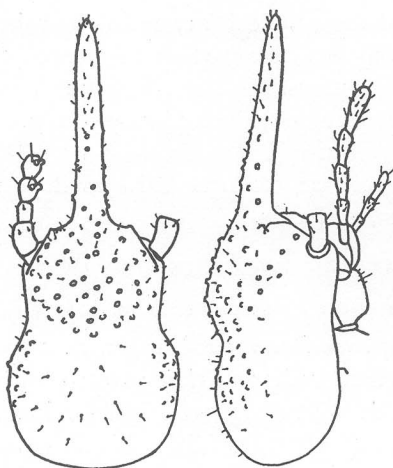


FIG. 2. Head from above and from the side of the holotype soldier of *Verrucositermes tuberosus*, new species.

towards the rear, and hind margin slightly emarginate. Hind margins of mesonotum and metanotum emarginate, each middle angle greater than a right angle. Tibial spurs 2:2:2.

SOLDIER (FIG. 2): Frontal projection and head with numerous short hairs. Pronotum with a few bristles on the front margin and numerous scattered short hairs on the surface. Tergites each with a row of bristles on the posterior margin and short hairs scattered over the surface. Sternites with a row of bristles on the posterior margins, and hairs longer than those on the tergites scattered thickly on the surfaces. Head conspicuously constricted in the middle, the posterior portion a little wider than the anterior portion. Head covered with many small tubercles, numerous in front and on the sides of the front and the frontal projection, but becoming fewer towards the tip of the frontal projection, the under side of the head, and the posterior portion of the top of the head. Frontal projection slender and elongated, sides of projection straight and parallel in the middle portion, and projection pointed slightly downward in profile. Antenna with 12 or 13 articles, the second narrower but almost as long as the third; the third, fourth, and fifth about equal. There are three tubercles on the inner side of the antennal articles from the third to the ninth or tenth. Mandibles without apical points. Front margin of the pronotum evenly curved, without a central indentation. The angle between the frontal lobe and the posterior portion of the pronotum in profile is close to a right angle.

WORKER (FIG. 3): Mandibles fairly close to those of *Subulitermes microsoma* (see Emerson, 1960, fig. 1). The apical teeth are distinctly larger than the first marginal teeth in both mandibles. The left mandible index (distance from the tip of the apical tooth of the left mandible to the tip of the first marginal tooth divided by the distance from the tip of the first marginal tooth to the tip of the third marginal tooth) is 1.46 compared to 1.29–1.33 in *Subulitermes microsoma*. The

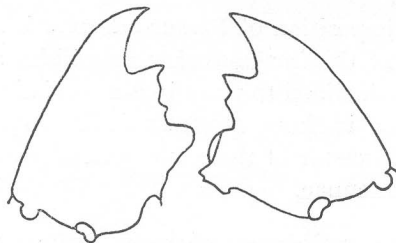


FIG. 3. Mandibles of the worker from the type colony of *Verrucositermes tuberosus*, new species.

angle between the apical tooth and the first marginal tooth is sharper and the cutting edge of the first plus the second marginal tooth is somewhat more undulating in *Verrucositermes tuberosus* compared to the left mandible of *Subulitermes microsoma*. The right mandible possesses a prominent second marginal tooth in both species. (Some specimens have the second marginal tooth less conspicuous than in figure 3, possibly from wear.)

RELATIONS: The imago of *Eutermellus bipartitus* (Sjöstedt) is larger; the fontanelle is shorter; the postclypeus is proportionately longer; the pronotum is proportionately longer; and the posterior projections of the mesonotum are rounded. The left mandible index of the worker of *Eutermellus bipartitus* is 1.12.

The soldier of *Verrucositermes* is unique among all known genera of nasute termites in its possession of numerous conspicuous tubercles on the head and antennae. Because of their structure and position, these tubercles are probably olfactory sense organs. The lack of the points on the soldier mandibles is shared by *Subulitermes*, *Convexitermes*, *Aciculitermes*, *Ceylonitermellus*, *Oriensubulitermes*, *Occasitermes*, *Occultitermes*, *Macrosubulitermes*, *Eutermellus*, *Afrosulitermes*, *Postsubulitermes*, and *Tarditermes*. Reduction of points on the vestigial mandibles probably evolved convergently several times in the evolution of the nasute soldiers on the *Subulitermes* branch of the subfamily (Emerson, 1960). Among the allied African genera, the soldier

of *Eutermellus bipartitus* is larger and has a proportionately wider posterior portion of the head, a less conspicuous constriction of the head, a more conical frontal projection, and several long bristles on the head. The soldier of *Afrosubulitermes congoensis* (fig. 4) has a less constricted head and a few longer bristles on the head. The soldier of *Postsubulitermes parviconstrictus* (fig. 7) has a very slight constriction of the head, and short hairs are lacking on the base and middle of the frontal projection.

