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TERMITOPHILES FROM NESTS OF *NASUTITERMES* COLLECTED BY ALFRED E. EMERSON IN THE ORIENT (Coleoptera: Staphylinidae)[1]

By **David H. Kistner**[2]

Abstract: New termitophilous Staphylinidae are described from *Nasutitermes* nests in the Orient collected by Alfred Emerson. These are *Austrointhus papuanus* (Papua), *Pseudoperinthus regularis* (Sarawak), *Lauella aenigma* (New Guinea), *L. alomai* (New Guinea), *L. gigantea* (New Guinea), *L. minuta* (New Guinea), *L. snyderi* (New Guinea). One new genus is described, *Paralauella*, with its new species *P. manni* from New Guinea. A key to all of the species of *Lauella* is presented together with the redescription of several species. The relationships between the species of *Lauella* are analyzed by numerical methods and a dendrogram presented. The host relationships are discussed; in general the species are host specific at the species level but two species have had one specimen each taken with other hosts.

The purpose of this paper is to report the extensive collections of staphylinid termitophiles collected by Professor Alfred E. Emerson during a study trip to the Orient in late 1962 and early 1963 from the nests of various species of *Nasutitermes*. We have already reported species he found with *Longipeditermes* (Kistner 1970a, 1970b), with *Hospitalitermes* (Kistner & Pasteels 1970, Kistner 1970c), with *Rhinotermitidae* (Pasteels & Kistner 1971) and with *Dicuspiditermes* (Kistner 1972).

Nasutitermes nests of the Orient have not yielded nearly the numbers or variety of termitophiles as nests of the same genus from the New World or Africa. The total fauna is as follows:

Termitophile	Host
Tribe Pseudoperinthini	
Indinthus fletcheri (Cameron)	*N. indicola* (Holmgren)
Tribe Corotocini	
Termitoptochus ceylonicus Silvestri	*N. ceylonicus* (Holmgren)
T. luzonicus Silvestri	*N. luzonicus* (Oshima)
T. philippinus Silvestri	*N. luzonicus*
Affinoptochus exclusus Kemner	
Tribe Termitonannini	
Lauella javana (Wasmann)	*N. corporaali*

The eight new species described herein more than double the known fauna, but do not add any new tribes or subtribes to the list.

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With the new genus and new species described herein, Emerson's total Oriental collections from his 1962-1963 trip have yielded 15 new genera and 34 new species.

Since there were many new species of the genus *Lauella*, the relationships between all the species were analyzed numerically and these results are presented in a general section where other relationships are also discussed which may be meaningful when the Oriental *Nasutitermes* species are revised.

All methods used in this study have been described before, most recently by Kistner (1968 and 1972). All measurements are in mm unless otherwise stated.

Acknowledgments: Thanks are given to Professor Alfred E. Emerson, University of Chicago for sending me his termitophiles and for providing the host determinations presented herein. Thanks are given to the following Shinner assistants of Chico State College who contributed to various aspects of this study: Maureen Brown, Daniela Davison, Jan Fischer, Herbert Jacobson, Joe Martin, Nancy Piastuch, Tom Rahn, Ruth Robertson, Riley Swift, and Angela Vendsel.

Tribe PSEUDOPERINTHINI Cameron

Subfamily Pseudoperinthinae Cameron 1939: 1.

Tribe Pseudoperinthini Seevers 1957: 247; Kistner & Pasteels 1970: 68 (diagnosis, key to genera).

Austrointhus papuanus Kistner, new species Fig. 2 & 4.

Distinguished from *A. gayi* Kistner & Pasteels by its smaller size and different chaetotaxy as well as the shape of the male genitalia.

Color reddish brown throughout. Dorsal surface of head, pronotum, elytra, and abdomen with a fine even covering of short yellow setae. Dorsal surface of head with no further chaetotaxy. Dorsal surface of pronotum with a lateral row of 6 macrosetae; with 4 macrosetae along the anterior border; and with 6 macrosetae scattered on disc, a row of 4 and then 2 behind. Elytra with lateral rows of 3 macrosetae and another 3 on disc. Macrochaetotaxy of abdominal tergites II-VIII as follows: 2, 6, 6, 6, 6, 6, 4. All sternites with an apical variable row of macrosetae. Male genitalia shaped as in Fig. 2 and 4. Spermatheca unknown.

Measurements: Pronotum length, 0.41; elytra length, 0.33. Number measured, 1.

Holotype ♂ (No. 13955), Papua, 8 km E Port Moresby, 16.XI.1972, ex conical mound, Coll. Alfred E. Emerson. In the collection of D. H. Kistner.

Notes: The host termites were determined to be *Nasutitermes* sp. I by Emerson (1970), specimens of which are in the collection of the American Museum of Natural History, New York.

Pseudoperinthus regularis Kistner, new species Fig. 1, 3, 5.

Related to *P. malayanus* Wasmann from which it is distinguished by the chaetotaxy of the pronotum, elytra, and abdomen.

Color yellowish brown throughout, head a little darker than the rest of the body,

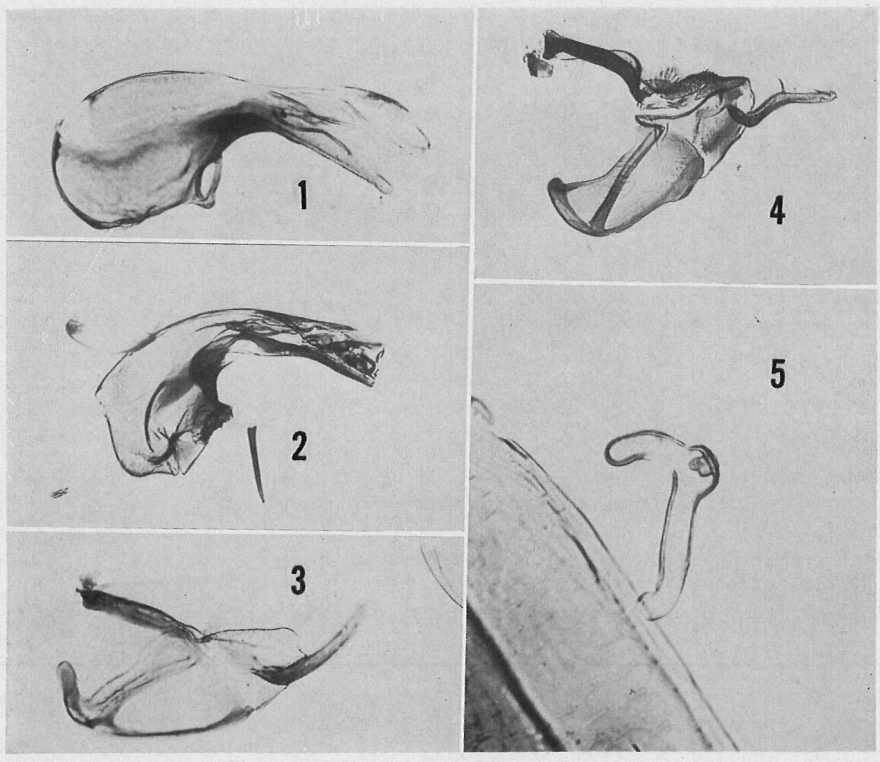

Fig. 1-5. *Pseudoperinthus regularis:* 1, Median lobe of ♂ genitalia; 3, lateral lobe of ♂ genitalia; 5, spermatheca. *Austrointhus papuanus:* 2, Median lobe of ♂ genitalia; 4, lateral lobe of ♂ genitalia.

appendages a little lighter than the rest of the body. Dorsal surface of head, pronotum, elytra, and abdominal tergites with an even covering of fine yellow short setae. Pronotum with 4 setae at each lateral edge, otherwise without additional fine yellow setae. Macrochaetotaxy of abdominal tergites II-VIII as follows: 0, 6, 6, 6, 6, 6, 6. Male genitalia shaped as in Fig. 5.

