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Six New Genera of Termitinae from the Belgian Congo (Isoptera, Termitidae)[1]

By Alfred E. Emerson[2]

INTRODUCTION

The present article is the third in a series of taxonomic papers that deals with the termites of the Belgian Congo collected during a three-month expedition in 1948 (Emerson, 1951, 1956a, 1956b, 1959, 1960). Including those genera described in this paper, 12 new genera have been discovered and described from the Belgian Congo by the author. New genera based on new species have been rather infrequently reported in recent years, so the discovery of so many in a presumably fairly adequately explored country is surprising. About half of the ap-

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

proximately 200 named species of termites known from the Belgian Congo were collected during 66 days of field work, and in addition about 100 new species were found, most of which await description when time permits. These data indicate that many additions to the termite fauna of the Belgian Congo still await discovery. Guesses are hazardous, but it would not be surprising if the complete fauna of the Belgian Congo contained 500 species of termites. Among the collections made in 1948, there are a few new genera represented by the imago caste alone. No attempt will be made to describe and name these imagoes, because so much confusion has resulted from named species based on the imago caste alone. It is now possible, following the phylogenetic studies by Ahmad (1950), to determine the genera of imagoes, but the generic descriptions of imagoes in the literature are still inadequate, and much comparative study of numerous characters remains to be done before much taxonomic and phylogenetic value can be derived from the study of imagoes unassociated with soldiers. The mandibles of the worker caste and of mature nymphs have essentially the same characters as those of the imago, and workers or nymphs are usually collected with the soldiers during the season when the winged imagoes cannot be found in the nests. Thus it is possible to make accurate generic assignments of imagoes when the workers or nymphs associated with soldiers are known. Unfortunately, however, few workers or nymphs have distinctive specific characters, so that mistakes may be made in the identification of the workers even when the genus can be determined with accuracy. In some instances, closely related genera do not have distinctive imago-worker mandibles, and in these cases other characters, such as pilosity, and certain structural characters and proportions may be used, but the author has found it necessary to have accurately determined specimens for direct comparison before he can be confident of his taxonomic interpretations. Because of the lack of thorough descriptions and drawings of the imago caste for many of the genera of termites, confusion and error can be avoided by awaiting more complete collections before basing new generic names on imagoes unassociated with soldiers and other castes. At the same time, the relatively conservative imago often gives valuable information about phylogenetic relationships that may be more difficult to detect from the highly adapted and often more rapidly evolving characters of the soldier caste.

Emerson (1955, p. 506) lists 141 named living genera of termites. Together with those described in the present paper, 24 genera of living termites have been described since 1955, making the present total

of 165 genera, excluding fossil genera. Some named genera are now being studied by several investigators and are to be subdivided into a number of genera. Also a few new genera based on new species are soon to be published. It is estimated that at least 20 genera will be added to the present total within the next five years.

The great scientific value of generic studies of termites is found in the added understanding of the phylogenetic relations of the systematic categories. A better interpretation of the phylogeny adds an evolutionary time dimension to our knowledge of living species in their geographical and ecological habitats. The correlation of information from various subsciences and from many groups of plants and animals is enabling us to make dramatic progress in our understanding of life processes and organic evolution. In the author's opinion, the systematist is adding essential basic data for this accelerating advance of the biological sciences (see Emerson, 1958).

Type specimens of the new species described in the following pages are deposited in the termite collection of the American Museum of Natural History, a collection that is already the most complete in type specimens and species of any in the world. When available, duplicate specimens of paratypes have already been exchanged with many institutions over the world in which are preserved important collections of termites.

NITIDITERMES, NEW GENUS

= Genus *Nititermes* EMERSON, 1955, p. 511 (no description).

TYPE SPECIES: *Nititermes berghei*, new species.

IMAGO (FIG. 1): Major portions of the head, pronotum, and tergites glossy dark brown. Top of head with a few scattered bristles and a number of small short hairs that do not form a mat; short hairs more numerous and longer in front and to the sides of the ocelli. Pronotum with numerous hairs and bristles, the hairs about half of the length of the bristles at the sides. Tergites covered thickly with hairs. Sternites covered with hairs that are in general somewhat longer than those on the tergites. Head widely oval, smooth, without much irregularity in the surface; with fine microscopic sculpturing or roughness around the fontanelle. Fontanelle elongate; in a short narrow depression in the head. Top of head between the ocelli flatly and evenly convex. Eye rather flat, of about medium size, a little less than one-third of its diameter from the lower margin of the head. Postclypeus comparatively long, about as long as half of its width. Pronotum wider than the head and proportionately long, hind margin with a slight shallow indenta-

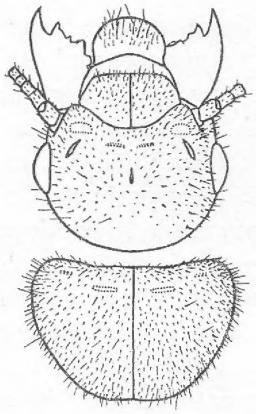

FIG. 1. Head and pronotum from above of the morphotype king of *Nititidi-termes berghei*, new genus, new species.

tion. Hind margins of the mesonotum and metanotum each with a fairly shallow indentation with an angle of about 135 degrees in the middle, and with rounded or bluntly pointed hind lobes each forming an angle greater than a right angle. Front coxa with a fairly sharp ridge extending about half of the length from the trochanter; profile of ridge evenly and rather flatly convex. Tibial spurs 3:2:2. Middle tibia with two dark conspicuous outer spines near the apex.

SOLDIER (FIG. 2): Head with a few scattered bristles and a tuft of hairs above the opening of the frontal gland. Postmentum with about two bristles at the sides of the anterior end. Labrum with several bristles on the pointed lobes. Tergites and sternites covered with many medium long hairs without distinction between hairs and bristles. Head thick from the side and quadrangular from above (fig. 2A), sides somewhat irregular but in general fairly straight and parallel, converging slightly towards the front and constricted slightly towards the rear; hind margin flatly rounded and joining each side with a rounded angle. Head without sharp ridges but with a rounded hump below and behind the antennal base on each side. Profile of head with a bulbous front above the depressed gland opening, front not reaching over the base of the mandibles. Profile of the top of the head fairly straight and joining the hind margin with an even curve. Postmentum (fig. 2B) slightly constricted about one-fourth of its length from the hind margin; sides concave at the constriction, convex and without angles at the anterior margin; cross section somewhat arched, with a fairly flat middle; profile evenly convex, without humps or irregularities. Antenna with 14 or 15 articles. Labrum (fig. 2C) with each

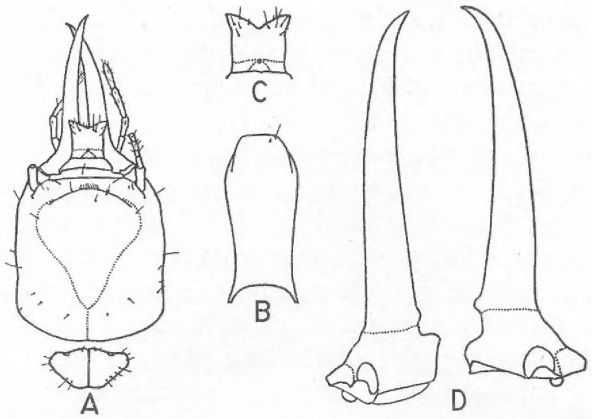

FIG. 2. Soldier of *Nititermes berghei*, new genus, new species. A. Head and pronotum of holotype from above. B. Enlarged postmentum, from below, of paratype from the type colony. C. Enlarged labrum of holotype. D. Enlarged mandibles of paratype from the type colony.

lateral point sharper than a right angle and with a fairly deep incision in the middle, the angle of which is a little greater than a right angle. Mandibles (fig. 2D) elongated and comparatively straight, with outer margins concave near the base and flatly convex from the basal portion to the tip; tips only slightly hooked; inner margin of each mandible with a small blunt tooth near the basal portion; rounded point of molar plate of left mandible in general sharper than a right angle and projecting forward to some extent; molar region rounded in the right mandible and not projecting forward. Mandibles shiny and smooth, without minute scales on the surface except for a very fine scaly roughness on the inside edge on the under side of the left mandible; with a long ridge separating the inside edge from the rest of the under side. Pronotum with a very slight indentation in the middle of the front margin; frontal lobe fairly long (fig. 2A shows the frontal lobe in a somewhat vertical position); profile of the pronotum with a concave rounded angle of about 150 degrees between the anterior and posterior portions. Front coxa with a fairly sharp longitudinal ridge; in profile with a fairly straight sloping edge towards the trochanter, a rounded somewhat convex hump towards the rear, and slightly concave towards the base. Tibial spurs 3:2:2. Middle tibia with two outer spines near the apex.

WORKER (FIG. 3): The mandibles resemble those of *Cubitermes*, *Procubitermes*, *Noditermes*, *Lepidotermes*, and *Mucrotermes*. The apical tooth of each mandible is proportionately larger than that of

Cubitermes, Noditermes, and the type species [*L. pretoriensis* (Sjöstedt)] of *Lepidotermes.* The apical teeth are proportionately smaller than those of *Mucrotermes* (fig. 5), and *Megagnathotermes.* The mandibles of *Procubitermes* (Ahmad, 1950, fig. 15) are somewhat similar, but *Nititidermes* has a proportionately slightly larger apical tooth, and the cutting edge of the apical tooth is more strongly concave. In *Nititidermes,* the apical tooth is markedly larger than the first marginal tooth in each mandible, the distance from the apex to the tip of the first marginal tooth of the left mandible is longer than the distance from the tip of the first marginal tooth to the tip of the third marginal tooth, and the cutting edge of the first plus second marginal tooth (second marginal tooth reduced) is strongly undulating and ends in a

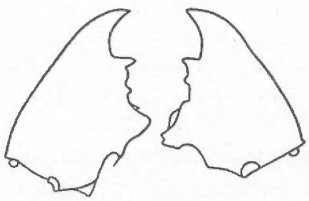

FIG. 3. Mandibles of worker from paratype colony of *Nititidermes berghei,* new genus, new species.

distinct notch in front of the third marginal tooth. The second marginal tooth of the right mandible is present and distinct, with each indented angle in front of and behind the second marginal tooth greater than a right angle.

RELATIONS: *Nititidermes* belongs to a group within the Termitinae that includes *Cubitermes, Procubitermes, Noditermes, Mucrotermes, Lepidotermes,* and some more specialized genera. Weidner (1956, p. 99) has placed some of these genera in his tribe Cubitermitini. For the present I am not using tribal categories, but, when the relationships of the genera within the subfamily are well known, the tribe may be used to symbolize related groups of genera. With the exceptions of *Lepidotermes planifacies* (Williams) and *L. simplex* (Holmgren), the species of these genera possess a markedly larger apical tooth compared to the first marginal tooth in each imago-worker mandible, usually have a strongly undulated cutting edge of the first plus second marginal tooth in the left imago-worker mandible, usually have a distinct notch in front of the third marginal tooth of the left imago-worker mandible, have a distinct second marginal tooth in the right imago-worker mandible, and have elongated biting mandibles in the

soldier, and the labrum of the soldier is indented in the middle with two lateral pointed tips.

Lepidotermes seems to be the most closely related genus to *Nititidermes*. An imago of *Lepidotermes simplex* (Holmgren) from a colony with homotype soldiers (determined and compared by A. Emerson, Pietermaritzburg, Natal, collected by C. Fuller, November 9, 1916, F655) has a dark color similar to that of *Nititidermes berghei*. The surface of the head and pronotum of *L. simplex* is dull and less shining. The short hairs on the head are more abundant. The head is proportionately shorter and more rounded from above. The top of the head between the ocelli is almost straight or very slightly and evenly concave. The eyes are more convex and less flattened. The upper margin of the ocellus is joined evenly with the head and is not protruding. The fontanelle is in a small depression in the head, is narrowly oval in shape, and is itself depressed. The antenna has 15 articles. The left mandible has the distance from the apex to the tip of the first marginal tooth about equal to the distance from the tip of the first marginal tooth to the tip of the third marginal tooth. The cutting edge of the first plus second marginal tooth of the left mandible is less strongly undulated, and the angle immediately behind the first marginal tooth is not so sharp. The right mandible is very similar. The pronotum is much narrower than the head, is proportionately shorter than in *Nititidermes berghei*, and has a widely emarginate hind margin. The front coxa is similar, but the ridge is not quite so sharp. The tibial spurs are 3:2:2, and the middle tibia has two strong outer spines near the tip in addition to the inside spurs. The worker mandible of *Lepidotermes pretoriensis* (Sjöstedt) illustrated by Ahmad (1950, fig. 15) is closer to *Nititidermes berghei* in the proportionate size of the apical teeth than is *L. simplex*, but the apical tooth of each mandible is a little larger in *Nititidermes*, and the cutting edge of the apical tooth is more strongly concave.

Lepidotermes soldiers indicate close generic affinities. A paratype soldier of *L. pretoriensis* was compared directly to a soldier of *Nititidermes berghei*. The head of *L. pretoriensis* is proportionately narrower. The postmentum has straight parallel sides that are slightly converging towards the rear (postmentum constricted in the middle in some species of *Lepidotermes*). The profile of the postmentum is somewhat irregularly humped, and the cross section is more arched than in *Nititidermes*. The antenna has 14 articles. The labrum has lateral points but has a much less marked angle of indentation in the middle of the front margin. (The labrum is indented more in some

species of *Lepidotermes*.) The mandibles of *L. pretoriensis* are more curved than in *Nititidermes*, but other species of *Lepidotermes* have greater or less curved mandibles, and some have a suggestion of elbowing. The mandible of *L. pretoriensis* has a sharper angle between the small blunt marginal tooth and the base, and the forward point on the base of the left mandible is somewhat sharper than in *Nititidermes berghei*. The mandibles of *Lepidotermes pretoriensis* are dull from below and not shiny and have a fine granular texture on the under surface. The front margin of the pronotum is flatly curved and is not indented in the middle. The front coxa has a longitudinal ridge that is not particularly prominent nor projecting much in profile. The tibial spurs are 3:2:2, and there are two outer spines on the middle tibia.

