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Coptophysa and *Coptophysella*, two new genera of physogastric termitophilous staphylinids associated with *Coptotermes* in Papua New Guinea (Coleoptera : Staphylinidae) *

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Abstract

Two closely related new genera of highly physogastric termitophilous staphylinids associated with *Coptotermes* are described from Papua New Guinea : *Coptophysa* and *Coptophysella* (Aleocharinae, Termitohospitini, Hetairotermitina). By the extent and location of body areas affected by physogastry, they differ from the other physogastric genus of this group, *Coptoxenus* KISTNER, to a degree suggesting a convergent evolution.
Key words : Coleoptera, *Coptotermes*, termitophilous Staphylinidae, new genera, new species, Papua New Guinea.

Résumé

Deux nouveaux genres étroitement apparentés de staphylins termitophiles fortement physogastres associés à *Coptotermes* sont décrits de Papouasie-Nouvelle-Guinée : *Coptophysa* et *Coptophysella* (Aleocharinae, Termitohospitini, Hetairotermitina). Par l'étendue et la disposition des parties du corps affectées par la physogastrie, ils diffèrent à un point tel de l'autre genre physogastre de ce groupe, *Coptoxenus* KISTNER, que cela suggère une évolution convergente.
Mots-clés : Coleoptera, *Coptotermes*, Staphylinidae termitophiles, nouveaux genres, nouvelles espèces, Papouasie-Nouvelle-Guinée.

Introduction

The Oriental and Australian zoogeographic regions have thus far yielded two groups of termitophilous aleocharine staphylinids associated with *Coptotermes*. The subtribe Coptotermoeciina (tribe Athetini) is known from the Australian continent only (KISTNER and PASTEELS 1970, ABDEL-GALIL and KISTNER 1987). In the subtribe Hetairotermitina (tribe Termitohospitini), *Hetairotermes* CAMERON is known from Malaya, Singapore, Sarawak, the Palau Islands and Australia (KISTNER 1970, ABDEL-GALIL and KISTNER 1987); *Coptoxenus*, from Sabah (KISTNER 1976); *Sinophilus*, from southern China (KISTNER 1985). The fourth genus of this subtribe, *Termitobra* SEEVERS, from the Palau Islands, as well as two species of *Hetairotermes*, were found with Nasutitermitinae (SEEVERS 1957, KISTNER 1970). Up to now, *Coptoxenus* is the only described physogastric genus of this group. In this paper, we describe two new physogastric genera recently discovered as guests of *Coptotermes* in Papua New Guinea, and discuss their relationships.

Methods

The specimens were preserved in 70 % ethanol. For dissections, they were soaked in 5 % KOH until all the soft parts were dissolved (24-48h), then dissected and mounted on slides in Hoyer's medium. Measurements were taken on whole individuals.

Systematic account

COPTOPHYSA gen. nov.

Related to *Hetairotermes* CAMERON and *Coptoxenus* KISTNER by the structure of its mouthparts and tarsal formula. Distinguished from it by the development of physogastry. Overall shape as in Figs 1-2. Head prognathous, epicranium bluntly produced between deep antennal fossae. Antennae 11-segmented, with petioles visible between articles (Fig. 1). Eyes well developed; labrum and mandibles shaped as in Fig. 3D. Gula wide, fused to submentum. Mentum distinct from submentum. Labium shaped as in Fig. 3A. Labial palpi 2-segmented, conical, very elongated, article 2 about half the length of article 1. Maxillae long, lacinia and galea of approximately equal length. Maxillary palpi 4-segmented. First article short, triangular; article 2 fusiform, 3 ovoid, 4 short and thin.
Pronotum wider than long, narrowed posteriorly (Figs 1,4A). Small area of expanded membrane between pro- and mesothorax (Fig. 2). Meso- and metanota shaped as in Fig. 3J. Mesonotum about half the length of metanotum. Elytra trapezoidal, with outer angles rounded (Fig. 5A). Wings remaining as stubs. Legs shaped as in Fig 2. Tibial spurs, 2,2,1. Tarsal formula, 4,4,5.
Abdomen strongly physogastric (Figs 1-2). Segments I-II represented by tergite only. Tergite I fused to metanotum