Measurements: Pronotum length, 0.31; elytra length, 0.22-0.23. Number measured, 2.

Holotype ♂ (No. 13958), Sarawak, 1°38′ N, 113°35′ E, 230 m, 3.III.1963, Carton nest 90' from ground, Coll. Alfred and Eleanor Emerson. In the collection of D. H. Kistner. Paratype: 1 ♀, same data as holotype (DK).

Notes: The host termites were determined to be *Nasutitermes regularis* (Haviland) by Emerson, specimens of which are in the Emerson Collection of the American Museum of Natural History.

Tribe TERMITONANNINI

Subtribe PERINTHINA

Genus **Lauella** Mann

Lauella Mann 1921: 54; Seevers 1957: 177, key to species, 27, convergent evolution, 45, phylogeny, 46, zoogeography; Kistner 1969: 541, Fig. 9, phylogenetic relationships; Kistner 1970d: 493, redescription, 494, key to species.

Since the genus was recently redescribed and no new characters have been discovered to change the description, this will not be redone here. The meso- and metanotum are illustrated here for the first time (Fig. 15). However, so many new species have been discovered that a new key to species is provided.

KEY TO SPECIES OF THE GENUS LAUELLA

1. Head, pronotum, and elytra smooth and shiny nearly devoid of punctation and fine setae; pronotum with 8 marginal setae on each lateral border; with *Nasutitermes olidus* (Hill) ..... **vitiensis**
   Head, pronotum, and elytra with a dense covering of very fine short setae; pronotum with less than 8 marginal setae on each lateral border 2
2 (1). Lateral border of pronotum with 5 marginal setae (Fig. 8); with *N.* sp. IV (Emerson) ..... **gigantea**
   Lateral border of pronotum with 3 or 4 marginal setae 3
3 (2). Lateral border of pronotum with 3 marginal setae (Fig. 10 or 12) 4
   Lateral border of pronotum with 4 marginal setae (Fig. 6, 7, 9, or 11) 6
4 (3). Anterior border of pronotum without long setae (Fig. 10) 5
   Anterior border of pronotum with 6 long setae (Fig. 12); with *N. orientis* Snyder ..... **snyderi**
5 (4). Disc of pronotum with 6 long setae (Fig. 10); with *N. gracili rostris* (Desneux) ..... **minuta**
   Disc of pronotum without long setae, with *N. graveolus* (Hill) ..... **australiensis** Kistner (for description see Kistner 1970: 496)
6 (3). Lateral border of elytra with 3 long setae; with *N. brevirostris* (Oshima) ..... **palauensis**
   Lateral border of elytra with 5 long setae 7
7 (6). Pronotal disc with 12 setae (Fig. 6); with *N.* sp. II (Emerson) ..... **aenigma**
   Pronotal dlsc with more than 12 setae 8
8 (7). Pronotal disc with 14 setae (Fig. 9); with *N. corporaali* (Wasmann) ..... **javana**
   Pronotal disc with 22 setae (Fig. 7); with *N.* sp. IV (Emerson) ..... **alomai**

Lauella aenigma Kistner, new species Fig. 6, 17.

Distinguished from *L. palauensis* to which it is most closely related by the chaetotaxy of the pronotum and elytra, and the shape of the spermatheca.

Color reddish brown throughout, appendages somewhat lighter. Dorsal surface of the head, pronotum, and elytra smooth and shiny with an even vestiture of extremely fine yellow setae. Anterior border of pronotum with a double sinuate shape. Posterior border of elytra with a sinuate shape and a very slight indentation somewhat inward from the lateral edge. Head with no large setae. Each lateral border of pronotum with 4 long black setae. Anterior border of pronotum with a row of 6 macrosetae. Disc with 12 macrosetae arranged as in Fig. 6. Lateral

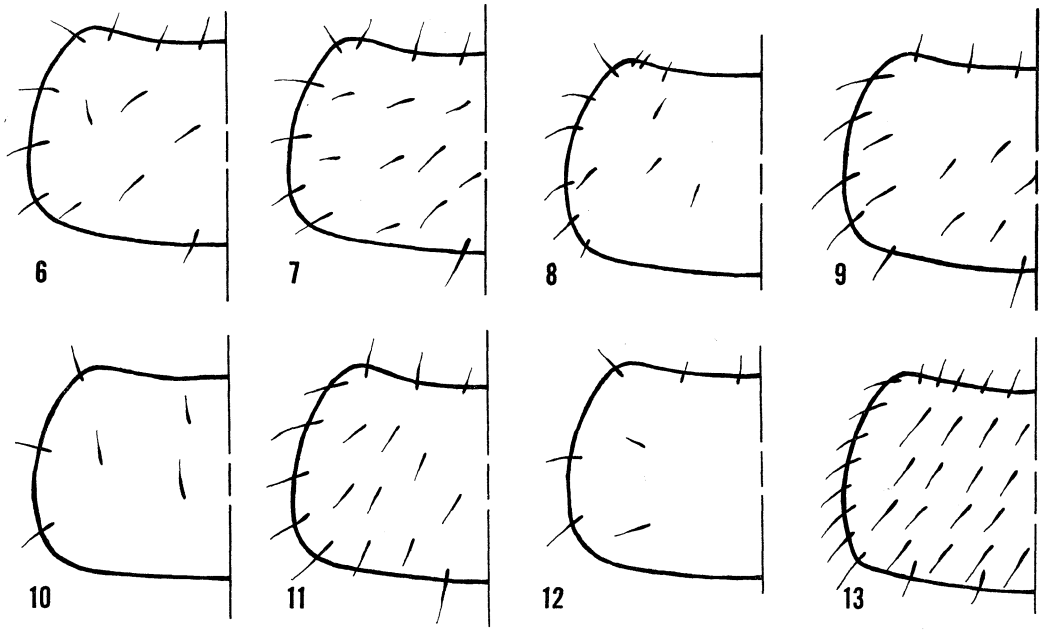

Fig. 6-13. Pronota: 6, *Lauella aenigma*; 7, *L. alomai*; 8, *L. gigantea*; 9, *L. javana*; 10, *L. minuta*; 11, *L. palauensis*; 12, *L. snyderi*; 13, *L. vitiensis*.

borders of elytra with 2 macrochaetae, disc with 1 macrochaeta. Macrochaetotaxy of abdominal tergites II-VIII as follows: 0, 4, 4, 4, 4, 4, 4-4. All sternites with an apical row of black setae. Outer paratergites with 1 macrochaeta each. Male genitalia too thin and membranous to be of significance as a species character. Spermatheca shaped as in Fig. 17.

