

Plateremaeoid mites (Arachnida: Acarina: Cryptostigmata) from South Australian soils

Glenn S. Hunt¹ and David C. Lee^{2,3}

¹Division of Invertebrate Zoology, Australian Museum, P.O. Box A285, Sydney South, New South Wales 2000, Australia

²South Australian Museum, North Terrace, Adelaide, South Australia 5000, Australia

Abstract - The plateremaeoid genera *Pedrocortesella* Hammer (Pedrocortesellidae) and *Pheroliodes* Grandjean (Pherolioididae) are redescribed and *Acupedicellus* n. gen. (Pedrocortesellidae) is proposed. Five new species are described from South Australian soils: *Pedrocortesella semireticulata* sp. nov., *Pedrocortesella cryptoreticulata* sp. nov., *Acupedicellus cornutus* sp. nov., and *Pheroliodes copiosus* sp. nov. and *Pheroliodes robustus* sp. nov., the first records of the Pherolioididae from Australia. Keys are given for the six species of *Pedrocortesella* and two species of *Pheroliodes* in Australia.

INTRODUCTION

This is part of a study of plateremaeoid mites by one author (G.H.) and of the South Australian Cryptostigmata by the other (D.L.). The Plateremaeoidea Trägårdh, 1931 was first ranked as a superfamily by Paschoal (1989) after a considerable increase in the number of supraspecific taxa by the addition of five families and 11 genera (Paschoal 1987a; 1987b; 1989).

Only five nominal plateremaeoid species have been described from Australia: *Plateremaeus novemsetosus* Balogh and Balogh, 1983 from northern Queensland and four nominal species in *Pedrocortesella* Hammer, 1961 from eastern Australia described by P. Balogh (1985). The status of these latter species is currently being reassessed by one of us (G.H.) in light of Paschoal's (1987b) revisionary work, and the study of further Australian material and Hammer's (1966) New Zealand material.

This paper describes one new genus and three new species in the family Pedrocortesellidae, and two new species in the Pherolioididae, the first records for this family in Australia.

Our paper is dedicated to Dr Barbara York Main who has been the main driving force in promoting Australian arachnology during the last 40 years.

MATERIALS AND METHODS

Descriptions apply to adults only. The specimens were collected from four of the moister sites with natural vegetation out of a total of nine sites sampled in South Australia (Lee and Pajak, 1990).

A Cambridge Stereoscan 120 with Robinson Detector was used for SEM. The following abbreviations are used to indicate the present location of material: AM - Australian Museum, Sydney; ANIC - Australian National Insect Collection, Canberra; SAMA - South Australian Museum, Adelaide. Abbreviations: *ia*, *im*, *ip* = anterior, median and posterior fissura; *lp*, *h1*, *p1*, *p2*, *p3* = notogastral setae; *ro*, *le*, *in* = rostral, lamellar and interlamellar seta; *en* = enantiophysis (horn); *p* = pedotectal tooth; *ss* = sensillus. Measurements are in micrometers; abbreviations IL = idiosomal length; FT = femur to tarsus length for each leg; TMH = tibial maximum height for each leg. Structures referred to in the key are labelled in Figs 6 and 9 using the above abbreviations.

SYSTEMATICS

Family Pedrocortesellidae Paschoal

Genus *Pedrocortesella* Hammer

Pedrocortesella Hammer, 1961: 38; P. Balogh, 1985: 49; Luxton, 1985: 37; Paschoal, 1987b: 386; Paschoal, 1989: 198; Fernandez, 1990: 84; Eguaras *et al.*, 1990: 276; Balogh and Balogh, 1992: 48

Type species

Pedrocortesella pulchra Hammer, 1961, by monotypy.

Rediagnosis

Prodorsum with deep transverse furrow, enantiophyses lacking, bothridium abutting notogaster; seta *ex* absent, notogaster flattish in

³Deceased 13 June 1994.

lateral aspect, usually with a U-shaped or O-shaped intramarginal depression; 5–6 pairs of notogastral setae, setae *p2* and *p3* usually situated dorsally at the same general level as *h1*; *lm* (*r3*) usually absent; 2 pairs of anal setae; claw pedicels usually short and stout; femur of leg I lacking strong dorsal process.

Redescription

Medium sized mites (400–600µm); notogaster of adults ovate, with or without exuvial scalps; prodorsum with deep transverse furrow but no enantiophyses; seta *le* lateral or dorsolateral; seta *ex* absent; seta *in* small and arising from small tubercle; bothridium with strong posterolateral carina; bothridium abutting notogaster, its posterior wall often incomplete; sensillus usually flattened, clavate and ciliate; notogaster flattish in lateral aspect, usually concave intramarginally, with integument alveolate-foveolate or sometimes reticulate, often perforated by visible pores; 4–6 pairs of notogastral setae around posterior margin of notogaster; setae *p2* and *p3* usually situated dorsally at the same general level as *h1*; *lm* (*r3*) usually absent; epimeral chaetotaxy 3:1:3:3; anal and genital plates approximate; genitoanal chaetotaxy 6–7:1:2:3; genital setae either forming straight line near inner margin of plate, or forming an arc; seta *ad1* usually posterior to anal plates, seta *ad3* most laterad; cerotegument on legs reticulate, often forming strong crests; leg claws tridactylous, laterals weaker than central prong; pedicel usually short and stout, claws often retract into recess in tarsus; tarsal cluster of leg I with seta *ft*" and omega 1 and 2 usually surrounded by collar, though former may be partitioned from solenidia.

