

tween crossed nicols and are probably essentially uniaxial with the acute bisectrix perpendicular to the cleavage. No definite interference figure could be observed although, in convergent light, there is a suggestion of strong dispersion. Many of the grains are clouded with opaque air inclusions. Plates on edge show very low birefringence with sub-normal low order blue interference colors. The index of refraction of basal plates ω , is about 1.570. It seems probable that the low birefringence, high dispersion, and confused optical figure are due to complex twinning, a characteristic of penninite.

Other specimens from this locality, not yet studied in detail, consist of pale violet micaceous scales of chromiferous chlorite greatly resembling lepidolite, and still others contain compact pale purple material mixed with picrolitic sheared serpentine.

ENTOMOLOGY.—*New termites from the Solomon Islands and Santa Cruz Archipelago—II.*¹ THOS. E. SNYDER. Bureau of Entomology.

Family TERMITIDAE

Genus *Nasutitermes* Banks (sens. lat.)

Subgenus *Nasutitermes* Holmgren (sens. str.)

Species of the subgenus *Nasutitermes* Holmgren (sens. str.) have a wide distribution throughout the tropics of the world; they occur as far north as Mexico and the Bahamas and in the United States there is a doubtful record from Texas. Southward, *Nasutitermes* occurs in South America, Africa, Madagascar, Asia, New Guinea, Oceania generally, and Australia.

More species are included in this subgenus than in any other genus or subgenus of termites, approximately 200 having been described, nearly one-half of which are American. As a rule, species of *Nasutitermes* are quite distinct, although there are certain natural groups in which the species are of especially close relationship.

The soldier secretes a sticky fluid from the nasus which is a very effective defence against ants; in some species the workers bite viciously. These termites live in carton tree nests, in colonies in wood, and in the ground; they are destructive wood-borers.

Large queens of the first form of two species of *Nasutitermes* (sens. lat.) were found later on Guadalcanar Island, Solomon Islands, by Mr. Knibbs, Government Surveyor, and given to Doctor Mann: one species with a large eye and ocelli close to the eye, the other with a smaller eye and more distant ocelli. Of the latter species there were, in addition to the large first form queens, many smaller queens of the second form, with wing pads

¹ See this JOURNAL 15: 395-407. 1925.

varying in length from normal to as long as those of the nymphs of the first form; i.e., there was a large series of "intermediates." These specimens are in the United States National Museum.

It was believed at first that *Nasutitermes* (*Grallotermes*) *oceanicum* Snyder was in this subgenus, but the elongate third segment of the antenna and the long legs lead me to place *oceanicum* in the subgenus *Grallotermes* Holmgren. However, *oceanicum* has also been compared with the descriptions of all species of *Nasutitermes* (sens. str.) and may be in this subgenus, in the *matan-gensis* group (Haviland).

Subgenus *Grallotermes* Holmgren

Only five species in this subgenus are known, all of which occur in the oriental region. They are distributed as follows: Philippine Islands (2), Carolina Islands (1), New Guinea (1), and India (1). The soldiers are dark colored and long-legged, and have points to the mandibles. The worker has the post-clypeus bulging (arched) and less than half as long as wide. The winged sexual forms have the antenna with 15 segments, and large, prominent eyes.

Nasutitermes (*Grallotermes*) *oceanicum*, new species.

Soldier.—Head castaneous-brown (lighter posteriorly, where rounded); pear-shaped; in profile head with nasus forming a slight curve, but is in nearly a straight line; head with two transverse rows of long hairs, one anteriorly and one posteriorly, also microscopic hairs. Mandibles with fairly long sharp points at apex.

Nasus same color as head, but with slight reddish tinge at apex, lighter at middle, elongate, aquiline, broad at base, pointed at apex where slightly turned down, and beset with hairs.

Antenna yellow to light yellow-brown, with 13 segments; segments becoming longer and broader toward apex, with long hairs; third segment elongate, subclavate, slender, much longer than either second or fourth segments, sometimes twice as long; second and fourth segments subequal, or fourth longer than second; last segment shorter, slender, subelliptical.