Measurements: Pronotum length, 0.37; elytra length, 0.22-0.23. Number measured, 2.

Holotype ♀ (No. 13949), New Guinea, 33 km SW Lae, 29.XII.1962, in wet log in Sago Forest, Coll. A. Emerson. In the collection of D. H. Kistner. Paratype : 1, New Guinea, 20 km ENE Lae, 20.XII.1962, ex nest in dead branch on forest floor, Coll. P. Aloma and A. Emerson (DK).

Notes: Both colonies of termites were determined to be *Nasutitermes* sp. II by Emerson (1970), specimens of which are in the Emerson collection of the American Museum of Natural History, New York.

Lauella alomai Kistner, new species Fig. 7, 20, 22.

Related to *L. palauensis* and *L. javana* from which it is distinguished by the chaetotaxy of the pronotum, its slightly smaller size, and the slightly different shape of the female spermatheca and median lobe of the male genitalia.

Color reddish brown throughout with the elytra somewhat darker than the rest of the body. Dorsal surface of the head, pronotum and elytra smooth and shiny with an even but sparse vestiture of extremely fine yellow setae. Anterior border of the pronotum sinuate in shape. Posterior border of elytra slightly indented near the lateral border. Head without major

macrosetae. Pronotum with a row of 6 setae along the anterior border and a row of 4 setae along each lateral border. Disc with the following rows counting from the middle and eliminating rows of setae on the lateral and anterior borders: 3, 2, 3, 3 (as in Fig. 7). Macrochaetotaxy of elytra with 2 macrosetae on the lateral border and 3 in a line across the anterior half of the disc. Macrochaetotaxy of abdominal tergites II-VIII as follows: 0, 4, 4, 4, 4, 4, 4-4. Each sternite with an apical row of black macrosetae. Outer paratergites each with one macroseta. Median lobe of male genitalia shaped as in Fig. 20. Female spermatheca shaped as in Fig. 22.

Measurements: Pronotum length, 0.30-0.34; elytra length, 0.25-0.28. Number measured, 10.

Holotype ♀ (No. 14107), New Guinea, 20 km S Lae, 6.XII.1962, Coll. P. Aloma, Alfred and Eleanor Emerson, ex wood carton nest on top of stump in forest. In the collection of D. H. Kistner. Paratypes: 23, same data as holotype (DK); 1, New Guinea, 22 km ENE Lae, 20.XII.1962, ex nest in dead branch on forest floor, Coll. P. Aloma and A. Emerson (DK).

Notes: The specimens host colony was determined to be *Nasutitermes* sp. IV by A. Emerson 1970, while the single specimen came from a nest of *Nasutitermes* sp. II. Specimens of both are in the Emerson collection of the American Museum of Natural History, New York.

Lauella gigantea Kistner, new species Fig. 8, 14.

Distinguished from all other species of *Lauella* including *L. vitiensis* to which it is most closely related, by its slenderer procoxae, the thicker flanges on the tibiae, as well as the shape of the spermatheca. This might form the basis of a new genus sometime in the future when more material is available but now it appears to be an aberrant species of the genus *Lauella.*

Color reddish brown throughout, appendages somewhat lighter. Dorsal surface of the head, pronotum, and elytra smooth and shiny with an even vestiture of extremely fine yellow setae. Anterior border of pronotum with a double sinuate shape. Posterior border of elytra sinuate in shape and with a very slight indentation slightly inward from the lateral border. Head with no large black setae. Each lateral border of pronotum with 5 large setae, and 3 smaller ones, 1 very close to the anterior border and 2 very close to the posterior border. Anterior border with a few, 3 on each side, of very short setae. Disc with 8 setae arranged as in Fig. 8. Lateral borders of elytra with 2 macrochaetae with 1 other short setae. Disc with 4 or 5 very short black setae. Macrochaetotaxy of abdominal tergites II-VIII: 2, 4, 4, 4, 4, 4, 4-6. All sternites with an apical row of small black setae. Sternites III and IV with miscellaneous black setae scattered over the rest of the sternite. Outer paratergites with 1 macroseta each. Male genitalia unknown. Spermatheca shaped as in Fig. 1.

Measurements: Pronotum length, 0.48; elytra length, 0.39. Number measured, 1.

Holotype ♀ (No. 13808), New Guinea, 20 km S Lae, 6.XII.1962. Coll. P. Aloma, Alfred and Eleanor Emerson. In the collection of D. H. Kistner.

Notes: The host termite was determined to be *Nasutitermes* sp. IV by A. Emerson 1970, specimens of which are in the Emerson collection of the American Museum of Natural History, New York.

Lauella javana Seevers Fig. 9.

Lauella javana Seevers 1957: 178, Java, Tjigembong, Preanger, with *Nasutitermes corporaali* (Wasmann). — Kistner 1970: 496, key to species.

Most closely related *L. alomai* and *L. paluensis* from which it is distinguished by the chaetotaxy of the pronotum.

Color reddish brown throughout with the head and elytra somewhat darker than the rest of the body. Dorsal surface of the head, pronotum, elytra, and abdominal tergites smooth and shiny with no unusual sculpture. Dorsal surface with an even vestiture of extremely fine yellow setae. Anterior border of pronotum arched with 6 setae. Lateral border of pronotum with 4 setae. Posterior border of pronotum with a double sinuate shape. Posterior border of elytra with a sinuate shape and a very slight indentation inward from the lateral edge. Head with no large black setae. Each lateral border of pronotum with 2 long setae. Disc of elytra with 3 setae in a row across the anterior 1/3. Disc of pronotum with longitudinal rows of 1, 2, 2, 2, 3 setae beginning with the median row and excluding setae of anterior and lateral margins and counting laterally, as in Fig. 9. Elytra with 2 macrosetae on the lateral border. Macrochaetotaxy of abdominal tergites II-VIII as follows: 0, 4, 4, 4, 4, 4, 4-4. Sternites with an apical row of macrosetae. Male genitalia and female spermatheca unknown.

Measurements: Pronotum length, 0.46; elytra length, 0.26. Number measured, 1.

MATERIAL EXAMINED: Only the type series (NHM, FMNH).

Lauella minuta Kistner, new species Fig. 10, 16.

Distinguished from all other species, including *L. snyderi*, to which it is most closely related by its chaetotaxy and the shape of the spermatheca.

Color reddish brown throughout, appendages somewhat lighter. Dorsal surface of head, pronotum, and elytra smooth and shiny, with an even vestiture of extremely fine yellow setae. Anterior border of pronotum with a double sinuate shape. Posterior border of elytra with a sinuate shape and a very slight indentation slightly inward from the lateral edge. Head with no large black setae. Each lateral border of pronotum with 3 black setae. Anterior border of pronotum with no black setae. Disc with 6 black setae, arranged as in Fig. 10. Lateral border of elytra with 1 macrochaeta, disc with 2 macrochaetae. Macrochaetotaxy of abdominal tergites II-VIII as follows: 2, 4, 4, 4, 4, 4, 4-4. Sternites each with an apical row of macrosetae. Outer paratergites each with 1 macrochaeta. Spermatheca shaped as in Fig. 16. Male genitalia too small and membranous to be of species significance.

Measurements: Pronotum length, 0.30-0.32; elytra length, 0.22-0.25. Number measured, 3.