Remarks

With the exception of an *Pedrocortesella dispersa* P. Balogh and an unusual species from Augusta Island, Western Australia (Hunt, in prep.), all *Pedrocortesellidae* examined from Australia have 5 (or perhaps sometimes 4) pairs of notogastral setae. Some species show certain characters which Paschoal (1987b) regarded as diagnostic of *Hexachaetoniella* Paschoal, a New Zealand genus possessing 6 pairs of notogastral setae. For example, Australian species with 5 pairs of notogastral setae may have genital setae in a straight line near the inner margin of each genital valve (a '*Hexachaetoniella*' character), or the setae may form an arc in which some setae are set away from the margin (a '*Pedrocortesella*' character). Paschoal himself had difficulty in defining the generic status of three nominal *Pedrocortesella* species because they seemed to have a mixture of generic characters. Paschoal's diagnoses of the two

genera may be too restrictive (Hunt, in prep) and a more general rediagnosis and redescription of *Pedrocortesella* given above. Indeed, Eguaras *et al.* (1990) included two species with six notogastral setae in *Pedrocortesella*.

Ryabinin (1986) synonymised *Pedrocortesella* with *Pedrocortesia* Hammer, 1958, a view supported by Woas (1992) who placed it in *Pheroliodes* (= *Pedrocortesia*). We consider the synonymy to be unwarranted as *Pedrocortesella* has diagnostic characters which we regard as significant at the generic level: 2 pairs of anal setae (not 3–5); no enantiophyses at the transverse furrow on the prodorsum (enantiophyses present); a flattish notogaster with large depressed areas and usually without a longitudinal anteromesal furrow (more or less uniformly convex, usually with furrow); seta *ex* absent in adult (present); and setae *p2* and *p3* usually situated dorsally at the same general level as *h1* (low on the posterior flank at the same general level as seta *p1*).

Woas (1992) has based his synonymy of *Pedrocortesella* with *Pheroliodes* largely on the inferred presence of enantiophyses in published illustrations of *Pedrocortesella* spp. The authors concerned do not describe enantiophyses as being present. We believe the line drawings are best interpreted as depicting carinae or areas at the margin of the transverse furrow where the cutical appears thicker in dorsal view, but without forming distinct opposing horns. Reexamination of the actual material is desirable. In the Australian fauna, there is a clear separation between species possessing enantiophyses and those without.

Pedrocortesella is regarded as belonging in a separate family from *Pheroliodes* by Paschoal (1987a, 1987b, 1989), but to the same family, namely Plateremaeidae, by Fernandez (1987, 1990), and an even more inclusive family, namely Gymnodamaeidae, by Woas (1992). Paschoal's classification is followed by Balogh and Balogh (1992) and is tentatively followed here while family level taxa are reassessed (Hunt, in prep.).

Key to adults of Australian species of *Pedrocortesella*

1. Sensillus globose 2
- Sensillus clavate and flattened 3
- 2(1). Interlamellar seta distant from bothridium by about 0.3 interbothridial distance; notogaster with closely spaced reticulations *P. queenslandica* P. Balogh
- Interlamellar seta close to bothridium; notogaster with reticulations separated by approximately their diameter *P. dispersa* P. Balogh

- 3(1). Genital valve with one seta offset laterad from main file *P. temperata* P. Balogh
Genital setae in a straight or arcuate single file 4
- 4(3). Genital valves not conspicuously foveate/alveolate, each with 6 setae
..... *P. semireticulata* sp. nov.
Genital valves conspicuously foveate/alveolate, each with 7 setae 5
- 5(4). Notogaster with exuvial scalps (if absent then notogastral setae *h1* marginal and without conspicuous cloak of cerotegument and notogaster not conspicuously pitted)
..... *P. cryptoreticulata* sp. nov.
Notogaster without exuvial scalps, notogaster conspicuously pitted, setae *h1* well inside margin and usually cloaked with conspicuous layer of cerotegument
..... *P. propinqua* P. Balogh

Pedrocortesella semireticulata sp. nov.

Figures 1, 2

Material Examined

Holotype

♀, Ferries-McDonald Conservation Park, South Australia, Australia, 35°15'S, 139°09'E, mallee-broombush open scrubland, berlesate soil, litter, sparse moss under ridge-fruited mallee (*Eucalyptus incrassata*) clumps amongst broombush shrubs (*Melaleuca uncinata*), 20 April 1974, D.C. Lee (SAMA N1993196).

Paratypes

Australia: South Australia: 24 adults, same data as holotype (SAMA N1993197–N1993220).

Other Material

Specimens were extracted from ANIC berlesates from the following localities. **Australia: South Australia:** Parilla, Paruna, Brookfield Conservation Park, Monash, Renmark, and Pinnaroo. **Victoria:** Nowingi and Lake Hattah. **New South Wales:** Leeton.