The phylogenetic position of *Verrucositermes* is not very clear, but, taking into account the imago-worker mandibles and the characters of the soldier, I am inclined to place it as a specialized offshoot branching off immediately in front of *Afrosubulitermes*. It seems unlikely that the common ancestor of these two genera possessed the tubercles on the head and antennae.

Verrucositermes tuberosus, new species

IMAGO (KING; FIG. 1): Head dark brown. Postclypeus yellow-brown, with a median longitudinal line. Labrum and pronotum same color as postclypeus. Wing scales with portions darker than the pronotum. Tergites and sternites yellow-brown. Antenna broken in the specimen, the third article narrower than the fourth but of almost the same length, the fourth equal to the fifth.

TABLE 1
MEASUREMENTS (IN MILLIMETERS) OF THE MORPHOTYPE KING OF
Verrucositermes tuberosus, NEW SPECIES

Length of head from front of postclypeus	0.71
Width of head	0.82
Diameter of eye	0.27
Length of ocellus	0.13
Width of ocellus	0.09
Ocellus from eye	0.06
Length of pronotum	0.38
Width of pronotum	0.62
Length of hind tibia	1.00

SOLDIER (FIG. 2): Head yellowish. Frontal projection slightly darker than the lighter portion of the head. Abdomen the color of the gray intestinal contents. The slight difference in the size of the soldiers from two colonies geographically far apart (see table 2) may be due to slight racial differences, differences in the maturity of the colonies, or a slight

difference in the genetics of the reproductive pairs. In the absence of other structural distinctions, it is deemed best to include the two colonies under the same species designation.

TABLE 2
MEASUREMENTS (IN MILLIMETERS) OF SOLDIERS OF *Verrucositermes*
tuberosus, NEW SPECIES

	Type Colony, Leopoldville			Paratype Colony, Camp Putnam		
	No.	Range	Mean	No.	Range	Mean
Length of head	4	1.26-1.29	1.28	22	1.32-1.40	1.36
Width of head	4	0.47-0.49	0.48	22	0.48-0.53	0.52
Thickness of head, including postmentum and tubercles	4	0.45-0.47	0.46	22	0.47-0.51	0.50
Width of pronotum	4	0.32-0.34	0.33	22	0.34-0.41	0.37
Length of hind tibia	4	0.71-0.74	0.73	22	0.75-0.84	0.79

The generic and specific descriptions are taken from a morphotype king, four soldiers (holotype and paratypes), workers, and nymphs from the type colony collected by A. Emerson at Kalina Point on the Congo River, Leopoldville (latitude 4° 18' S., longitude 15° 18' E.), Belgian Congo, on June 5, 1948, in soil at the base of a tree in second-growth woods with other termites; and from 22 soldiers, workers, and nymphs from a paratype colony collected by A. Emerson at Camp Putnam (latitude 1° 24' N., longitude 28° 36' E.) on the Epulu River, Belgian Congo, on May 22, 1948, in the ground under a log in the rain forest.

AFROSUBULITERMES, NEW GENUS

= Genus *Afrosubulitermes* EMERSON, 1955, p. 515 (no description).

TYPE SPECIES: *Afrosubulitermes congoensis*, new species.

SOLDIER (FIG. 4): Head with six long bristles, four in a row behind the antennae and two on the vertex. Head and frontal projection covered with abundant short hairs. Pronotum with a few long bristles and some short hairs. Tergites each with a posterior row of short bristles and also covered with hairs about half as long as the bristles. Sternites with bristles and hairs longer than those on the tergites, but with the same proportions of length. Head with a weak and rather inconspicuous constriction behind the antennae. Frontal projection is of medium length, with parallel straight sides through most of its length. Antenna with 12 articles. Mandibles without points. Front margin of the pronotum evenly and flatly convex, profile with the

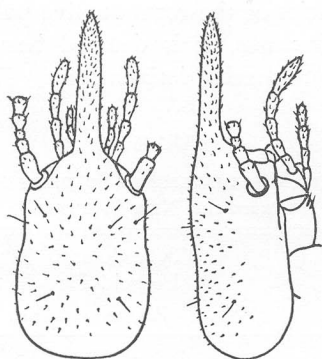


FIG. 4. Head from above and from the side of the holotype soldier of *Afrosbulitermes congoensis*, new species.

angle between the front and back portions less than a right angle. Tibial spurs 2:2:2.