Pronotum light yellow brown (darker at anterior margin), saddle-shaped, semicircular, inclined anteriorly, not or only slightly emarginate anteriorly, there provided with hairs.

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

Abdomen with tergites light yellow-brown; tergites with short hairs and a row of long hairs at base of each; sternites with dense long hairs; cerci elongate, prominent.

Measurements.—Length of entire soldier, 4.1–4.2 mm.; length of head with nasus, 1.85–1.9 mm.; length of head without nasus (to anterior, to base of mandibles), 1.05–1.1 mm.; length of nasus, 0.8 mm.; length of pronotum (where longest not at median), 0.25 mm.; length of hind tibia, 1.35 mm.; width of head posteriorly (where widest), 1.05–1.1 mm.; height of head at middle, 0.65 mm.; width of pronotum, 0.55 mm.

Nymphs of sexual form (with long wing pads) with large eye 0.32 mm. in length; antenna with 15 segments; third segment shorter than second or fourth; pronotum emarginate posteriorly.

Worker large, 5 to 5.5 mm. in length; head dark castaneous brown; Y-

suture distinct; antenna with 14 segments; post-clypeus bulging, length less than half its width.

Type locality.—Graciosa Bay, Santa Cruz Archipelago.

Described from a large series of soldiers collected with nymphs of the sexual form and workers at the type locality by Dr. W. M. Mann in July, 1916.

Type,² *soldier*.—Cat. No. 15293, Museum of Comparative Zoology, Cambridge, Mass.; paratype in U. S. National Museum.

Subgenus *Subulitermes* Holmgren

Species of the subgenus *Subulitermes* are few in number (only 15 have been described) and are restricted to the tropics of America, Africa, Asia, and Oceania. These termites range as far north as Panama in Middle America.

Winged adults of but very few species are known. In some species the number of antennal segments of the nymphs of the sexual forms has been noted in publishing the descriptions of the soldier and worker castes.

In the three new forms here proposed from the South Seas the nymphs of the sexual winged adults or the winged adults have 13 segments to the antenna and the soldiers 11 segments, while most of the previously described species from the oriental region have more segments to the antenna in both these castes.

Nasutitermes (*Subulitermes*) *orientis*, new species

Winged adult.—Head very dark reddish castaneous brown (lighter near eyes and posteriorly and anteriorly), not much longer than broad, suboval, punctate, with dense hairs, a few longer than the others. Fontanelle a hyaline, narrow, elongate, subelliptical slit ending in a raised spot at epicranial suture, posterior to ocelli. Eye black, not round, projecting, close to lateral margin of head. Ocelli hyaline, raised, suboval, separated from eyes by a distance less than their diameter.

Antenna dark brown; with 13 segments, the segments becoming longer and broader toward apex; third segment slender, subclavate shorter than second or fourth segment; fourth shorter than second segment; last segment slender, elongate, subelliptical.

Pronotum same color as head, nearly straight anteriorly (broadly and shallowly concave); posterior margin acutely emarginate; sides narrowed angularly to the posterior margin; hairs dense and long.

Wings dusky grayish; costal area yellow-brown (darker); tissue and margins hairy; in fore wing, median vein close to cubitus, in about middle of wing, branches to apex; hyaline area between median and cubitus; cubitus with 7-9 branches or subbranches to lower margin, not reaching apex.

Legs yellow-brown (the tibiae darker), elongate, slender; hairs long.

Abdomen with tergites reddish brown, slightly lighter colored than head, with dense long hairs, those at base of tergites longest; cerci prominent, broad at base, fairly elongate.

Measurements.—Length of entire winged adult, 9.5 mm.; length of entire dealated adult, 6 mm.; length of head to tip of labrum, 1.2 mm.; length of

² No definite specimen designated as holotype; hence, since the specific descriptions were made from a series, these are cotypes.

pronotum, 0.6 mm.; length of fore wing, 7.75 mm.; length of hind tibia, 1.1 mm.; diameter of eye (long diam.), 0.3 mm.; width of head (at eyes), 1.05 mm.; width of pronotum, 0.85 mm.; width of fore wing, 2.25 mm.