Williams (1954, pp. 220, 222) described two species under the names of *"Procubitermes goliathi"* and *"Procubitermes planifacies."* I have examined specimens kindly sent me by Mr. W. Victor Harris, Commonwealth Institute of Entomology, British Museum (Natural History). I am of the opinion that these two species should be placed in the genus *Lepidotermes*. The holotype soldier of *Lepidotermes goliathi* (Williams) was compared to *Nititidermes berghei* directly. *Lepidotermes goliathi* has a smaller and proportionately less thick and bulbous head, a rather distinct rounded ridge on the side running below and behind the antennal base from the side base of the mandible to the side of the hump on top, and the antennal base in a concave depression in the head bounded by this rounded ridge and a line from the top base of the mandible to the side of the frontal gland. The postmentum is more constricted about one-fourth of its length from its base, is much more flatly convex in profile, has somewhat more angular sides of the anterior portion, and has a similar arched cross section. The antenna has 14 articles, the first and second articles being proportionately similar to those of *Nititidermes berghei*. The labrum of *Lepidotermes goliathi* has a less deep frontal incision, and the angle of each side point is close to a right angle. The mandibles are finely but conspicuously scaly, without microscopical striations; the texture is irregular from just in front of the marginal tooth to the apex on both the under and upper sides. The mandibles are more curved from the marginal tooth to the apex than in *Nititidermes berghei*. The basal tooth just behind the marginal tooth in each mandible of *Lepidotermes goliathi* is much more prominent and projects forward nearly to the level of the marginal tooth. The pronotum has a proportionately smaller anterior portion and a wider and more conspicuous indenta-

tion in the front margin. The profile of the pronotum is sharply concave compared to the much less sharply concave profile in *Nitiditermes berghei.* The front coxa is more rounded, without the sharp longitudinal ridge found in *N. berghei,* but with a short rounded ridge near the trochanter. The tibial spurs are 3:2:2, and the middle tibia has two stiff outer spines near the tip. Although *Lepidotermes goliathi* is a very distinct species, it is closer to *Lepidotermes pretoriensis* than to *Nitiditermes berghei.*

Lepidotermes planifacies (Williams) conforms to the generic characters of *Lepidotermes* in its minutely granular upper and under surfaces of the soldier mandibles from the marginal tooth to the apex and fine striations visible in a favorable light near the apex and near the marginal tooth. The tooth-like projection of the molar plate of the left mandible does not project forward so much as in *L. goliathi,* but projects forward more than in *Nitiditermes berghei.* The labrum of the soldier of *Lepidotermes planifacies* is not indented in the middle so much as in *Nitiditermes berghei,* nor are the lateral points so sharp. The irregular postmentum of the soldier in profile, the sharper front in profile, and the equal distance of the left imago-worker mandible from the apex to the first marginal tooth compared to the distance between the tips of the first and third marginal teeth suggest the possibility that *Lepidotermes planifacies* may belong to a new genus approaching *Fastigitermes. Lepidotermes planifacies* is distinct from *Profastigitermes putnami* described in the following pages and, in the opinion of the author, seems best included in *Lepidotermes,* at least until a more exacting study of related species has been made.

The major generic distinctions separating *Nitiditermes* from *Lepidotermes* are the more deeply incised front margin of the soldier labrum and the characters of the imago-worker mandibles.

The genus *Procubitermes* has been confused with several related genera by various authors including myself (Emerson, 1928). At the present time I include only the type species, *P. arboricola* (Sjöstedt), and four other species, *P. sjöstedti* (von Rosen), *P. ueleensis* Sjöstedt, *P. niapuensis* Emerson, and *P. undulans* Schmitz, in the genus *Procubitermes.* For a time I thought *P. niapuensis* might be a synonym of *P. ueleensis,* but a comparison of the types of the imago caste of each species shows specific distinctions. The genus is found in forested regions and does not seem to have invaded savanna communities. A homotype imago of *P. undulans* (collected, determined, and compared by A. Emerson, Camp Putnam, Belgian Congo, May 13, 1948) was compared directly to the imago of *Nitiditermes berghei.* The color of

Procubitermes undulans is light and not glossy. The head has many more short hairs about one-third of the length of the longer bristles and forming a contrasting thin mat in profile. The pronotum has many more short hairs than in *Nititidermes berghei,* and the pilosity of the tergites and sternites is similar in the two species. The size of the head of *Procubitermes undulans* is smaller, and the top of the head between the ocelli is almost straight and flatter, with protruding ridges above the ocelli. The eye is proportionately closer to the lower margin. The ocellus is proportionately closer to the eye. The fontanelle is similar in shape but lighter in color. The antenna has 15 articles. The postclypeus is very slightly longer than half of its width. The mandibles are generically similar, but *Nititidermes berghei* has a sharper angle immediately behind the first marginal tooth of the left mandible. The pronotum of *Procubitermes undulans* is narrower than the head, proportionately shorter, and has a more emarginate hind margin. The hind margins of the mesonotum and metanotum have sharp indentations in the middle, with the angle of each less than a right angle and the angle of each lateral point less than a right angle. The front coxa is very similar in the shape of the longitudinal ridge. The tibial spurs are 3:2:2. The middle tibia has two outer spines in a similar position.

The soldier of the various species of *Procubitermes* has the vertex of the head more pointed behind the gland opening. The postmentum is narrower than in *Nititidermes.* The first article of the antenna is proportionately larger. The shape of the labrum is close. The mandibles are either more curved or are slightly elbowed, and have fine oblique striations on the surface. The marginal teeth of the soldier mandibles may be more pointed or more blunt than those of *Nititidermes,* they are placed a little farther forward from the basal groove, and there is a wider curve from the tooth to the basal portion.

Nititidermes berghei, new species

Imago (King and Dealated Male; fig. 1): Portions of the under side of the head, thorax, and abdomen yellow-brown in contrast to the glossy dark brown of the upper part of the head and the pronotum. Fontanelle same color as the head. Postclypeus a little lighter than the head, with a median dark line. Pronotum with a thin, light, longitudinal line in the middle. Sternites yellow-brown in the middle of the anterior portion of segments 2 to 5; sternites 6 to 9 mainly dark brown. Ocellus about its own length removed from the eye. Antennae broken, the second article longer than the third, the third longer than the fourth and equal to the fifth. Mandibles similar to those of the worker (fig. 3),

except that the angle between the apical tooth and the first marginal tooth of the left mandible is less than a right angle and sharper than in the worker, and the right mandible has an angle definitely less than a right angle between the apical tooth and the first marginal tooth. Other characters are described under the genus.

TABLE 1

MEASUREMENTS (IN MILLIMETERS) OF DEALATED MALES OF *Nititermes berghei*, NEW SPECIES

	Morphotype King	Paratype Dealated Male
Width of head	1.33	1.44
Diameter of eye	0.36	0.38
Eye from lower margin of head	0.10	0.09
Length of ocellus	0.15	0.14
Ocellus from eye	0.15	0.14
Length of postclypeus	0.37	0.35
Width of postclypeus	0.71	0.71
Length of pronotum	0.88	0.94
Width of pronotum	1.45	1.47
Length of hind tibia	1.41	1.56

SOLDIER (FIG. 2): Head light brownish yellow. Outer portion of the mandibles dark; bases the same color as the adjoining head. Pronotum and tergites lighter than the head. Head (fig. 2A) without sharp ridges. A rounded hump occurs below and behind the antennal base on each

TABLE 2

MEASUREMENTS (IN MILLIMETERS) OF SOLDIERS FROM FOUR COLONIES OF *Nititermes berghei*, NEW SPECIES

	Holotype	Paratypes Range
Length of head with mandibles	3.52	3.53–3.82
Length of head to side base of mandibles	1.86	1.91–2.03
Width of head	1.59	1.56–1.79
Thickness of head, including postmentum	1.35	1.35–1.52
Greatest width of postmentum	0.48	0.47–0.51
Least width of postmentum	0.39	0.34–0.41
Width of labrum at tip	0.45	0.43–0.47
Length of left mandible	1.80	1.82–1.88
Length of pronotum	0.47	0.44–0.47
Width of pronotum	0.88	0.82–0.91
Length of hind tibia	1.25	1.23–1.36

side. In the antenna with 14 articles, the second article is a little shorter and about half as wide as the first; the third is as long as the second. In the antenna with 15 articles, the proportions of the first and second articles are the same, but the third is much shorter than the second. Other characters are described under the genus.

LOCALITY AND MATERIAL: The descriptions were taken from two dealated males (one morphotype king) from separate colonies, and 32 soldiers (including the holotype and paratypes) with workers from four colonies collected by A. Emerson at Keyberg (latitude 11° 47′ S., longitude 27° 25′ E.) near Elisabethville, Belgian Congo, on April 23, 1948, and April 24, 1948. The type colony was found in a mound of hard gray carton 1 foot high and 2½ feet in diameter, extending 8 inches under ground at the edge of a dembo (periodic grassland swamp). One paratype colony was found in a mound 1 foot high and 1 foot in diameter, with a hard carton center at the edge of a dembo in grassy woodland. Specimens of *Ancistrotermes, Amitermes, Microcerotermes,* and *Crenetermes* were also found in this mound. Another paratype colony was found in a mound 3 inches high and 14 inches in basal diameter in grassy woodland together with *Crenetermes.* Another paratype colony with a dealated male was found in a mound 6 inches high and 2 feet in diameter near a dembo in grassland. This mound also contained some colonizing dealated imagoes of other species, and soldiers or workers of *Microtermes, Anoplotermes, Microcerotermes,* and *Ophiotermes.*

The species is named in honor of Dr. Louis van den Berghe, Directeur de l'Institut Recherche Scientifique du Afrique Centrale (I.R.S.A.C.), Congo Belge, who did much to facilitate my studies of termites in the Belgian Congo prior to the later establishment of the research stations now operating under his direction.

MUCROTERMES, NEW GENUS

< Genus *Procubitermes* SILVESTRI, 1914a, p. 113.
< Genus *Procubitermes* SILVESTRI, 1914b. p. 578.
< Genus *Procubitermes* SJÖSTEDT, 1926, p. 256.
< Subgenus *Procubitermes* EMERSON, 1928, pp. 408, 419, 529.
< Genus *Procubitermes* SNYDER, 1949, p. 167.
= Genus *Mucrotermes* EMERSON, 1955, p. 511 (no description).

TYPE SPECIES: *Mucrotermes osborni,* new species.

ADDITIONAL SPECIES: *Mucrotermes heterochilus* (Silvestri) and *Mucrotermes,* new species, an undescribed species from French Guinea. Silvestri (1914a, p. 113; 1914b, p. 578) described *Mucrotermes heterochilus* under the name *"Procubitermes heterochilus."* The description of the

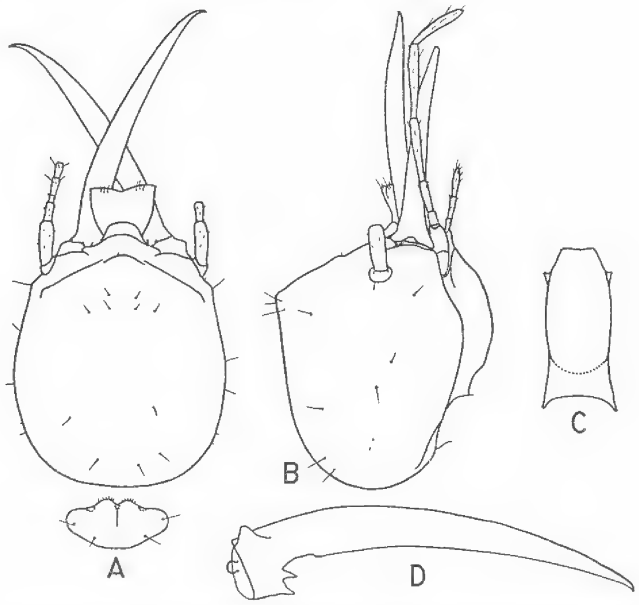

FIG. 4. Soldier of *Mucrotermes osborni*, new genus, new species. A. Head and pronotum of holotype from above. B. Head of holotype from the side. C. Postmentum of holotype from below. D. Enlarged left mandible of paratype from the type colony.

genus given below is based largely on the type species, *M. osborni*, because I had no specimens of *M. heterochilus* available for study until 1957. I now have a dealated male, two soldiers, and workers of a new species from French Guinea collected by Maxime Lamotte. I have not been able to incorporate this new species and the imago characters into the present paper, and do not think it advisable to delay publication until the description and drawings of the new species can be made.

SOLDIER (FIG. 4): A tuft of bristles near the opening of the frontal gland is lacking in *Mucrotermes* but is characteristic of several related genera. The head is comparatively short, wide, and thick. Sides of head from above (fig. 4A) somewhat convex, with a small lateral hump below and behind the base of the antenna. Vertex (fig. 4B) rather sharply humped in profile, with a steeply sloping front and vertex above and below the frontal gland opening that lies in the middle of the slope a little closer to the postclypeus than to the top. On each side of the median hump of the vertex there is a lateral hump above and a little behind the base of each antenna. Postmentum of *M. osborni* from below (fig. 4C) with a slight constriction at the sides about one-fourth of the median length of the postmentum from its posterior margin.