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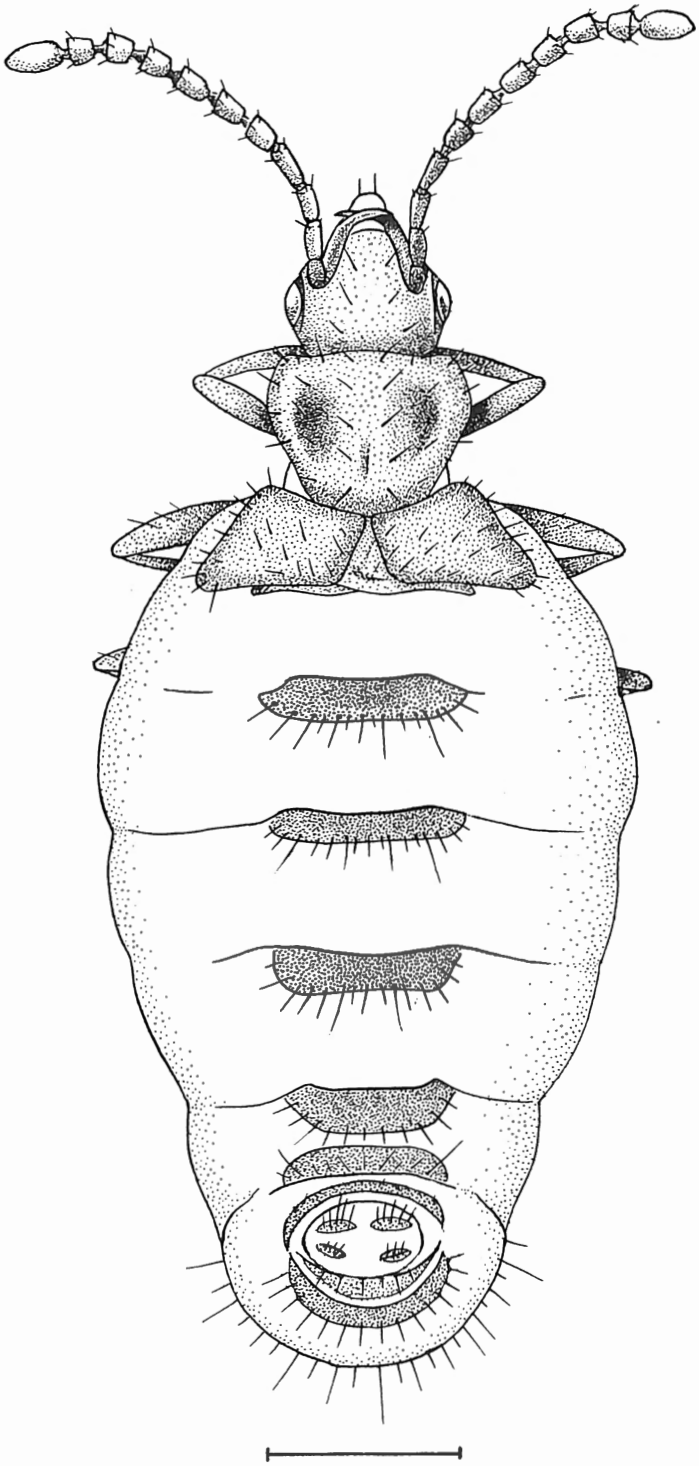


Fig. 1. Coptophysa obesa, *sp. n., dorsal view. - Scale bar = 0.5 mm.*

(Fig. 3J), thus different from *Coptoxenus*. Membraneous expansions between tergites I-V, to a lesser extent V-VI; between metasternum and sternite III, between sternites IV-VII; between tergites and sternites on segments III-VI. Paratergites attached to sternites : 2 pairs on segments III-VI, 1 on segment VII (Fig. 2). Median area of thickened cuticle along the anterior margin of tergite VII (Fig. 3K), at the site of the tergal gland complex (Pasteels 1968, Kistner 1970); posterior border of this tergite bearing a continuous, brush-like row of small setae. Areas of secondary sclerotization forming rounded expansions on the anterior corners of tergites II-VII (Fig. 3K), and narrow strips along the sides of sternites III-VII, including the paratergites. Segment VIII with tergite and sternite only. Segment IX trilobed (Fig. 3E); upper lobes bearing numerous setae, from base to apex, as in *Hetairotermes* (Kistner 1970).