Diagnosis

Adult without exuvial scalps; notogaster not punctate and not conspicuously foveolate/alveolate, with reticulations of cerotegument of low relief which give way to transverse striae of higher relief in the intramarginal depression; each notogastral seta set in conspicuous pit; anal and genital plates relatively smooth, only with slight dimpling; genital setae in straight line close to inner margin of plates; circular collar enclosing

tarsal cluster comprising *ft''* and omega 1 and 2; distal recess between *tc'* and *tc''* receives retracted empodial claw.

Description

Adult

Prodorsum. Integument with reticulations of low relief particularly anterior to deep transverse furrow. *le* dorsolateral, each arising from large pit, *ro* lateral. Pedotectal tooth strongly curved anteriorly and engaging concavity in trochanter of leg I. Bothridium against slight concavity in notogaster, its posterior and anterior margins depressed; sensillus clavate and strongly ciliate; *in* tiny, set in pit in very small tubercle, barely rising above its margin (Fig. 1E, arrow). *Notogaster.* Without scalps. Oval, with narrow central plateau and broad intramarginal depression; plateau with reticulations of low relief which give way to transverse striae of higher relief in the intramarginal depression; flanks of notogaster reticulated. Posterior margin barely, if at all, invaginate when viewed from above, but with a conspicuous mesial keel flanked by grooves and setae *p1* when viewed posteriorly (Fig. 1G). Fissura *ia* and *im* subparallel and *ip* subperpendicular to sagittal plane. 5 pairs of moderately short notogastral setae, each seta set in conspicuous pit (Fig. 1F); 4 pairs, *h1*, *p2*, *p3* and *lp*, close to posterior margin; *p2* closest to *ip*. *Epimeral chaetotaxy* 3–1–?2–?2. *Genitoanal region.* Aggenital and adanal plates with reticulations of low relief; genital and anal plates (Fig. 2B, C) relatively smooth, revealing only very shallow dimpling when cerotegument removed. Genitoanal chaetotaxy 6–1–2–3; genital setae in straight line close to inner margin of each plate; no adanal setae level with proximal half of anal plates; aggenital seta near posterolateral corner of genital plate. *Legs.* Tibia I distal apophysis very long, over-riding tarsus for about 0.4 tarsus length (Fig. 2D). Tarsus I distal apophysis with strong dorsal crest of cerotegument extending proximal to it. Apophysis with a circular collar enclosing tarsal cluster comprising *ft''* and omega 1 and 2 (Fig. 2E); immediately distal to it is a shallow depression between *tc'* and *tc''* (herein termed "distal recess") which receives the retracted empodial claw. Pedicel short, unguinal complex heterotridactylous, *Measurements.* IL = 425–460 (n=25). Leg lengths (FT) for IL=460: 238, 204, 206, 235. TMH for IL=460: 36, 24, 19, 22. Legs medium length (ratio mean FT to IL = 0.48) and stout (ratio mean TMH to mean FT = 0.40).

Remarks

One specimen was examined from Kimba and from Sherlock, South Australia. Each had 7 pairs of genital setae but otherwise appeared extremely