WORKER (FIG. 5): The mandibles are fairly close to those of *Subulitermes microsoma* (Silvestri) from Brazil (Emerson, 1960, fig. 1). The left mandible index is 1.47 compared to 1.29–1.33 in *Subulitermes microsoma*. The apical tooth of each mandible is large in comparison with the first marginal tooth. The cutting edge of the first plus second



FIG. 5. Mandibles of the worker from the type colony of *Afrosbulitermes congoensis*, new species.

marginal tooth of the left mandible is undulating. The third marginal tooth of the left mandible is closer to the molar plate than in *Verrucositermes*, and the second marginal tooth of the right mandible is less conspicuous than it is in *Verrucositermes* and *Subulitermes*. The molar plate of the left mandible of the worker is more prominent than in the nymph with wing pads, but it is still not so prominent nor so rounded as in *Verrucositermes*.

RELATIONS: *Afrosbulitermes* seems to be most closely related to *Verrucositermes* among the African genera on the *Subulitermes* branch of the Nasutitermitinae. The soldier of *Verrucositermes* differs sharply

by the possession of tubercles on the head. *Eutermellus* has an imago-worker left mandible index of 1.12 and also has a somewhat reduced second marginal tooth in the imago-worker right mandible. The imago-worker mandibles of *Mimeutermes*, *Postsubulitermes*, and *Tarditermes* have proportionately larger apical teeth, with consequently higher left mandible indices, although the absence of a definite third marginal tooth in the left mandible of *Mimeutermes* makes it impossible to calculate the left mandible index with accuracy.

***Afrosubulitermes congoensis*, new species**

SOLDIER (FIG. 4): Head and frontal projection brownish yellow. Thorax and abdomen pale yellow. Head portion without the frontal projection, from above somewhat quadrangular, with the sides roughly parallel. Antenna with 12 articles, the third article narrower and a little shorter than the fourth, the fourth shorter than the second (in some specimens these articles approach equal length). Other characters of the species are included in the generic description.

TABLE 3

MEASUREMENTS (IN MILLIMETERS) OF TEN SOLDIERS OF *Afrosubulitermes congoensis*, NEW SPECIES, FROM STANLEYVILLE, LEOPOLDVILLE, AND NEAR BRAZZAVILLE

	Range
Length of head	1.01-1.07
Width of head	0.37-0.41
Thickness of head, including postmentum	0.37-0.39
Width of pronotum	0.24-0.32
Length of hind tibia	0.47-0.53

RELATIONS: The soldier is easily distinguished from the known species in allied genera by the quadrangular shape of the head, the medium length of the frontal projection, the pilosity of the head, the lack of small tubercles on the head, and the slight constriction of the head.

The description of both the genus and species is taken from numerous soldiers, workers, and nymphs from six colonies. The type colony (holotype soldier, paratype soldiers, workers) was collected by A. Emerson at Stanleyville (latitude 0° 30' N., longitude 25° 11' E.), Belgian Congo, on May 26, 1948, in a mound nest in second-growth woods with several other species of termites. Two paratype colonies

were also collected by A. Emerson at Stanleyville, Belgian Congo, on June 1, 1948, and a single soldier was collected by N. A. Weber, No. 2235, at the same locality on March 19, 1948. A paratype colony with soldiers and workers was collected by A. Emerson at Leopoldville (latitude $4^{\circ} 18' S.$, longitude $15^{\circ} 18' E.$), Belgian Congo, on June 5, 1948, in a carton nest below the surface of the ground within another nest occupied by *Tuberculitermes bycanistes* (Sjöstedt) in second-growth woods. A paratype colony was collected by A. Emerson 13 kilometers west of Brazzaville (latitude $4^{\circ} 14' S.$, longitude $15^{\circ} 22' E.$), French Equatorial Africa, on June 8, 1948, in a mound of *Amitermes evuncifer* Silvestri 2 feet high in a burned-over pineapple field near the edge of some moist woods.

In all recorded cases, the nests of *Afrosubulitermes congoensis* were found in the nests or mounds of other species of termites. All the records are from second-growth woods in rain-forest areas except for the locality west of Brazzaville which was in a field on the edge of moist woods. In this latter case, the mound was constructed by *Amitermes evuncifer*, a savanna species that is never found in rain forests. The association of these two species in the same mound is probably very unusual and could occur only in an ecological transition area or under the artificial conditions created by man. In all other cases, the associated termites were species typical of rain-forest habitats or second-growth woods in rain-forest areas.