This genus is presently monobasic and the type species, *Coptophysa obesa*, is described here. Characters used in the species description are those generally of diagnostic value in related genera.

Coptophysa obesa spec. nov.

Sclerites blackish-brown throughout. Pronotum bearing 28 major setae (Fig. 4A). Chaetotaxy of elytra as in Fig. 5A. Abdominal tergite I glabrous; tergites II-VI with a posterior row of 4 long setae; smaller setae along posterior edge of tergites II-IV; increasing numbers of small setae on posterior part of tergites V-VIII, longer ones on the posterior border of the latter. Numerous small hairs and 2-4 rows of larger setae on sternites III-VIII. Male genitalia shaped as in Figs 3L. Spermatheca as in Fig. 3G.

Measurements (in mm) : Head width, 0.45-0.47; pronotum width, 0.56-0.58; pronotum length, along median line, 0.34-0.40; elytra length, 0.52-0.54; total body length, 2.75-3.12. Number of individuals measured, 4.

Holotype : Sogeri, Central Province, Papua New Guinea (147°24'E, 9°25'S), 15 July 1984. Preserved in alcohol.

Paratypes : 6, same data as holotype : 2 completely, 2 partially on slides, the rest preserved in alcohol.

Beetles were collected from a dead liana still attached to the supporting tree, in a strip of rainforest amid savanna woodlands. They were running among workers and soldiers of a large *Coptotermes*, possibly *C. elisae* (Desneux).

All type specimens are in the collection of the Institut royal des Sciences Naturelles de Belgique (IRSNB), with a few specimens of host termites. The remaining host termites are in the authors' collection (reference No. PNGT740).

COPTOPHYSELLA gen. nov.

Closely related to *Coptophysa* by its mouthparts and development of physogastry. Distinguished from it by the position of the paratergites, reduced tarsi and distribution of setae on abdominal segment IX.

Overall shape as in Figs 6-7. Head prognathous, epicranium bluntly produced between deep antennal fossae. Antennae 11-segmented, with petioles visible between articles. Eyes well developed. Labrum and mandibles shaped as in Fig. 3C. Gula wide, fused to submentum. Mentum distinct from submentum. Labium shaped as in Fig. 3B. Labial palpi 2-segmented, conical, very elongated, article 2 about two-fifths the length of article 1. Maxillae long, lacinia and galea of approximately equal length. Maxillary

