NOTES ON PHILIPPINE TERMITES, II

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SIX PLATES AND THREE TEXT FIGURES

This paper presents descriptions of six species of Philippine termites which seem to be new to science. They represent four genera (*Kalotermes, Cryptotermes, Prorhinotermes,* and *Leucotermes*) not heretofore reported from the Islands and one new genus, *Planocryptotermes.* The list of species described is as follows:

Genus *Kalotermes* Hagen sensu restricto.
1. *Kalotermes mcgregori* sp. nov.

Genus *Cryptotermes* Banks.
2. *Cryptotermes cynocephalus* sp. nov.

Genus *Planocryptotermes* gen. nov.
3. *Planocryptotermes nocens* sp. nov.

Genus *Prorhinotermes* Silvestri.
4. *Prorhinotermes luzonensis* sp. nov.
5. *Prorhinotermes gracilis* sp. nov.

Genus *Leucotermes* Silvestri sensu restricto.
6. *Leucotermes philippinensis* sp. nov.

These species, with the exception of *P. nocens,* belong to genera of widespread occurrence, known from Japan and Formosa to the north (except *Kalotermes*) and from the East Indies, Ceylon, and India to the south, and it might well have been predicted that such termite species would be found in our Philippine fauna. Therefore, the fact that the former collections made by Baker and by McGregor as well as my earlier collections failed to bring them to light might well cause surprise. The reasons for their not having been collected, however, are not far to seek. With exception of the *Planocryptotermes* species, they are not among our common forms. Nor are they conspicuous, since none of them builds mounds or exposed nests; nor do the first five species build exposed galleries, while the last one seems to be a rare species.

I wish to take this opportunity to thank Mr. R. C. McGregor, ornithologist of the Bureau of Science, for his never-failing in-

terest, his aid in collecting, and for affording me, while acting director, the facilities of the Bureau in making drawings, taking photographs, etc. To Dr. Sanji Hozawa, of the Japanese Imperial Plant Quarantine, and to Dr. Masamitsu Oshima, director of the Government Institute of Science of Formosa, both expert termitologists, I wish to express my gratitude for splendid sets of comparative material, including many cotypes or autotypes of Japanese and Formosan forms and, in the case of Doctor Oshima, for autotypes of many of his Philippine species. This material has been and will continue to be of great value in determining our Philippine termites.

All of the species described in this paper, like the other species of the lower families of the order, present a rich protozoan fauna within the hind gut. Prof. C. A. Kofoid, of the University of California, who has done much work with the protozoa of American termites and who with his staff is entering upon a comparative study of these specialized forms, has kindly consented to work up those found in our termites, and I am sending him material as rapidly as is practicable. The results of these studies should throw an interesting light on our classification, and a knowledge of the "parasites" may prove of real value in classifying the species and properly grouping the genera.

CLASSIFICATION

After careful study and correspondence with various students of termite classification I have decided to make those changes in generic and family names which, as Banks has recently pointed out, will be necessary if we follow strictly the international rules of zoölogical nomenclature. The necessity for having and observing such a set of rules is so obvious and has been so thoroughly discussed that I need not defend my action in this matter. The changes are inevitable, and the sooner we accept and use them the less difficulty will there be and the sooner will we arrive at a firm basis for our nomenclature. It was only after long hesitation and with great regret that I felt myself forced to adopt these changes which must for the time result in such an unfortunate confusion of generic names of long standing. I find that others of the younger workers in the group have passed through the same attitude of mind to arrive at the same conclusion.

The tendency is apparent, in most recent publications on this group, to do away with the awkward tripartite names by raising

the subgenera to generic rank wherever possible. Such a change seems to me to be conducive to clearness and usableness, particularly in the older genera, *Kalotermes, Eutermes,* and *Termes,* and I shall adopt it in my work on the Philippine termites.

With the above changes Holmgren's arrangement of families and genera is an admirable one, and I shall follow it. It may be of interest to point out here that in addition to the characters already pointed out by Holmgren as separating the three higher families it is very significant that the protozoan faunæ of the guts of the three groups are characteristic. I find none of the polyflagellate protozoa (*Hypermastigina*) in the gut of any of the Termitidæ (Metatermitidæ of Holmgren), and those of the Rhinotermitidæ (Mesotermitidæ of Holmgren), while very similar in all the genera of that family, are quite different from those found in the Kalotermitidæ (Protermitidæ of Holmgren). This is significant in connection with the position which Banks [1] gives to *Leucotermes* in his classification.

MEASUREMENTS AND TERMS

While measurements made from a small range of specimens must not be considered as fixing the variational range for a species and must be used with caution, such measurements are of undoubted value in the determination of species in a group where specific lines are by no means easy to draw, and I shall as a rule accompany my descriptions by a set of such measurements.

There has been a considerable degree of carelessness on the part of some workers in furnishing the details necessary for an intelligent use of specific descriptions. Measurements are given for body length, head length, head length without mandibles, pronotum length, etc., without making it clear just what such measurements mean. If systematic work is to accomplish anything worth while the forms of animals should be so described that they may be recognized by other investigators—not only the specialist in the group, but the biologist interested in the study of animals from other points of view, or even the layman desirous of knowing the common forms of life about him. But far too many systematic descriptions seem to be written for the specialist only, and they are often of little value to him in the absence of type material. May I go further and speak from the experience gained in entering a new systematic field? The needless use of terms of limited application should be avoided.

[1] Banks, N., and Synder, T. E., Bull. U. S. Nat. Mus. 108 (1920) 75.

Such terms as are used should be made clear. References to literature should be given whenever available. Descriptions should be comparative. Specific diagnoses are often very valuable. Systematic discussions should point out which are the nearly related species and in what particulars the new species differs from these nearly related forms. All this will add little to the labor of the systematist who has such details at his immediate command, and will add immensely to the usefulness and value of his work, not only to the general student but to the systematist so unfortunate as to lack a wide range of comparative material and a complete library.

To return to our original question: Just what is the meaning of many of the measurements used? For instance, body length? Does it mean from the distal tip of the mandible to the posterior tip of the abdomen? If so, does it mean with the head extended forward or in any position in which it may chance to be, and with the mandibles crossed or extended? Or does it mean the length of the thorax and abdomen? These are not idle questions. They involve a difference of several millimeters in animals less than a centimeter in length. In the *Macrotermes* soldier, for example, the head may assume any position, from that in which it forms a line with the long axis of the body to one in which it forms a right angle with the body, making a difference of 3 millimeters or more in total length. Again, head length without mandibles or, in the nasute soldiers, without rostrum is a very indefinite measurement unless carefully defined.

To avoid the difficulties that I have experienced in using descriptions I shall define those terms and measurements which I expect to use in my future descriptions. Some changes and additions will undoubtedly be necessary as the work develops but these will be explained as they arise.

HEAD SUTURES

Frontal suture (stem of the Y suture of some authors).—A median longitudinal suture dividing the epicranium into two equal lateral halves in the region of the vertex. Absent or imperfect in most soldiers.

Transverse suture (arms of Y suture).—Separates the vertex from the frons. Absent or imperfect in most soldiers.

Clypeofrontal suture.—Separates frons and clypeus. Absent or imperfect in most soldiers.

Clypeal suture.—Divides clypeus transversely into a distal anteclypeus and a proximal postclypeus. Lacking in some forms.

Labral suture.—Between anteclypeus and labrum.

HEAD REGIONS

The head sclerites are not clearly marked, particularly in the soldier, hence the areas or regions referred to are necessarily more or less indefinite.

Labrum ("Oberlippe" of Holmgren).—Upper lip.

Lingula (Fuller, 1915).—Anterior hyaline extension of labrum found in certain soldiers (of *Macrotermes*, for example).

Anteclypeus ("Clypeoapicale" of Holmgren).—Distal region of clypeus between labial and clypeal sutures.

Postclypeus ("Clypeobasale" of Holmgren).—Proximal region of clypeus, between clypeal and clypeofrontal sutures.

Frons, front ("Transversalband" of Holmgren).—The region bounded posteriorly by the transverse suture, anteriorly by the clypeofrontal suture, and laterally by the antennal carinæ. Not at all or imperfectly defined in most soldiers.

Frontal area (Fuller, 1915).—Forehead ("Stirn"), including frons and clypeus where transverse suture and clypeofrontal suture are both obsolete, as is the case in most soldiers. Region between fontanelle and clypeal or labral suture, since fontanelle is typically located at junction of frontal and transverse sutures.

Vertex.—The top of the head corresponding to epicranial region of insects whose head sclerites are well defined.

Occiput (*occipital region*).—"An indefinite area forming the convex caudal extremity of the head." (Fuller, 1915.)

Genæ.—Sides or cheeks of head. An indefinite area not delimitated in termites.

Ventral genæ.—Ventral surfaces of the head lateral to the gula including postgenæ which are not delimitated.

Gula ("menton" of Bugnion, "submentum" of Holmgren).—A distinct median ventral sclerite, articulating anteriorly with the labium.

MISCELLANEOUS HEAD STRUCTURES

Fontanelle.—A foramen in the epicranium, usually in the frontal suture at its junction with transverse suture.

Fontanelle plate.—The region of the frontal gland marked externally as a thickened or darkened area.

Antennal fossæ ("Antennenvertiefungen" of Holmgren).—The depressed lateral areas from which the antennæ arise.

Antennal foveolæ (Fuller, 1915).—The pits from bottom of which the antennæ arise.

Margins of antennal foveolæ.—Chitinous margin of antennal pits which is usually thickened, often raised, extended, or elaborated.

Antennal carinæ ("Antennenleisten" of Holmgren).—The ridges above, that is medial to, antennal fossæ.

MEASUREMENTS

Body length.—By this I mean, unless otherwise stated, the distance in a straight line from that part of the head, with exception of the antennæ or palpi, which happens to be most distal (with soldiers usually the tips of the mandibles, and with workers or adults the clypeus or labrum) to the posterior tip of the abdomen. As this measurement varies greatly with the position of the head, method of killing, preservation, etc., it should be used with caution in differentiating species.

Body length without head.—From the anterior edge of pronotum in the midline to the posterior tip of the abdomen. In using this and other measurements of body length it should be kept in mind that specimens preserved in alcohol often undergo a very distinct swelling, heavily chitinized regions becoming widely separated, as a result of which body length becomes considerably increased over that normal for the species in life.