POSTSUBULITERMES, NEW GENUS

= Genus *Postsubulitermes* EMERSON, 1955, p. 515 (no description).

TYPE SPECIES: *Postsubulitermes parviconstrictus*, new species.

IMAGO (FIG. 6): Head and postclypeus covered rather thinly with very short hairs and also with several long bristles. Pronotum with numerous long bristles near the margins of the sides and rear; surface with a few short hairs. Tergites and sternites with many long bristles or hairs about equal in length on both the tergites and sternites. White membrane of the abdomen of the queen with many hairs not so long as the longest bristles on the tergites, but conspicuously longer than the short hairs on the head. Ocellus large, fairly prominent, less than half of its width removed from the eye, a little larger than the antennal socket. Fontanelle light brown, long and forked at the tip; in a slight depression in the top of the head. Postclypeus about as long as half of its width (0.18 mm. long and 0.36 mm. wide). Antenna broken in specimen. Pronotum with sides fairly straight and converging towards the rear, posterior angles rounded, hind margin

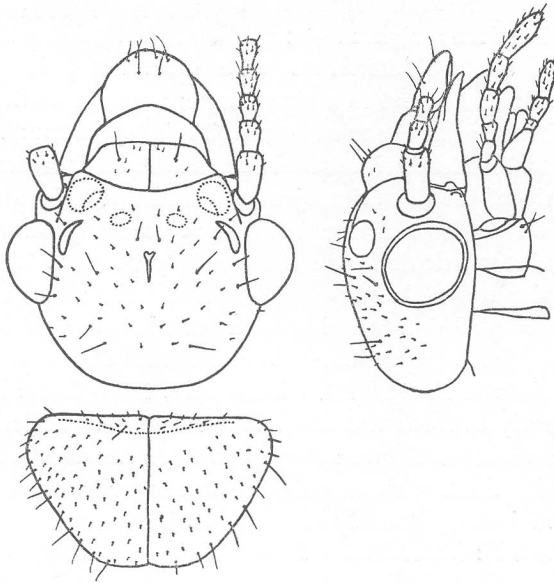


FIG. 6. Head and pronotum from above and head from the side of the morphotype imago (queen) of *Postsubulitermes parviconstrictus*, new species.

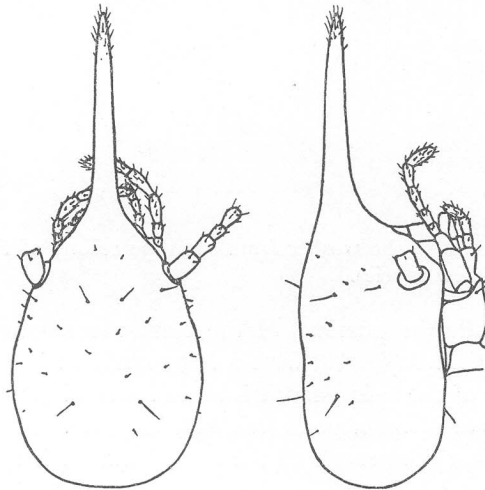


FIG. 7. Head from above and from the side of the holotype soldier of *Postsubulitermes parviconstrictus*, new species.

slightly emarginate. Mesonotum with fairly sharp posterior points, each a little less than a right angle; median indentation a little greater than a right angle. Metanotum with posterior points somewhat rounded, each about equal to a right angle; angle of median indentation wider than that of the mesonotum. Tibial spurs 2:2:2.

SOLDIER (FIG. 7): Head with scattered bristles and short hairs; several hairs at the tip of the frontal projection, but short hairs absent in the middle and on the base of the frontal projection. Pronotum with a few short hairs, particularly on the anterior portion. Tergites each with a posterior row of bristles and scattered hairs about one-third of the length of the bristles. Sternites with both bristles and hairs longer than those on the tergites, hairs about one-half of the length of the bristles. Head from above oval, with a thin, long, frontal projection tapering slightly towards the front and a slight constriction behind the antennae visible both from above and from the side. Antenna with 12 articles. Mandibles without points. Front margin of pronotum very shallowly and inconspicuously emarginate. Tibial spurs 2:2:2.

WORKER (FIG. 8): Mandibles with proportionately longer apical teeth than in either *Afrosubulitermes* or *Verrucositermes*. Third marginal tooth of the left mandible indistinct. Second marginal tooth of the right mandible absent. Left mandible index is 2.63.