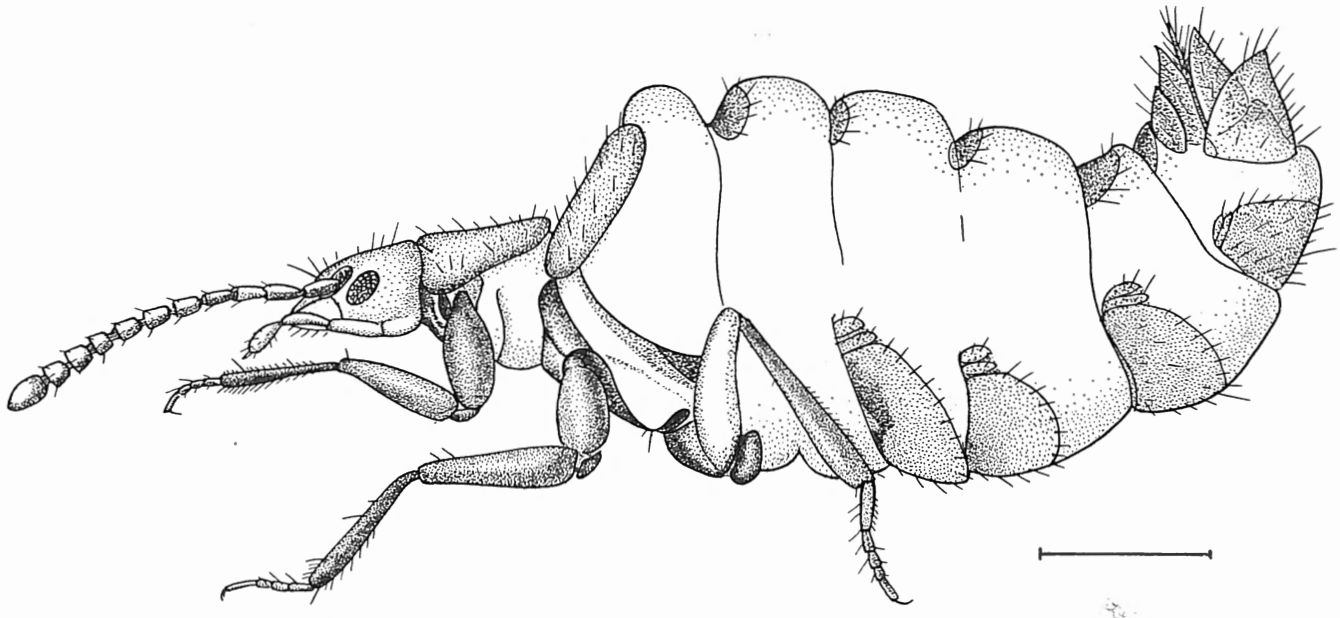


Fig. 2. Coptophysa obesa, *sp. n., lateral view. - Scale bar = 0.5 mm.*

palpi 4-segmented. First article short, triangular; article 2 fusiform, 3 ovoid, 4 short and thin.

Pronotum wider than long, rounded laterally and posteriorly (Figs 4B,6). Mesonotum about half the length of metanotum. Elytra with inner and outer margins almost parallel; outer posterior angle not rounded (Fig. 5B). Wings absent. Legs shaped as in Figs 7,8. Tibial spurs, 2,2,0. Tarsal formula, 2,2,4, with first article of median and hind tarsi constricted and bearing two rows of setae, as if formed by the fusion of two articles (Fig. 8).

Abdomen strongly physogastric (Figs 6-7). Segments I-II represented by tergite only. Tergite I fused to metanotum. Membraneous expansions between tergites I-VI, to a lesser extent VI-VII; between metasternum and sternite III, between sternites IV-VII; large expansions between tergites and sternites, from metathorax to abdominal segment VI. Two pairs of subequal paratergites isolated in the expanded membrane on segments III-VI (Fig. 7); inner paratergites reduced on segment VII. Median area of thickened cuticle along the anterior margin of segment VII, at the site of the tergal gland complex; posterior border of this tergite bearing a continuous, brush-like row of small setae. Areas of secondary sclerotization forming rounded expansions on the anterior corners of tergites II-VII. Segment VIII with tergite and sternite only. Segment IX trilobed (Fig. 3F); upper lobes bearing a terminal brush of setae, as in *Coptoxenus* (Kistner 1976).

This genus is presently monobasic and the type species, *Coptophysella pulposa*, is described here. Characters used in the species description are those generally of diagnostic value in related genera.

Coptophysella pulposa spec. nov.

Sclerites medium brown throughout. Chaetotaxy of pronotum and elytra as in Figs 4B, 5B. Abdominal tergite I glabrous. Numerous small hairs and 1 row of larger setae on tergites II-VIII and sternites III-VIII. A few large setae slightly in front of the posterior row on tergite VIII and sternites VII-VIII. Male genitalia shaped as in Figs 3M-N. Spermatheca as in Fig. 3H.