Postmentum of *M. heterochilus* with sides at the constriction slightly and fairly evenly concave. Sides of postmentum of both species nearly straight anterior to the median hump. A short sharp lateral ridge occurs on the postmentum, extending a little behind the base of each maxilla and becoming rounded until it fades out at the level of the hump. From below, these lateral extensions may overlap and tend to obscure the lateral sutures in the middle portion of the postmentum. The lateral sutures of the postmentum are slightly concave behind the front portion. In profile (fig. 4B), the postmentum is irregularly convex in outline, with a hump varying somewhat in its outline both between the species and within the species. The hump is situated about one-fourth to one-fifth of the length of the postmentum from the middle hind margin. Postclypeus rather short, and the suture with the front is fused in the middle and not conspicuous. Antenna with 14 or 15 articles. Labrum (fig. 4A) wider in front than behind, with two lateral points each sharper than a right angle; front margin shallowly and weakly bracket-shaped or almost concave. Maxillary palps proportionately long and nearly reaching the tip of the extended mandibles. Mandibles (fig. 4D) long, slender, and somewhat weakly curved inward, with a slight tendency to be elbowed about one-third to one-fifth of their length from the lower condyle; with a small slightly curved tip; base of the left mandible with a sharp, conspicuous, pointed, tooth-like projection within the curve from the inner apical edge to the sharp interior point of the inside of the basal portion (the generic name is based on this pointed, tooth-like projection). Edge of the left mandible a little anterior to the sharp, tooth-like projection has a small, blunt protuberance that possibly represents a reduced marginal tooth. The right mandible is symmetrical with the left mandible except at the base which has neither the sharp, tooth-like projection within the curve nor the sharp point on the inside of the basal portion. Mandibles with oblique striations visible in a favorable light. The pronotum (fig. 4A) with a shallow or deep incision in the front margin. Front coxa without a sharp longitudinal ridge and without a conspicuous hump in outline. Tibial spurs 3:2:2. Two additional spines on the middle tibia in a longitudinal row on the outside near the tip.

WORKER (FIG. 5): Both mandibles with proportionately large apical teeth. There is no visible angular notch in front of the third marginal tooth of the left mandible. The right mandible has a small but distinct second marginal tooth.

RELATIONS: The worker mandibles of *Mucrotermes osborni* (fig. 5)

FIG. 5. Mandibles of worker of *Mucrotermes osborni*, new genus, new species, from the type colony (corrections of worn mandibles were made from paratype workers).

are related to those of *Procubitermes arboricola* (Sjöstedt) and *Unguitermes bidentatus* (Silvestri) (see Ahmad, 1950, p. 71, fig. 15). The dentition of the worker mandibles of *Unguitermes* seems to be the closest, although, because of the characters of the soldier, I am inclined to interpret the phylogeny of these two genera as originating separately from a base near *Procubitermes*.

The soldier could easily be a specialization of a group closely related to *Procubitermes*. The small humps on the vertex and on the sides of the head are derivations of the more regular-shaped head of *Procubitermes*. There is no indication that the ancestors ever had a sharp projection from the postmentum such as is seen in *Noditermes* or *Unguitermes*. The left mandible of the soldier, although showing a unique tooth-like projection in the curve of the base, could have evolved from the more primitive mandible base of *Procubitermes*. My tentative conclusion is that the marginal tooth of the left mandible is reduced to a blunted hump in *Mucrotermes*, and that the sharp, pointed projection in the curved edge of the base of the mandible is homologous with, or a parallel evolution to, the wider projection in a similar position in the soldier mandibles of *Proboscitermes* and *Orthotermes*. The slight elbowing of the soldier mandibles is suggestive of the more strongly elbowed mandibles of *Procubitermes undulans* Schmitz, but this character is probably convergent. The hump in the profile of the postmentum of the soldier is similar to that of *Procubitermes undulans*, but the lateral sharp ridge is more distinct in *Mucrotermes*. The maxillary palps are proportionately shorter in *Procubitermes undulans*. The front margin of the soldier labrum is slightly bracket-shaped or slightly concave in *Mucrotermes* compared to the

deeply incised labrum of *Procubitermes undulans* and *P. niapuensis*. The incised front margin of the pronotum of the soldier of *Mucrotermes* is roughly similar to the shallow or weakly emarginate pronotum of *Procubitermes undulans* and *P. niapuensis*. The front coxa, tibial spurs, and middle tibial spines are similar in the two genera. I interpret these data to be an indication that *Mucrotermes* has evolved from a stock close to *Procubitermes*. *Procubitermes* on the whole is more generalized. *Noditermes* is also probably derived from *Procubitermes*. The projection of the postmentum in *Noditermes* is derivative compared to the postmentum of the soldier of *Procubitermes*. *Nitiditermes* and *Lepidotermes* are also derived from a stock close to *Procubitermes*, but are not very closely related to *Mucrotermes*.

Mucrotermes osborni, new species

SOLDIER (FIG. 4): Color of head brownish yellow. Pronotum generally paler than the head. Legs and abdomen paler than pronotum. Head with a few scattered bristles and short hairs on the top and sides and a very few short hairs near the opening of the frontal gland. A single bristle is usually on the lateral hump below and behind the base of the antenna. Postmentum without hairs or bristles. Labrum with a few bristles near the anterior border at the sides. Pronotum with a few

TABLE 3

MEASUREMENTS (IN MILLIMETERS) OF SOLDIERS OF *Mucrotermes osborni*, NEW SPECIES, FROM THE TYPE COLONY NEAR CAMP PUTNAM AND FROM THE PARATYPE COLONY FROM YANGAMBI

	No.	Range
Length of head with mandibles	2	3.23–3.47
Length of head to side base of mandibles	11	1.59–1.76
Width of head	11	1.35–1.50
Thickness of head, including postmentum	11	1.30–1.44
Length of postmentum in middle	4	0.93–1.00
Greatest width of postmentum in middle	11	0.37–0.43
Width of labrum between points	10	0.40–0.47
Length of left mandible	11	1.68–1.85
Length of pronotum	7	0.30–0.32
Width of pronotum	11	0.69–0.75
Length of hind tibia	11	1.03–1.18

bristles at the sides and back, but front margin in most specimens only with short hairs and in a few with one or two bristles. Tergites and sternites each with a row of marginal bristles. Tergites with a few

short hairs at the sides. Sternites with a number of short hairs that do not form a mat. Antenna with 14 or 15 articles. If with 15 articles, the third article is much shorter than the second or fourth. If with 14 articles, the third article is equal to the second and a little longer than the fourth. Other characters are described under the genus.

COMPARISONS: *Mucrotermes heterochilus* (Silvestri) was originally assigned to *Procubitermes* but is surely congeneric with *Mucrotermes osborni*. The soldier mandibles, particularly the basal portions, the general shape of the head of the soldier, the lateral small hump behind each antennal base, the slope of the vertex, the position and pilosity of the frontal gland opening, and the proportions of the maxillary palps, indicate close affinity. The worker mandibles of *M. heterochilus* are close to those of *M. osborni*, except that the apical tooth of each mandible is proportionately somewhat larger. A cotype soldier of *M. heterochilus* from Segboroué (latitude 6° 20′ N., longitude 2° 0′ E.), Dahomey, differs from *M. osborni* in its smaller size (width of head, 1.10 mm.); in the more pronounced hump at the rear portion of the postmentum; in the more concave front margin of the labrum; in the sharper lateral points of the labrum and the more concave side behind the points; in the fact that the elbow of each mandible is proportionately farther from the base; and in the more shallow indentation of the front margin of the pronotum.

LOCALITIES AND MATERIAL: The species is described from six soldiers (holotype, paratypes) and one worker from the type colony collected by A. Emerson in the ground at 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 20, 1948; and five soldiers and two workers from the paratype colony collected by A. Emerson in the outside layers of a mound at the base of a tree occupied by *Protermes prorepens* (Sjöstedt) at Yangambi (latitude 0° 47′ N., longitude 24° 23′ E.), Belgian Congo, on May 29, 1948.

The species is named in honor of President Fairfield Osborn of the New York Zoological Society, whose interest and encouragement enabled me to carry out my studies of the termites of the Belgian Congo in 1948.

FURCULITERMES, NEW GENUS

= Genus *Furculitermes* EMERSON, 1955, p. 511 (no description).

TYPE SPECIES: *Furculitermes winifredae*, new species.

ADDITIONAL SPECIES: *Furculitermes hendrickxi*, new species; *F. brevilabius*, new species; *F. cubitalis*, new species; *F. soyeri*, new species;

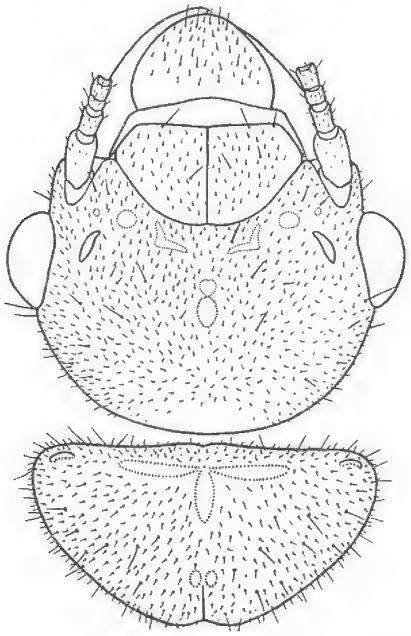

FIG. 6. Head and pronotum, from above, of morphotype queen of *Furculitermes winifredae*, new genus, new species.

F. parviceps, new species; *F. longilabius*, new species; and *F. brevimalatus*, new species.

It was very surprising to find this new genus represented by eight new species during my short collecting trip to the Belgian Congo in 1948. Samples from 16 colonies in both rain forest and wooded grassland were obtained during 66 days of active collecting, so that it must be assumed that the genus is not rare.

IMAGO (FIGS. 6, 11): Head, pronotum, legs, and tergites brownish yellow or yellowish brown. Pronotum (figs. 6, 11) with a T-shaped mark in the middle near the front margin, and two dots near the middle line in the posterior region. Sternites light in the middle. Head and pronotum (fig. 6) with scattered long bristles and many short hairs. Whitish sides of the swollen abdomen of the queen covered with small dots or rugosities, each with a single short hair in the middle. Head widely oval, with muscle insertions, as in figure 6. Fontanelle same color as the head; slightly depressed and not very conspicuous; size about the same or a little larger than the middle muscle insertion immediately in front of it. Eyes and ocelli of medium size, the ocellus about its width or a little more than its width removed from

the eye. Postclypeus comparatively long, about as long as half of its width; rather moderately arched in profile. Antenna broken in all specimens before me, the third article shorter than the fourth, the fourth shorter than the second. Imago-worker mandibles as in figure 8B and described under the worker. Pronotum (figs. 6, 11) somewhat narrower than the head, length from slightly longer to distinctly longer than half of its width; the posterior margin moderately but distinctly emarginate. Hind margin of mesonotum conspicuously emarginate, the angle a little wider than a right angle. Hind margin of the metanotum similar to the mesonotum, with the angle of indentation about equal to a right angle or wider. Front coxa rounded and lacking a conspicuous longitudinal sharp ridge or projection. Tibial spurs 3:2:2. Middle tibia with one or two short outer spines near the tip, each a little darker and thicker than the surrounding hairs. The fifth abdominal segment (first sternite reduced) with a conspicuous, somewhat sclerotized area in front of the sternite. No such sclerotized area in front of other sternites.

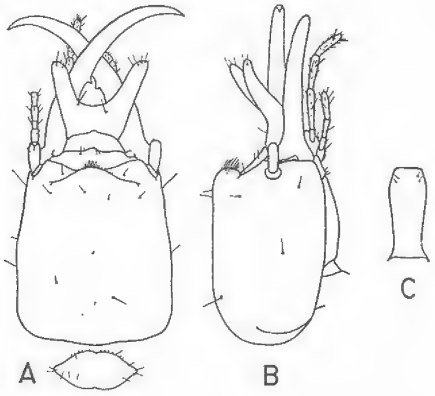

FIG. 7. Holotype soldier of *Furculitermes winifredae,* new genus, new species. A. Head and pronotum from above. B. Head from the side. C. Postmentum from below.

SOLDIER (FIGS. 7, 8A, 9, 10): Color of head and darker parts brownish yellow. Labrum and lighter parts pale yellow or whitish. Head and pronotum (fig. 7A) with a few scattered bristles; a bunch of bristles around the frontal gland opening, and a few short hairs near the bunch of bristles and also on the front margin of the pronotum. Postmentum (fig. 7C) with a few small bristles (usually two to four) in the anterior portion. Labrum (figs. 7A, 9) with a few bristles and a few short hairs at the tips of the lateral forked lobes, and a few bristles

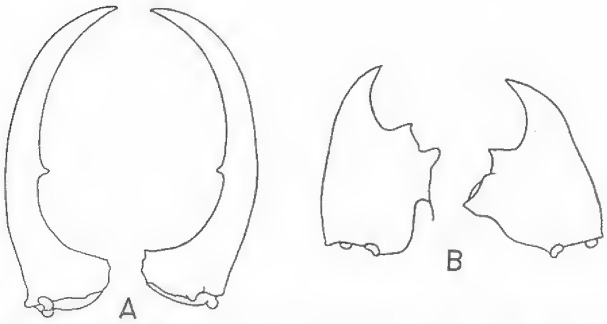

FIG. 8. A. Mandibles of paratype soldier from the type colony of *Furculitermes winifredae*, new genus, new species. B. Mandibles of worker from the type colony of *Furculitermes winifredae*, new genus, new species.