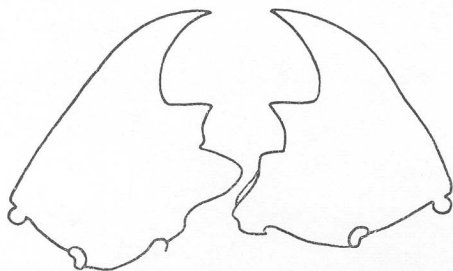


FIG. 8. Mandibles of the worker from the type colony of *Postsbulitermes parviconstrictus*, new species.

RELATIONS: The proportions of the teeth are somewhat similar to those of *Tarditermes* (fig. 10) with a left mandible index of 2.91, but the inside edge of the apical tooth is more curved in *Postsbulitermes*. The mandibles of *Mimeuterme*s (Ahmad, 1950, fig. 11) are fairly close, but the third marginal tooth of the left mandible is reduced to such an extent that the index cannot be calculated with accuracy.

The imago of *Verrucositermes* (fig. 1) has less contrast in the color of the head and pronotum, the short hairs on the head are more

abundant and longer, and the ocellus is proportionately smaller. The imago of *Tarditermes* is much larger and has a proportionately wider pronotum (fig. 9). *Eutermellus bipartitus* is larger, the color of the head and that of the pronotum are only slightly different from each other, the ocellus is smaller, and the hairs on the head are longer.

The soldier has a much thinner frontal projection than that of *Mimeutermes*, and the points on the mandibles are always lacking. *Verrucositermes* has distinctive tubercles on the head. *Afrosubulitermes* has short hairs on the frontal projection at the base and in the middle, and the head is proportionately shorter and less oval. *Tarditermes* is larger, lacks the contrasting long bristles on the head, and has a thicker and more tapering frontal projection. *Eutermellus* has a more conical frontal projection and lacks short hairs on the head.

I am inclined towards the opinion that *Postsubulitermes* is derived from a genus close to *Afrosubulitermes*, but the separation of analogous from homologous reduction of the marginal teeth of the imago-worker mandible is speculative with the present data. Each African genus on the *Subulitermes* branch is distinctive, and the phylogenetic relations are obscure.

Postsubulitermes parviconstrictus, new species

IMAGO (QUEEN; FIG. 6): Head dark brown. Postclypeus, antennae, and legs brownish yellow. Labrum, pronotum, mesonotum, metanotum, and sternites yellow, contrasting sharply with the dark head. Wing

TABLE 4

MEASUREMENTS (IN MILLIMETERS) OF MORPHOTYPE QUEEN OF
Postsubulitermes parviconstrictus, NEW SPECIES

Length of head to tip of labrum	1.03
Width of head	0.80
Length of fontanelle	0.11
Diameter of eye	0.29
Length of ocellus	0.13
Width of ocellus	0.10
Ocellus from eye	0.04
Length of pronotum	0.42
Width of pronotum	0.70
Length of hind tibia	1.11

scales and tergites brown, a little lighter than the head. Antennae broken in the specimen, the second, third, and fourth articles about equal in length. Other characters are described under the genus.

SOLDIER (FIG. 7): Head yellow-brown, anterior portion of frontal projection distinctly darker than the head and the base of the projection. Thorax, legs, and abdomen yellowish, paler than the head. Antenna with 12 articles, the third article narrower than the others, but the second, third, and fourth are about equal in length. Other characters are described under the genus.

TABLE 5

MEASUREMENTS (IN MILLIMETERS) OF TEN SOLDIERS OF *Postsubulitermes parviconstrictus*, NEW SPECIES, FROM YANGAMBI AND NEAR CAMP PUTNAM

	Range
Length of head	1.39-1.53
Width of head	0.55-0.60
Thickness of head with postmentum	0.50-0.56
Width of pronotum	0.34-0.39
Length of hind tibia	0.71-0.79

The descriptions are based on specimens from five colonies. The type colony with the morphotype queen, holotype soldier, paratype soldiers, workers, and nymphs was collected by A. Emerson at Yangambi (latitude 0° 47' N., longitude 24° 23' E.), Belgian Congo, on May 30, 1948. A paratype colony with soldiers and workers was collected by A. Emerson at Camp Putnam (latitude 1° 24' N., longitude 28° 36' E.) on the Epulu River, Belgian Congo, on May 13, 1948, No. 20. Three other paratype colonies were collected by A. Emerson near a Pygmy camp 4 kilometers north of Camp Putnam, Belgian Congo, on May 19, 1948, and May 20, 1948.

The type colony at Yangambi was found in hard carton inside the surface soil of a mound on the forest floor occupied by other species of termites. All colonies at or near Camp Putnam were found in mounds on the forest floor. Two of the mounds were occupied by other species of termites, and one mound of loose dirt seemed to be deserted by its original builders. One colony from Camp Putnam was in the soil at the base of a tree trunk, with the nests of *Cubitermes*, *Proculitermes*, and *Noditermes* on the ground surface or on the side of the tree. All the localities in the Belgian Congo are in the rain forest.