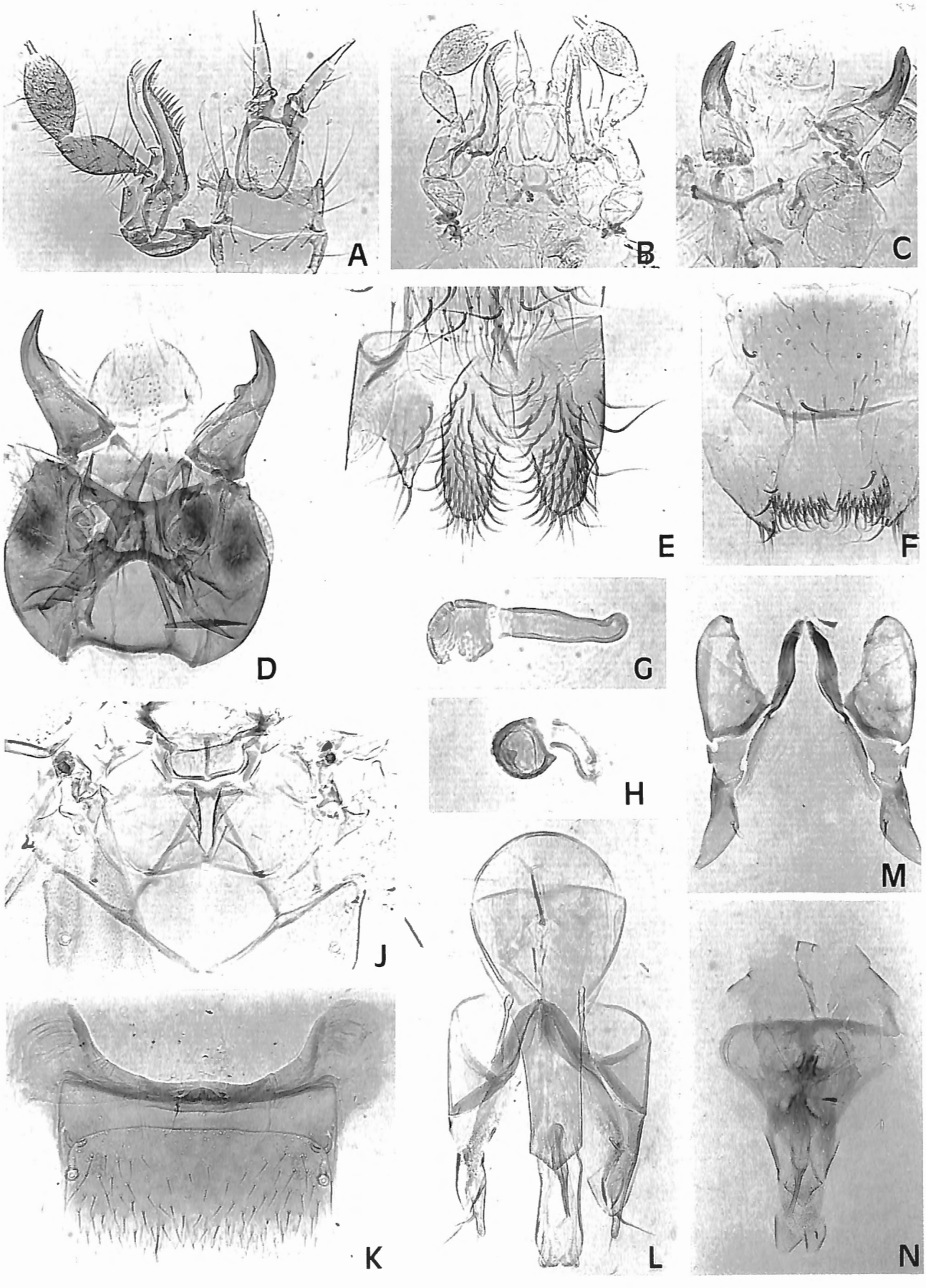
Measurements (in mm) : Head width, 0.39-0.40; pronotum width, 0.56-0.59; pronotum length, along median line, 0.34-0.36; elytra length, 0.40-0.43; total body length, 2.28-2.38. Number of individuals measured, 2.

Holotype : Hatzfeldhafen, 3 km on the road to Yoro, Madang Province, Papua New Guinea (145°13'E, 4°25'S), 25 August 1984. Specimen preserved in alcohol, legs of the right side on slide. Paratypes : 2, same data as holotype : 1 completely on slides, the other preserved in alcohol, its genitalia on slide.