The winged adults of very few species of *Subulitermes* are known; *N. (S.) orientis* is a dark-colored, hairy-headed species, with antenna of but 13 segments.

Soldier.—Head yellow-brown or light castaneous brown (darkest on sides, lighter posteriorly and anteriorly), pear-shaped, slightly constricted in middle, rounded posteriorly; in profile head and nasus forming approximately a straight line; head with dense short hairs and scattered long hairs (3–4 rows). Mandibles without points at apex, or a minute, very short, sharp point in some specimens.

Nasus reddish brown, elongate, slender, cylindrical; hairs short.

Antenna light yellow-brown, with 11 segments; segments becoming longer and broader toward apex, with long hairs; third segment subclavate, subequal in length to second and fourth segments, but more slender; last segment suboval, slender.

Pronotum light yellow (margins darker), saddle-shaped, with short hairs and also long hairs on anterior margin, very slightly emarginate (roundly and shallowly) anteriorly.

Legs tinged with yellow; elongate; slender; hairs long.

Abdomen tinged with yellow; tergites with dense long hairs, the longest row at base of each; cerci fairly elongate and prominent.

Measurements.—Length of entire soldier, 3–3.3 mm.; length of head with nasus, 1.3 mm.; length of head without nasus (to anterior), 0.8 mm.; length of nasus, 0.5 mm.; length of pronotum, 0.15 mm.; length of hind tibia, 0.67 mm.; width of head posteriorly (where widest), 0.8 mm.; width of pronotum, 0.4 mm.

Worker.—Post-clypeus not as long as half its breadth.

Type locality.—Auki, Malayta Island, Solomon Islands.

Described from a large series of winged adults and soldiers collected with workers at the type locality by Dr. W. M. Mann, in May and June, 1916.

Type, soldier.—Cat. No. 15294, Museum of Comparative Zoology, Cambridge, Mass.; morphotype, winged adult; paratypes in U. S. National Museum.

Nasutitermes (S.) orientis is distinct in its hairy head, number and shape of antennal segments, and size.

***Nasutitermes (Subulitermes) orientis* Snyder, *tulagiensis*, new variety**

Soldier.—Head light castaneous brown (yellow-brown, with greyish tinge), lighter near antennal sockets and posteriorly; head slightly constricted behind antennae, suboval, with few long hairs anteriorly and posteriorly and dense shorter hairs. Nasus light castaneous, with a reddish tinge, elongate, slender, cylindrical, slightly more robust at base (or more conical than in *orientis*); nasus with dense short hairs. Mandibles without points.

Antenna light yellow-brown with 11 segments; segments becoming longer and broader toward apex, with long hairs; third segment slender, subclavate, longer than second or fourth segments (when fourth is shorter than second segment), or approximately subequal to them; last segment slender, elongate and subelliptical.

Pronotum tinged with yellow (the anterior margin darker), saddle-shaped, with long hairs on anterior and short hairs on posterior margins.

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

Abdomen dirty-white, tinged with yellow; tergites with a row of long hairs at base and other denser, shorter hairs; cerci fairly elongate, prominent.

Measurements.—Length of entire soldier, 2.5–3 mm.; length of head with nasus, 1.2–1.25 mm.; length of head without nasus (to anterior), 0.75 mm.; length of nasus, 0.45 mm.; length of pronotum, 0.12 mm.; length of hind tibia, 0.67 mm.; width of head (where widest, posteriorly), 0.7 mm.; width of pronotum, 0.37 mm.

Worker.—Length of post-clypeus less than half its breadth.

Type locality.—Tulagi Island, Solomon Islands.

Described from a large series of soldiers and workers collected by Dr. W. M. Mann at the type locality in May, 1916. Doctor Mann also collected soldiers, nymphs of the sexual form, and workers of this species of Ugi Island, Solomon Islands, in July and August, 1916. The antenna of these nymphs of the sexual form had 13 segments.