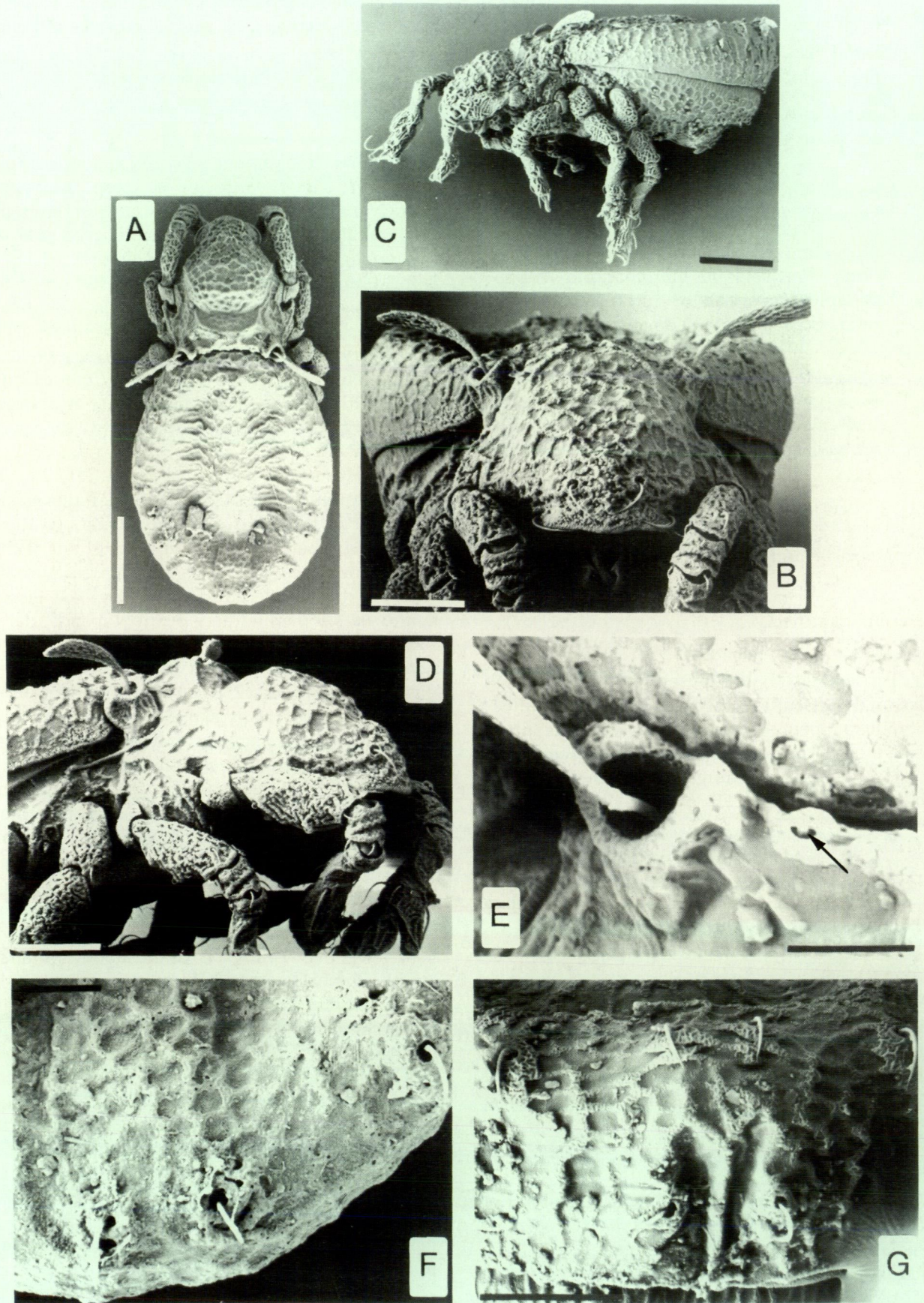


Figure 1 *Pedrocortesella semireticulata* sp. nov., adults. A, C, whole body, dorsal and lateral; B, D, prodorsum, frontal and lateral; E, bothridium; F, posterior notogastral setae; G, notogaster, posterior mesal. Scale bars: A, C = 100 μ m; B, D, G = 50 μ m; E, F = 20 μ m.

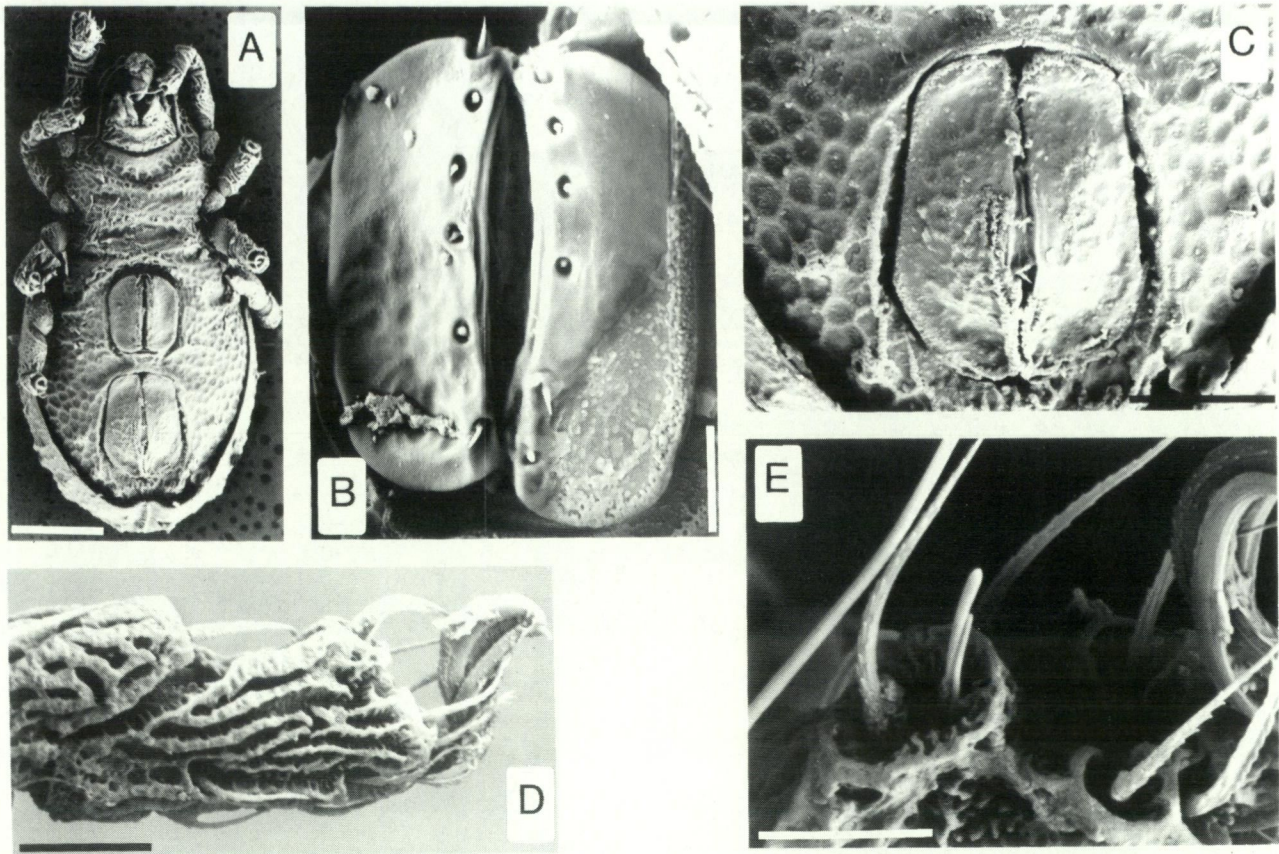


Figure 2 *Pedrocortesella semireticulata* sp. nov., adults: A–D, type locality; E, Parilla population. A, whole body, ventral; B, C, genital and anal plates; D, tarsus of leg I, antiaxial; E, detail of tarsal cluster, oblique dorsal. Scale bars: A = 200µm; C = 50µm; B, D = 20µm; E = 10µm.

similar to specimens with 6 pairs collected from other localities. This difference in setal number may prove to be of interspecific significance when a larger series is available: the Kimba and Sherlock specimens are not given specific placement at this stage.