Beetles were found walking among workers and soldiers of a small *Coptotermes*, possibly *C. pamuae* Snyder, in a log on the rainforest floor. Type specimens are in the collection of the IRSNB, with a few specimens of host termites. The remaining host termites are in the authors' collection (reference No. PNGT795).

Discussion

The entomofauna of New Guinea is of mixed zoogeographical origin : many taxa are of Oriental derivation, but some Australian elements are present, especially in the southern, savanna-covered part of the island (Gressitt, 1982). The discovery of *Coptotermes* guests related to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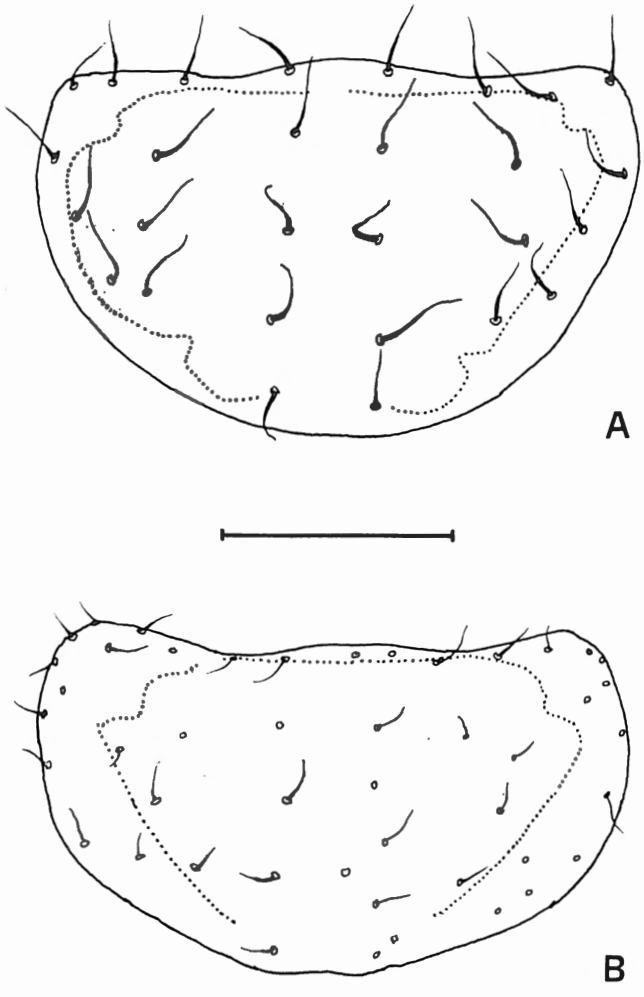

Fig. 4. *Pronota.* - A, Coptophysa obesa, *sp. n.;* B, Coptophysella pulposa, *sp. n. - Scale bar = 0.25 mm.*