Head length.—In the soldier this is the distance from the posteriormost part of the head to tip of the mandibles. This distance is usually measured with the head removed from the body and lying flat, in which case it is from the most posterior visible portion of the head in the midline to the tip of the mandibles; or, if these are crossed, to a line from their anteriormost point making a right angle with the long axis of the body. It may be measured with the head lying on its side from the posterior line of the head to the distal tip of the mandibles. In the adult this is the distance from the posterior border of the head to the most distal part, usually the labrum. Here again we have a measurement which varies greatly in some species with the change in position of the mandibles, and it should therefore be used with caution.

Head length without mandibles.—Measured, in soldiers, from the posterior line of the head to the labral suture, with the head

lying flat; if measured with the head on one side, from the external articulation of the mandibles to the posterior margin of the head.

Head width.—Measured at the widest point, including eyes when present. Considerable confusion has arisen from a careless use of this measurement!

Fontanelle index.—Distance from the posteriormost part of the head in the midline to the fontanelle divided by the length of the head without mandibles. I plan to use this value in certain species because of the indefiniteness which I have encountered as to the meaning of such statements as: "Fontanelle at middle of head," "Fontanelle in front of the middle of the head," etc.

Pronotum width.—Measured at the widest point.

Pronotum length.—Measured in the midline and hence the minimum length in species with notched pronotum. I suspect that this term is used by some writers, without explanation, to mean *maximum* pronotum length.

Family KALOTERMITIDÆ Banks

Protermitidæ Holmgren.

Genus **KALOTERMES** Hagen sensu restricto

Subgenus *Calotermes* sensu stricto Holmgren.

DIAGNOSIS

Adult.—Median vein of the forewing runs parallel to the cubitus and midway between it and the radial sector, simple or branched. Antennæ with 16 to 19 segments.

Soldier.—Head relatively large, elongate, arched, gradually flattened anteriorly; mandibles large, toothed but unsymmetrical, all femora enlarged. Antennæ with 13 to 18 segments, the third typically enlarged, modified, and highly chitinized. Similar to soldiers of *Neotermes*.

The species of *Kalotermes* are to be found living in the dead branches of living trees, in the dead wood of hollow or injured trees or, in some cases, in or very near the live wood. They have, therefore, the same habitat as the species of the closely related genus *Neotermes*. They form small colonies of at most a few hundred individuals consisting chiefly of larvalike "workers," a few nymphs of supplementary reproductive forms, and a few soldiers.

Kalotermes seems to have its greatest development in the Nearctic Region where Banks has reported nine species. It

seems to be replaced in the main in the Oriental Region by the species of *Neotermes* and *Glyptotermes*. The species described here is the first species of the genus *Kalotermes* reported from the Philippines, and the second from the Oriental Region, the only other species being *K. indicus* (Holmgren) reported from Macassar and Siam.

Kalotermes mcgregori sp. nov. Plate 1, figs. 1 and 2, text fig. 1.

Types.—Short-headed soldiers (from No. 188 of general collection), long-headed soldiers, "workers," and nymphs (from No. 289 of general collection), No. 24 in type collection.

Cotypes.—No. 188 in general collection (*McGregor and Light*), Culi Culi, Rizal Province, Luzon, near Manila, October 3, 1920; No. 289 in general collection (*McGregor and Light*), Culi Culi, November 19, 1920, same colony as No. 188; No. 339 (*McGregor and Light*), Rosario, Batangas Province, Luzon, December 25, 1920.

DIAGNOSIS

Body of all castes broad and flat; thorax long; head and body hairy; antennæ of soldiers with 15 to 17 segments, the third heavily chitinized and twice as long as the second. Dorsal and lateral margins of antennal foveolæ projecting. Pronotum long and very broad, much broader than the head and strongly arched, deeply concave anteriorly, its anterolateral regions projecting over the head. Abdominal terga of soldier somewhat chitinized. Living in the trunk of *ipil-ipil* (*Leucaena glauca* Benth.).

DESCRIPTIONS

Adult.—Unknown. Well-developed wing pads show (March) the median to lie parallel to and midway between the radius sector and the cubitus.

Soldier.—Head shading from yellow posteriorly to chestnut anteriorly, mandibles black; antennæ brown proximally, shading into very light yellow distally. Pronotum, mesonotum, and metanotum light brown; abdominal tergites, tibiæ and tarsi of legs yellow with a faint brownish tinge or light brown, femora lighter.

Head, body, and legs covered with a dense growth of subequal microscopic hairs; head short, thick, and directed somewhat downward, flat below, rounded laterally and above, converging slightly at both ends, bluntly rounded posteriorly. Frons rather precipitate, slightly concave in central region. A few soldiers have longer heads with straight sides converging but

little at either end and are marked by the apparent absence of eyes and by the presence of a hyaline spot near the antennæ (see text fig. 1). Mandibles (see Plate 1, fig. 1) short, stout, with a very distinct upcurve, and slightly incurved tips; their outer surfaces show a low basal hump, a slight concavity in the center, and a convexity near the distal end; left mandible a little longer than right, with three teeth on cutting edge; distal tooth double and extended distally, second triangular, somewhat truncated distally with a low posterior projection confined to the dorsal region of the mandible; basal tooth large and bluntly triangular; right mandible with two triangular teeth, with short distal and long proximal faces; proximal region of mandible roughened. Labrum about twice as broad as long, reaching to the anterior border of lower tooth of right mandible, parallel-sided, with slightly rounded anterolateral corners and a slightly convex anterior margin bearing a number of bristlelike hairs.

Antennæ with 15 to 17 segments, first segment large, cylindrical, and nearly hidden from above by the projecting dorsal margin of the antennal foveolæ; second short and cylindrical, third large and heavily chitinized, obconic with a proximal diameter less than that of the second segment; next six obconic but short and thick; more distal segments thickly clavate and lightly chitinized, apical segment oval, white. Eye hyaline and separated by less than its diameter from edge of antennal foveola (not discernible in long-headed soldiers); gula short and broad, anterior region but little less than twice as wide as narrowest portion. Legs short, femora swollen; pronotum large and considerably broader than head, much arched, making nearly a semicircle in transverse section; anterior border not notched in midline but deeply concave, the rounded anterior corners projecting far over the posterolateral regions of head; median longitudinal line distinct; broadest point of pronotum in line with the center of anterior border; lateral border receding to meet the nearly straight, weakly arcuate, posterior border; anterior margin slightly upraised and marked by a dark brown edge; mesonotum and metanotum short, mesonotum about two-thirds as long as pronotum, with notched posterior border, metanotum shorter than mesonotum. Body distinctly flattened, thoracic region as long as the abdomen in dorsal view; abdominal tergites chitinized. Practically all soldiers collected show wing pads varying in size.

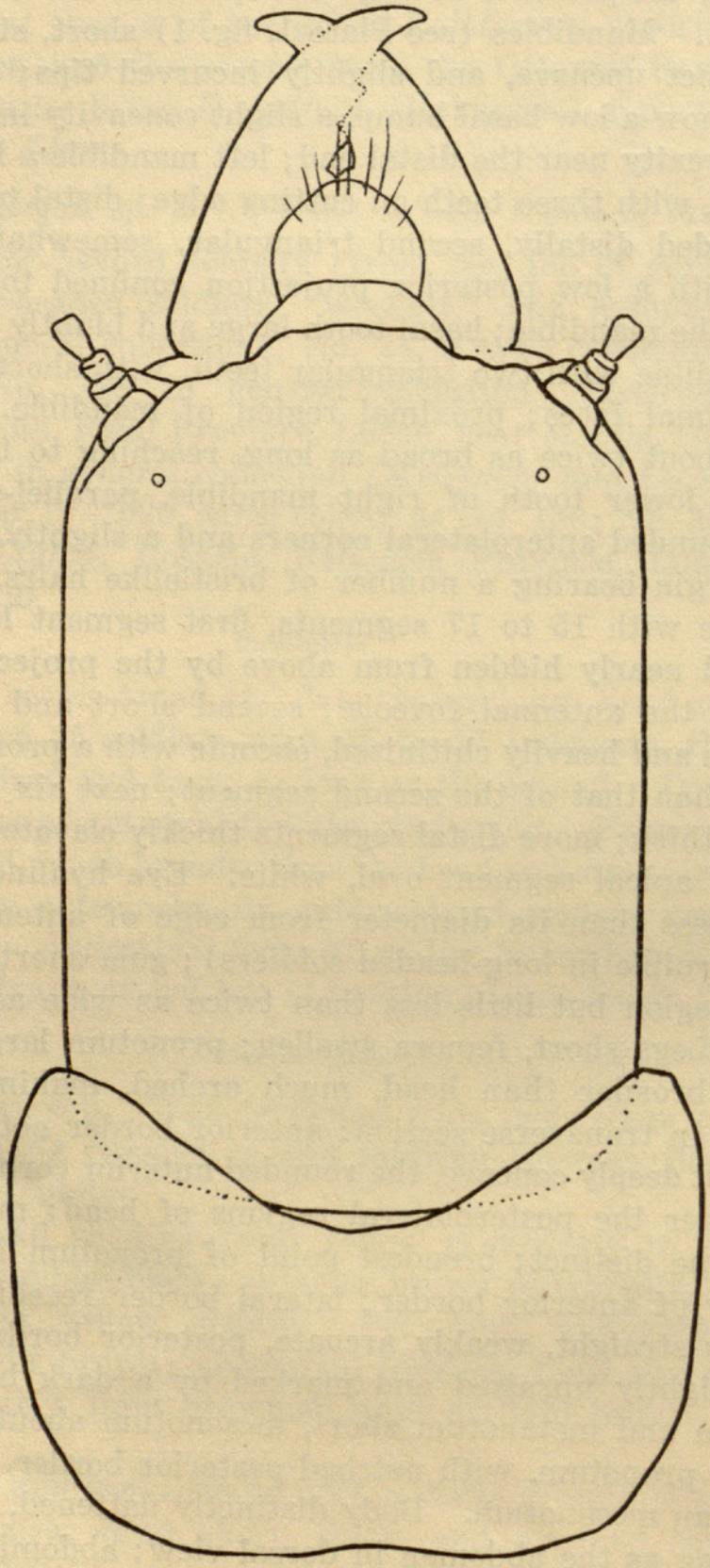


FIG. 1. *Kalotermes mcgregori* sp. nov. Outline drawing of head and pronotum of long-headed soldier. Note absence of distinct eyespots and the presence of curious hyaline spots in anterolateral region.

Measurements of Kalotermes mcgregori sp. nov., soldier.