Distribution

Mallee country in South Australia, western Victoria and southwestern New South Wales.

Etymology

The specific epithet refers to the reticulate pattern in the central part of the notogaster which tends to break down more laterally.

Pedrocortesella cryptoreticulata sp. nov.

Figures 3, 4

Material Examined

Holotype

♀, near summit of Mt Lofty, Cleland Conservation Park, South Australia, Australia, 34°59'S, 138°45'E, sclerophyll forest, berlesate soil, litter and

sparse moss under sclerophyllous shrubs among messmate stringybark (*Eucalyptus obliqua*), 9 May 1974, D.C. Lee (SAMA N1993221).

Paratypes

Australia: South Australia: 32 adults, same data as holotype.

Other Material

Australia: South Australia: 1 specimen, Sherlock.

Diagnosis

Adult almost always with exuvial scalps; rostral area with reticulations of high relief; notogaster reticulated, reticulations of lower relief on central plateau, setae *h1* close together at extreme posterior margin, tending to overlap; *p1*, *p2* and *p3* arise from posterolateral flank, their insertions not seen from above; genital and anal plates strongly pitted; genital setae in straight line somewhat removed from inner margin; circular collar enclosing tarsal cluster comprising *ft''* and *omega 1* and *2*; distal recess between *tc'* and *tc''* receives retracted empodial claw.