Holotype ♀ (No. 14108), New Guinea, 22 km ENE Lae, 19.XII.1962, Coll. A. Emerson, with foraging soldiers and workers. In the collection of D. H. Kistner. Paratypes: 1 ♂, 1 ♀, same data as holotype (DK).

Notes: The host termites were determined to be *Nasutitermes gracilirostris* (Desneux) by A. Emerson and are in the Emerson Collection of the American Museum of Natural History, New York.

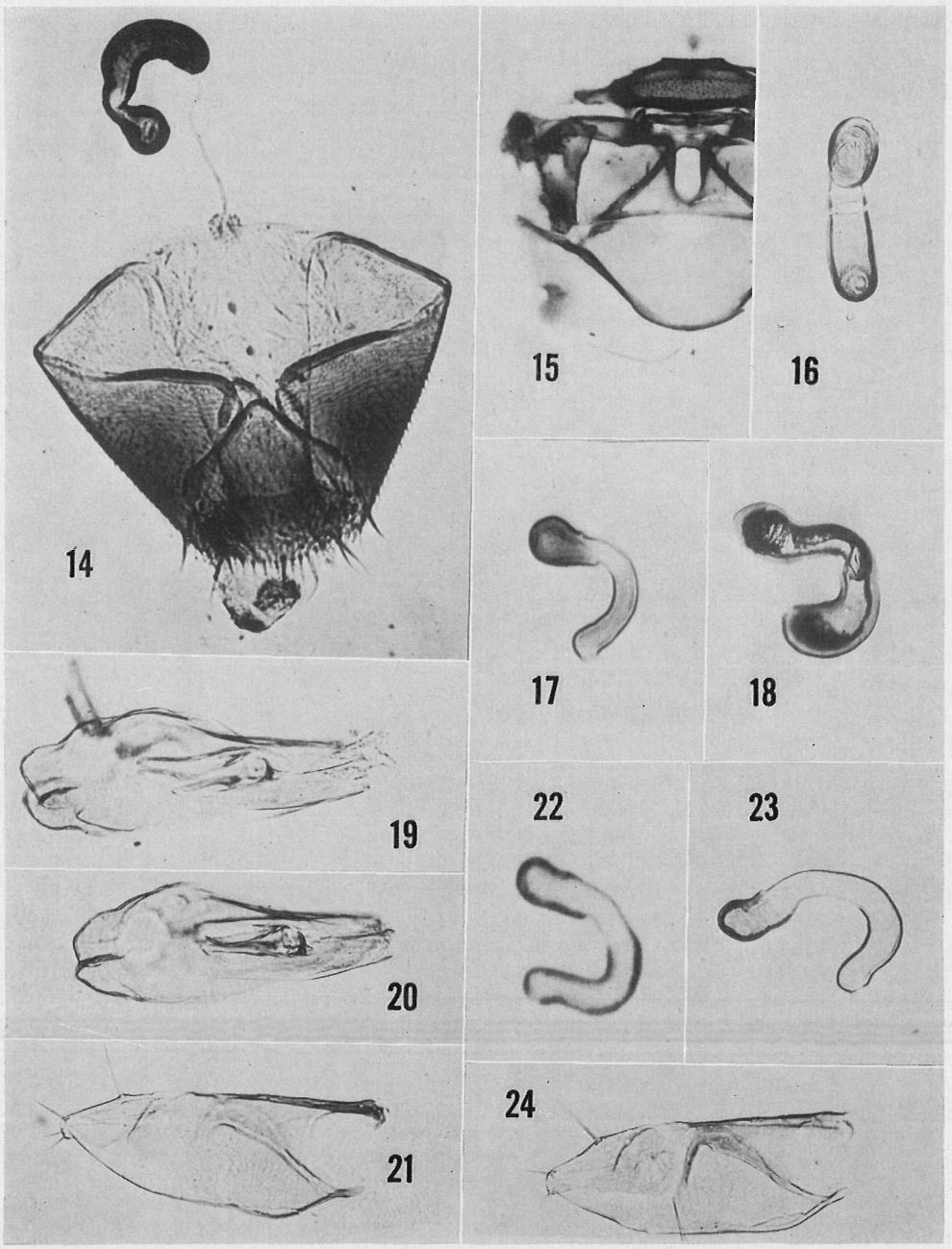

Fig. 14–24. *Lauella gigantea:* 14, abdominal segment IX and spermatheca. *L. palauensis:* 15, meso- and metanotum; 19, median lobe of ♂ genitalia, ventral view; 21, lateral lobe of ♂ genitalia; 23, spermatheca. *L. alomai:* 20, median lobe of ♂ genitalia, ventral view; 22, spermatheca; 24, lateral lobe of ♂ genitalia. *L. aenigma:* 17, spermatheca. *L. minuta:* 16, spermatheca. *L. snyderi:* 18, spermatheca.

Lauella palauensis Seevers Fig. 11, 15, 19, 21, 23.

Lauella palauensis Seevers 1957: 178, fig. 27c, Micronesia, Palau Islands, Garakayo Isld., with *Nasutitermes breriovstris* (Oshima). — Kistner 1970: 495 (key to species).

Most closely related to *L. javana* and *L. alomai* from which it is distinguished by the chaetotaxy of the pronotum and elytra and the shape of the spermatheca.

Color reddish brown throughout with the head and elytra somewhat darker than the rest of the body. Dorsal surface of the head, pronotum, elytra, and abdominal tergites smooth and shiny with no unusual sculpture. Dorsal surface with an even vestiture of extremely fine yellow setae. Anterior border of the pronotum arched with 6 setae. Posterior border of pronotum with a sinuate shape. Posterior border of elytra with a sinuate shape and a very slight indentation inward from the lateral edge. Head with no large black setae. Each lateral border of pronotum with 4 long setae. Disc with longitudinal rows of 2, 2, 3, and 3 setae beginning with the median row and excluding setae of anterior and lateral margins and counting to the side, as in Fig. 11. Elytra with 3 macrosetae on the lateral border, and a row of 3 in a row on the anterior half of the disc. Macrochaetotaxy of abdominal tergites II-VIII as follows: 0, 4, 4, 4, 4, 4, 4-4. Sternites with an apical row of macrosetae. Male genitalia shaped as in Fig. 19 & 21. Female spermatheca shaped as in Fig. 23.

Measurements: Pronotum length, 0.38-0.40; elytra length 0.29-0.31. Number measured, 10.

MATERIAL EXAMINED: The type series (FMNH, DK); 2, New Guinea, 22 km W Lae, 10.XII.1962, Coll. P. Aloma, Alfred and Eleanor Emerson (DK); 1, New Guinea, Botanic Garden nr. Lae, 22.XI.1962, Coll. A. Emerson, vial no. 2 (DK); 19, same locality, date, and collector, vial no. 1 (DK); 23, same locality, Coll. Alfred and Eleanor Emerson, and P. Aloma, 31.XI.1962 (DK); 1, New Guinea, 28 km WNW Lae, 15 XII.1962, Coll. P. Aloma, Alfred and Eleanor Emerson, vial no. 6 (DK).

Notes: Most of the host termites including those of the type series were determined as *Nasutitermes brevirostris* (Oshima) by Emerson, specimens of which are in the Emerson collection of the American Museum of Natural History, New York. The last cited specimen came from a colony *Nasutitermes* sp. III also determined by Emerson and in the same collection. The above records constitute a large extension of range of the species.