(usually two) inside the curved front margin in the basal portion. Tergites with a posterior row of bristles and a number of microscopical short hairs. Sternites with many scattered bristles and many shorter hairs that are much longer than those on the tergites. Head (fig. 7A) subrectangular, with irregularly slightly curved sides slightly or moderately converging towards the front; hind angles comparatively sharply curved. Profile of top of head (fig. 7B) slightly convex, flat, or a little concave, with a rounded small projection in front of the opening of the frontal gland below the tip, and a short horizontal groove below the opening of the frontal gland. Postmentum (fig. 7C) somewhat constricted about one-fifth of its length from the middle hind margin; profile flatly convex or with a small flat hump. Articles of the maxillary palps moderately elongated, the extended palps reaching about halfway from the marginal tooth to the tip of the extended mandibles. Antenna with 14 or 15 articles. If with 14 articles, the third article is much longer than the second or fourth and sometimes shows signs of dividing. If with 15 articles, the third article is shorter than the second or fourth. Labrum (figs. 7A, 9) large, with two forked lateral lobes that are somewhat narrow and end in rounded or slightly truncated tips reaching beyond the marginal teeth of the extended mandibles; front margin deeply concave. The gross soft whitish appearance of the labrum suggests that it may have a glandular as well as a sensory function. Mandibles (figs. 7A, 8A, 10) elongated; outer margin fairly evenly convex, a little irregular or somewhat elbowed; the inside edge of the mandible moderately curved, without a hook at the tip; inside edge of each mandible with a small pointed tooth about 39 to 47 per cent of the total length from the basal ventral condyle; the curve of the mandible between the base and the tooth is a fairly even extension

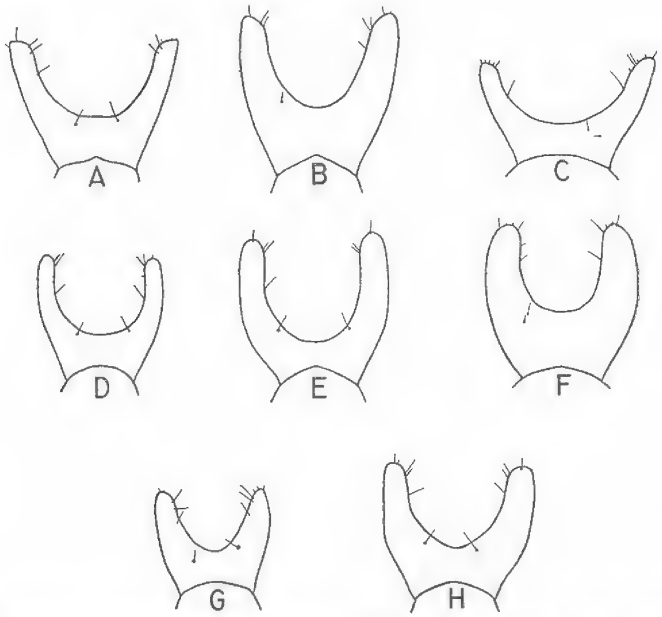

FIG. 9. Labra of soldiers of *Furculitermes*, new genus. A. *F. winifredae*, new species, paratype from type colony. B. *F. longilabius*, new species, holotype. C. *F. parviceps*, new species, holotype. D. *F. brevimalatus*, new species, holotype. E. *F. brevilabius*, new species, holotype. F. *F. soyeri*, new species, holotype. G. *F. hendrickxi*, new species, holotype. H. *F. cubitalis*, new species, holotype.

of the apical cutting edge, with a somewhat sharper curve ending in a point on the inside of the basal portion. Surface of the mandible granulated from the tip to the region of the tooth. Pronotum (fig. 7A) a little wider than half of the width of the head; front margin slightly but distinctly emarginate. Front coxa with a rounded longitudinal ridge. Tibial spurs 3:2:2. Middle tibia with one outer spine near the tip. All tibiae with several inner spines on the inside of the outer half, particularly in the hind tibiae.

WORKER (FIG. 8B): The apical tooth of each mandible comparatively large. The second marginal tooth of the right mandible absent.

COMPARISONS: The imago-worker mandibles, with the absence of the second marginal tooth in the right mandible, are similar only to those of *Euchilotermes, Ophiotermes, Tuberculitermes,* and *Spinitermes* among related genera of the Termitinae. The reduced second marginal teeth of the right mandibles and the large apical tooth of each mandible may be convergent in the imago-worker mandibles in some of these genera. The South American *Spinitermes* is quite remote

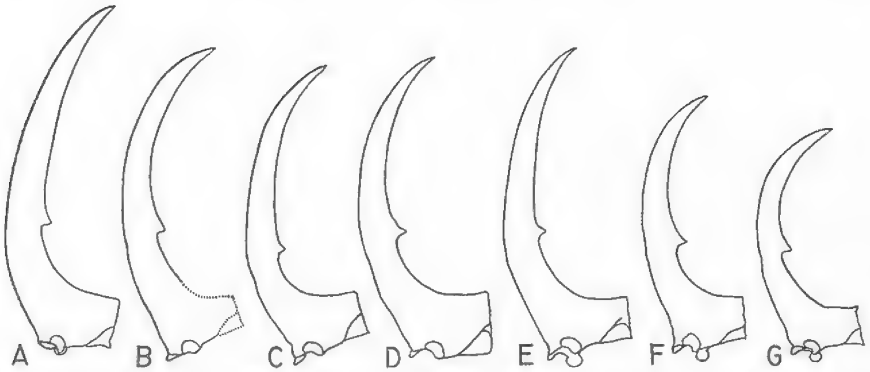

FIG. 10. Left mandibles of soldiers of *Furculitermes*, new genus. A. *F. longilabius*, new species, paratype from the type colony. B. *F. hendrickxi*, new species, holotype (dotted lines estimated from undissected mandible). C. *F. cubitalis*, new species, paratype from the type colony. D. *F. brevilabius*, new species, paratype from the type colony. E. *F. soyeri*, new species, paratype from the type colony. F. *F. parviceps*, new species, paratype from the type colony. G. *F. brevimalatus*, new species, paratype from the type colony.

from the African genera, and its phylogenetic origin is still obscure. When the characters of the soldier as well as the imago-worker mandibles are taken into consideration, the closest genus to *Furculitermes* is *Euchilotermes*. *Euchilotermes* differs in having a proportionately somewhat smaller apical tooth in each imago-worker mandible.

The soldier of *Euchilotermes* is closest to that of *Furculitermes*, but differs particularly in the proportionately shorter labrum in the middle, and in the proportionately longer and less sharply curved inner edge of the mandible from the tooth to the sharp basal point. The soldier mandible of *Euchilotermes* is more generalized, so that it is suggested that *Furculitermes* should be placed immediately after *Euchilotermes* in both the linear and phylogenetic orders.

The new species of *Furculitermes* are not strikingly distinct one from the others. In the early stages of my study of these forms, I thought there were fewer species and that each was more variable in its characters. The lines of demarcation between the species are still tentative, but the data on the soldiers and the two species represented by imagoes seem most easily interpreted as indicating eight species, the soldiers of which differ from one another particularly in the profiles of the tops of the heads, the shapes of the labra, the shapes of the mandibles, and in certain measurements. It is anticipated that more extensive collecting will produce larger series for taxonomic study which will result in a better statistical concept of intraspecies variation.

Furculitermes winifredae, new species

IMAGO (QUEEN; FIG. 6): Color of head, pronotum, and hard parts brownish yellow. Central muscle insertion on the head lighter than the fontanelle. Postclypeus a little lighter than the head. T-shaped mark on the pronotum conspicuous and lighter than the rest of the pronotum. Fontanelle mark a little larger than the central muscle insertion in front of it. Fontanelle flatly depressed. Ocellus about its width removed from the eye. Pronotum slightly longer than half of its width. Angles of incision in the hind margins of the mesonotum and metanotum each somewhat wider than a right angle.

TABLE 4

MEASUREMENTS (IN MILLIMETERS) OF THE MORPHOTYPE QUEEN OF *Furculitermes winifredae*, NEW SPECIES

Length of head to side base of mandibles	0.94
Width of head	1.27
Length of fontanelle	0.12
Diameter of eye	0.33
Length of ocellus	0.13
Width of ocellus	0.10
Ocellus from eye	0.10
Length of postclypeus	0.32
Width of postclypeus	0.64
Length of pronotum	0.59
Width of pronotum	1.08
Length of hind tibia	1.42

COMPARISONS: The imago of *F. brevilabius* is a little darker in color, and the T-shaped mark on the pronotum is darker and not so distinct. The fontanelle is smaller and more sharply depressed, and the pronotum (fig. 11) is proportionately longer.

SOLDIER (FIGS. 7, 8A, 9A): Top of head in profile (fig. 7B) nearly straight or slightly concave (one specimen is slightly convex). The most distinctive specific characters are the size and proportions of the parts, the shape of the labrum (fig. 9A), and the shape of the mandibles (fig. 8A). Antenna with 14 or 15 articles. Mandibles in some specimens a little more irregular in outline than in figure 8A, but all have a fairly evenly convex outer edge and are not elbowed as in *F. cubitalis* (fig. 9C).

COMPARISONS: *Furculitermes parviceps* has a shorter head, is in general smaller, has less converging sides of the head in front, has a narrower frontal projection from the top, and the postmentum, labrum (fig. 9C), and mandibles (fig. 10F) are proportionately close. *Furculi-*

termes longilabius is particularly distinguished by its longer labrum (fig. 9B) in the middle and the somewhat more curved lateral margins of the labrum. *Furculitermes brevilabius* is particularly distinguished by its shorter labrum (fig. 9E) in the middle, and the more curved lateral margins of the labrum. *Furculitermes brevimalatus* is distinguished by its smaller size, its short mandibles (fig. 10G), and the curved lateral margins of the labrum (fig. 9D). *Furculitermes soyeri* is easily distinguished by its shorter head, thinner and shorter mandibles (fig. 10E), and the thicker lobes of the labrum (fig. 9F), with more curved lateral margins. *Furculitermes hendrickxi* differs in the shorter lateral lobes

TABLE 5

MEASUREMENTS (IN MILLIMETERS) OF SOLDIERS OF *Furculitermes winifredae*, NEW SPECIES

	Holotype	Paratypes Type Colony Range	Paratype Colony Range
Length of head with mandibles	—	4.12–4.29	4.38
Length of head to side base of mandibles	2.12	2.06–2.09	2.03–2.15
Length of head to tip of frontal projection	1.94	1.86–1.97	1.92–1.94
Width of head	1.74	1.68–1.79	1.74–1.75
Thickness of head, including postmentum	1.35	1.26–1.37	1.30–1.38
Length of postmentum in middle	1.04	0.96–1.06	0.96–0.97
Greatest width of postmentum	0.49	0.47–0.52	0.48–0.49
Least width of postmentum	0.37	0.33–0.39	0.32–0.37
Length of labrum in middle	0.29	0.26–0.29	0.26–0.27
Length of lateral lobe of labrum from its side base	0.94	0.91–0.96	0.94–0.97
Length of left mandible	2.23	2.12–2.29	2.23–2.29
Length of left mandible from tooth to tip	1.26	1.15–1.29	1.29
Length of pronotum	0.41	0.35–0.43	0.37–0.38
Width of pronotum	0.91	0.91–0.97	0.95
Length of hind tibia	1.45	1.45–1.49	1.47–1.48

of the labrum (fig. 9G), and somewhat different measurements. The single known soldier of *F. hendrickxi* was collected at the same time and in the same nest structure as a paratype colony of *F. winifredae*—a fact that at first confused the taxonomic separation of the two species. *Furculitermes cubitalis* differs in the shorter labrum (fig. 9H) in the middle, in the more elbowed mandibles (fig. 10C), and in a more concave profile of the head behind the frontal projection.

LOCALITY AND MATERIAL: The descriptions are based on specimens from two colonies collected by A. Emerson at Camp Putnam (latitude

1° 24′ N., longitude 28° 36′ E.) on the Epulu River, Belgian Congo, on May 12, 1948. The morphotype queen, seven soldiers (holotype, paratypes), workers, and nymphs were taken in hard dirt carton in a mound of *Protermes prorepens*, No. 18, in the rain forest. Two soldiers were taken from the paratype colony in an old capped nest of *Cubitermes* on the side of a tree at ground level in the rain forest, together with one soldier of *Furculitermes hendrickxi* and specimens of *Crenetermes*, *Noditermes*, and *Pericapritermes*.

The species is named in honor of my late wife, Winifred Jelliffe Emerson, who assisted me greatly during my studies in the Belgian Congo, and who actively collected, made observations, and took field notes on a large proportion of the termites and termitophiles discovered.

Furculitermes hendrickxi, new species

Soldier (figs. 9G, 10B): Top of head flat in profile or very slightly convex, with no concavity behind the frontal projection. Sides of head converging towards the front. Antenna with 15 articles. Outer margin of labrum (fig. 9G) somewhat convex, with relatively short lateral lobes. Outer edge of each mandible (fig. 10B) fairly evenly convex.