Type, soldier.—Cat. No. 15295, Museum of Comparative Zoology, Cambridge, Mass.; paratypes in U. S. National Museum.

This variety is slightly smaller than *orientis* and the third segment of the antenna is somewhat longer, but in most characters it is close to the typical form.

***Nasutitermes* (*Subulitermes*) *sanctae-crucis*, new species**

Winged adult.—Head dark castaneous brown with reddish tinge, not much longer than broad, suboval, punctate, with dense, fairly long hairs and scattered longer hairs. Fontanelle as in *N. (S.) orientis* Snyder, but only the spot back of the ocelli hyaline.

Eyes black, not round, prominent, projecting, close to lateral margin of head. Ocelli hyaline, suboval, projecting, close to eye, separated from eyes by a distance less than their short diameter.

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

Pronotum slightly lighter-colored than head, punctate; anterior margin nearly straight; posterior margin emarginate (not so strongly as in *orientis*); sides angularly narrowed posteriorly; hairs dense and long.

Wings smoky gray, the costal area darker (yellow-brown); tissue and margins of wing hairy; in fore wing, median vein parallel and close to cubitus, placed in middle of wing, branching to apex of wing, with 2 or 3 branches; cubitus below middle of wing, with 8–10 branches or subbranches to lower margin; hyaline area between median and cubitus.

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

Abdomen with tergites lighter-colored than head, with dense long hairs, the basal row longest; cerci short but prominent, the base stout.

Measurements.—Length of entire winged adult, 9.5–9.75 mm.; length of entire dealated adult, 5.5–6 mm.; length of head (to tip of labrum), 1.4 mm.; length of pronotum, 0.55 mm.; length of fore wing, 8 mm.; length of hind tibia, 1.15 mm.; diameter of eye (long diameter), 0.32 mm.; width of head (at eyes), 1.15 mm.; width of pronotum, 0.85 mm.; width of fore wing, 2.2–2.25 mm.

The winged sexual adult of *Nasutitermes (S.) sanctae-crucis*, unlike most oriental species of *Subulitermes*, has only 13 segments to the antennae.

Soldier.—Head light castaneous brown (yellow-brown with reddish tinge), lighter-colored at sides and anteriorly and posteriorly, slightly constricted in middle, pear-shaped, rounded posteriorly; head with nasus in

nearly a straight line, except for slight elevation at base of nasus; head with dense short hairs and 3-4 transverse rows of long hairs. Mandibles without points at apex.

Nasus darker-colored than head, castaneous with reddish tinge, cylindrical, slender, elongate, but not as long as length of head to base of mandibles, with short hairs.

Antenna yellow-brown, with 11 segments; segments becoming longer and broader toward apex, with long hairs; third segment subclavate, subequal to second or fourth segments, although sometimes longer than fourth and shorter than second; last segment slender, suboval.

Pronotum tinged with yellow (anterior margin darker), saddle-shaped, slightly emarginate anteriorly, with dense, short hairs and longer hairs on anterior margin.

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

Abdomen with tergites tinged with yellow; tergites with dense long hairs, the row of hairs at the base of each being longest; cerci prominent.

Measurements.—Length of entire soldier, 2.6-2.9 mm.; length of head with nasus, 1.3-1.4 mm.; length of head without nasus ventrally (to anterior margin), 0.7-0.75 mm.; length of nasus, 0.6 mm.; length of pronotum, 1.5 mm.; length of hind tibiae, 0.7 mm.; width of head posteriorly (where widest) 0.7-0.75 mm.; width of pronotum, 0.36 mm.

Type locality.—Graciosa Bay, Santa Cruz Archipelago.

Described from a series of winged adults and soldiers collected with workers at the type locality by Dr. W. M. Mann in July, 1916.

Type, soldier.—Cat. No. 15296, Museum of Comparative Zoology, Cambridge, Mass., morphotype winged adult; paratype in the U. S. National Museum.

Nasutitermes (*S.*) *sanctae-crucis* has a longer nasus than *orientis* Snyder; unlike most oriental species of *Subulitermes* there are only 11 segments to the antenna and a very hairy head.