Postsubulitermes parviconstrictus constructs soil galleries with characteristic pitted interior surfaces. The material used for the lining seems to be excrement plastered and molded onto the interior surfaces of the galleries. The pits measure about 0.18-0.59 mm. in diameter

and about 0.06–0.47 mm. between the pits which are separated by rounded ridges. In a preserved specimen of the gallery wall, each of five pits was filled with one termite egg closely fitting the size of the pit and fairly firmly stuck in the pit, thus giving the impression that the eggs were placed in the pits by the termites. The eggs were about 0.23–0.29 mm. long. Other eggs were loose in the vial of alcohol. The eggs were in various stages of development.

TARDITERMES, NEW GENUS

= Genus *Tarditermes* EMERSON, 1955, p. 515 (no description).

TYPE SPECIES: *Tarditermes contracolor*, new species.

IMAGO (FIGS. 9, 10): Head, postclypeus, and pronotum covered somewhat thickly with short hairs but not thick enough to form a mat. Head, postclypeus, and margins of pronotum with several bristles. Wing membrane covered rather thickly with short hairs which are long compared to those on the wings of most termites. Each tergite covered rather thickly with short hairs and also with a row of bristles on the

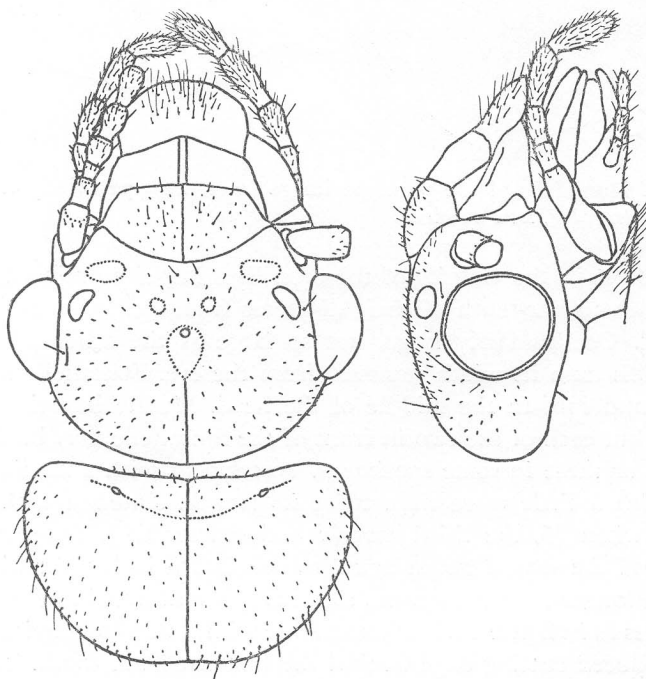


FIG. 9. Head and pronotum from above and head from the side of the morphotype imago of *Tarditermes contracolor*, new species.

posterior margin, each bristle about three times as long as the short hair. Sternites with rather thick covering of hairs that are somewhat longer than the hairs of the tergites, the posterior hairs longer than those on the anterior portion of each sternite but not forming a contrasting row of bristles as they do on the tergites. White membranous parts of the abdomen covered with short hairs about the same length as those on the wing membranes. Head wide, with somewhat straight



FIG. 10. Mandibles of the paratype imago from the type colony of *Tarditermes contricolor*, new species.

parallel sides in the vicinity of the eyes. Eyes large, prominent, about one-seventh to one-tenth of their diameter from the lower margin of the head. Ocellus fairly large, not so large as the antennal socket, slightly less than its width removed from the eye. Fontanelle a small, light, round spot in the middle of the head. Muscle insertions as in figure 9, but each of the two in front of the fontanelle may be divided into two or three in some specimens. Postclypeus with a median dark line, width a little more than twice its length. Antenna with 14–15 articles; when 15, the third narrow and shorter than the second or fourth and the second about equal to the fourth in length; when 14, the third longer than the second, the second about equal to the fourth. Mandibles as in figure 10. Each mandible with a very long apical tooth and a reduced cutting edge behind the first marginal tooth. The left mandible index is 2.91, indicating a proportionately longer apical tooth in relation to the distance from the first marginal tooth to the

tip of the third marginal tooth compared to any other known genus on the *Subulitermes* branch of the Nasutitermitinae. Right mandible with no second marginal tooth. Pronotum proportionately large, not quite so wide as the head; sides rounded and posterior margin very slightly emarginate. Mesonotum with rounded median angle and rounded lateral points, angle about 130 degrees. Metanotum also with rounded lateral projections and angle greater than that of the mesonotum. Tibial spurs 2:2:2.