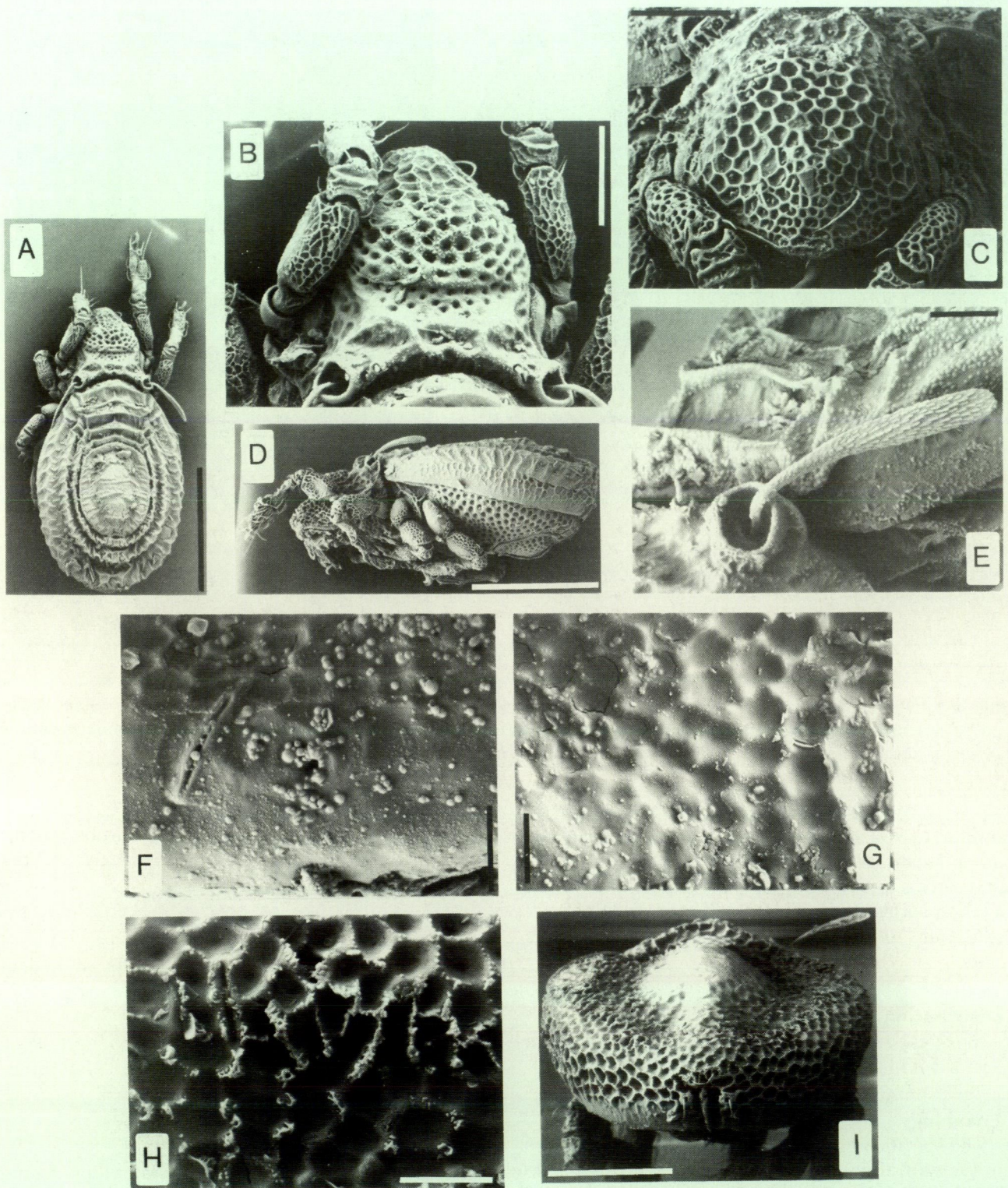


Figure 3 *Pedrocortesella cryptoreticulata* sp. nov., adults: A–G, type locality; H–I, Sherlock population. A, D, whole body, dorsal and lateral; B, C, prodorsum, dorsal and frontal; E, bothridium and sensillus; F, H, notogastral integument showing fissura *im*; G, integument mesad to F; I, notogaster, posterodorsal. Scale bars: A, D = 200µm; I = 100µm; B, C = 50µm; E–H = 20µm.

Description

Adult

Prodorsum. Dorsal microsculpture in 3 fields: rostral area with reticulations of high relief, reticulations capped with crests or granules of

cerotegument; posterior to it integument punctate; between bothridia integument relatively smooth though with 2 strong crests separated by depressed area. Pedotectal tooth *p* smooth, apparently not engaging depression in trochanter I. Viewed dorsally, *le* arises from small pit just inside lateral

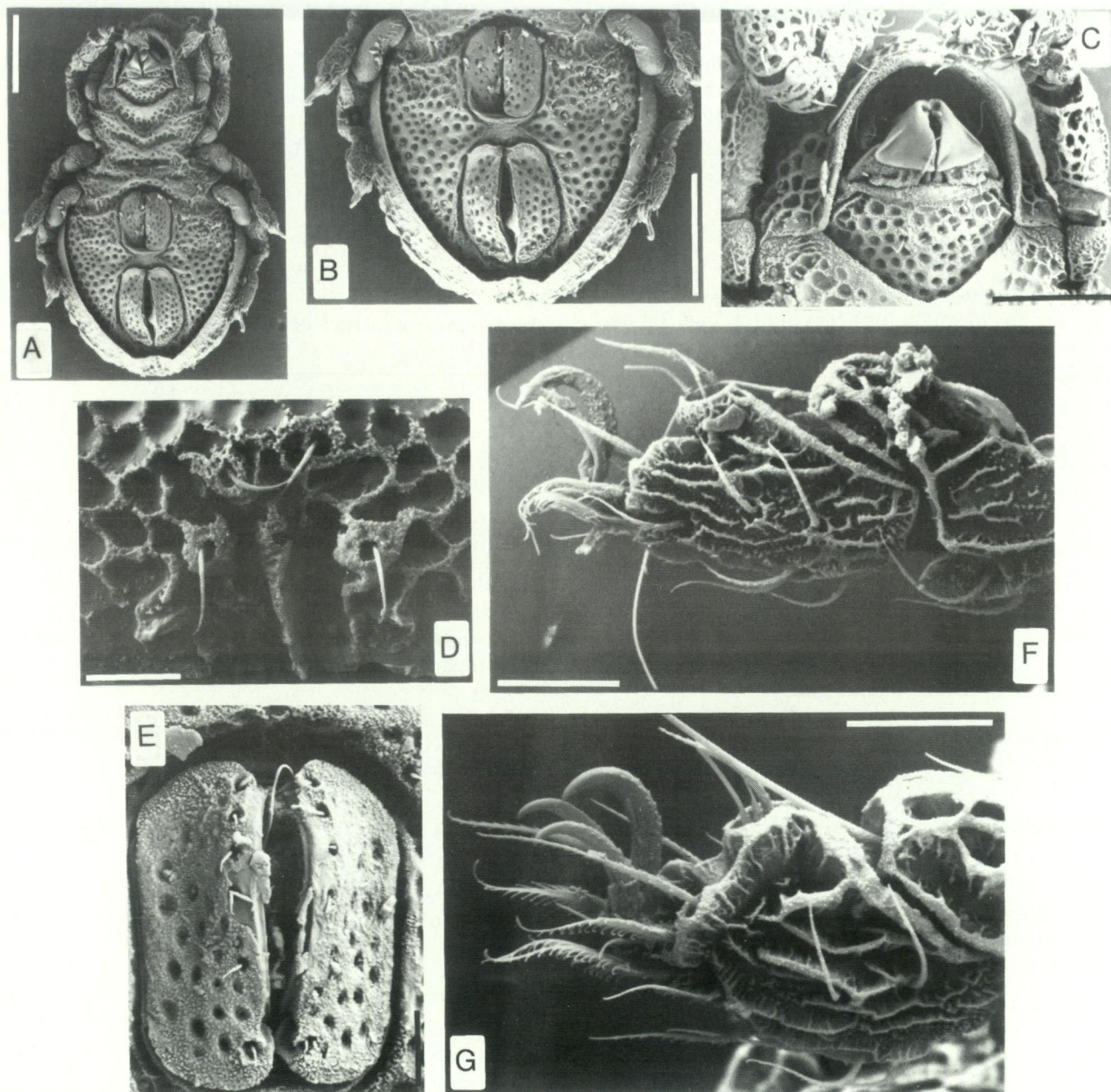


Figure 4 *Pedrocortesella cryptoreticulata* sp. nov., adults: A–C, E, F, type locality; D, G, Sherlock population. A, whole body, ventral; B, anogenital region; C, gnathosoma; D, notogastral setae, posteromesal; E, genital valves; F, G, tarsus of leg I, antiaxial. Scale bars: A, B = 100µm; C = 50µm; D–G = 20µm.