Lauella snyderi Kistner, new species Fig. 12, 18.

Most closely related to *L. australiensis* from which it is distinguished by the chaetotaxy of the pronotum and elytra and the shape of the spermatheca.

Color reddish brown throughout, appendages somewhat lighter. Dorsal surface of head, pronotum, and elytra smooth and shiny, with an even vestiture of extremely fine yellow setae. Anterior border with double sinuate shape. Posterior border of elytra with a sinuate shape and a very slight indentation slightly inward from the lateral edge. Head with no large black setae. Each lateral border of pronotum with 3 long setae, anterior border with 6 setae counting 1 of the lateral setae which is near the anterior border. Disc with 2 setae distributed as in Fig. 12. Lateral border of each elytron with one macroseta, disc without any macrosetae. Macrochaetotaxy of abdominal tergites II-VIII as follows: 0, 4, 4, 4, 4, 4, 4-6. All sternites with an apical row of black setae. Outer paratergites each with 1 macrochaeta. Male genitalia unknown. Spermatheca shaped as in Fig. 18.

Measurements: Pronotum length, 0.29; elytra length, 0.23. Number measured, 1.

Holotype ♀ (No. 13954), New Guinea, 15 km N Lae, 1.XII.1962, ex dead log with King, Queen, soldiers, workers, and eggs, Coll. Alfred and Eleanor Emerson. In the collection of D. H. Kistner.

Notes: The host termites were determined to be *Nasutitermes orientis* Snyder by Emerson 1970. The species is named after the late Dr Thomas E. Snyder, an eminent colleague who described the host species of termite.

Lauella vitiensis Mann Fig. 13.

Lauella vitiensis Mann 1921: 54, Fiji Islands, Vunisea, Kadavu, Host, *Nasutitermes olidus* (Hill). — Seevers 1957: 177. — Kistner 1970d: 494, key, distribution.

Hetairotermes leai Cameron 1927: 269, Fiji Islands, Taveuni, with a termite; synonymized by Seevers 1957: 177.

Most closely related to *L. gigantea* from which it is distinguished by the chaetotaxy of the pronotum and elytra.

Color dark reddish brown throughout with the appendages somewhat lighter than the rest of the body. Dorsal surface of the head, pronotum, elytra, and abdominal tergites smooth and shiny with no unusual sculpture. Dorsal surface of the head, pronotum, and elytra with only a rare trace of fine yellow setae, extremely sparsely distributed. Anterior border of the pronotum arched with 10 setae. Lateral border of pronotum with 8 setae. Posterior border of pronotum with a double sinuate shape. Posterior border of elytra with a sinuate shape and a very slight indentation inward from the lateral edge. Head with no large black setae. Posterior border of pronotum with 4 black, long setae. Disc with longitudinal rows of approximately 4, 4, 4, 4, setae beginning with the median row and excluding setae of anterior and lateral margins counting to the sides, as in Fig. 13. Elytra with 7 long setae on the lateral border and 4 rows of approximately 3 setae each covering the disc of the elytra. Macrochaetotaxy of abdominal tergites II-VIII as follows: 6, 4, 4, 4, 4, 4, 4. Sternites with an apical row of macrosetae. Male genitalia and female spermatheca unknown.

Measurements: Pronotum length, 0.60; elytra length, 0.38. Number measured, 1.

MATERIAL EXAMINED: 1, Fiji, Suva, 14.III.1929, 15 km on Main Rd past Colo. Rd., Coll. K. P. Schmidt (FMNH); 1, Cotype, *Hetairotermes leai* Cannon, Fiji, Taveuni, Coll. A. M. Lea (BMNH).

Genus **Paralauella** Kistner, new genus

A highly distinctive genus that is slightly physogastric and in which the limuloid shape has been lost secondarily. Easily distinguished from *Lauella* by its more elongate shape. Closely related also to *Termitonicus* Mann from which it is distinguished by its subquadrate pronotum as well as the shape of the abdomen.

Overall shape as in Fig. 25. Head capsule wider than long, with no nuchal ridge nor any neck. Antennae inserted between the eyes very near to anterior tentorial pits. Gula of normal length with the sides diverging slightly from anterior to posterior. Gula, submentum, and mentum all fused together. Eyes present, rounded in shape, with facets directed both anteriorly and laterally, nonsetose. Antennae 11-segmented, as in Fig. 29; with 2 basiconic sensillae

on the terminal segment. Mandibles asymmetrical, shaped as in Fig. 26 and 27. Maxillae shaped as in Fig. 30; palpi 4-segmented. Maxillary acetabulae not margined. Labium shaped as in *Lauella;* palpi 3-segmented. Labrum shaped as in Fig. 28.

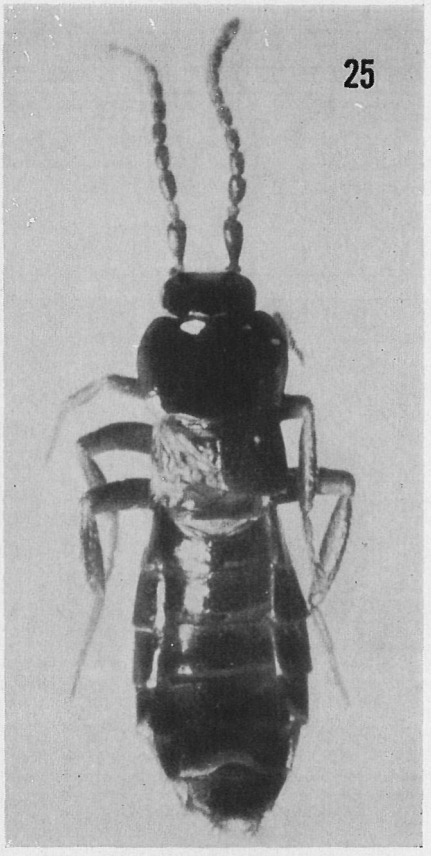

Fig. 25. *Paralauella manni,* dorsal view of entire beetle.

Pronotum wider than long, subquadrate, shaped as in Fig. 38. Posterior border of pronotum sinuate, disc with a deep impression in the anterior third. Hypomera of pronotum reflexed ventrally about 1/5 the width of the pronotum on each side. Prosternum evenly rounded between the legs with relatively short anterolateral articulation processes. Procoxal cavities closed behind by membrane containing straplike, sclerotized mesothoracic peritremes. Meso- and metanotum shaped as in Fig. 36. Mesosternum about 3/4 the length the metasternum, shaped as in Fig. 31, with a broad blunt process between the widely separated and distinctly margined mesocoxal acetabulae. Metasternum smooth with no unusual sculpture, shaped as in Fig. 31. Elytra shaped as in Fig. 40, lateral borders only slightly reflexed ventrally. Wings present and of normal size, with the usual staphylinid venation. Pro-, meso-, and metalegs shaped as in Fig. 33, 34, and 32, respectively; tarsal formula 4-4-4. Procoxae longer than femur of foreleg. Metacoxae subtriangular but elongate with the length much longer than the width.