	Short-headed soldiers.		Long-headed soldiers.
	With large wing pads.	With short wing pads.	
	mm.	*mm.*	*mm.*
Body length	7.00	6.75	9.00
Body length, without head	5.25	5.00	5.50
Head length	3.00	3.25	4.25
Mandible length, dissected:			
Left	1.35	1.25	1.50
Right	1.25		
Head length, without mandibles	2.00	2.10	2.50
Head width	1.75	1.70	1.85
Pronotum length	1.10	1.10	1.25
Pronotum width	2.25	2.00	2.25

"*Larvæ.*"—Large, broad, and thick. Antennæ with 11 to 17 segments; when 17, segments 2 and 3 incompletely separated; other segments short, thickly clavate, with thick distal and narrow proximal ends, or suborbicular.

SYSTEMATIC POSITION

While it is difficult to determine the generic position of the species of *Kalotermes* in the absence of the adult, I feel that there can be little doubt in the case of the present species. The short legs with swollen femora, the large and heavily chitinized third antennal segment, the presence of distinct wing pads and, finally, the distinct difference in shape of body, degree of chitinization, size and shape of pronotum, etc., which differentiate it from the common species of *Neotermes,* make it practically certain that we have in this species a representative of the genus *Kalotermes,* which is here reported from the Islands for the first time. Were it not for these striking differential characters one might well hesitate to report a *Kalotermes* species in the absence of the winged adult, in view of the absence of any species of this genus in the known termite fauna of Formosa and Japan to the north and the East Indies, Ceylon, etc., to the south, the only oriental species being *K. indicus* (Holmgren), known only from the adult. An examination of the venation of the wing pads of "workers" collected recently confirms

my diagnosis, as the median runs parallel to and midway between the radius sector and cubitus.[2]

The protruding margin of the antennal foveolæ of the soldier, the very large, characteristically shaped pronotum, the presence of wing pads, and the characteristic toothing of the mandibles suffice to differentiate this species from other species of the genus.

I have named this distinct species in honor of Mr. R. C. McGregor, ornithologist of the Bureau of Science, who helped me to collect it and whose aid and interest have to a great extent made possible the rapid collection of local Philippine termites.

DISTRIBUTION AND BIOLOGICAL NOTES

This species was found living in tunnels very close to, if not actually within, the live wood of a small leguminous tree, *Leucaena glauca* Benth., known locally as *ipil-ipil* (Tagalog). Introduced from America, this plant is widespread about towns and country dwellings where its rapid growth, which enables it to drive out cogon grass, and its usefulness for firewood and fence posts make its propagation worth while. The very interesting question arises at once as to whether this species is found in other and native trees or is confined to this plant and, if so, whether it was introduced with the plant and is, therefore, an American species, or whether it has become adapted to this habitat since the introduction of the plant here. It seems very unlikely that plants large enough to harbor these termites were brought here, but it is by no means beyond the range of possibility. A review of the American *Kalotermes* species shows this species to be most nearly related to *K. jouteli* Banks, which it resembles in the shape of the head, the toothing of the mandible, the size of the third antennal joint, etc. It differs from it in many points, however, such as size and shape of the pronotum, shape of the third antennal joint, the projecting margins of the antennal foveolæ, etc. It appears to be a new species, therefore, whether introduced from America or not.

[2] Since writing the above I have taken two winged adult *Kalotermes* specimens in Cebu Island. Whether these belong to this or some related species cannot be determined until the series is completed in either locality. There remains the possibility that the form described here represents the soldiers and workers of *K. indicus* Holmgren known from the adult only, but the widely separated habitat makes this extremely improbable.

It was first found by Mr. McGregor and myself (No. 188) on October 3, 1920, at Culi Culi, Rizal Province, near Manila, when two soldiers and numerous "workers" were collected. Later, November 19, more extensive collections were made from the same tree, numerous soldiers and very many "larvæ" and "nymphs" being collected (No. 289). The termites were found living in channels deep in the heartwood and were apparently rapidly destroying the tree. At the first collection one side of the tree, which was dead, contained in numerous tunnels near the surface large numbers of workers and soldiers of a species of *Nasutitermes,* whose tunnels were separated internally by very thin walls from those of the *Kalotermes* colony. Such associations, whether chance relations or not, are very common. In the case of *Prorhinotermes luzonensis,* described below, three species were involved, *Prorhinotermes,* a *Hospitalitermes* species, and a *Neotermes* species. *Prorhinotermes gracilis* was also found in close association with a *Neotermes* species.

At the second collection many "nymphs" were found, some large with large wing pads, others small with but slight beginnings of wing pads but easily distinguished by their opaque white color as contrasted to the dirty white color of the posterior abdominal region of the "workers", many of which were as large as the largest nymphs but showed no wing pads. It was only at this collection that the long-headed soldiers were taken. Were it not for their presence in both colonies one might suspect that they represented a different species, so distinctly different are they from the more numerous short-headed soldiers.

A second colony, living like the first in ipil-ipil, was found by Mr. McGregor and myself on December 25, 1920, while on a collecting trip to Batangas, in the municipality of Rosario, Batangas Province, some 70 kilometers from the first colony. The finding of this second colony in the same tree species makes it seem that the species is a regular inhabitant of this tree, whether it is able to live in others or not. One or more *Neotermes* species also inhabit the ipil-ipil as they do also the guava, the *cacauate* (*Gliricidia maculata* HBK) and the *ciruelas* (*Spondias purpurea* Linn.) ; but many examinations of the last three trees, while producing large collections of *Neotermes,* have failed to show *Kalotermes mcgregori* or any related species.

On March 31, 1921, Mr. McGregor and I again visited the colony at Culi Culi and cut down the tree for further study in the laboratory. The termites had been driven by the dry weather to the deeper and damper portions of the tree, particularly

to the heartwood, where they were running longitudinal tunnels. The forms which I had formerly distinguished as "workers" as contrasted with the nymphs all bore large wing pads, which would seem to bear out the belief that there is no definitely differentiated worker caste, and that the opaque so-called nymphs are probably early stages of supplementary reproductive forms.

I was greatly pleased on examining the venation as seen in these wing pads to find that the median runs parallel to and midway between the radius sector and the cubitus, thus confirming my diagnosis of this as a species of *Kalotermes*.

Material for a study of the protozoan fauna of this species has been sent to Professor Kofoid.

Genus CRYPTOTERMES Banks

Subgenus *Cryptotermes* (Banks) Holmgren.

DIAGNOSIS

Adult.—Median vein bends up to unite with the radial sector beyond the middle of the wing. Wing iridescent. Antennæ of 14 to 16 segments.

Soldier.—Head short, high, and thick, bilobed anteriorly, with a vertical frontal area containing a distinct cavity. Mandibles short, humped basally, bent near the middle, weakly toothed or untoothed. Antennæ of 9 to 13 segments, the third not especially long. Pronotum with strongly concave anterior margin, not toothed. Styles reduced.

The genus *Cryptotermes* comprises species from all parts of the world. They are typically house termites, living in boards, furniture, etc., in houses or, more rarely, in dead wood of trees. They are extremely ubiquitous; there is hardly a house in the Islands but harbors these little wood destroyers or those of the very closely related genus *Planocryptotermes*. Haviland points out a similar condition in Borneo, and it is probably true in the entire tropical Indian and Malayan regions. Their presence is usually manifested by the piles of little impressed fæcal pellets which they drop from apertures in the board they are attacking. There are apparently a number of Philippine species with this habit. Their collection is made difficult by the necessity of removing or destroying boards, furniture, etc., to get at the termites.

Cryptotermes cynocephalus sp. nov. Plate 2, figs. 1 and 2.

Types.—Adults, soldier, larva, and nymph, No. 25 in type collection. Soldier, larva, and nymph from No. 67 of the general

collection, deälated adult, No. 433 of general collection, winged adult from No. 443 of general collection.

Cotypes.—No. 67 (*del Rosario*), Manila; No. 433 (*Light*), Manila; No. 443 (*Gamboa*), Manila; No. 448 (*Aguila*), Manila, in general collection.

DIAGNOSIS

Adult.—Very small, less than 5 millimeters long without wings; slender, dark, with narrow, dark wings; antennæ long, with 13 to 15 segments, third smallest.

Soldier.—Very short, about 3.25 millimeters long; head short, thick and high, bulldoglike, frontal region very strikingly developed with distinctly bilobed dorsal margin, anterior cavity deep; a distinct median dorsal cavity present; anterior and anterodorsal margins of the antennal foveola extended anteriorly to form a flat projection (spine) with rounded tip.

Larvæ and nymphs.—Small and slender.

DESCRIPTIONS

Adult.—Head flat, longer than broad; disregarding the eyes, nearly parallel-sided, sparsely haired; eyes not large or prominent, ocellus elongate in an anterodorsal direction, in contact with the eye in front of its middle. Antennæ more than twice as long as width of head, 13 to 15 segments, first segment large and cylindrical, second smaller and cylindrical, third smallest, thickly obconic, fourth to sixth gradually increasing in size, thicker than third, and with rounded distal ends, eighth to thirteenth (when 14) increasingly long and with thicker distal ends, last as long as thirteenth but narrow and oval in shape; antennæ with scattered larger hairs and a dense coat of short straight hairs. Labrum swollen, yellow; anteclypeus white; postclypeus brown, about as long as anteclypeus, remainder of head brown; pronotum brown, arched, narrower than the head (with eyes), concave anteriorly, sides somewhat rounded, posterolateral corners bluntly rounded, posterior margin nearly straight, slightly notched at center. Anterior wing scales brown, much longer than the posterior pair and reaching to or beyond the middle of the latter; abdominal tergites dark brown, metanotum yellow, giving the appearance of a transverse light band in dorsal view, abdominal sterna brown with a narrow median light area.

Wings slender, cloudy gray, iridescent; median and cubitus very slightly chitinized except at base in some specimens, costa and radius sector heavily chitinized, gray-brown; all veins and

branches as well as areas between the veins marked by papilla-like projections; base of anterior wing twice the width of base of posterior wing; forewing with radius sector and median separate at base; radius sector sends five distinct branches, and one or more small branches to the costa; median joins radius sector beyond middle of wing usually near to origin of third branch of radius sector; cubitus with eleven to thirteen branches; hind wing with six or seven branches uniting radius sector and costa, inner three large; median and radius sector usually united for a short distance at their bases; median joins radius sector distally between points of origin of second and third branches of latter (in one specimen median runs to end of wing!); cubitus with about eleven branches which tend to be more subdivided than those of forewing; cubitus of both wings bends slightly toward radius sector near level of junction of median and radius sector; a few indefinite cross veins unite cubitus and radius sector beyond junction of latter with median.