margin; *ro* laterally. Anterolateral margin of bothridium somewhat depressed, posterior margin not obviously so. Sensillus clavate, conspicuously ciliate; *in* small, spiniform (Fig. 3E). *Notogaster*. Nearly always carries exuvial scalps. When scalps removed notogaster oval, weakly reticulated, reticulations tend to be lower on mesial plateau. Posterior margin convex, not invaginate when viewed from above, but with a mesial keel flanked by grooves and setae *p1* when viewed posteriorly. Fissura *ia* subparallel and *im* and *ip* subperpendicular to sagittal plane, 4 pairs of moderately short notogastral setae seen, each seta set in small pit; *h1* close together at extreme

posterior margin, tending to overlap; *p1*, *p2* and *p3* arise from posterolateral flank, their insertions not seen from above. *Epimeral chaetotaxy* 3–1–3–3. *Genitoanal region*. Aggenital and adanal plates punctate, genital and anal plates strongly so. Genitoanal chaetotaxy 7–1–2–3; genital setae in straight line but more removed from inner margin plate than in *P. semireticulata*; no adanal setae level with proximal half of anal plate; aggenital seta near posterolateral corner of genital plate. *Legs*. Tibia I distal apophysis long, over-riding tarsus for about 0.3 tarsus length. Tarsus I distal apophysis with strong dorsal crest of cerotegument extending proximal to it. Apophysis with a circular collar

enclosing tarsal cluster comprising ft'' and ω 1 and 2; distal recess between tc' and tc'' receives retracted empodial claw. Pedicel short, unguinal complex heterotridactylous. *Measurements*. IL = 425–488 (n=25). Leg lengths (FT) for IL=433: 216, 202, 190, 194. TMH for IL=433: 34, 26, 24, 24. Legs medium length (ratio mean FT to IL = 0.46) and stout (ratio mean TMH to mean FT = 0.51).

Variation

The Sherlock specimen has notogastral reticulations of much higher relief (cf. Figs 3H and 3F) but otherwise appears similar. The populations are here regarded as conspecific despite the wide geographical separation.

Distribution

Mt Lofty and Sherlock areas, South Australia.

Etymology

The specific epithet refers to the reticulation pattern being hidden by the scalps.

Acupedicellus gen. nov.

Type species

Acupedicellus cornutus sp. nov. by monotypy.

Diagnosis

Similar to *Pedrocortesella* except that femur of leg I with strong dorsal process which lies over prodorsum; tarsi pear-shaped, tapering distally, without distal recess, pedicel of pretarsus long and isodiametric.

Description

Small sized mites (400 μ m); notogaster ovate, without exuvial scalps; prodorsum with deep transverse furrow but no enantiophyses; seta *le* dorsolateral; seta *ex* absent; seta *in* small and arising from small tubercle; bothridium with hole in its lateral base; bothridium abutting notogaster; sensillus flattened, clavate and ciliate; notogaster flattish in lateral aspect, concave intramarginally, with integument punctate; 5 pairs of notogastral setae around posterior margin of notogaster; *lm* (*r*3) lacking; epimeral chaetotaxy 3:1:3:3; anal and genital plates close; genitoanal chaetotaxy 7:1:2:3; genital setae forming an arc; seta *ad*1 posterior to anal plates, seta *ad*3 most laterad; femur of leg I with strong dorsal process which lies over prodorsum; tibiae with ventral ridges, tarsi pear-shaped, tapering distally, collar around tarsal cluster not greatly interrupting profile; pretarsus heterotridactylous with long, isodiametric pedicel; on tarsus I solenidia ω 1 and 2 and ϵ surrounded by collar with seta ft'' tending to be

enclosed by a proximal extension of this collar.

Remarks

Acupedicellus n. gen. is similar to *Pedrocortesella* Hammer but we feel the highly distinctive structure of the legs warrants separate generic status.

Etymology

The genus name is a combination of two Latin words meaning "little pointed foot" and refers to the tapering structure of the tarsi.

Acupedicellus cornutus sp. nov.

Figures 5, 6B–G

Material Examined

Holotype

♀, Chambers Gully, Cleland Conservation Park, South Australia, Australia, 34°59'S, 138°41'E, savannah woodland, berlesate soil, grass and moss between manna gum trees (*Eucalyptus viminalis*), 12 June 1974, D.C. Lee (SAMA N1993254).

Paratype

Australia: South Australia: 1 ♀, same data as holotype (AM).

Diagnosis

As for genus.