Genus *Microcerotermes* Silvestri

Species of the genus *Microcerotermes* are widely distributed throughout the tropics of the world. The West Indies and Central America represent their most northerly points of distribution, but their range extends to South America, Africa, Madagascar, Asia, New Guinea, Oceania generally, and Australia.

Over 55 species of *Microcerotermes* have been described, some of which are closely related and difficult to separate. These termites live in hard carton nests on trees, on the ground, and in colonies in wood; they are destructive wood borers.

Microcerotermes piliceps, new species

Soldier.—Head castaneous (red-brown), not twice as long as broad, cylindrical, the sides parallel (slightly concave in middle); head broadest posteriorly, narrowed anteriorly; posterior margin rounded; epicranial suture very steeply inclined anteriorly; head with dense, fairly long hairs. Fontanelle hyaline, small but distinct, raised, subelliptical, located at beginning of epicranial suture. Eye not distinct, on lower rim of depression

containing antennal socket. Gula at middle slightly less than half as broad as greatest anterior width. Labrum light yellow-brown, broader than long, subtriangular anteriorly, with long hairs.

Mandibles dark reddish-brown (lighter-colored at base), bowed or sabre shaped; in left mandible, bow 0.6 mm. deep (from inner margin to a line connecting apex and base); mandibles broad at base, narrowed and pointed at apex, where incurved, margins irregularly and coarsely serrate for basal two-thirds of their length.

Antenna yellow to light yellow-brown, with 13 segments; segments becoming broader toward apex, with long hairs; third segment half as long as second; fourth segment slightly shorter than second, last segment elongate, slender, subelliptical.

Pronotum light yellow-brown, saddle-shaped, shallowly and roundly concave medianly at anterior and posterior margins; sides gradually and roundly narrowed posteriorly, margins with dense long hairs.

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

Abdomen tinged with yellow; tergites with dense long hairs; cerci not prominent.

Measurements.—Length of entire soldier, 5.3 mm. (shrunken?); length of head with mandibles, 2.7 mm.; length of head without mandibles (to anterior margin), 1.9 mm.; length of left mandible, 1.25 mm.; length of pronotum, 0.3 mm.; length of hind tibia, 0.9 mm.; width of head posteriorly, 1.2 mm.; width of head anteriorly, 1 mm.; height of head at middle, 1 mm.; width of pronotum, 0.75 mm.

Type locality.—Ugi Island, Solomon Islands.

Described from a large series of soldiers collected with workers at the type locality by Dr. W. M. Mann in July and August, 1916.

Type, soldier.—Cat. No. 15297, Museum of Comparative Zoology, Cambridge, Massachusetts; paratypes in United States National Museum.

Microcerotermes piliceps is distinctive on account of the densely hairy head of the soldier; *M. serrula* Desneux, from Borneo, is readily distinguished from *piliceps* by its smaller soldier, the head of which is less densely hairy; the soldier of *piliceps* also has a more hairy head than *M. annandalei* Silvestri, from Barkuda Island.

SCIENTIFIC NOTES AND NEWS

Dr. D. ROBERTS HARPER 3rd, physicist in the Bureau of Standards for more than sixteen years, has resigned to take charge of some heat measurements in the general engineering laboratory of the General Electric Company at Schenectady. Dr. HARPER has been stationed in New York for the past two years as the liaison officer of the Bureau of Standards with the American Engineering Standards Committee.

The degree of Doctor of Laws was recently conferred on Dr. CHARLES D. WALCOTT, Secretary of the Smithsonian Institution, by the University of the State of New York. This degree is conferred upon only one person each year, Secretary Walcott being the twelfth recipient of this honor.

Dr. S. F. BLAKE, of the Bureau of Plant Industry, returned early this month from Europe. Dr. Blake has been examining types of South American Compositae at the principal European herbaria.



1925. "New Termites from the Solomon Islands and Santa Cruz Archipelago."
Journal of the Washington Academy of Sciences 15, 438–444.

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