Measurements of Cryptotermes cynocephalus sp. nov., winged adult.

	mm.
Wing length	6.25
Body, without wings	4.75
Head length	1.00
Head width	0.80
Antenna length	1.65
Pronotum width	0.75
Pronotum length	0.45

Soldier.—Mandibles and anterior region of the head black shading into a dull purplish on posterior portion of the head and lateral cervical sclerites; antennæ, palpi, and distal portions of the legs light yellow, body segments and proximal portions of legs pale purplish brown. Head directed ventrally and nearly at right angles to body, short, thick and high, broadest anteriorly, suggesting the head of a bulldog (hence the specific name); anterior surface deeply excavated and extensively roughened and sculptured; lateral and dorsal margins of this frontal area produced to form a very marked, outwardly and forwardly directed flange, deeply notched in the midline, giving the head the bilobed appearance characteristic of the genus; below, this flange runs laterally on either side to form the anteriorly extended posterodorsal margin of the antennal foveola, being separated by a groove from the anterodorsal and anterior margins of the foveola which form an anteriorly projecting, laterally flattened, scalelike spine, whose upper portion

is overlapped above by the lower portion of the frontal flange; below this the ventral gena is extended to form a much smaller spine, lying over the mandibular hump.

Dorsal profile in side view high, domed posteriorly, sunken in the middle and elevated anteriorly. Seen from above there is a very distinct concavity in front of the middle of the head and behind the flange. This is narrow and elongated and, with the middorsal notch in the flange, gives the head a distinctly bilobed appearance in dorsal view. The surface of the flange and the region of the head posterior to it, particularly the sides of the dorsal cavity, are distinctly rugose.

Mandibles very short and strongly incurved, when closed protruding for a distance but little more than one-third of the anterior surface of the head; antennæ of from 9 to 12 segments, longer than the head depth; third segment smaller than the second and more heavily chitinized; pronotum strongly arched, deeply bilobed anteriorly, rounded laterally and posteriorly, the anterior and posterior regions being elevated.

Measurements of Cryptotermes cynocephalus sp. nov., soldier.

	mm.
Body length	3.25
Body length, without head	2.65
Head length (posterior margin to middorsal region of flange)	0.90
Head width	0.75
Pronotum length	0.50
Pronotum width	0.85

"Workers" and nymphs.—Small and slender. Considerably smaller than those of *Planocryptotermes nocens* g. et sp. nov. which they otherwise resemble.

SYSTEMATIC POSITION

This species is characterized by the small size of all castes (less even than that of *C. cavifrons* Banks), the strikingly developed and roughened margin of the frontal region of the soldier, and the very small mandibles. The head profile of the soldier resembles that of *C. cavifrons,* but it differs from the latter and resembles *C. brevis* (Walker) in the roughened condition of the anterior and dorsal regions of the head. From the Japanese form, *C. kotoensis* Oshima, the soldier differs, among other characters, in its small, weak mandibles. From *C. domesticus* (Haviland), its nearest neighbor geographically, it differs in its smaller body size, its smaller and narrower head, its smaller mandibles, in that the anterior surface of the head

makes slightly more than a right angle with the mandibles, and in the shape and position of the spine near the antennal foveola, which in *C. cynocephalus* is simply an extension of the anterior and anterodorsal margin of the foveola. Specimens just received of the Hawaiian *Cryptotermes*-like species, kindly sent me by Mr. David T. Fullaway, entomologist of the Bureau of Agriculture, show a very striking difference among other points in their greater size. From what Mr. Fullaway has told me of the venation of the adult I am led to believe that this as yet undescribed species must be placed in another genus rather than in *Cryptotermes*.

DISTRIBUTION AND BIOLOGICAL NOTES

House termites, living in the dry, seasoned wood of planks and boards of houses, in furniture, in picture frames, etc. The specimens on which this species is based were found together with those of *Planocryptotermes nocens* sp. nov. (see below) by Prof. José I. del Rosario, of the department of chemistry, College of Liberal Arts, University of the Philippines; they were living in boards of his house and were kindly collected for me. Whether the two species were in the same boards or not I do not know since the material was collected under the impression that but one species was involved. This was true also of the second colony of this species collected which was found living in the same board with *P. nocens* sp. nov. This colony was collected by Cipriano Gamboa on March 7, 1921, and included a few winged adults (No. 443). A third, larger, colony (No. 448) was found by Paulino Aguila in the boards of a house on March 8, 1921, and contained numerous winged adults. This would seem to be very near the time for swarming, as many of the adults were fully pigmented and able to fly freely.[3] Among the hundreds of "workers" and adults, only five soldiers were found. These, like those of the colony mentioned above, were dead, as the boards had been exposed to the sun. Since

[3] Since writing the above, winged specimens of *C. cynocephalus* have been taken at various times during the months of June and July in my house in Paco, Manila, which is badly infested with house termites. These adults are never numerous and, strange to say, emerge in the early morning rather than at night, as is the habit of *Planocryptotermes* and most other termites. During the latter part of June and the early part of July a few of them were to be taken on my window curtain each morning and a deälated pair of these, our tiniest adult termites, were commonly to be seen in the early morning coursing excitedly over my washstand.

no extensive collections of house termites have been made here or elsewhere, I do not know whether *C. cynocephalus* and *P. nocens* have the same distribution; nor do we know their relative frequency. We do know that practically every house in the Islands is infested with this or other species of house termites.[4]

These termites attack isolated boards and are therefore not reached by methods which prevent the activity of the much more seriously harmful *Coptotermes, Leucotermes,* and *Eutermes* (*Microcerotermes*) species, which require a connection with the ground or a considerable moisture supply. Since the "house termites" reach their future habitat in a winged state, there is no way of preventing their presence in tropical regions where it is impossible to keep the house closed against their ingress. The only methods of combating them would be, therefore, the use of treated lumber, together with the prompt removal of any infested boards, which would presumably be prohibitive in cost. Their presence is usually demonstrated at once by the little piles of impressed pellets of fæcal matter which they throw out from their galleries: during the night, as a rule, but sometimes during the day. These little piles of yellow or orange-colored pellets (color depending upon that of the wood) are very characteristic sights in our houses in the Tropics. These termites are taken by many to be beetles because of the larvalike appearance of the worker and the curious color and shape of the soldier. Indeed they are locally known as *gorgojo* (beetle) or more commonly *bucbuc* (borer) and with the species of the genus *Planocryptotermes* are the only termites not recognized as such and given the name *anay* by Filipinos generally.

Genus **PLANOCRYPTOTERMES** novum

DIAGNOSIS

Imago.—As in *Cryptotermes* but with as many as 18 [5] segments in antennæ.

[4] Collections which I made in Cebu and Negros during April and May, and further collections in Manila, have produced no new species of house-living *Cryptotermes.* They have shown *Planocryptotermes* to be common and apparently much more prevalent than *Cryptotermes* and have produced another species of *Planocryptotermes* from Manila, one from Cebu, and apparently two from Negros, all closely related to *P. nocens.* We would seem justified in the belief, therefore, that the "house termites," whose piles of fæcal pellets are to be found in nearly every dwelling in the Philippines, belong in great part to the new genus *Planocryptotermes.*

[5] In the adult of an undescribed species from Manila.

Soldier.—Similar to *Lobitermes* Holmgren. Head broad, flat and smooth, somewhat longer than broad; forehead nearly vertical, with notch in middorsal region of border. Antennæ with 11 to 14 segments, third segment not much larger than second. Mandibles distinctly toothed.

Genotype, *Planocryptotermes nocens* sp. nov.

I have founded this new genus for the species described below (*P. nocens*) and several others from other parts of the Islands to be described later. *Calotermes pinangae* (Haviland), which Holmgren places provisionally in his subgenus *Lobitermes*, probably belongs with these species. All the data I can gather from descriptions and illustrations point to that conclusion and a study of the winged form will probably show this to be true.

I had been led to the belief that the adult of *P. nocens* would agree with that of *Cryptotermes* for the reasons that *Cryptotermes*-like adults had been taken from time to time in numerous places known to be infested with *Planocryptotermes*, and that no other Kalotermitinæ adult had been taken in these vicinities except the tiny form which I have since determined to be the adult of *C. cynocephalus*. With so many houses infested with these termites it seemed extremely unlikely that the adults had escaped notice so long and as I have pointed out above the only adults captured showed the *Cryptotermes* type of wing venation.

Very recently adults found in colonies of *P. nocens* and other species of the genus have confirmed this assumption, making it necessary to establish the new genus for the group, since the adults of *Lobitermes* do not have the *Cryptotermes* venation.

The soldiers of the new genus are characterized by a larger size than those of *Cryptotermes*, by a larger head which is flattened dorsally and is considerably broader than high and somewhat longer than broad, by a more or less pronounced notch in the projecting rim of the frontal area, and by the absence of any considerable elaboration or rugosity in the frontal area which characteristically makes more than a right angle with the mandibles, which in turn are longer and slenderer than in *Cryptotermes* and distinctly toothed. They are characteristically house termites but are sometimes found in dead limbs of trees. Like *Cryptotermes* their presence is denoted by the piles of little fæcal pellets dropped from openings in the boards they inhabit (see Plate 6).

Planocryptotermes nocens sp. nov. Plate 2, figs. 3 and 4; Plates 5 and 6.

Types.—Adult, soldier, larva, and nymph, No. 26 in type collection from No. 202 of general collection.

Cotypes.—No. 39 (*del Rosario*), Manila; No. 202 (*Light*), Manila; and No. 442 (*Gamboa*), Manila, in the general collection.

DIAGNOSIS

Adult.—Antennæ long, with 16 segments, rather sparsely haired with stiff hairs of two sizes, segments 11 to 15 thickly clavate with very slender proximal ends, terminal segment shorter and much narrower, ovate; body with wings from 8.5 to 9 millimeters long, without wings from 5 to 5.5 millimeters long; pronotum slightly narrower than head.

Soldier.—Head about 1.25 millimeters long from posterior border to middorsal margin of frontal area, about 1.50 millimeters from posterior border to labral suture; about 1.25 millimeters wide; head making more than a right angle with mandibles; margin of frontal area not strongly developed, bilobed, with one deep median dorsal and two slighter lateral dorsal notches; anterior concavity shallow; two short "antennal spines," one an extension of the anteroventral margin of the antennal foveola, the other of the anterodorsal margin. Antennæ of 13 or 14 segments. House termites.