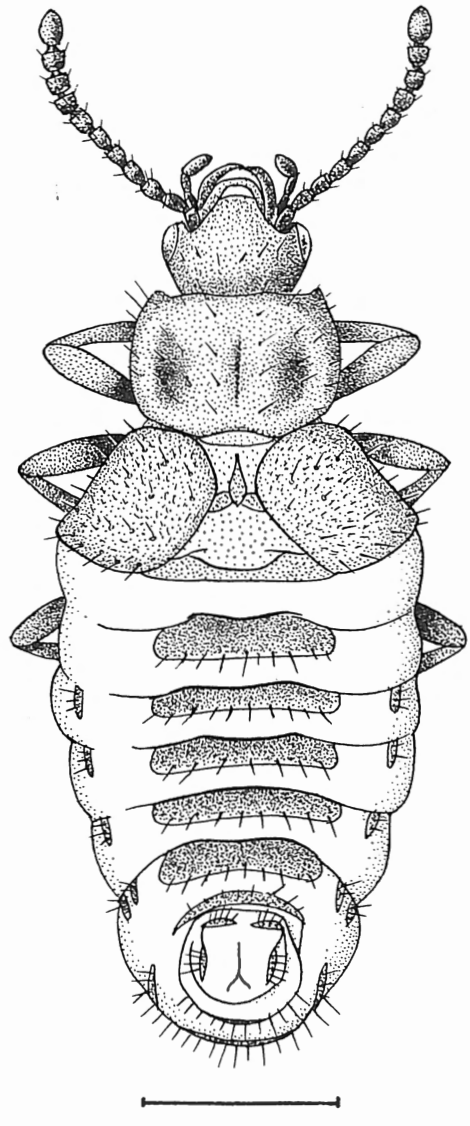

Fig. 6. Coptophysella pulposa, *sp. n., dorsal view. - Scale bar = 0.5 mm.*

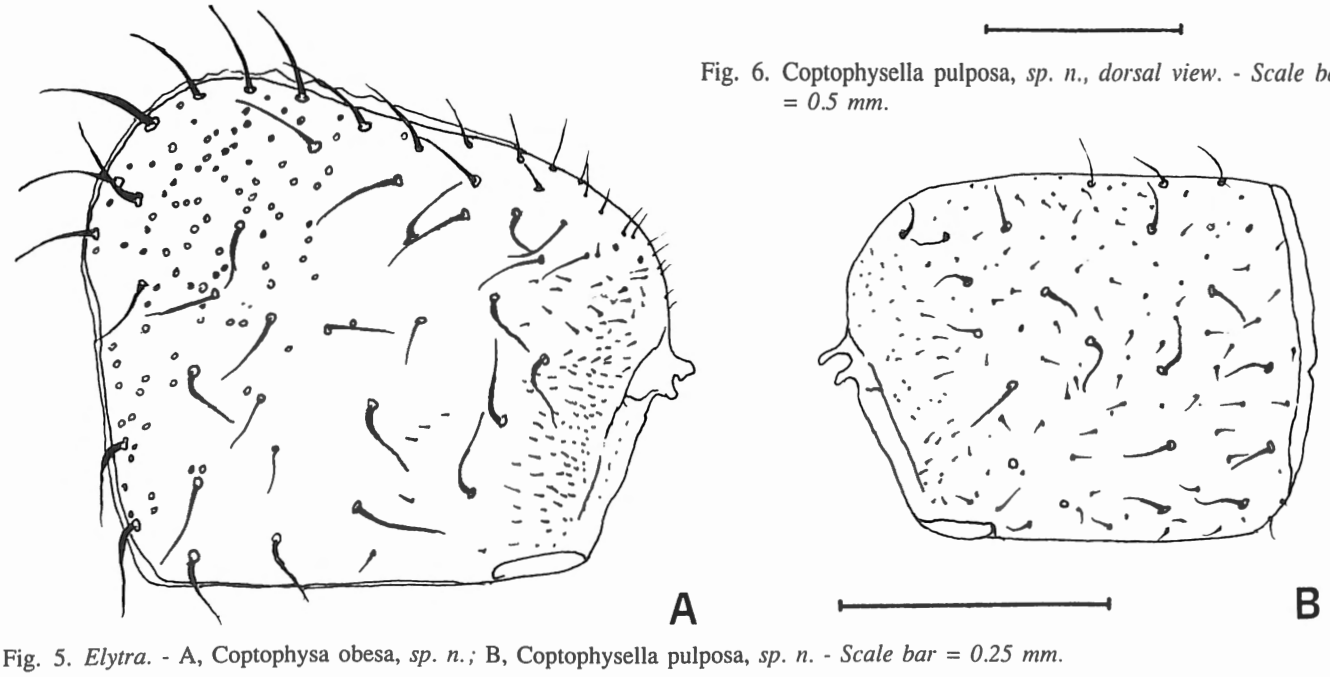

Fig. 5. *Elytra.* - A, Coptophysa obesa, *sp. n.;* B, Coptophysella pulposa, *sp. n. - Scale bar = 0.25 mm.*