Abdomen shaped as in Fig. 35, 36, and 39 with the membranes between the segments not broadly expanded but the segments themselves are widened. Segment I fused to the metanotum, shaped as in Fig. 36. Segment II represented by the tergite alone (Fig. 39). Segments III–VI with 1 tergite, 1 sternite, and 2 pairs of paratergites each. Segment VII with 1 tergite, 1 sternite, and 1 pair of paratergites. The dorsal rim of the abdomen occurs between the outer paratergites and the the sternites. Inner paratergites much wider than outer paratergites; up to 5 times as wide. Segment VII with a single median gland reservoir on the anterior border. Segment VIII represented by a tergite and sternite alone. Segment IX trivalved, shaped as in *Lauella.* Female spermatheca sclerotized, presumed variable by species. Male genitalia unknown.

Type-species: *Paralauella manni* n. sp., a description of which follows.

Paralauella manni Kistner, new species Fig. 25–40.

Since this genus is presently monobasic, the characters isolated as being specific are based on the study of other related genera.

Color reddish brown throughout with the head, pronotum, and elytra much darker in color than the abdomen and appendages. Dorsal surface of the head, pronotum, and elytra smooth and shiny, with an even but sparse vestiture of extremely fine yellow setae. Head without macrochaetae. Pronotum with a lateral row of 3 fine but black setae. Pronotum otherwise

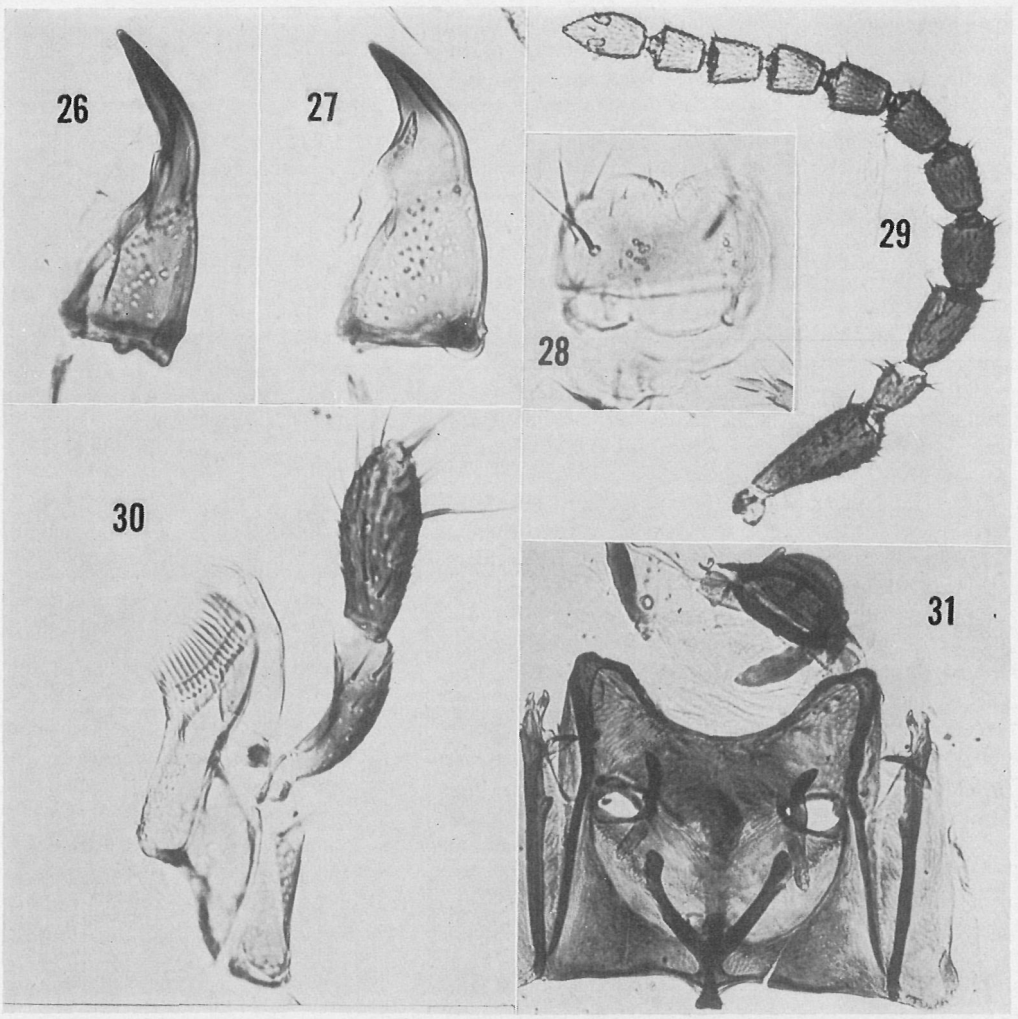

Fig. 26–31. *Paralauella manni:* 26, right mandible ; 27, left mandible ; 28, labrum ; 29, antenna ; 30, maxilla ; 31, meso- and metasternum.

without significant chaetotaxy. Elytra with about 3 or 4 very short but black setae in a line on the disc in the middle. Macrochaetotaxy of abdominal tergites II–VIII : 0, 4, 6, 6, 6, 4, 6. All sternites with an apical row of black setae. Outer paratergites with 1 macroseta each. Male genitalia unknown. Spermatheca shaped as in Fig. 37.

Measurements : Pronotum length, 0.39–.40 ; elytra length, 0.29–0.30. Number measured, 2.

Holotype ♀ (No. 14109), New Guinea, 20 km S Lae, 6.XII.1962, ex wood carton nest in top of stump in forest, Coll, P. Aloma, Alfred and Eleanor Emerson. In the collection of D. H. Kistner. Paratype : 1, same data as holotype (DK).

Notes : The host termites were determined to be *Nasutitermes* sp. IV by Emerson (1970), specimens of which are in the Emerson collection of the American Museum