DESCRIPTION

Adult.—General color brown above, ventral surface of thorax yellow, of abdomen light brown; wings faintly iridescent, light transparent brown, anterior border darker opaque brown; head rounded posteriorly, nearly semicircular, longer than broad, with scattered spikelike hairs; Y suture visible in center of head; labrum small, somewhat swollen, yellow; antennæ typically with 16 segments, all segments rather sparsely haired with scattered, stiff, larger hairs and more numerous smaller hairs; first segment cylindrical, second shorter, slightly swollen distally, proximally heavily chitinized; third thickly obconic, about as long as second; fourth to eighth as long as broad, increasing slightly in size and becoming more smoothly rounded; ninth larger, broadly oval; tenth to fifteenth increasingly long, clavate with very slender bases; sixteenth long-oval, shorter, and slenderer.

Measurements of Planocryptotermes nocens sp. nov., winged adult.

	mm.
Body length, with wings	8.5–9.00
Body length, without wings	5.0–5.50
Head length [a]	1.16
Head width	1.08
Pronotum width	1.01
Pronotum length	0.63

[a] Posterior margin to middorsal margin of frontal area.

Soldier.—Mandibles and frontal area of head, with its margin, black, the rest of the head shading from smoky brown in front to dirty yellow at posterior surface; thorax and legs smoky, abdomen light smoky yellow, having a faint purplish tinge. Antennæ and mouth appendages light yellow to white. Head making an angle of about 45° with the body, short, broad, and square, being only slightly longer than broad and about half as high as long and showing scattered hairs, which are smaller and more numerous toward the anterior; anterior surface making an angle of more than 90° with the mandibles; posterior border nearly straight in dorsal view, with shortly rounded corners; sides and posterior surface of head sloping inward and upward to dorsal surface from a line of maximum convexity considerably below the mid-horizontal plane of the head; sides of head nearly straight and parallel.

Eyes small, hyaline and circular, lying in a considerably larger, circular elevation of the lateral surface of the head, about one and a half times their diameter from posterior margin of the antennal foveolæ, making a distinct lateral projection in dorsal view in front of which the sides converge slightly only to diverge in the low but distinct margin of the frontal area, so that the width of the head from edge to edge of the frontal margin would about equal that through the eyes; in dorsal profile the head in side view presents a sharp rise posteriorly from the border to a point one-third the distance between the posterior border and the margin of the frontal area; from this point there is a very gentle down curve to near the frontal margin and a short but distinct rise to the anterior edge of the projecting margin; dorsal surface with a very small concavity just posterior to the middorsal region of the margin of the frontal area; frontal margin less developed in middorsal region where it shows a distinct median notch, flanked on either side by a much smaller lateral notch and a second very slight notch; the margin, slightly roughened laterally to these notches, curves anteriorly, laterally, and ventrally to end in the dorsal margin of the antennal foveola

where it is laterally deflected and continuous with the posterior margin of the foveola. On either side of the mouth parts on the ventral side of the head is a dark narrow ridge (the edge of the ventral gena) running forward and laterally to culminate in a laterally flattened spinelike projection ("antennal spine") of the anteroventral margin of the antennal foveola; above this the anterior margin is reduced, giving the appearance of a deep notch internal to which the anterodorsal margin projects as a broader, still more prominent "spine."

Lying between and above the antenna and the mandible of each side is a pair of rounded elevations, the outer slightly more dorsal than the inner. Concavity of frontal area shallow and its surface smoothly rugose; mandibles distinctly thickened basally with a lateral hump, distal three-fourths slender in side view and considerably flattened dorsoventrally; left mandible less curved than right and bearing three teeth, the distal two small and the proximal one long and low; right mandible more strongly curved, with two teeth, the distal one large, with distal edge at right angles to mandible and proximal edge long, making a very obtuse angle with surface of mandible; proximal tooth of right mandible low and inconspicuous; large distal tooth of the right side fits in between the two distal teeth of left mandible when mandibles are closed, tip of the right mandible crossing under that of the left which projects beyond it; labrum white in color, projecting over the proximal half of the opened mandibles, narrow, converging distally with a distinct rounded point bearing two long, upcurved hairs at its tip with several smaller hairs just posterior to them.

Antennæ considerably longer than height of head, 13- or 14-segmented; when 13, the third obconic and nearly as long as the second; when 14, the third segment divided to form a short obconic third and a short disk-shaped fourth; first segment cylindrical, longest and thickest; first, second, and third heavily chitinized; first one or two beyond the third less so and the remainder very lightly so; first one or two segments beyond the third often nearly disk-shaped, the three beyond these become increasingly long, the proximal end more distinctly narrowed and stalked, the distal end more rounded (that is, spherical) beyond which, with exception of last, they are similar and may be described as short, thick clubs with narrow stalks and thick rounded distal regions; last two segments oval, somewhat longer and considerably narrower than preceding segments, the last only about two-thirds as wide as the next to the last. Gula small, weakly chitinized and

about half as wide as long. Pronotum narrower than head, arched, about half as long as broad, and distinctly elevated anteriorly, anterior border deeply concave, thickened, edged with black and slightly rugose, anterolateral corners rounded laterally, marked anteriorly by a distinct notch and by rugosities; lateral margins nearly straight, converging toward the posterolateral corners which round into the slightly convex posterior border.

Measurements of Planocryptotermes nocens sp. nov., soldier.

	mm.
Body length [a]	4.25 –4.60
Body length, without the head	3.50 –4.10
Head length:	
Posterior margin to middorsal margin of frontal area	1.25 –1.35
Posterior margin to labral suture	1.50
With the mandibles	2.20 –2.25
Head width	1.12 –1.25
Pronotum width	1.00 –1.00
Pronotum length	0.575–0.625

[a] Made from preserved specimens. Possibly much longer in life.

"Larva."—Reaching a length of about 5 millimeters. One of 5 millimeters shows 12 segments in the antennæ. Slender, thorax much slenderer than abdomen which is long, swollen posteriorly, and colored a yellowish brown by the wood particles and protozoa of the gut. A larva of 1.85 millimeters shows antennæ of 10 segments, segments 3, 4, 5, and 6 being rudimentary.

Nymph.—Similar to "larva" in general appearance but reaching larger size, having wing pads in various stages of development and distinct, gray, compound eyes. One about 6 millimeters in length shows 17 segments in the antennæ, 4 of them still rudimentary.

SYSTEMATIC POSITION

This species differs from *Calotermes pinangae* (Haviland), the only other described species of the genus, among other points, in the toothing of the mandible and in the greater length and breadth of the head and pronotum.

DISTRIBUTION AND BIOLOGICAL NOTES

House termites, living in boards in houses, furniture, picture frames, etc. More extensive collecting is necessary to determine the relative prevalence of the different species of this genus. My collection contains several closely related new species which I plan to describe in a future number of these notes.

So far this species has been collected only in Manila and only a few times here. Adults of this species were collected by me (No. 15) in June, 1920, with numerous dried insects in a hanging lamp shade at my former house in Ermita, Manila. I had noted the appearance of this form on June 12, which points to a protracted or irregular swarming on the part of this species. The second collection was, as noted above, by Prof. José I. del Rosario from boards in his house, with *C. cynocephalus;* the third by me from boards and moulding of a case for birds' eggs hanging on a cement wall in the laboratory. The fact that no other species of the genus has been found in boards in Manila leads to the belief that it is the common species, at least in this locality.[6] *P. nocens,* like *C. cynocephalus,* forms small colonies, eating the dry wood, without any direct connection with the ground or any external source of moisture. Most of the specimens described were found living in the wood of a box containing an exhibit of birds' eggs. The box had been hanging on a cement wall surface in the laboratory for several years without being in contact with any other wood. The assistant who hung the box tells me that there were signs of termite work when it was hung. This would seem to imply that the colony found had been in the wood for some years. Since there were less than a hundred specimens collected, of which but two were soldiers, we can get some idea of how slowly such colonies develop. Since, also, the wood was by no means all destroyed we can get an idea of how slowly they work (see photographs of work, Plates 5 and 6). Since writing the above an examination of a part of this colony (March, 1921) shows that many of the "workers" as well as the white nymphs are developing wing pads. One soldier and numerous workers were found in boards of the house of Prof. José I. del Rosario, where in association with *Cryptotermes cynocephalus* they were attacking only the boards of white lauan (*Anisoptera thurifera* Blume), a comparatively soft wood, and avoiding the harder molave and ipil, which are nearly termite proof.

[6] Since writing the above a very distinct species has been taken in Manila, one of the five species yet to be described which were mentioned above. However, winged adults of *P. nocens* have been found commonly about the lights during June and July, and adults of the other species have not, and there seems no reason therefore to change our belief that *P. nocens* is by far the commonest house termite of this locality as other closely related species of the same genus seem to be in Cebu and Negros.

Family RHINOTERMITIDÆ Banks

Mesotermitidæ Holmgren.

Genus PRORHINOTERMES Silvestri

Arrhinotermes Wasmann.

DIAGNOSIS

Adult.—Head broadly egg-shaped, nearly circular. Clypeus much broader than long, swollen. Antennæ with 19 to 22 segments. Pronotum narrower than the head. Wing membrane weakly haired, strongly reticulate. The median of both wing pairs arises from the cubitus or is lacking or arises from the radial sector in hind wing (*P. luzonensis!*).

Soldier.—Head distinctly narrowed distally. Compound eyes present, distinct or vestigial. Fontanelle distinct. From the fontanelle there runs forward a more or less distinct channel. Fontanelle gland large, extending far backward into the body. Antennæ of 16 or 17 segments.

Worker.—Clypeus rather large. With or without distinct compound eyes.

SYSTEMATIC POSITION

In 1902 Wasmann described the genus *Arrhinotermes* for a new species, *A. heimi* from Ceylon, based on adults only. In an appendix to the same article he describes *A. oceanicus*, based on adults from Cocos Island. Holmgren (1911) points out that *A. heimi* Wasmann is apparently a *Coptotermes*, and Bugnion in 1910 had reported the adults described by Wasmann as *A. heimi* to be nothing else than the adults of *Coptotermes travians* (Haviland). As Holmgren points out, therefore, according to the rules of nomenclature, *A. heimi* being considered as the type, *Arrhinotermes* becomes a synonym. Banks (1920) replaces it by *Prorhinotermes* Silvestri (1909). Holmgren, however, in view of the fact that *A. oceanicus* Wasmann described in the appendix to the same article is a true *Arrhinotermes*, retains that generic name with *A. oceanicus* Wasmann as the type. If we are to follow the rules of nomenclature, *Arrhinotermes* must be considered a synonym and I am, therefore, following Banks in this matter.