◁ Fig. 3. Coptophysa obesa, *sp. n. :* A, *labium and maxilla;* D, *head capsule and labrum;* E, *abdominal segment IX;* G, *spermatheca;* J, *meso-, metanotum and abdominal tergite I;* K, *abdominal tergite VII;* L, *male genitalia.* - Coptophysella pulposa, *sp. n. :* B, *labium and maxillae;* C, *mandibles and labrum;* F, *abdominal segment IX;* H, *spermatheca;* M-N, *lateral and central lobes of male genitalia. - Scale :* A-F, J-N, *x 105;* G-H, *x 260.*

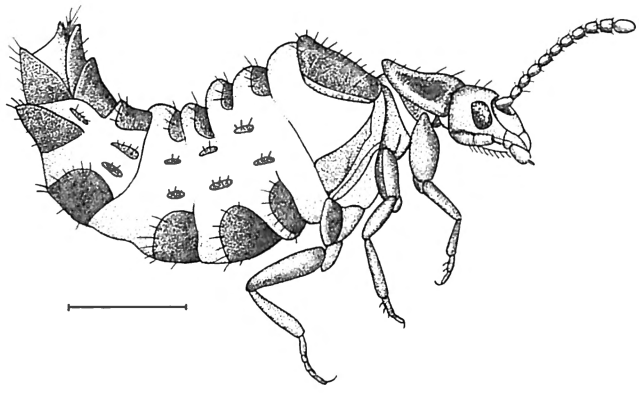

Fig. 7. Coptophysella pulposa, *sp. n., lateral view. - Scale bar = 0.5 mm.*

either the Hetairotermitina or Coptotermoeciina could thus be expected from Papua New Guinea.

Coptophysa obesa and *Coptophysella pulposa* are clearly related to *Hetairotermes* and *Coptoxenus* by the structure of their mouthparts. According to KISTNER's descriptions, the latter two genera possess 5-segmented maxillary and 3-segmented labial palps, but this difference does not appear from the illustrations (KISTNER 1970, Figs 2C, D, and 1976, Figs 2E, 3H). The tarsal formula is of lesser taxonomic value, since *Coptophysella*, obviously very close to *Coptophysa*, has reduced tarsi. Like *Coptoxenus* (KISTNER 1976), both new genera described here were found with workers and soldiers of *Coptotermes*. The distribution of the body areas affected by physogastry is very similar in these two genera, but markedly different in *Coptoxenus*. In the latter, membrane expansion occurs between metathorax and abdominal segments I-III. Such a difference suggests that the development of physogastry in the Hetairotermitina has occurred at least twice, once in *Coptoxenus* and once in *Coptophysa* and *Coptophysella*, by convergent evolution.

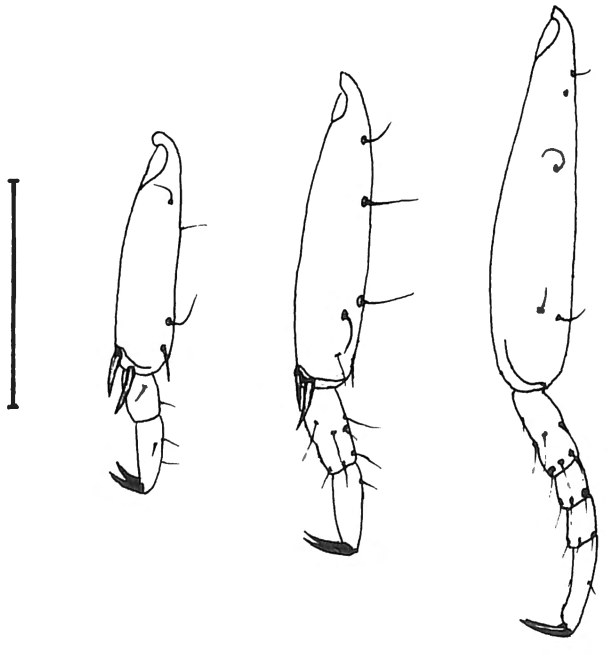

Fig. 8. Coptophysella pulposa, *sp. n. Pro-, meso- and metaleg : tibia and tarsus; smaller setae not represented. - Scale bar = 0.25 mm.*

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