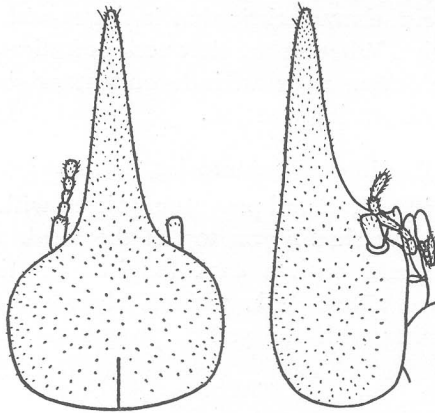


FIG. 11. Head from above and from the side of the holotype soldier of *Tarditermes contracolor*, new species.

SOLDIER (FIG. 11): Head and frontal projection covered with minute hairs visible only in a good light, and bristles absent except near the tip of the frontal projection. Pronotum with a few short hairs and no bristles. Tergites with short inconspicuous hairs and no bristles except on the posterior tergites. Sternites with short hairs and a posterior row of long bristles. Head comparatively large and wide, with a conical frontal projection that is thick at its base. Head without a constriction. Antenna with 13 articles, the second and third about equal in length, the fourth article a little shorter than the third. Mandibles without points. Pronotum comparatively wide, front margin without or with only a very slight indentation; front region rather large; profile with an angle between the front and rear portion a little greater than a right angle. Tibial spurs 2:2:2.

RELATIONS: The imago differs in its large size from all its nasute relatives except *Angularitermes* from South America. The left mandibular index is greater than that of any other genus on the *Paracorni-*

termes-Subulitermes branch, with the possible exception of *Mimeutermes* in which the third marginal tooth is so reduced that accurate measurements cannot be taken. *Tarditermes* is a strikingly divergent genus, with obscure relationships of the imago caste to those of its related genera.

The soldier is comparatively large and is not close in the shape of the head to that of any other related genus. The lack of points on the mandibles of the soldier indicates a derived rather than a primitive genus. The name given to the genus has reference to its very slow movements in life, a characteristic that it shares with *Angularitermes* from South America. Whether the slow actions indicate a phylogenetic relation to *Angularitermes* or an independent origin cannot be answered with the present information.

***Tarditermes contricolor*, new species**

IMAGO (FIGS. 9, 10): Head and pronotum yellow, with darker portions above the ocelli, dark shading on top of the head, and a light area behind the fontanelle, with a dark longitudinal line at the rear. Postclypeus yellow. Wings dark, particularly when folded together, markedly contrasting with the yellow pronotum and thorax. Wing

TABLE 6

MEASUREMENTS (IN MILLIMETERS) OF SIX MALE AND FEMALE IMAGOS OF
Tarditermes contricolor, NEW SPECIES, FROM THE TYPE COLONY

	Range
Length of head from side base of mandibles	0.88- 0.94
Width of head	1.28- 1.35
Diameter of eye	0.41- 0.42
Eye from lower margin	0.04- 0.07
Length of ocellus	0.16- 0.17
Width of ocellus	0.10- 0.12
Ocellus from eye	0.07- 0.09
Width of fontanelle	0.04- 0.06
Length of postclypeus	0.27- 0.30
Width of postclypeus	0.61- 0.63
Length of pronotum	0.68- 0.75
Width of pronotum	1.20- 1.23
Length of hind tibia	1.45- 1.56
Length of forewing from costal suture	10.15-11.48
Width of forewing	3.01- 3.35

scales a little lighter than the wing membranes. Wing membrane without dark dots or asters. Legs, tergites, and sternites yellow. Other char-

acters are described under the genus. The males and females overlap in nearly every measurement, except that the wing width is smaller in the males measured.

SOLDIER (FIG. 11): Back of head deep yellow grading into dark brown at the anterior portion of the frontal projection. Legs, thorax, and abdomen pale yellow. Other characters are described under the genus.