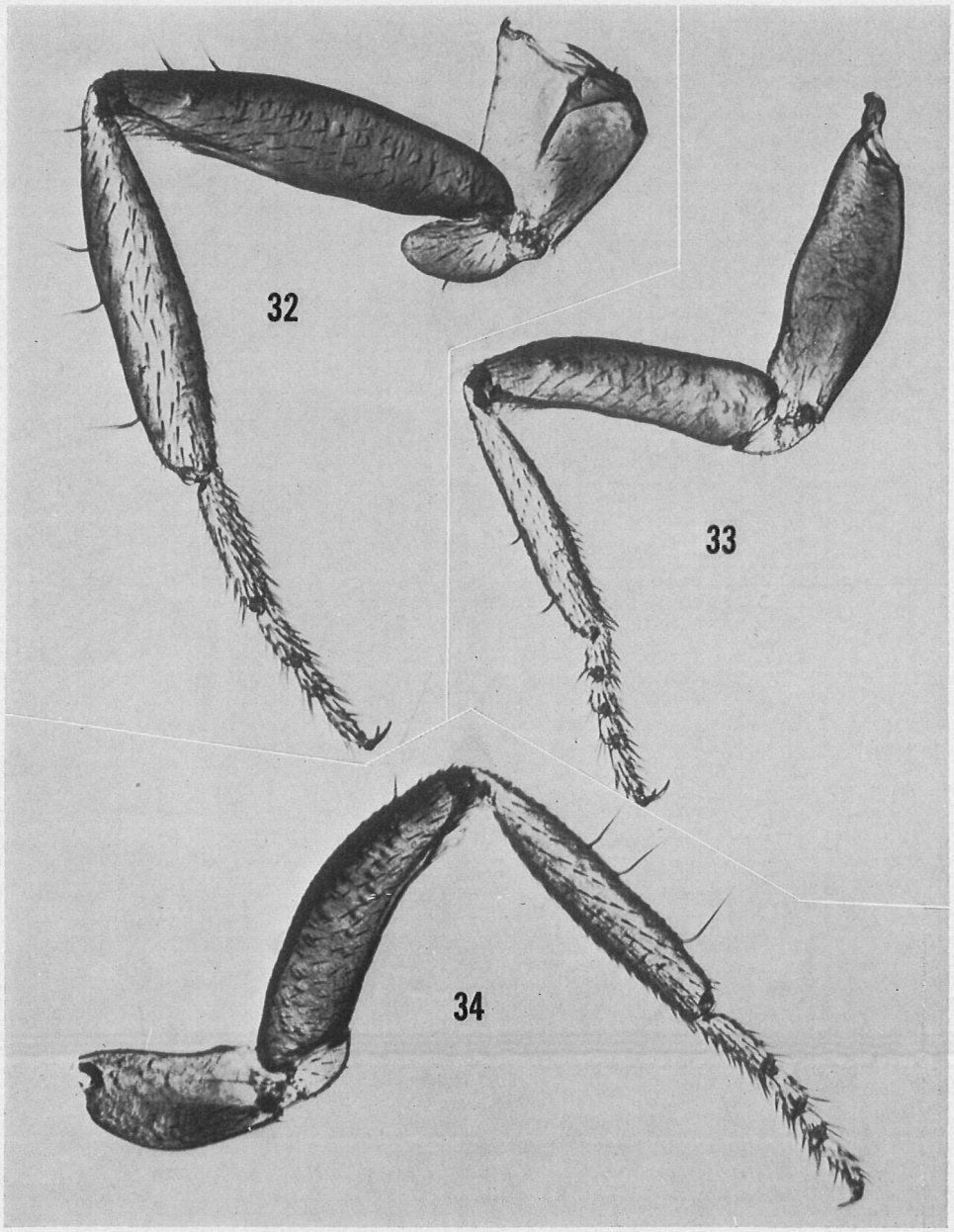

Fig. 32–34. *Paralauella manni :* 32, metaleg ; 33, proleg ; 34, mesoleg.

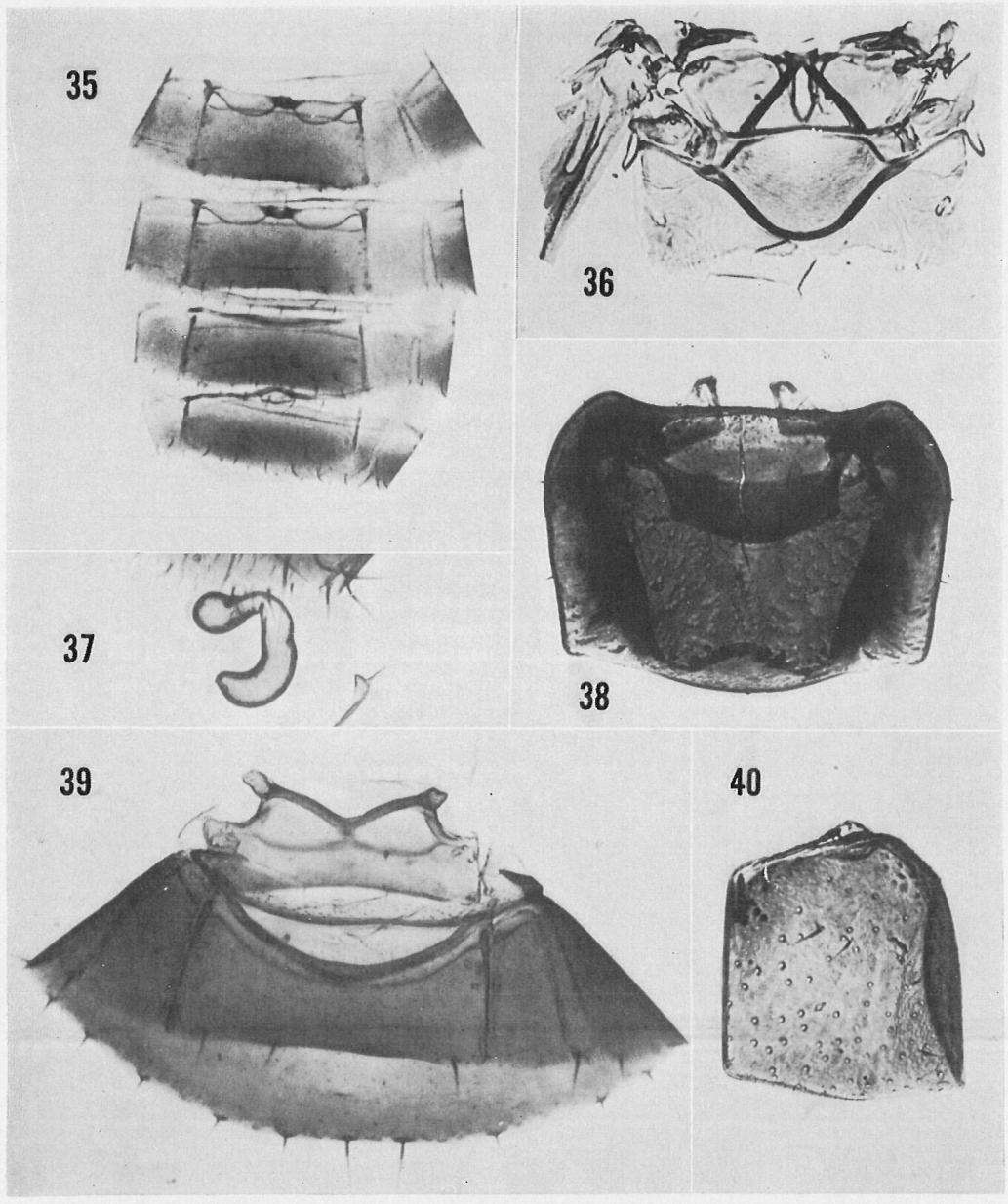

Fig. 35–40. *Paralauella manni:* 35, abdominal segments IV–VII ; 36, meso- and metanotum ; 37, spermatheca ; 38, pronotum and prosternum; 39, abdominal segments II & III ; 40, elytron.

of Natural History, New York. The species is named for the late Dr W. M. Mann.

Numerical Analyses

To examine the relationships of the species of *Lauella*, a list of unit characters was developed following the general outline of Sokal and Sneath (1963). This list of 32 characters is presented in Table 1. If a character was present, it was coded 1. If it was not present, it was coded 0. Since the setae occupy standard positions on the disc of the pronotum and elytra, a pronotal disc with 22 setae, i.e. *L. alomai*, was coded 1 in all setae count categories under 22. This might also have been done for the lateral borders of the pronotum but it was not as there were not many subdivisions of this character present. The results of coding the 32 characters for the 9 species are given in Table 2. These data were punched onto cards and then loaded into a CD 3150 computer to produce the simple matching coefficients described by Sokal & Michener (1958) and then to cluster the values using the weighted-pair group method described by Sokal and Sneath (1963). The original matrix values produced are presented in Table 3. These values represent the fraction of characters in common between the species.