TABLE 6

Measurements (in Millimeters) of Holotype Soldier of *Furculitermes hendrickxi*, New Species

Length of head with mandibles	4.19
Length of head to side base of mandibles	2.00
Length of head to tip of frontal projection	1.82
Width of head	1.69
Thickness of head, including postmentum	1.32
Length of postmentum in middle	0.80
Greatest width of postmentum	0.47
Least width of postmentum	0.37
Length of labrum in middle	0.26
Length of lateral lobe of labrum from its side base	0.69
Length of left mandible	2.25
Length of left mandible from tooth to tip	1.32
Length of pronotum	0.39
Width of pronotum	0.94
Length of hind tibia	1.43

Comparisons: The size and proportions of the soldier are close to those of *F. winifredae*, from which the present species differs conspicuously in the shape of the labrum (figs. 9A, 9G), and particularly in the

length of the lateral lobe of the labrum from its side base. *Furculitermes cubitalis* has more elbowed mandibles (fig. 10C), and the profile of the top of the head is concave.

LOCALITY AND MATERIAL: The description is based on a single holotype soldier from a vial containing two soldiers of *F. winifredae* collected by A. Emerson at Camp Putnam (latitude 1° 24′ N., longitude 28° 36′ E.) on the Epulu River, Belgian Congo, on May 12, 1948, in an old capped nest of *Cubitermes* on the side of a tree at ground level together with *Crenetermes, Noditermes,* and *Pericapritermes.*

The species is named in honor of M. F. L. Hendrickx, Directeur Régional de l'Institut National pour l'Étude Agronomique du Congo Belge, Mulungu, Belgian Congo. M. Hendrickx assisted us greatly through the hospitality of his home and in supplying vital transportation during my studies of termites at the Agricultural Experiment Station at Mulungu. Since our visit he has sent me collections of termites secured at high altitudes in the Lake Kivu region.

Furculitermes brevilabius, new species

IMAGO (QUEEN; FIG. 11): Color of head, pronotum, and hard parts yellowish brown. Fontanelle dark. Postclypeus a little lighter than the head. T-shaped mark on pronotum not conspicuous and almost as dark as the rest of the pronotum. Fontanelle sharply depressed, about the

TABLE 7

MEASUREMENTS (IN MILLIMETERS) OF MORPHOTYPE QUEEN OF *Furculitermes brevilabius*, NEW SPECIES

Length of head to side base of mandibles	1.02
Width of head	1.43
Length of fontanelle	0.09
Diameter of eye	0.39
Length of ocellus	0.18
Width of ocellus	0.12
Ocellus from eye	0.13
Length of postclypeus	0.39
Width of postclypeus	0.72
Length of pronotum	0.79
Width of pronotum	1.26
Length of hind tibia	1.88

same size as the central muscle insertion immediately in front of it. Ocellus slightly more than its width removed from the eye. Pronotum distinctly longer than half of its width. Angle of incision of hind margin

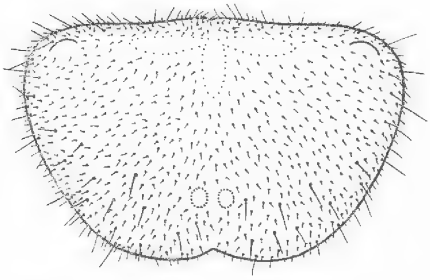

FIG. 11. Pronotum, from above, of morphotype queen of *Furculitermes brevilabius*, new species.

of mesonotum slightly greater than a right angle. Angle of incision of metanotum equal to a right angle.

COMPARISONS: The queen of *F. winifredae* is smaller in all measurements and is lighter in color, with a lighter and more distinct T-shaped mark on the pronotum. The fontanelle of *F. winifredae* is larger and

TABLE 8

MEASUREMENTS (IN MILLIMETERS) OF SOLDIERS OF *Furculitermes brevilabius*, NEW SPECIES

	Holotype Near Camp Putnam	Paratypes Type Colony Range	Paratype Yangambi
Length of head with mandibles	3.79	—	3.94
Length of head to side base of mandibles	2.03	1.88–2.00	1.91
Length of head to tip of frontal projection	1.90	1.76–1.88	1.86
Width of head	1.76	1.68–1.76	1.72
Thickness of head, including postmentum	1.36	1.32–1.38	1.31
Length of postmentum in middle	0.94	0.89–0.91	—
Greatest width of postmentum	0.43	0.44–0.47	0.45
Least width of postmentum	0.32	0.33–0.39	0.30
Length of labrum in middle	0.21	0.12–0.18	0.18
Length of lateral lobe of labrum from its side base	1.03	0.94–1.00	0.97
Length of left mandible	2.14	2.07–2.20	2.12
Length of left mandible from tooth to tip	1.25	1.20–1.24	1.21
Length of pronotum	0.41	0.42	0.46
Width of pronotum	0.90	0.88	0.90
Length of hind tibia	1.41	1.35–1.46	1.43

more flatly depressed. The pronotum (fig. 6) is only slightly longer than half of its width.

SOLDIER (FIGS. 9E, 10D): The soldier is close to that of *F. winifredae*, with the exception of the labrum which is shorter in the middle, with long, moderately thin, lateral lobes and with conspicuously more curved lateral margins (figs. 9A, 9E). Top of head in profile slightly convex, with a slight concavity behind the frontal projection. Antenna with 14 or 15 articles. Mandibles (fig. 10D) with fairly evenly convex outer margins.

COMPARISONS: The soldier of *F. cubitalis* has somewhat elbowed mandibles (fig. 10C) and a more concave profile of the head behind the frontal projection.

LOCALITIES AND MATERIAL: The descriptions are based on one morphotype queen, seven soldiers (holotype, paratypes), workers, and nymphs from the type colony collected by A. Emerson at 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 the base of a deserted mound of loose dirt. A paratype soldier with workers was collected by A. Emerson at Yangambi (latitude 0° 47′ N., longitude 24° 23′ E.), Belgian Congo, on May 29, 1948, in a mound 3 feet high and 4 feet in diameter occupied by *Protermes* and *Microtermes*.

Furculitermes cubitalis, new species

SOLDIER (FIGS. 9H, 10C): Very close to *F. brevilabius* from which it differs in having more elbowed mandibles (fig. 10C) and in having a more concave top of the head in profile. The labrum (fig. 9H) and general measurements are close to those of *F. brevilabius*.

COMPARISONS: *Furculitermes winifredae* has the outer margins of the mandibles (fig. 8A) more evenly curved, the profile of the head is not so concave behind the frontal projection, the side margins of the labrum (fig. 9A) are straighter, and the labrum is longer in the middle. *Furculitermes hendrickxi* has the outer margins of the mandibles (fig. 10B) more evenly curved, the profile of the head is slightly convex behind the frontal projection, and the lateral lobes of the labrum (fig. 9G) are shorter. *Furculitermes brevilabius* has the outer margins of the mandibles (fig. 10D) more evenly curved, the profile of the head is less concave behind the frontal projection, and the labrum (fig. 9E) is very similar in the two species. *Furculitermes brevimalatus* is smaller, with shorter mandibles (fig. 10G), the outer margins of the mandibles are more evenly curved, the profile of the head is less concave behind the frontal projection, and the labrum (fig. 9D) has thinner lateral lobes. *Furculitermes soyeri* also has elbowed mandibles (fig. 10E), but the

sides of the head do not converge so much towards the front, the profile of the head is not so concave behind the frontal projection, and the labrum (fig. 9F) is longer in the middle, with thicker lateral lobes. *Furculitermes longilabius* has somewhat less elbowed mandibles (fig. 10A), which are also longer, the profile of the head is similar, but the labrum (fig. 9B) is distinctly longer in the middle. *Furculitermes parviceps* is smaller, the head does not converge so much towards the

TABLE 9

MEASUREMENTS (IN MILLIMETERS) OF SOLDIERS OF *Furculitermes cubitalis*, NEW SPECIES

	Holotype	Paratypes Type Colony Range	Paratype Colony Range
Length of head with mandibles	3.92	—	4.06
Length of head to side base of mandibles	1.91	1.88–2.06	1.94–2.03
Length of head to tip of frontal projection	1.83	1.82–1.94	1.86–1.91
Width of head	1.65	1.63–1.78	1.63–1.71
Thickness of head, including postmentum	1.29	1.27–1.36	1.26–1.31
Length of postmentum in middle	0.94	0.88–0.98	0.96–1.03
Greatest width of postmentum	0.44	0.43–0.46	0.43–0.45
Least width of postmentum	0.32	0.30–0.35	0.31–0.32
Length of labrum in middle	0.21	0.20–0.24	0.18–0.21
Length of lateral lobe of labrum from its side base	0.94	0.91–1.00	0.91–1.06
Length of left mandible	2.15	2.12–2.17	2.14–2.16
Length of left mandible from tooth to tip	1.27	1.25–1.35	1.25–1.35
Length of pronotum	0.37	0.38–0.41	0.38–0.43
Width of pronotum	0.87	0.85–0.89	0.85–0.87
Length of hind tibia	1.24	1.23–1.35	1.26–1.33

front, the profile of the head is not so concave behind the frontal projection, the outer edges of the mandibles (fig. 10F) are more evenly curved, and the lateral margins of the labrum (fig. 9C) are not so curved.

LOCALITY AND MATERIAL: The species is described from eight soldiers (holotype, paratypes) with workers collected by A. Emerson from the type colony at Stanleyville (latitude 0° 30′ N., longitude 25° 11′ E.), Belgian Congo, on May 26, 1948, from a mound nest on the ground also occupied by *Tuberculitermes bycanistes* and *Noditermes;* and from three soldiers of a paratype colony collected by A. Emerson in the same locality and on the same date from a hard carton nest on the ground.

Furculitermes soyeri, new species

SOLDIER (FIGS. 9F, 10E): Head slightly converging towards the front. Top of head in profile slightly convex. Frontal projection from above comparatively wide (1.04 mm.). Profile of postmentum slightly humped in the middle. Antenna with 15 articles. Labrum (fig. 9F) long in the middle, with wide lateral lobes strongly curved on the outside margins. Mandibles (fig. 10E) somewhat elbowed, with a fairly straight middle section. Front margin of the pronotum comparatively deeply incised.

TABLE 10

MEASUREMENTS (IN MILLIMETERS) OF SOLDIERS OF *Furculitermes soyeri*, NEW SPECIES

	Holotype	Paratypes Type Colony Range	Paratype No. 7 Range	Paratype
Length of head with mandibles	3.68	—	3.59	—
Length of head to side base of mandibles	1.91	1.74–1.88	1.74–1.86	1.76
Length of head to tip of frontal projection	1.77	1.65–1.76	1.67–1.79	1.70
Width of head	1.60	1.53–1.59	1.56–1.72	1.59
Thickness of head including postmentum	1.26	1.21–1.24	1.27–1.29	1.23
Length of postmentum in middle	0.85	0.82–0.94	0.78–0.89	0.77
Greatest width of postmentum	0.45	0.45–0.46	0.43–0.45	0.41
Least width of postmentum	0.30	0.30–0.32	0.29–0.32	0.30
Length of labrum in middle	0.32	0.28–0.32	0.27–0.32	0.28
Length of lateral lobe of labrum from its side base	1.04	0.94–1.00	0.93–1.03	0.91
Length of left mandible	2.06	1.97–2.08	2.08–2.12	2.03
Length of left mandible from tooth to tip	1.15	1.12–1.18	1.22–1.28	1.23
Length of pronotum	0.37	0.37–0.41	0.38–0.39	0.38
Width of pronotum	0.83	0.80–0.86	0.86–0.88	0.81
Length of hind tibia	1.18	1.17–1.20	1.15–1.21	1.12

COMPARISONS: The labrum with the wide lateral lobes and the strongly curved side margins is unique among the known species of the genus.

LOCALITY AND MATERIAL: The descriptions are based on specimens from three colonies from savanna woodland in the Katanga. The type colony with five soldiers (holotype, paratypes) and workers was collected by A. Emerson at Keyberg (latitude 11° 47′ S., longitude 27° 25′ E.)

near Elisabethville, Belgian Congo, on April 21, 1948, at the base of a mound which also contained *Trinervitermes* and *Anoplotermes*. Three soldiers with workers were collected from a paratype colony by A. Emerson at Keyberg, Belgian Congo, on April 25, 1948, No. 7, in a nest of *Odontotermes patruus* Sjöstedt. A single paratype soldier was collected by A. Emerson at Keyberg, Belgian Congo, on April 25, 1948, in a mound of *Trinervitermes* 5 inches high and 2 feet in diameter also occupied by *Amitermes* and *Microcerotermes*.

The species is named in honor of M. L. Soyer, Directeur Régional de l'Institut National pour l'Étude Agronomique du Congo Belge, Elisabethville, Belgian Congo. Both M. Soyer and Mme. L. Soyer-Poskin gave valued help in facilitating our studies of termites in the Katanga.

Furculitermes parviceps, new species

SOLDIER (FIGS. 9C, 10F): Sides of head converging only a little towards the front. Top of head in profile slightly concave. Antenna with 14 or 15 articles. Labrum (fig. 9C) short, with diverging and relatively narrow lateral lobes with slightly curved sides. Mandibles (fig. 10F) with outer edges fairly evenly convex, with a very slight elbowing. Front margin of the pronotum distinctly emarginate.