TABLE 7

MEASUREMENTS (IN MILLIMETERS) OF TEN SOLDIERS OF *Tarditermes contricolor*, NEW SPECIES, FROM THE TYPE COLONY

	Range
Length of head	2.41-2.65
Width of head	1.25-1.49
Thickness of head with postmentum	0.96-1.08
Width of pronotum	0.69-0.71
Length of hind tibia	1.12-1.19

The descriptions of the imago and soldier were taken from numerous specimens from the type colony which includes the holotype soldier, the morphotype imago, and many paratype imagoes, soldiers, and workers collected by A. Emerson near a Pygmy camp 4 kilometers north of Camp Putnam (latitude 1° 24' N., longitude 28° 36' E.) on the Epulu River, Belgian Congo, on May 19, 1948, in dirt galleries in the outer portion of a mound of *Acanthotermes acanthothorax* (Sjöstedt) which measured 2½ feet high and 6 feet in diameter. The locality was in deep rain forest. The soldiers and workers were markedly slow in their movements, a characteristic that suggested the generic name. A single paratype imago was collected by A. Emerson flying to a light after a rain in the evening at Camp Putnam on the Epulu River, Belgian Congo, on May 17, 1948.

SUMMARY

Four new genera and four new species of nasute termites on the *Subulitermes* branch of the subfamily Nasutitermitinae of the family Termitidae are described and figured from the rain-forest formation of the Belgian Congo:

Verrucositermes, new genus, with *V. tuberosus*, new species, as the type species, is described from the imago, soldier, and worker castes.

Afrosulitermes, new genus, with *A. congoensis*, new species, as the type species, is described from the soldier and worker castes.

Postsubulitermes, new genus, with *P. parviconstrictus*, new species,

as the type species, is described from the imago, soldier, and worker castes.

Tarditermes, new genus, with *T. contricolor*, new species, as the type species, is described from the imago and soldier castes.

Trinervitermes hainesi (Fuller), new combination, is tentatively proposed for the species described by Fuller (1922, p. 115) under the name "*Subulitermes hainesi*."

BIBLIOGRAPHY

AHMAD, M.

1950. The phylogeny of termite genera based on imago-worker mandibles. Bull. Amer. Mus. Nat. Hist., vol. 95, pp. 37-86.

CALABY, J. H.

1956. The distribution and biology of the genus *Ahamitermes* (Isoptera). Australian Jour. Zool., vol. 4, pp. 111-124.

EMERSON, A. E.

1928. Termites of the Belgian Congo and the Cameroon. Bull. Amer. Mus. Nat. Hist., vol. 57, pp. 401-574.
1951. Termite studies in the Belgian Congo. Deuxième Rapport Ann. 1949, Inst. Recher. Sci. Afrique Centrale, pp. 149-160.
1953. The African genus *Apicotermes* (Isoptera: Termitidae). Ann. Mus. Roy. Congo Belge, ser. 8°, Sci. Zool., vol. 17, pp. 99-121.
1955. Geographical origins and dispersions of termite genera. Fieldiana, Zool., vol. 37, pp. 465-521.
- 1956a. Regenerative behavior and social homeostasis of termites. Ecology, vol. 37, pp. 248-258.
- 1956b. Ethospecies, ethotypes, taxonomy, and evolution of *Apicotermes* and *Allognathotermes* (Isoptera, Termitidae). Amer. Mus. Novitates, no. 1771, pp. 1-31.
1959. The African termite genera *Firmitermes*, *Hoplognathotermes*, *Acutidentitermes*, *Duplidentitermes*, and *Heimitermes* (Termitidae, Termitinae). Amer. Mus. Novitates, no. 1947, pp. 1-42.
1960. New genera of termites related to *Subulitermes* from the Oriental, Malagasy, and Australian regions (Isoptera, Termitidae, Nasutitermitinae). Amer. Mus. Novitates, no. 1986, pp. 1-28.

FULLER, C.

1922. The termites of South Africa. South African Jour. Nat. Hist., vol. 3, pp. 70-131.

SANDS, W. A.

1956. A new species of *Mimeutermes* from the Gold Coast (Isoptera: Nasutitermitinae). Proc. Roy. Ent. Soc. London, vol. 25B, pp. 83-84.

SILVESTRI, F.

1912. Termiti raccolte da L. Fea alla Guinea Portoghese e alla isole S. Thomè, Annobon, Principe e Fernando Poo. Ann. Mus. Civ. Stor. Nat. Genova, ser. 3, vol. 5, pp. 211-255.
1914. Contribuzione alla conoscenza dei termitidi e termitofili dell'Africa occidentale. I. Termitidi. Boll. Lab. Zool. Gen. Agr., Portici, vol. 9, pp. 1-146.

SJÖSTEDT, Y.

1926. Revision der Termiten Afrikas 3. Monogr. K. Svenska Vetenskapsakad. Handl., ser. 3, vol. 3, pp. 1-419.

SNYDER, T. E.

1949. Catalog of the termites (Isoptera) of the world. Smithsonian Misc. Coll., vol. 112, pp. 1-490.