The genus *Prorhinotermes* seems to be peculiarly an island genus and while widely distributed is represented by few species and those apparently closely related. So far as I am able to ascertain, no other region has yet produced two species of this

genus. The American species is *P. simplex* (Hagen), found in the East Indies and Florida; the Formosan species is *P. japonicus* Holmgren; Ceylon has *P. flavus* (Bugnion and Popoff); Samoa, *P. inopinatus* Silvestri; Krakatoa, *P. krakataui* Holmgren; *P. oceanicus* Holmgren is found in Cocos Island; and *P. wasmanni* Holmgren, in Costa Rica. In view of this peculiar distribution of the genus it was to be expected that the Philippines would show at least one Luzon species and perhaps others from different islands. The facts in the case are a good example of the surprises which await the termite collector in the Philippines. This genus was not encountered until collections were made on the Manila-North Road where, near the Bulacan-Rizal boundary, three soldiers of *P. luzonensis* sp. nov. were found, without workers, in a stump. Later collections showed, within 50 meters of this, a small complete colony of *P. gracilis* sp. nov. (see below), with a deälated adult living in the hollow end of a branch of a guava tree. Still later collections produced from a similar situation, within a kilometer or two of the spot, the large colony with many winged adults on which the new species *P. luzonensis* is based living in close relation with a *Hospitalitermes* species and a *Neotermes* species. Extensive collections since that time have shown no other colonies in Luzon, although a few winged adults have been taken.[7]

Prorhinotermes luzonensis sp. nov. Plate 3, figs. 1 and 2, text fig. 2.

Types.—Winged adults, large and small soldiers, workers, and nymphs, No. 27 in the type collection (from No. 205 in the general collection).

Cotypes.—No. 97 (*McGregor and Light*), Rizal-Bulacan boundary, September 13, 1920; No. 205 and mixed with No. 209 in the general collection (*McGregor and Light*), Rizal Province, about one kilometer from the Rizal-Bulacan boundary on the Manila-North Road, October 4, 1920; No. 436, near No. 205 (*McGregor and Light*), March 27, 1921.

DIAGNOSIS

Adult.—Length, 7 to 8 millimeters, with wings, 11 to 12 millimeters; anterior wing, 9 millimeters long. Antennæ with 18 to 21 segments. Pronotum 1.50 millimeters broad by 0.75 to 0.85 millimeter long. Wings in appearance like those of *P. flavus*

[7] Collections recently made in the central islands of Cebu and Negros show one or more species of *Prorhinotermes* to be common in the former island and fairly so in the latter.

(Bugnion and Popoff) and in venation like those of *P. inopinatus* Silvestri but extremely variable. Median and cubitus more or less completely united in anterior wing, tending to separate and reunite, forming a closed cell; median of hind wing often arising from radial sector or from branches from both radial sector and cubitus. Radial sector thickened, particularly in outer third of each wing, and united with the costa by 8 or 9 short, thick, cross veins. All veins marked externally by tiny papillæ. Gula much broader than long, rounded posteriorly. Toothing of mandible like that of *P. japonicus* and *P. inopinatus*, not like that of *P. flavus*.

Soldier.—Large soldier with long head converging distinctly anteriorly, somewhat like *P. flavus* but with much longer body and longer maxillary palpi. Antennæ of 18 or 19 segments. Head with mandibles, 2.75 to 3 millimeters long; head width, 1.50 to 1.65 millimeters. Small soldier with head 2.50 millimeters long with mandibles, and about 1.40 millimeters wide.

DESCRIPTIONS

Adult.—Head, body, and legs yellow shading into brown in older individuals; head, base and anterior border of wings and posterior abdominal tergites often smoky. Wings diaphanous with the exception of costa and radial sector which are a grayish yellow becoming smoky near the base. Body more or less rounded, which, together with its light color and diaphanous wings, gives this termite an appearance quite different from that of most adult termites; 8 millimeters long, with wings 11 to 12 millimeters long, anterior wing 9 millimeters long. Head broadly egg-shaped, somewhat flattened behind and narrowed in front, slightly longer than broad (1.55 by 1.40 millimeters); posterior border rounded, surface flattened, slightly concave. Fontanelle small but distinct, frons incompletely delimitated, rising to meet the much-swollen postclypeus which is distinctly divided in the midline; postclypeus more than twice as broad as long and showing in front of fontanelle a shallow channel outlined in dark brown; anteclypeus small, white, four times as broad as long; labrum large, swollen, with four apical hairs in two lateral pairs; labrum a little longer than clypeus. Ocelli very near the compound eyes, small, indistinct, hyaline, an elongated oval, long axis nearly parallel to long axis of head. Antennæ with 18 to 21 joints, first large, cylindrical, heavily chitinized, second shorter, narrow and cylindrical, third and fourth smallest, disk-shaped, the others orbicular to broad-oval

with exception of apical segment which is narrower and elongated oval. Antennæ and palpi very hairy, head with a few scattered hairs. Pronotum somewhat arched transversely and longitudinally, narrower than head, nearly twice as broad as long, anterior margin weakly concave, upturned, sides upturned, rounded; receding to form rounded posterior margin. Mesonotum and metanotum much narrower than pronotum, sharply rounded posteriorly.

Wings hyaline, veins difficult to make out, with exception of costa and radial sector which are large and a yellowish gray in color and run close together and parallel to one another to near the tip where they become much narrowed, lose their color, the radial sector soon uniting with costa; costa and radial sector joined in distal third of wing by 8 or 9 short, thick, cross veins as in *P. inopinatus.* Median of anterior wings very variable, united with cubitus through greater or less portion of wing; in many wings separating and uniting once or twice to form enclosed cells (see Plate 3, fig. 1); in other wings median arises from cubitus near distal third of wing as in *P. flavus;* median or median and cubitus when united joined to radius sector by numerous, rarely branched, cross veins; cubitus giving off numerous (12 to 18) branched or unbranched veins to the posterior margin, which are united by numerous cross branches resulting in a characteristic reticulation. Median of hind wing often arising from radial sector near base of wing or by branches from radial sector and cubitus and united by numerous cross veins to radial sector and cubitus. All veins marked externally by lines of little hairlike rugosities. Anterior wing scales much larger than posterior pair; both light brown in color with exception of oblique white line and bearing a few scattered spinelike hairs and a line of similar hairs along anterior border.

Large soldier.—Head outstretched, body long and slender, body with head and mandibles as long as adult, head yellow, mandibles reddish black, thorax and abdomen light yellow, hairs scattered on head, numerous on all other parts. Head considerably longer than broad, posterior border straight, corners rounded, broadest near posterior end, converging anteriorly, head with mandibles 2.75 to 3.00 millimeters long, without mandibles 1.80 to 1.90 millimeters long, maximum width 1.40 to 1.65 millimeters, minimum width 1.00 millimeter; head very low, flattened above; ventral genæ somewhat arched; gula much narrowed at middle, nearly as broad posteriorly as in region of

articulation of maxillæ, twice as wide as at narrowest region; maxillary palpi longer than mandibles.

Fontanelle circular, aperture directed somewhat posteriorly, channel of about same diameter running forward to base of postclypeus. Antennal carinæ prominent, edged with red, projecting laterally over bases of antennæ, ending at each posterolateral corner of postclypeus in a little rounded chitinous projection, the medial articulation of the mandible; postclypeus short and narrow, more than twice as broad as long; anteclypeus very short and white; labrum short, tongue-shaped, with roundly pointed apex bearing two hairs. Mandibles as in *P. flavus* but with more gradually incurved tip; antennæ of 18 or 20 segments, much like those of adult. Compound eye distinct, hyaline, lying in midlateral line of head just behind and considerably below posterior end of antennal carina. Pronotum considerably narrower than the head, somewhat arched with a middorsal longitudinal groove, slightly concave anteriorly, with shortly rounded anterolateral corners; sides rounding broadly into the nearly straight posterior margin which is very slightly concave in its central region; pronotum 1.35 millimeters broad and 0.65 millimeter long. Pronotum broadest near anterior end, mesonotum near middle, and metanotum near posterior end; mesonotum narrower, shorter, and less heavily chitinized than pronotum.

Small soldier.—Similar to large soldier but smaller and body broader and flatter with head carried at an angle to body, broader in proportion to length and not converging anteriorly so much as in large soldier.

Measurements of Prorhinotermes luzonensis sp. nov., small soldier.

	mm.
Body length	6.00
Head length, with mandibles	2.50
Head length, without mandibles	1.60
Head width:	
Maximum	1.45
Minimum	1.00
Pronotum width	1.25
Pronotum length	0.55

Worker.—Body much like large soldier. Head like adult but much less heavily chitinized and eyes much less prominent. Head sutures not very distinct and fontanelle much larger and roughly triangular; thickened, rounded articulations at lateral ends of clypeofrontal suture distinct as in adult and soldier; antennæ and mandibles same as in adult; eyes hyaline, larger than in soldier, and in same relative position. Antennæ of 18

segments. Pronotum 1 by 0.55 millimeter, mesonotum and metanotum broader than pronotum.

Nymph.—Very numerous nymphs with swollen floatlike wing pads united in midline and similar to those described by Snyder for *P. simplex* were present in the colony. These will be studied later in connection with the findings of Thompson and Snyder.[8]

DISTRIBUTION AND BIOLOGICAL NOTES

As pointed out in the discussion under the genus, three collections of *Prorhinotermes* have been made, all in Rizal within a kilometer or two of the Rizal-Bulacan boundary. The material on which this species is based came from a single colony found in a large hollow guava tree about a kilometer from the boundary. The colony was associated with a *Hospitalitermes* species, probably *hospitalis* (Haviland) or some nearly related species such as *H. luzonensis* (Oshima). In tearing away the nest of the *Hospitalitermes* species a winged *Prorhinotermes* was seen but in the dusk was not at once recognized as a termite because of its light color, and its transparent wings and rounded body. Later, large numbers of all castes were collected, but unfortunately few data were obtained as to the relative positions and relations of the two forms. From the same place a number of specimens of *Neotermes malatensis* (Oshima) were obtained. These collections were made with Mr. R. C. McGregor on October 4, 1920, and large numbers of winged adults and nearly mature nymphs were found in the nest.[9]

Several isolated winged adults have been collected. One (No. 197) was collected by me about the lights of the University Club, San Luis Street, Manila, September 27, 1920; another (No. 212) was collected from the lights in Quiapo, Manila, October 6, 1920; and two others (Nos. 66 and 245) I found in my former house in Ermita, Manila, one on August 28, and one on October 31, 1920. As adult specimens were found in large number in the colony (No. 205) on October 4, it seems probable that the winged adults take flight during August, September, and October,[10] a few at a time probably, as the flying

[8] Thompson, C. B., and Snyder, T. E., Biol. Bull. 36 (1919) 115.