TABLE 11

MEASUREMENTS (IN MILLIMETERS) OF SOLDIERS OF *Furculitermes parviceps*, NEW SPECIES

	Holotype	Paratypes Type Colony Range
Length of head with mandibles	3.69	—
Length of head to side base of mandibles	1.76	1.70–1.91
Length of head to tip of frontal projection	1.68	1.65–1.77
Width of head	1.57	1.49–1.59
Thickness of head, including postmentum	1.22	1.18–1.30
Length of postmentum in middle	0.87	0.83–0.92
Greatest width of postmentum	0.46	0.45–0.50
Least width of postmentum	0.33	0.32–0.36
Length of labrum in middle	0.18	0.18–0.20
Length of lateral lobe of labrum from its side base	0.79	0.84–0.90
Length of left mandible	1.98	1.88–2.06
Length of left mandible from tooth to tip	1.08	1.04–1.09
Length of pronotum	0.37	0.35–0.39
Width of pronotum	0.80	0.77–0.84
Length of hind tibia	1.27	1.19–1.35

COMPARISONS: *Furculitermes parviceps* is distinguished from the other known species of the genus by the size and the comparatively slightly curved sides of the labrum with diverging lateral lobes.

LOCALITY AND MATERIAL: The species is described from six soldiers (holotype, paratypes) with workers from the type colony collected by A. Emerson at Camp Putnam (latitude 1° 24′ N., longitude 28° 36′ E.) on the Epulu River, Belgian Congo, on May 14, 1948, in a soft, deserted carton nest on the ground which also contained *Microtermes* and *Microcerotermes.*

Furculitermes longilabius, new species

SOLDIER (FIGS. 9B, 10A): Sides of head from above conspicuously converging towards the front. Top of head slightly concave in profile. Profile of postmentum evenly convex, without a hump as in *F. soyeri.* Antenna with 15 articles. Labrum (fig. 9B) proportionately long in the middle, with moderately curved lateral margins and moderately wide

TABLE 12

MEASUREMENTS (IN MILLIMETERS) OF SOLDIERS OF *Furculitermes longilabius*, NEW SPECIES

	Holotype	Paratypes Type Colony Range	Paratypes Pygmy Camp Range	Paratypes Stanleyville Range
Length of head with mandibles	4.59	—	4.47	4.13
Length of head to side base of mandibles	2.20	2.06–2.21	2.21–2.24	1.97–2.06
Length of head to tip of frontal projection	2.09	1.96–2.05	1.94	1.85–1.86
Width of head	1.91	1.86–1.98	1.92–2.00	1.86–1.88
Thickness of head, including postmentum	1.46	1.41–1.48	1.50–1.53	1.41
Length of postmentum in middle	1.05	0.92–1.01	0.88–1.00	0.88–0.90
Greatest width of postmentum	0.49	0.48–0.52	0.52–0.55	0.50
Least width of postmentum	0.37	0.34–0.40	0.35–0.36	0.37–0.40
Length of labrum in middle	0.34	0.30–0.35	0.27–0.31	0.28–0.29
Length of lateral lobe of labrum from its side base	1.18	1.00–1.14	1.07–1.17	0.97
Length of left mandible	2.53	2.41–2.56	2.35–2.44	2.33–2.39
Length of left mandible from tooth to tip	1.57	1.47–1.62	1.47–1.53	1.45–1.51
Length of pronotum	0.49	0.43–0.48	0.44–0.45	0.47
Width of pronotum	1.03	1.00–1.01	0.97–1.00	1.00–1.03
Length of hind tibia	1.50	1.48–1.60	1.55–1.59	1.47–1.48

lateral lobes. Mandibles (fig. 10A) slightly elbowed and somewhat less curved than those of most of the other species except *F. soyeri*. Front margin of pronotum not quite so deeply incised in the middle as in *F. soyeri*.

COMPARISONS: Labrum of *F. soyeri* (fig. 9F) with more strongly curved lateral margins and somewhat wider lateral lobes. Labrum of *F. longilabius* (fig. 9B) longer in the middle than that of other species except *F. soyeri* and *F. winifredae*. Lateral lobes of *F. winifredae* (fig. 9A) diverge more owing to the straighter outer margins. *Furculitermes winifredae* also has a narrower head (fig. 7A).

LOCALITIES AND MATERIAL: The descriptions are based on specimens from three colonies. Six soldiers (holotype, paratypes) with workers from the type colony were 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 a sand carton nest under a log in the rain forest. Three soldiers with workers were collected from a paratype colony by A. Emerson at a Pygmy camp 4 kilometers north of Camp Putnam on the Epulu River, Belgian Congo, on May 20, 1948, in the ground. Two soldiers with workers were collected from a paratype colony by A. Emerson at Stanleyville (latitude 0° 31′ N., longitude 25° 11′ E.), Belgian Congo, on May 25, 1948, in second-growth woods in an area once covered by rain forest.

Furculitermes brevimalatus, new species

SOLDIER (FIGS. 9D, 10G): Head from above with sides converging somewhat towards the front. Top of head in profile nearly straight or very slightly concave. Profile of postmentum fairly evenly convex. Labrum (fig. 9D) with narrow lateral lobes and lateral margins comparatively strongly curved. Front margin of labrum U-shaped, in this respect resembling those of *F. brevilabius* (fig. 9E) and *F. soyeri* (fig. 9F). Mandibles (fig. 10G) comparatively short, with fairly evenly curved outer edges and comparatively more strongly curved than in any other described species (fig. 10). Pronotum with a small incision in the front margin.

COMPARISONS: The soldier mandibles (fig. 10G) are shorter and more strongly curved than in any other described species (fig. 10). On the whole, *F. brevilabius* seems to be the closest species.

LOCALITY AND MATERIAL: Three soldiers (holotype, paratypes) with workers were collected from the type colony by A. Emerson at Stanleyville (latitude 0° 30′ N., longitude 25° 11′ E.), Belgian Congo, on June 1, 1948, in the soil of second-growth woods in a rain-forest region. A

single soldier and workers from a paratype colony were collected by A. Emerson at Stanleyville, Belgian Congo, on June 2, 1948, associated with *Cephalotermes rectangularis* (Sjöstedt).

TABLE 13

MEASUREMENTS (IN MILLIMETERS) OF SOLDIERS OF *Furculitermes brevimalatus*, NEW SPECIES

	Holotype	Paratypes Type Colony Range	Paratype Colony
Length of head with mandibles	3.30	—	—
Length of head to side base of mandibles	1.74	1.77–1.78	1.76
Length of head to tip of frontal projection	1.70	1.71–1.76	1.76
Width of head	1.47	1.45–1.54	1.51
Thickness of head, including postmentum	1.18	1.18–1.24	1.22
Length of postmentum in middle	0.87	0.82–0.85	0.91
Greatest width of postmentum	0.41	0.38–0.40	0.43
Least width of postmentum	0.29	0.29–0.32	0.32
Length of labrum in middle	0.21	0.22	0.22
Length of lateral lobe of labrum from its side base	0.88	0.91	0.88
Length of left mandible	1.68	1.68–1.70	1.75
Length of left mandible from tooth to tip	0.91	0.88–0.92	0.96
Length of pronotum	0.36	0.35–0.36	0.36
Width of pronotum	0.77	0.79–0.80	0.76
Length of hind tibia	1.17	1.15–1.18	1.16

PILOTERMES, NEW GENUS

= Genus *Pilotermes* EMERSON, 1955, p. 511 (no description).

TYPE SPECIES: *Pilotermes langi*, new species.

IMAGO (FIGS. 12, 13): Head and pronotum (fig.12) with a few scattered bristles and many short hairs, hairs approximately one-third as long as the bristles and forming a thin mat that contrasts with the bristles in profile. Wing membrane with many scattered short hairs. Both tergites and sternites with bristles on the posterior margins and covered with short hairs about half of the length of the bristles and about the same length on both tergites and sternites. Head (fig. 12) oval. Area between the ocelli flatly convex, almost straight in outline, and top border of the ocellus very slightly raised. Fontanelle small, oval, a little less than or about as long as one-half of the length of the ocellus; slightly depressed from the surrounding portion of the head. Eyes of medium size, strongly convex and prominent, close to the lower margin of the

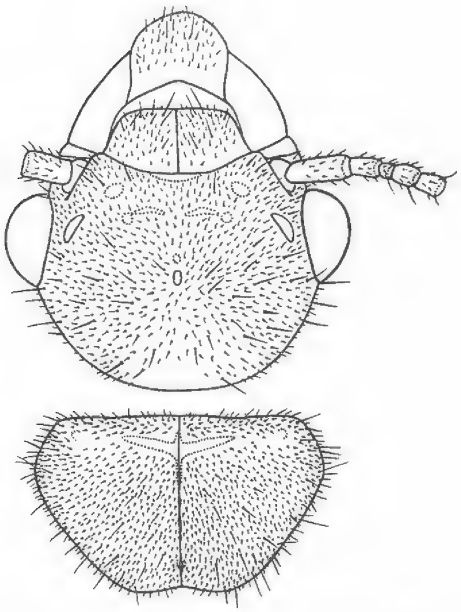

FIG. 12. Head and pronotum, from above, of morphotype female imago of *Pilotermes langi*, new genus, new species.

head. Ocellus fairly large, about one-third of its length and less than its width removed from the ocular suture; close in size to the base of the antenna. Antenna with 15 articles, the fourth article a little shorter than the second and equal to the fifth, the third much shorter than the fourth. Postclypeus with a median line, about as long as half of its width, moderately arched in profile. Mandibles (fig. 13) each with a long and fairly robust apical tooth. In the left mandible, the distance from the apical tooth to the first marginal tooth is much longer than from the first marginal tooth to the tip of the third marginal tooth (proportion 19:10). The cutting edge of the left mandible from the tip of the first marginal tooth to the shallow notch in front of the third marginal tooth is flatly concave and not undulated. The right mandible has a conspicuous second marginal tooth, and the angle between the first and second marginal teeth is a little wider than a right angle. Pronotum (fig. 12) a little longer than half of its width; width less than the width of the head; front margin with a small median indentation and hind margin rather strongly emarginate. Mesonotum and metanotum each narrowly and deeply indented, the angle of indentation less than a right angle and the angle of each pointed lobe less than a right angle. Front coxa with a blunt, rather rounded, and inconspicuous

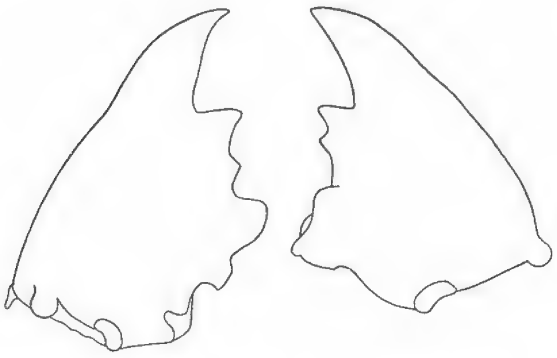

FIG. 13. Mandibles of female imago of *Pilotermes langi*, new genus, new species.

longitudinal ridge. Tibial spurs 3:2:2. Middle tibia with two outer spines near the tip. Wing membranes finely granulated on the surfaces.

SOLDIER (FIG. 14): Head with a number of scattered bristles and a few short hairs on the front, a tuft of conspicuous down-curved bristles near the opening of the frontal gland. Postmentum (fig. 14C) with two bristles at the anterior end. Tergites and sternites with medium long bristles and a few inconspicuous short hairs. Head (fig. 14A) proportionately short, wide, and thick; almost circular from above. Sides and rear margin of head somewhat convexly curved. Front of vertex from above obtusely and weakly pointed. One soldier in the series has a bilobed or weakly indented hind margin of the head. Front of vertex rounded in profile (fig. 14B) and nearly vertical directly above the opening of the frontal gland; a fairly deep but short horizontal groove below the opening of the frontal gland; a short vertical groove on each side of the opening of the frontal gland; the opening of the frontal gland is on a hump surrounded on three sides by grooves, but the hump is evenly joined to the vertex above it. The posterior suture of the rather short postclypeus is visible just below the gland opening. Postmentum (fig. 14C) with sides not markedly constricted; sides slightly convex in the front three-fourths; each side with a long, fairly sharp, longitudinal ridge extending from the region near the base of the maxillae to about one-fourth of the length of the postmentum from the middle rear margin, each ridge extending over the lateral sutures as viewed from below; profile of postmentum (fig. 14B) fairly evenly convex, with no hump or projection. Antenna with 14 articles, the first article about as long as the second, third, and fourth together, the third shorter than the second and either shorter or longer than the fourth.

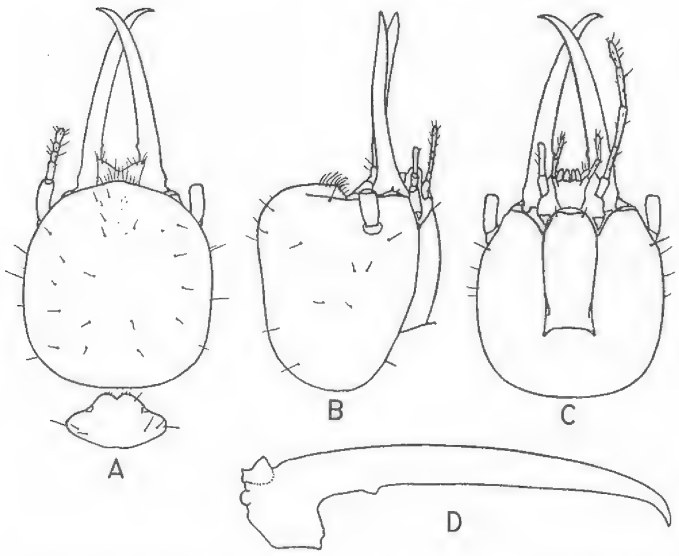

FIG. 14. Soldier of *Pilotermes langi*, new genus, new species. A. Head and pronotum of holotype from above. B. Head of holotype from the side. C. Head of holotype from below. D. Left mandible of paratype from the type colony.