Table 1. List of characters used for numerical analysis

1. Head & pronotum with an even vesti-ture of fine setae	14. Pronotal disc with 14 long setae
2. Lateral border of pronotum with 4 long setae	15. Pronotal disc with no long setae
3. Lateral border of pronotum with 5 long setae	16. Lateral border of elytra with 5 long setae
4. Lateral border of pronotum with 3 long setae	17. Lateral border of elytra with 3 long setae
5. Lateral border of pronotum with 8 long setae	18. Lateral border of elytra with 1 long setae
6. Anterior border of pronotum with 6 long setae	19. Elytral disc with 1 setae
7. Anterior border of pronotum with no long setae	20. Elytral disc with 3 setae
8. Pronotal disc with 12 long setae	21. Elytral disc with 4 or 5 setae
9. Pronotal disc with 22 long setae	22. Elytral disc with 2 setae
10. Pronotal disc with 8 long setae	23. Elytral disc with 0 setae
11. Pronotal disc with 6 long setae	24. Abdominal tergite II with 2 setae
12. Pronotal disc with 20 long setae	25. Abdominal tergite VIII with 2 rows of 4 and 6 setae respectively
13. Pronotal disc with 4 long setae	26. Length of pronotum 0.37-0.44
	27. Length of pronotum 0.29-0.34
	28. Length of pronotum 0.47-0.50
	29. Elytral length, 0.22-0.23
	30. Elytral length, 0.25-0.28
	31. Elytral length, 0.29-0.31
	32. Elytral length, 0.38-0.39

The results of cluster analysis are presented in Fig. 41. Matrix values are presented in that figure only where groupings join. Reference to the figure shows 3 rather distinct groupings. One group contains *L. alomai*, *javana*, *palauensis*, and *aenigma* (species numbers 1, 2, 5, and 7). Another group contains *L. snyderi*, *australiensis*, and *minuta* (species numbers 4, 6, and 9), while the third connecting group contains *L. vitiensis*, and *L. gigantea*. These relationships were predicted using traditional taxonomic criteria.

Table 2. Distribution of unit characters in the species of *Lauella*. Characters are arranged sequentially from left to right following the same order given in Table 1.

Species number	Species	Characters . . . 10 20 30
1	Lauella aenigma	11000101011010010010000001001000
2	L. alomai	11000101111111010011010000100100
3	L. gigantea	10100100011010010011110110010001
4	L. minuta	10010010001010001010010100101100
5	L. palauensis	11000101011111001011010001000010
6	L. snyderi	10010100000010000100001010101000
7	L. javana	11000101011011010011010000010100
8	L. vitiensis	00001001111111000011110000000001
9	L. australiensis	10010010000000110000001010010000

Table 3. Matrix of simple matchine coeficients of relationship for the species of *Lauella*. Species numbers are the same as in Table-2.

Species	2	3	4	5	6	7	8	9
1	.719	.625	.594	.750	.625	.781	.563	.531
2		.594	.563	.781	.469	.875	.719	.375
3			.531	.563	.500	.719	.625	.531
4				.531	.656	.563	.469	.563
5					.438	.781	.688	.344
6						.469	.375	.719
7							.656	.500
8								.344

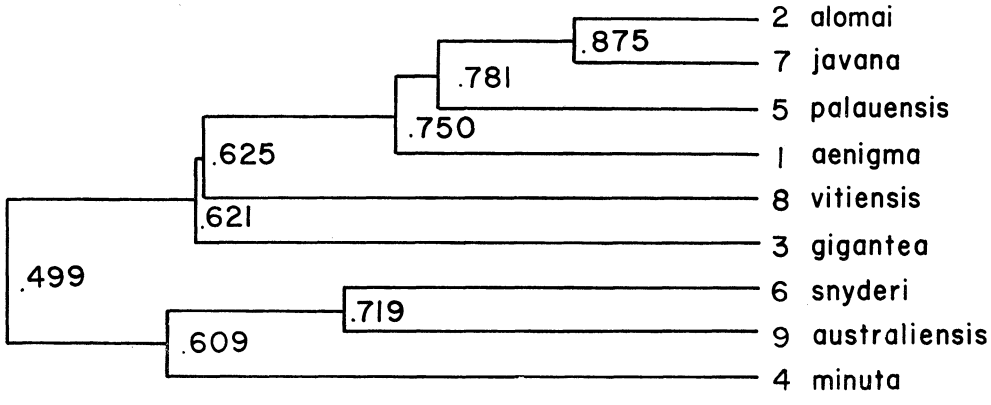

Fig. 41. Dendrogram of the species of the genus *Lauella*.

Host Relationships

A summary of the host relationships of species in this paper is given in Table 4. If the evolution of the termitophiles parallels the evolution of the termites, we should expect Emerson's *Nasutitermes* sp. I to be more closely related to Australian *Nasutitermes* than to *Nasutitermes* from the Oriental region where *Austrointhus* is replaced by *Pseudoperinthus* and *Malayinthus.*

Table 4. Summary of host relationships by termite host

Host Termite	Termitophile
Nasutitermes brevirostris (Oshima)	*Lauella palauensis*
N. corporaali (Wasmann)	*L. javana*
N. gracilirostris (Desneux)	*L. minuta*
N. graveolus (Hill)	*L. australiensis*
N. olidus (Hill)	*L. vitiensis*
N. orientis Snyder	*L. snyderi*
N. regularis (Haviland)	*Pseudoperinthus regularis*
N. sp. I (Emerson)	*Austrointhus papuanus*
N. sp. II (Emerson)	*L. aenigma*
	L. gigantea
	L. alomai (?)
N. sp. III (Emerson)	*L. palauensis* (?)
N. sp. IV (Emerson)	*L. alomai*
	Paralauella manni

Host specificity may not be so perfect in the genus *Lauella* as 2 species, *L. alomai* and *L. palauensis*, have been taken with 2 hosts each. However, each of the host records indicated by a question mark is based on 1 specimen so they are not as certain as I should like.

One would like to think *Nasutitermes graveolus* is more closely related to *N. orientis* and *N. gracilirostris* than to *N. brevirostris* and *N. corporaali* because of the relationships between the species of *Lauella* shown in Fig. 41. However, these relationships probably will not be ascertainable until after the Oriental *Nasutitermes* are revised so further speculations along these lines will be reserved for the termite experts.

The extension of the range of *Lauella palauensis* Seevers as well as its host *Nasutitermes brevirostris* to New Guinea is worthy of further comment. In a rapid perusal of the *Insects of Micronesia* series, very few Micronesia insects showed affinities with those of New Guinea. Of those few that did, the majority were from the Palau Islands. While the Palau Islands are the closest Micronesian Islands to New Guinea, they are still 400–500 miles from the nearest New Guinea coast and 1200–1400 miles from the vicinity of Lae where the species was taken. Since *Nasutitermes brevirostris* makes carton nests in trees, it is likely that a log with a carton nest on it was washed ashore in the Palau Island and the termites as well as the termitophiles were established in that way as there is no evidence that there was a land connection between the Palau Islands and New Guinea.

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