[9] Another trip to obtain more data about this colony showed the guava tree with the colony to have been destroyed, but another colony was found in another guava tree not far away (No. 436). Unfortunately it was impossible to make any extensive collections without destroying the tree.

[10] It is interesting to note in this connection that winged adults of the same or a closely related species were taken about the lights in Cebu, in May, 1921.

specimens collected were scattered individuals and I have seen no large flights. The finding of these adults in different parts of the city lends color to the belief that this species is more widespread than the limited number of colonies found would indicate. Both the house in Ermita and the University Club building are badly infested with termites, my house partly at least by *Eutermes* (*Microcerotermes*) and the club house partly at least by *Coptotermes* but possibly also by *Prorhinotermes*. These termites, being wood-dwellers and apparently building no covered galleries such as those of *Eutermes* (*Microcerotermes*) or *Coptotermes* and not dropping fæcal pellets as do many species of the Kalotermitidæ, are not easily located; hence the poverty of our collections.[11]

SYSTEMATIC POSITION

The few species of this widely separated genus have not been studied as thoroughly as might be wished. Further study of a wide range of material may show that we have a single very variable species ranging from Formosa to Samoa of which *P. japonicus, P. luzonensis, P. flavus,* and *P. inopinatus* are merely variants, or subspecies. The great variation in the wing venation of *P. luzonensis* would lend color to this belief.

From other species as now known, *P. luzonensis* differs in the following points, among others: From *P. oceanicus* Wasmann, *P. krakataui* Holmgren, and *P. simplex* Hagen in the greater size of the winged adult, and very strikingly from the soldier of *P. krakataui* in the greater number of antennal segments; from *P. wasmanni,* a description of which I have failed to find, it probably differs in its larger size, since Holmgren believes *P. wasmanni* may represent the soldiers of *P. oceanicus;* from each of the three closely related species *P. japonicus, P. flavus,* and *P. inopinatus* it differs in a number of minor points; from *P. flavus,* in wing venation, in toothing of mandible of adult, and in relative breadth and length of pronotum; from *P. japonicus* and *P. inopinatus,* in greater convergence of anterior end of head of large soldier, etc.

Prorhinotermes gracilis sp. nov. Text fig. 3.

Types.—Deälated adult, large soldier, small soldier, and workers, No. 28 in type collection (from No. 150 in the general collection).

[11] Through the kindness of the Bureau of Public Works I am in position to report that this species has recently been found attacking the posts on the ground floor of the Bureau of Printing building. Further inspections of public buildings will probably show them to be quite common.

Cotypes.—No. 150 of general collection (*McGregor and Light*), Rizal Province near Rizal-Bulacan boundary on Manila-North Road, September 29, 1920.

DIAGNOSIS

Adult.—Same as *P. luzonensis* but darker brown in color. Wings not known.

Soldier.—Like *P. luzonensis* but smaller, slenderer, lighter in color, head smaller, antennæ of 15 or 16 segments, segments longer and slenderer than in *P. luzonensis;* compound eyes vestigial only, not protruding as in *P. luzonensis;* pronotum much smaller than in *P. luzonensis.*

Worker.—Smaller, slenderer, lighter, antennæ of 15 segments.

DESCRIPTIONS

Adult (*deälated*).—Agrees very closely with *P. luzonensis;* color above generally darker brown, possibly due to greater age of this specimen which has made its flight while those of *P. luzonensis* were taken from the nest in the winged state. Anterior wing scales very broad, posterior ends overlapping in the midline (possibly an abnormality).

Large soldier.—In general like *P. luzonensis* but body smaller, about the size of the small soldier of *P. luzonensis,* slenderer, lighter in color, and less heavily chitinized; head smaller, pale yellow posteriorly but mandibles as dark as in *P. luzonensis;* mandibles as long as or longer than in *P. luzonensis* but slenderer; antennæ with 16 segments, third obconic, usually distinctly larger and more heavily chitinized than second or more distal segments; other segments longer and slenderer than in *P. luzonensis*; compound eye vestigial, not protruding at all, represented by a vague white area invisible except under microscope; anteclypeus extremely short; narrowest part of gula more posterior than in *P. luzonensis;* pronotum smaller in proportion than in *P. luzonensis.*

Measurements of Prorhinotermes gracilis sp. nov., large soldier.

	mm.
Body length	5.75–6.00
Head length, with mandibles	2.30–2.50
Head length, without mandibles	1.50–1.60
Head width:	
Maximum	1.25–1.30
Minimum	0.90
Pronotum width	1.00–1.05
Pronotum length	0.45–0.48

Small soldier.—Body short, flat, darker yellow, and more heavily chitinized than large soldier; head larger than in large soldier, making an angle of about 45° with body. Pronotum slightly larger. Otherwise as in large soldier.

Measurements of Prorhinotermes gracilis sp. nov., small soldier.

	mm.
Body length	4.30–5.50
Head, with mandibles	2.50–2.60
Head, without mandibles	1.45–1.50
Head width:	
Maximum	1.32–1.35
Minimum	0.90–0.95
Pronotum width	1.05
Pronotum length	0.50

Worker.—Long, slender, very lightly chitinized; thorax narrow, head light yellow, body transparent white, abdomen colored dirty salmon to brown by intestinal contents. Head flattened; posterolateral region swollen, like *P. luzonensis,* but eyes only slightly developed, projecting very slightly.

SYSTEMATIC POSITION

In view of the fact that this is the first case of two *Prorhinotermes* species found living together in the same region, and of the further fact that the two species were found in close proximity and have not been found elsewhere, it would seem an obvious inference that we are dealing here with variational forms rather than with two distinct species. A consideration of the differences between the two species makes this position untenable, however. *P. gracilis* differs much more distinctly from *P. luzonensis* than the latter differs from *P. japonicus, P. flavus,* or *P. inopinatus,* with regard to which it is indeed a possibility that we are dealing with a very variable species of wide distribution. The lighter color and lack of chitinization and the very slight development of the compound eyes might be due to a more sheltered life habit; the size difference might be a variation; but the very definite difference in number of antennal segments and their shape and size are difficult to explain as mere variations. A more detailed study would show a host of minor differences and, unless the anterior wing scales of the one adult of *P. gracilis* are abnormal, the wings of the two species must differ very greatly. For these reasons I have felt it impossible to avoid making this a new species, to which I have given the specific name *gracilis* because of the slender form of the worker and large soldier.

DISTRIBUTION AND BIOLOGICAL NOTES

FIG. 2. *Prorhinotermes luzonensis* sp. nov. Antenna in outline for contrast with antenna of *P. gracilis* shown in next figure. × 42.

Collected by McGregor and Light on September 29, 1920, from a hollow guava stub with living branches, near the Manila-North Road, in Rizal Province, about 100 meters from the Rizal-Bulacan boundary monument. This small colony was discovered while searching for *Neotermes*, one or more species of which are very common in guavas; in fact, a number of *Neotermes* specimens were collected at the same time, probably from tunnels near the surface of the wood. In this connection it is interesting to note that *P. luzonensis* was also found in association with, or at least in very close proximity to, *Neotermes*. The *P. gracilis* colony was found living in a mass of wood pulp, probably fæcal matter, similar to that used by *Neotermes* to plug up points of entry into a limb, and deposited by them also in some of their workings. At the time this was thought to be *Neotermes* waste, but I have not been able to verify this point and it seems probable that it was produced by the *Prorhinotermes* colony. In the center of this mass was a harder lump, apparently a royal chamber, in which was found a deälated adult male; the queen escaped or was overlooked.

FIG. 3. *Prorhinotermes gracilis* sp. nov. Antenna in outline to contrast with that of *P. luzonensis* in preceding figure. × 42.

Genus **LEUCOTERMES** Silvestri sensu restricto

Subgenus *Leucotermes* sensu stricto Holmgren.

DIAGNOSIS

Adult.[12]—Yellow to brownish yellow; head oval; clypeus flat, short, and broad; labrum broad and convex; fontanelle small,

[12] From Banks and Holmgren. I have not seen the adult.

dotlike, rather far back on head. Ocelli small or lacking. Antennæ of 15 to 17 segments, segments 2, 3, and 4 very short. Gula as long as broad. Pronotum flat, concave in front and behind. Anterior wing scale much larger than hind one. Wings slightly reticulate and strongly haired. Subcosta of anterior wing not extending beyond the wing scale. Radius running near anterior border with which it is often united. Radius sector simple, parallel to the anterior border to which it is often united apically by several small branches. Median usually simple and running nearer the cubitus than the radius sector. Cubitus with 8 to 12 branches to the hind margin. Radius of hind wing separate from anterior margin only within the wing scale. Tibiæ with three apical spines. Cerci 2-segmented.

Soldier.—Head rectangular, with rather strongly inclined forehead clearly grooved in center. Clypeus short. Labrum rather long, tongue-shaped, with a sharp hyaline tip. Eyes lacking. Fontanelle in front of center of head. Mandibles with a large left and a small right basal tooth and beyond that with slight or no toothing. Pronotum flat, concave in front and behind.

Worker.—Head rounded, oval, somewhat larger than the adult. Labrum large and broad. Head sutures not distinct. Fontanelle and plate present. Antennæ with 13 to 15 segments.

Leucotermes philippinensis sp. nov. Plate 4.

Type.—No. 29 in type collection, soldier, worker, and nymph (from No. 128 of the general collection).

Cotypes.—Nos. 128 and 132 (*Miss Ursula B. Uichanco*), Manila, September 24 and 26, 1920; No. 432 (*McGregor and Light*), Manila, March 25, 1921; No. 441 (*McGregor*), Manila, April 3, 1921, in the general collection.

DIAGNOSIS

Adult.—Unknown.

Soldier.—Labrum with pointed, awl-shaped, hyaline tip, fontanelle opening from distinct reddish brown tube; antennæ of 15 segments, the first very large and strongly swollen at distal end, all segments with a dense covering of short, distally directed, incurved hairs with scattered longer hairs; coxæ and femora swollen, tibiæ slightly so, tarsi very slender and more strongly chitinized. Body slender, particularly in region of thorax, covered with a coat of hair similar to that of the antennæ, the short, incurved hairs directed posteriorly, hairing particularly heavy at posterior end of body.