The maxillary palps are long and attenuated, extending to about seven-eighths of the length of the extended mandibles. Labrum (fig. 14A) with two sharp lateral points with some variation in the length and sharpness; with a fairly deeply incised front margin, the angle of incision somewhat wider than a right angle. Mandibles (figs. 14A, 14D) slender and elongated, with a slightly and evenly curved outside edge and somewhat hooked tips; with minute oblique striations on the surface both above and below; each mandible with a reduced but fairly sharp tooth on the inside edge and proportionately farther from the base than in many related genera; mandibles approximately symmetrical; the curve between the base and the attenuated portion of the left mandible just behind the tooth is fairly sharp and forms an angle roughly close to a right angle, while in the right mandible the equivalent angle is a little wider. Pronotum (fig. 14A) has a deep depression in the middle near the hind margin; front margin conspicuously and deeply incised. Front coxal ridge not sharp, a little humped in profile. Tibial spurs 3:2:2. Middle tibia with two dark spines on the outer edge a little behind the tip. The secretion from the frontal gland of the soldier coagulates in alcohol into a firm translucent jelly resembling that of *Proboscitermes*.

RELATIONS: The imago-worker mandibles seem to be closest to those of *Fastigitermes, Proboscitermes,* and *Orthotermes* (see Ahmad, 1950, p. 73, fig. 16). The imago of *Fastigitermes jucundus* (Sjöstedt) is undescribed. Sjöstedt (1911) included an imago in his description of *"Eutermes jucundus,"* but an examination of this imago by the present author shows that it belongs to *Anoplotermes.* A worker of *Fastigitermes jucundus* (determined and collected by A. Emerson, Camp Putnam on the Epulu River, Belgian Congo, May 23, 1948) has proportionately somewhat shorter apical teeth, the left mandible has a sharper angle between the apical tooth and the first marginal tooth, the third marginal tooth is smaller and is pointed backward more, and the cutting edge of the first plus second marginal tooth is closely similar but slightly more undulated in outline. The left mandible of the imago of *Orthotermes* has a more backward-pointed third marginal tooth. A worker of *Proboscitermes tubuliferus* (Sjöstedt), determined and collected by A. Emerson, Yangambi, Belgian Congo, May 30, 1948, has proportionately shorter apical teeth, and the edge of the first plus second marginal tooth of the left mandible is more undulated, with a slightly more distinct notch in front of the third marginal tooth. The right mandible is close except for the larger apical tooth in *Pilotermes.*

The soldier of *Mucrotermes* (fig. 4) has no tuft of hairs near the frontal gland opening, differs in the base of the left mandible (fig. 4D), and has a pointed vertex (fig. 4B) above the gland opening. Many other characters also distinguish these remotely related genera. The soldier of *Procubitermes* lacks a tuft of hairs near the frontal gland opening; the front of the head is more slanted and less vertical; the postmentum lacks sharp longitudinal ridges on the sides and has a distinct rounded hump in *P. undulans;* the maxillary palps are proportionately shorter in relation to the mandibles; the labrum is larger, two-lobed, and with rounded lateral points in front, and a somewhat deeper V-shaped incision in the front margin; the mandibles show oblique striations on the upper and lower surfaces that are not quite so distinct as in *Pilotermes;* the indentation of the front margin of the pronotum is much more shallow than in *Pilotermes;* and the ridge on the front coxa is similar. The soldier of *Proboscitermes* differs from that of *Pilotermes* in having a much enlarged frontal proboscis, a small labrum with sharply pointed sides and a median lobe, a constricted postmentum without the sides overlapping the lateral sutures, and the left mandible with a deep incision behind the blunt, reduced, marginal tooth, and a large wide pointed projection between the incision and the sharp prolonged inside point of the molar region. In spite of these striking dif-

ferences, *Pilotermes* and *Proboscitermes* are related in a number of general features of the mandibles, head, antennae, maxillary palps, pronotum, and front coxa. It is my tentative conclusion that *Proboscitermes* is an extreme modification of a basal type related to *Pilotermes*. *Pilotermes* probably is derived from a primitive group related to *Cubitermes* and *Procubitermes*. *Proboscitermes* seems to be more closely related to *Basidentitermes* and *Orthotermes* than it is to *Pilotermes*. The soldier of *Basidentitermes* differs from that of *Pilotermes* in having a wide median lobe on the front margin of the labrum, a simple constricted postmentum without overlapping sides, a less circular shape of the head from above, different types of grooves and ridges on the head, less hooked mandibles at the tip, and a deep incision at the base of the left mandible. The two genera are similar in the texture of the surface of the mandibles, in the elongated maxillary palps, in the first article of the antenna, in the tibial spurs, and in the middle tibial spines. Although *Basidentitermes* is more closely related to *Proboscitermes* than to *Pilotermes*, a number of characters indicate a fairly close relation to *Pilotermes*, some more primitive and others more derivative. The imago-worker mandibles of *Basidentitermes* are more primitive than those of *Pilotermes* in the shorter apical tooth and the undulated cutting edge of the first plus second marginal tooth of the left mandible. *Basidentitermes* is probably the most closely related genus to *Pilotermes* now known, but the large number of striking differences indicate that the phylogeny has been strongly divergent and that neither genus could be the ancestral type of the other.

Pilotermes langi, new species

IMAGO (FIGS. 12, 13): Color of head medium yellowish brown. Fontanelle white. Postclypeus a little lighter than the head. Pronotum same color as the head, with a light T-shaped mark in the middle, a light dot at each side near the front in line with the branches of the T-shaped mark, and two small light spots close together in the middle not far from the hind margin. Wings brown. Tergites and sternites a little lighter than the head and pronotum; the sternites with a light area in the middle anterior portion of each.

SOLDIER (FIG. 14): Head brownish yellow in front, paler behind. Pronotum paler than the front of the head. Legs a little paler than the pronotum. Abdomen whitish. The anatomical characters are described under the genus and illustrated in figure 14.

LOCALITIES AND MATERIAL: The descriptions are based on several imagoes (morphotypes), soldiers (holotype, paratypes), and workers

TABLE 14

MEASUREMENTS (IN MILLIMETERS) OF TWO MALES AND TWO FEMALES OF *Pilotermes langi*, NEW SPECIES

	Males	Females
Length of head to front of labrum	1.27– 1.29	1.23– 1.29
Length of head to front of postclypeus	0.88	0.91
Length of head to side base of mandibles	0.75	0.76– 0.79
Width of head	1.17– 1.18	1.18– 1.21
Length of fontanelle	0.06– 0.08	0.08
Diameter of eye	0.32– 0.33	0.34
Eye from lower margin	0.04– 0.05	0.03
Length of ocellus	0.15	0.16– 0.17
Width of ocellus	0.11	0.10– 0.12
Ocellus from eye	0.06– 0.07	0.05– 0.08
Length of postclypeus	0.22	0.22– 0.23
Width of postclypeus	0.48– 0.49	0.46– 0.47
Length of pronotum	0.53– 0.57	0.54– 0.55
Width of pronotum	0.96– 0.97	0.94– 0.95
Length of hind tibia	1.18– 1.21	1.23
Length of anterior wing from costal suture	10.90–11.09	10.90–11.09
Width of anterior wing	2.68– 2.80	2.56– 2.64

from the type colony collected by A. Emerson at 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, from a mound 15 inches high and 10 inches in diameter at the base, probably

TABLE 15

MEASUREMENTS (IN MILLIMETERS) OF SIX SOLDIERS OF *Pilotermes langi*, NEW SPECIES

	Range
Length of head with mandibles	2.71
Length of head to side base of mandibles	1.34–1.50
Width of head	1.29–1.38
Thickness of head, including postmentum	1.23–1.28
Greatest width of postmentum	0.40–0.42
Least width of postmentum	0.38
Width of labrum between points	0.35–0.39
Length of left mandible	1.41–1.46
Length of left mandible from tooth to tip	0.97–0.99
Length of pronotum	0.33–0.35
Width of pronotum	0.71–0.74
Length of hind tibia	0.96–1.06

built by another species of termite and subsequently abandoned. *Jugositermes tuberculatus* Emerson and a species of *Microtermes* were also found in this mound but were surely not the builders. Six soldiers, workers, and nymphs were collected from a paratype colony by A. Emerson at Camp Putnam on the Epulu River, Belgian Congo, on May 23, 1948.

The species is named in honor of Mr. Herbert Lang whose early explorations and excellent general collections in the Belgian Congo laid a basis for much of our present knowledge of the termite fauna, and who originally stimulated my personal interest in the termites of this region (see Emerson, 1928).

PROFASTIGITERMES, NEW GENUS

= Genus *Profastigitermes* Emerson, 1955, p. 511 (no description).

Type Species: *Profastigitermes putnami*, new species.

Soldier (fig. 15): Head (figs. 15A, 15B) with numerous scattered bristles and a large bunch of long hairs around the frontal gland opening; a few bristles near the front margin of the labrum; and two bristles near the anterior margin of the postmentum (fig. 15C). Pronotum (fig. 15A) with a few bristles near the side and hind margins, and short hairs on the front margin. Head from above (fig. 15A) subquadrangular, relatively wide, a little wider in the anterior half than in the posterior half. Profile of head (fig. 15B) with a somewhat rounded hump on the vertex above and somewhat posterior to the opening of the frontal gland. A semicircular depression runs from under the frontal gland opening to the sides of the opening. A low but distinct ridge extends transversely from the top of the antennal base to the distinct suture of the postclypeus. A distinct depressed curved line extends along the upper side of a ridge from the posterior edge of each antennal base to the side base of each mandible. Another short ridge curves from the region of the lower mandibular condyle towards the postmentum, but fades out without touching the lateral suture of the postmentum. Postmentum (fig. 15C) constricted from below; side margins behind the anterior portion concave; narrowest region in the area of a conspicuous double-pointed projection about one-fourth of the length of the postmentum from the middle hind margin; projection with a slightly concave ridge between the points when viewed from the front. Antenna with 14 articles, the second, third, and fourth articles nearly equal in length and the first article about three times the length of the second. Maxillary palps, when extended, reaching about two-thirds of the length of the extended mandibles. Labrum (fig. 15A) with two sharp lateral

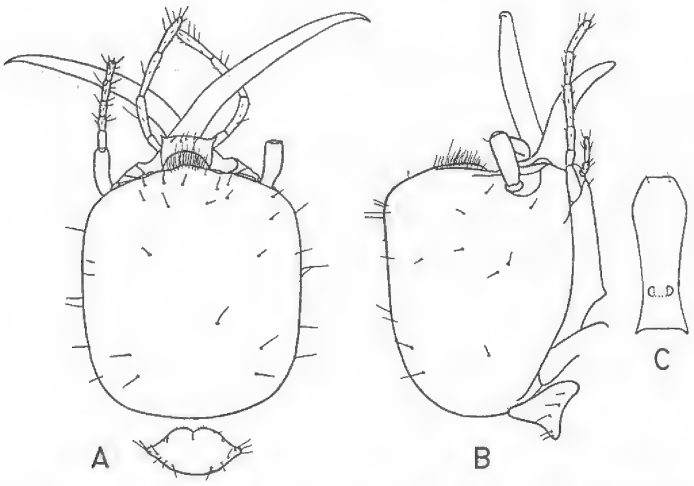

FIG. 15. Holotype soldier of *Profastigitermes putnami*, new genus, new species. A. Head and pronotum from above. B. Head and pronotum from the side. C. Postmentum from below.

points and a wide, slightly convex front margin between the points. Mandibles (fig. 15A) close in general type to those of *Pilotermes*, long and slender, with oblique striations on the surface, elbowed inward at about two-fifths of the total length from the lower basal condyle, tips slightly hooked, marginal tooth closer to the base in each mandible than in *Pilotermes langi* (fig. 14D), and the angle between the tooth and the basal projection a little wider in each mandible than in *Pilotermes*. Pronotum (fig. 15A) with a distinctly and fairly deeply incised front margin. Front coxa without a sharp longitudinal ridge. Tibial spurs 3:2:2. Two distinct spines in a longitudinal row on the outer edge of the middle tibia near the tip.

COMPARISONS: The closest genus seems to be *Fastigitermes*. In the absence of the worker or imago, the affiliations cannot be determined with complete confidence, but the soldiers of *Fastigitermes* exhibit general resemblances in the mandibles, including the basal structures, and also in the postmentum, labrum, antenna, pronotum, tibiae, and front coxa. The shape of the head and the size of the soldier indicate a somewhat more generalized condition, and it is my opinion that *Profastigitermes* is somewhat more primitive than *Fastigitermes* and should be placed immediately in front of *Fastigitermes* in the phylogenetic order. *Fastigitermes* has a more forward-produced hump on the vertex above the opening of the frontal gland, so that the angle of the anterior slope of the vertex and front from the base of the postclypeus is less than a

right angle in profile. The tuft of bristles around the frontal gland opening is not so thick nor so conspicuous in *Fastigitermes.* The projection of the postmentum is proportionately much greater in *Fastigitermes* and ends in a fairly sharp, single, backward-pointing spine. The soldier of *Fastigitermes jucundus* has an elbow in the left mandible near the region of the marginal tooth, while in *Profastigitermes* the elbow is about one-third of the distance from the tooth to the tip of the mandible. *Fastigitermes* has a tooth in each mandible proportionately farther from the base than in *Profastigitermes,* and the angle between the tooth and the base is a little sharper, with a very sharp, tooth-like projection at the base of the left mandible that is not so sharp nor so conspicuous in *Profastigitermes.* The ridges and depressions between the antennal base and the base of the mandibles, and between the antennal base and the postclypeus, differ in degree of development and relative positions but appear to be homologous. The labrum is generically related. The pronotum of *Fastigitermes jucundus* is not incised in front, but the pronotum of a new species of *Fastigitermes* as yet undescribed is incised, so this character is specific rather than generic. The soldier of *Pilotermes* (fig. 14) is easily distinguished from that of *Profastigitermes* (fig. 15) by its rounder head, rounder vertex in profile, V-shaped indentation of the front margin of the labrum, less constricted postmentum, lack of a projection on the postmentum, and less spread of the tuft of hairs near the opening of the frontal gland. The marginal tooth of the soldier mandible of *Pilotermes* (fig. 14D) is farther from the base of the mandible than in *Profastigitermes,* the angle of curvature between the tooth and the inner basal point is narrower in both mandibles, and the mandibles are not elbowed. *Profastigitermes* does not have the deeply incised notch in the base of the left mandible found in soldiers of *Basidentitermes, Orthotermes,* and *Proboscitermes.* The shape of the front margin of the soldier labrum suggests a relationship between these last three genera, *Fastigitermes,* and *Profastigitermes,* while in this respect *Pilotermes* is more generalized. The soldier of *Nititidermes* (fig. 2) is easily distinguished from *Profastigitermes* by the shape of the labrum and the lack of a projection on the postmentum. The soldier of *Mucrotermes* (fig. 4D) is easily distinguished from *Profastigitermes* by the sharp, tooth-like projection in the basal inner angle of the left mandible, and by many other generic characters in addition.