Worker.—Antennæ of 15 segments, first long and curved, not distally swollen; hairs as in soldier; body slender.

Nymph.—Clypeus very greatly swollen; anterolateral corners of frons raised, projecting; antennæ of 16 or 17 segments, haired as in soldier.

DESCRIPTIONS

Adult.—Unknown.

Soldier.—Head, antennæ, and maxillary palpi pale yellow; head darker yellow anteriorly; mandibles dark, transparent, brownish red; bases of mandibles, internal mandibular articulations, margins of antennal foveolæ and "fontanelle tube" a light reddish brown; body white; anterior region of pronotum and the tarsi light yellow. Head long, parallel-sided, sides slowly rounding into rounded posterolateral corners; posterior margin straight; head dorsoventrally flattened with rounded sides ("thickly cylindrical" of Holmgren). Forehead abrupt, making angle of about 120° with the mandibles, laterally rimmed, centrally concave, dorsal rim concave; fontanelle, which is directed forward and distinctly visible internally as a brown tube, lies at posterior end of concavity; head considerably thickened anteriorly, thickest just behind level of antennæ. Mandibles short (0.825 millimeter long), strong, nearly straight, tips somewhat incurved, right untoothed, left with roughened cutting edge and two small and low but distinct teeth close together near the base. Labrum 0.45 millimeter long and 0.225 millimeter broad, tongue-shaped, ending in a very slender, awl-shaped, hyaline tip; two large hairs at base of tip, beyond which the hyaline region has a length of 0.09 millimeter. Anteclypeus very short, hyaline; medial articulations of mandibles at sides of postclypeus prominent and reddish in color.

Antennæ of 15 segments, relatively thick, much longer than mandibles, reaching about to posterior margin of head with scattered large hairs and very numerous, short, distally directed, incurved smaller hairs; basal segment very large, swollen distally; second cylindrical, larger than third; others larger than second, suborbicular to broadly oval; apical segment slightly slenderer, long-oval; margins of antennal foveolæ projecting, reddish brown. Pronotum narrower than head, more than half as long as broad, slightly concave anteriorly and less so posteriorly, broadest near anterior end, lateral margins receding gradually and rounding posteriorly into straight posterior border, slightly emarginate in center; sides depressed, anterior margin very slightly upraised; divided by middorsal longitudinal groove;

mesonotum much shorter and narrower, metanotum somewhat narrower; lateral margins of mesonotum receding, those of metanotum convex; posterior margin of each slightly emarginate in center. Coxæ, femora, and, to some extent, tibiæ swollen; tarsi very slender, strongly chitinized, yellow. Body slender, thorax particularly so, abdomen broadest near posterior end. Body and legs with scattered larger hairs and numerous smaller, incurved, posteriorly directed hairs, similar to those of the antennæ; hairing most prominent toward posterior tip of abdomen; head more sparsely haired. Cerci prominent.

Measurements of Leucotermes philippinensis sp. nov., soldier.

	mm.
Body length	4.25 –4.75
Head length	2.15 –2.25
Head, without mandibles	1.10 –1.50
Head width	0.80 –0.90
Pronotum width	0.68 –0.78
Pronotum length	0.425–0.50

Worker.—Small; body white; head very pale yellow with exception of exposed portion of mandible and mandibular articulations which are brownish yellow. Body, head, and legs covered with numerous hairs, the larger and more scattered hairs yellow, the shorter and more numerous, incurved, and posteriorly directed hairs white; body most heavily haired posteriorly, body longer than that of soldier; head broadly oval; clypeus swollen; antennæ of 15 segments, first long, curved, not distally swollen as in the soldier, apical segment slender, egg-shaped, longer than others with exception of first segment, haired as in soldier. Fontanelle and sutures not visible.

Nymph.—Much like worker but abdomen very much longer and whiter, anterior wing pads 0.10 millimeter long; head much broader behind, clypeus very greatly swollen, distinctly bilobed; anterolateral corners of frons high, projecting; compound eye projecting but little; antennæ of 16 or 17 segments, shaped and haired like worker; fontanelle and Y-suture not visible.

DISTRIBUTION AND BIOLOGICAL NOTES

The specimens on which this species are based were collected for me by Miss Ursula B. Uichanco, head of the department of biology, of the Philippine Normal School. Three soldiers, a number of workers, and several nymphs (No. 128) were collected on September 24, 1920, from galleries in cracks in the cement floor and from the door jamb of the storeroom. One soldier and a few workers (No. 132) were collected on September 26,

1920, from galleries on cement wall leading from a hole in the cement floor. On March 25, 1921, my attention was called by Mr. McGregor to termites building slender galleries on the cement supports of a porch of the Bureau of Science. These turned out to be this species, and two soldiers and numerous workers and nymphs were collected.[13] The latter showed no wing pads and it seems probable therefore that the period for emergence of the adult lies somewhere between September when the nymphs showed wing pads and March when they showed none. The species of *Leucotermes* have somewhat the same habits as *Coptotermes* but probably confine their attacks more completely to seasoned wood of buildings.[14] I hope in the future to make systematic collections in condemned buildings, which I surmise will disclose a considerably greater *Prorhinotermes* [11] and *Leucotermes* population than is at present known.

SYSTEMATIC POSITION

This species is very nearly related to *Leucotermes indicola* Wasmann. In the absence of comparative material it is impossible to be absolutely certain that we are not here dealing with a variety of that species; but from all the data available on that species (Wasmann, Holmgren) I feel satisfied that, aside from minor differences, *L. philippinensis* differs from *L. indicola* Wasmann in the much greater length of the hyaline tip of the labrum of the soldier, in the greater length of the antennæ and of the distal segments thereof, in the peculiar hairing of all castes, and in the presence of the definitely marked brown tube leading inward from the fontanelle. As the species of this subgenus are usually confined to a given region and are usually without coregional species, I have given the new species the name *philippinensis*.

[13] On March 3, 1921, Mr. McGregor brought me specimens from a colony in a house in Paco, Manila, where repairs were being made due to termite damage. Examination showed them to be *Leucotermes* and a visit to the colony furnished a large series of this species. The nest, which superficially resembled that of *Coptotermes* with its speckled yellow appearance, was much more compact with thicker walls and smaller and more rounded chambers. The nest was in the end of two floor sills. The wood attacked was not so thoroughly destroyed as in the case of attack by *Coptotermes*, particularly in the case of hardwood sills which were attacked mainly at the ends and on the sides. Pine pieces were entirely destroyed and replaced.

[14] More recently this species was found attacking growing sugar cane in an experimental plot near the Bureau of Science building. Mr. H. A. Lee, plant pathologist of the Bureau of Science, who brought this to my attention, tells me that he has frequent reports of termite damage to plants!

ILLUSTRATIONS

PLATE 1

FIG. 1. *Kalotermes mcgregori* sp. nov. Head and pronotum of short-headed soldier. Mandibles opened to show toothing. (Antennæ imperfect!) × 16.5.

2. *Kalotermes mcgregori* sp. nov. Head and thorax, showing wing pads and antennæ with 17 segments. × 16.5.

PLATE 2

FIG. 1. *Cryptotermes cynocephalus* sp. nov. Side view of head and part of thorax. × 30.

2. *Cryptotermes cynocephalus* sp. nov. Dorsal view of head and pronotum. × 30.

3. *Planocryptotermes nocens* sp. nov. Dorsal view of head and pronotum. × 30.

4. *Planocryptotermes nocens* sp. nov. Pronotum. × 30.

PLATE 3

FIG. 1. *Prorhinotermes luzonensis* sp. nov. Head and pronotum of large soldier. × 19.

2. *Prorhinotermes luzonensis* sp. nov. Winged adult. × 9.

PLATE 4

Leucotermes philippinensis sp. nov. Dorsal view of soldier. × 24.

PLATE 5

FIG. 1. A piece of picture molding attacked by *Planocryptotermes nocens* sp. nov., only a thin paperlike shell remaining.

2. Cut end of above enlarged.

3. Smaller pieces of pine eaten away, leaving extremely thin outer layer.

PLATE 6

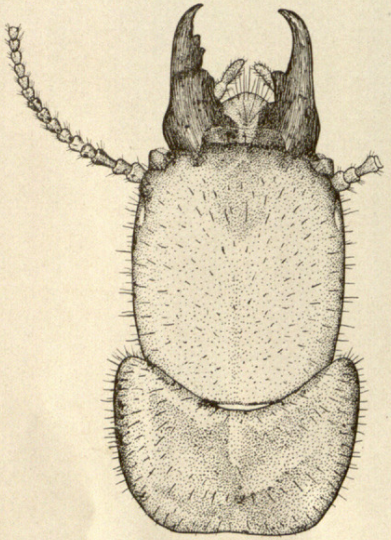
A group of impressed fæcal pellets of *Planocryptotermes nocens* sp. nov. enlarged about three times.

TEXT FIGURES

FIG. 1. *Kalotermes mcgregori* sp. nov. Outline drawing of head and pronotum of long-headed soldier. Note the absence of distinct eyespots and the presence of curious hyaline spots in anterolateral region.

2. *Prorhinotermes luzonensis* sp. nov. Antenna in outline for contrast with antenna of *P. gracilis* shown in the next figure. ×42.

3. *Prorhinotermes gracilis* sp. nov. Antenna in outline to contrast with that of *P. luzonensis* in the preceding figure. × 42.



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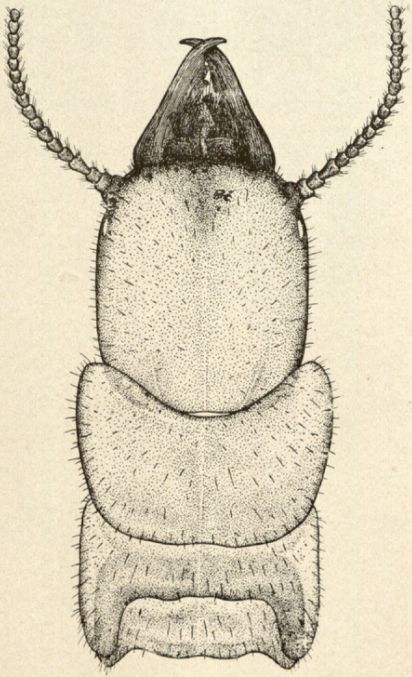

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PLATE 1. CALOTERMES MCGREGORI SP. NOV.