Profastigitermes putnami, new species

SOLDIER (FIG. 15): Head brownish yellow. Pronotum paler than head.

Abdomen paler than pronotum. Anatomical characters are included in the generic description and illustrated in figure 15.

TABLE 16

MEASUREMENTS (IN MILLIMETERS) OF THE HOLOTYPE SOLDIER OF *Profastigitermes putnami*, NEW SPECIES

Length of head to side base of mandibles	1.74
Width of head	1.49
Thickness of head, including postmentum projection	1.42
Length of postmentum in middle	1.02
Greatest width of postmentum	0.36
Least width of postmentum	0.26
Width of labrum between points	0.43
Length of left mandible	1.88
Length of pronotum	0.32
Width of pronotum	0.65
Length of hind tibia	1.14

LOCALITY AND MATERIAL: The description is based on a single holotype soldier collected inadvertently with other termites by A. Emerson in the rain forest at Camp Putnam (latitude 1° 24′ N., longitude 28° 36′ E.) on the Epulu River, Belgian Congo, on May 23, 1948.

The species is named in honor of the late Mr. Patrick Putnam who, with his wife, Mrs. Ann Putnam, enabled me to collect in the vicinity of his camp, and with whom I collected in the outskirts of Leopoldville. With his long experience in the region, he assisted me with advice on the natural history of the Congo, and he also introduced me to a number of residents who in turn helped me to collect in favorable localities.

FORFICULITERMES, NEW GENUS

= Genus *Forficulitermes* EMERSON, 1955, p. 512 (no description).

TYPE SPECIES: *Forficulitermes planifrons*, new species.

SOLDIER (FIG. 16): Head (figs. 16A, 16B) with scattered bristles and a very few short hairs on top. Frontal gland region without a tuft of hairs or bristles. Postmentum (fig. 16C) with two anterior bristles. Labrum (fig. 16A) with a few long bristles in the middle near the tip. Pronotum (fig. 16A) with a few scattered bristles, front margin with short hairs. Pilosity of tergites and sternites similar, each with numerous long bristles and a small number of short hairs, not, however, forming a mat. Head from above (fig. 16A) subquadrangular, with somewhat straight or slightly convex sides. Front and vertex relatively flat com-

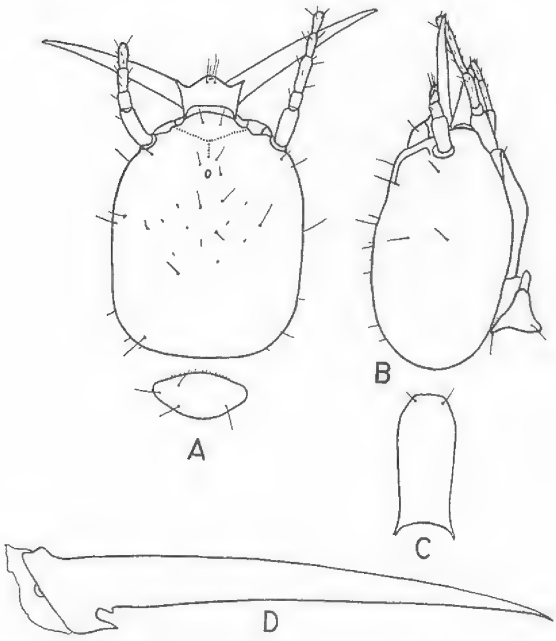

FIG. 16. Soldier of *Forficulitermes planifrons*, new genus, new species. A. Head and pronotum of holotype from above. B. Head and pronotum of holotype from the side. C. Postmentum, from below, of paratype from the type colony. D. Left mandible of paratype from the type colony.

pared to those of related genera. Frontal gland in a small depression, with two flat longitudinal ridges in front of the opening on each side, a slight longitudinal depression and a small elevated hump on each side between the gland opening and the base of the antenna. Postmentum (fig. 16C) slightly constricted towards the rear, sides slightly convex or nearly straight between the rear constriction and the widest portion in front, profile somewhat humped in the widest portion and fairly straight both in front of and behind the hump. Antenna with 12 or 13 articles; if with 12, the third article is much longer than the second or fourth, fourth longer than the second; if with 13 articles, the third and fourth articles are about equal, and each is a little longer than the second. In some specimens with broken antennae (possibly each had 14 articles), the third article is shorter than the fourth and the fourth is shorter than the second. Suture between the postclypeus and the front visible but not sharply distinct; profile of the postclypeus convex. Labrum (fig. 16A) with two lateral sharp points in front and with a conspicuous convex median lobe in the middle of the front margin, sides

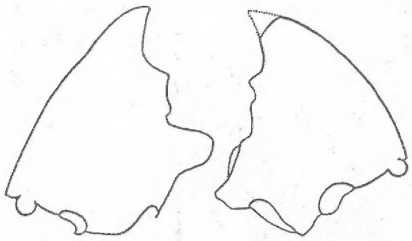

FIG. 17. Mandibles of worker (tip of right mandible broken and edges of both mandibles worn) of *Forficulitermes planifrons*, new genus, new species, from the type colony.

fairly straight and somewhat converging towards the rear. Mandibles (figs. 16A, 16D) of the biting type; with oblique striations visible in a favorable light; comparatively straight and slender, with both the inside and outside edges only slightly curved inward, tips not hooked and only a little more curved inward than each mandible as a whole; base of left mandible with a small, fairly sharp tooth projecting from the line of the inner cutting edge; behind the tooth there is a deep and small, somewhat angular curve ending in a sharp spine-like projection, the tip of the projection extending farther forward than the marginal tooth; base of right mandible somewhat similar to that of the left mandible, but the marginal tooth is slightly smaller and blunter, and the projection from the base is less spine-like, is not so sharp, and the tip does not extend so far forward as the marginal tooth. Maxillary palps with long articles reaching nearly to the tip of the mandibles when extended forward. Pronotum (fig. 16A) without indentations in either the front or hind margins; profile (fig. 16B) with a moderately concave depression in the middle. Front coxa without a sharp longitudinal ridge and with a slight hump in profile near the posterior margin. Tibial spurs 3:2:2. Middle tibia with two outer spines in a longitudinal row not far from the tip.

WORKER (FIG. 17): The mandibles of the single worker available for study are somewhat worn and indicate only the general generic relationships. The mandibles resemble the more generalized genera near *Basidentitermes*. The apical tooth is large compared to the first marginal tooth in each mandible. The right mandible possesses a distinct second marginal tooth.

COMPARISONS: *Forficulitermes* is related to *Basidentitermes, Proboscitermes, Orthotermes, Profastigitermes,* and *Fastigitermes* in the shape of the soldier labrum with its median lobe and sharp lateral points. The specializations of the vertex and the region of the frontal

gland opening indicate that *Forficulitermes* is a rather bizarre diminutive form branching from the phylogenetic tree near *Basidentitermes*. *Forficulitermes* is not close to *Basidentitermes*, particularly in the characters of the bases of the mandibles. The worker mandibles (fig. 17) are more primitive than those of *Tuberculitermes* (see Ahmad, 1950, p. 71, fig. 15).

Forficulitermes planifrons, new species

SOLDIER (FIG. 16): Color of head and thorax brownish yellow. Abdomen paler than the head. Anatomical characters are described under the genus and illustrated in figure 16.

TABLE 17

MEASUREMENTS (IN MILLIMETERS) OF THREE SOLDIERS OF *Forficulitermes planifrons*, NEW SPECIES

	Holotype	Type Colony Range
Length of head with extended mandibles	—	1.62
Length of head to side base of mandibles	0.77	0.77–0.79
Width of head	0.65	0.65–0.68
Length of postmentum in middle	—	0.43
Greatest width of postmentum	0.20	0.20–0.21
Least width of postmentum	—	0.18
Width of labrum between points	0.23	0.23
Length of left mandible	0.84	0.84–0.85
Length of pronotum	0.19	0.17–0.19
Width of pronotum	0.35	0.35–0.36
Length of hind tibia	0.62	0.62–0.65

WORKER (FIG. 17): Mandibles described under the genus and illustrated in figure 17.

LOCALITY AND MATERIAL: The description is based on three soldiers (holotype, paratypes) and one worker from the type colony collected by A. Emerson at Sona Mpangu (latitude 5° 30′ S., longitude 13° 55′ E.), Belgian Congo, on April 12, 1948, in grassland, in a mound constructed by *Trinervitermes* and also occupied by *Microtermes*.

SUMMARY

Six new genera based on new species from the Belgian Congo are described and illustrated. The phylogenetic position of each genus is discussed.

Nititidtermes, new genus, contains only the type species, *N. berghei*, new species, described from the imago, soldier, and worker castes.

Mucrotermes, new genus, contains the type species, *M. osborni*, new species, described from the soldier and worker castes, and also includes *M. heterochilus* (Silvestri), new combination, originally placed in the genus *Procubitermes*, and described by Silvestri from the soldier and worker castes collected in Dahomey.

Furculitermes, new genus, contains the type species, *F. winifredae*, new species, described from the imago, soldier, and worker castes, and seven additional species. *Furculitermes hendrickxi*, new species, is described from the soldier caste; *F. brevilabius*, new species, is described from the imago and soldier castes; *F. cubitalis*, new species, is described from the soldier caste; *F. soyeri*, new species, is described from the soldier caste; *F. parviceps*, new species, is described from the soldier caste; *F. longilabius*, new species, is described from the soldier caste; and *F. brevimalatus*, new species, is described from the soldier caste.

Pilotermes, new genus, contains only the type species, *P. langi*, new species, described from the imago and soldier castes.

Profastigitermes, new genus, contains only the type species, *P. putnami*, new species, described from the soldier caste.

Forficulitermes, new genus, contains only the type species, *F. planifrons*, new species, described from the soldier and worker castes.

An imago described by Sjöstedt (1911) under the name *"Eutermes jucundus"* and later placed in the genus *Fastigitermes*, is separated from the soldier and worker castes and transferred to *Anoplotermes* sp.

Two species based on the soldier castes were described by Williams (1954) under the names *"Procubitermes goliathi"* and *"Procubitermes planifacies."* These are now transferred to *Lepidotermes goliathi* (Williams), new combination, and *Lepidotermes planifacies* (Williams), new combination.

The genus *Procubitermes* Silvestri is restricted to five described species, the type species, *P. arboricola* (Sjöstedt), and four additional species, *P. sjöstedti* (von Rosen), *P. ueleensis* Sjöstedt, *P. niapuensis* Emerson, and *P. undulans* Schmitz.

BIBLIOGRAPHY

AHMAD, M.

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

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.
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.
1958. The evolution of behavior among social insects. *Chap. 15 in* Roe, Anne, and G. G. Simpson (eds.), Behavior and evolution. New Haven, Yale University Press, pp. 311–335.
1959. The African termite genera *Firmitermes, Hoplognathotermes, Acutidentitermes, Duplidentitermes,* and *Heimitermes* (Termitidae, Termitinae). Amer. Mus. Novitates, no. 1947, pp. 1–42.
1960. New genera on the *Subulitermes* branch of the Nasutitermitinae from the Ethiopian region (Isoptera, Termitidae). Amer. Mus. Novitates, no. 1987, pp. 1–21.

SILVESTRI, F.
1914a. Contribuzione alla conoscenza dei termitidi e termitofili dell'Africa occidentale. I. Termitidi. Boll. Lab. Zool. Gen. Agr., Portici, vol. 9, pp. 1–146.
1914b. Contribuzione alla conoscenza dei termitidi e termitofili dell'Africa occidentale. I. Termitidi. Ann. R. Scuola Sup. Agr., Portici, vol. 12, pp. 475–616.

SJÖSTEDT, Y.
1911. Zur Termitenfauna Kongos. Ent. Tidskr., vol. 32, pp. 137–170.
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.

WEIDNER, H.
1956. Beiträge zur Kenntnis der Termiten Angolas, hauptsächlich auf Grund der Sammlungen und Beobachtungen von A. de Barros Machado (I. Beitrag). Publ. Cult. Compan. Diamantes Angola, no. 29, pp. 55–106.

WILLIAMS, R. M. C.
1954. New East African Termitinae (Isoptera: Termitidae). Proc. Roy. Ent. Soc. London, ser. B, vol. 23, pp. 215–227.