Description

Female

Prodorsum. Punctate, *le* dorsolateral, *ro* lateral and longer; pedotectal tooth strongly curved anteromesad. Bothridium slightly removed from notogaster, not coiled, posterior and anterolateral rim depressed; sensillus clavate, ciliate distal to rim of bothridium, cilia very strong; marked hole near base of posterolateral carina (Fig. 5E, arrow); *in* tightly juxtaposed with bothridial wall (Fig. 5F); interbothridial carina gently curved when viewed anteriorly, not presenting as 2 crests. *Notogaster*. No exuvial scalps, oval, punctate, cerotogument tending to form a film with tubercles between punctations (Fig. 5G), film thicker towards margins. Central plateau slightly convex, broad; anterior rim of notogaster with a transverse furrow; posterior margin invaginate when viewed from above, without keel between setae *p*1 when viewed posteriorly. Fissurae large, *ia* subparallel, *im* subperpendicular, *ip* oblique to sagittal plane. Notogastral setae (Fig. 5A) conspicuous, heavily clothed in cerotogument, *h*1 not very close to each other, inserted well within margin near inframarginal depression; *p*2, *p*3, *lp* inserted near

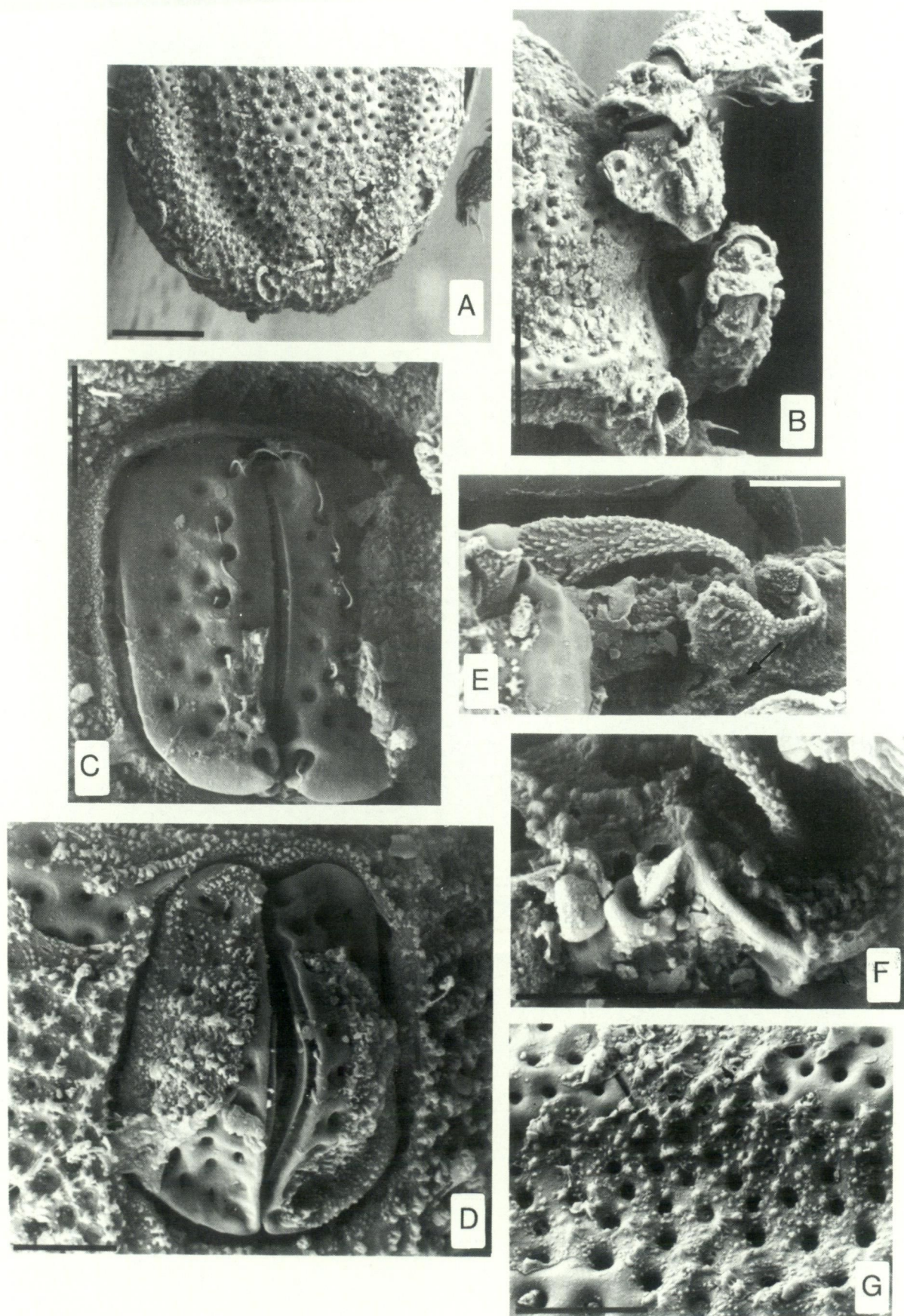


Figure 5 *Acupedicellus cornutus* sp. nov., paratype female. A, posterior portion of notogaster, dorsal; B, right leg I, dorsal; C, D, genital and anal plates; E, sensillus, lateral; F, interlamella seta; G, detail of cerotegument near fissura *im*. Scale bars: A–B = 50µm; C–G = 20µm.

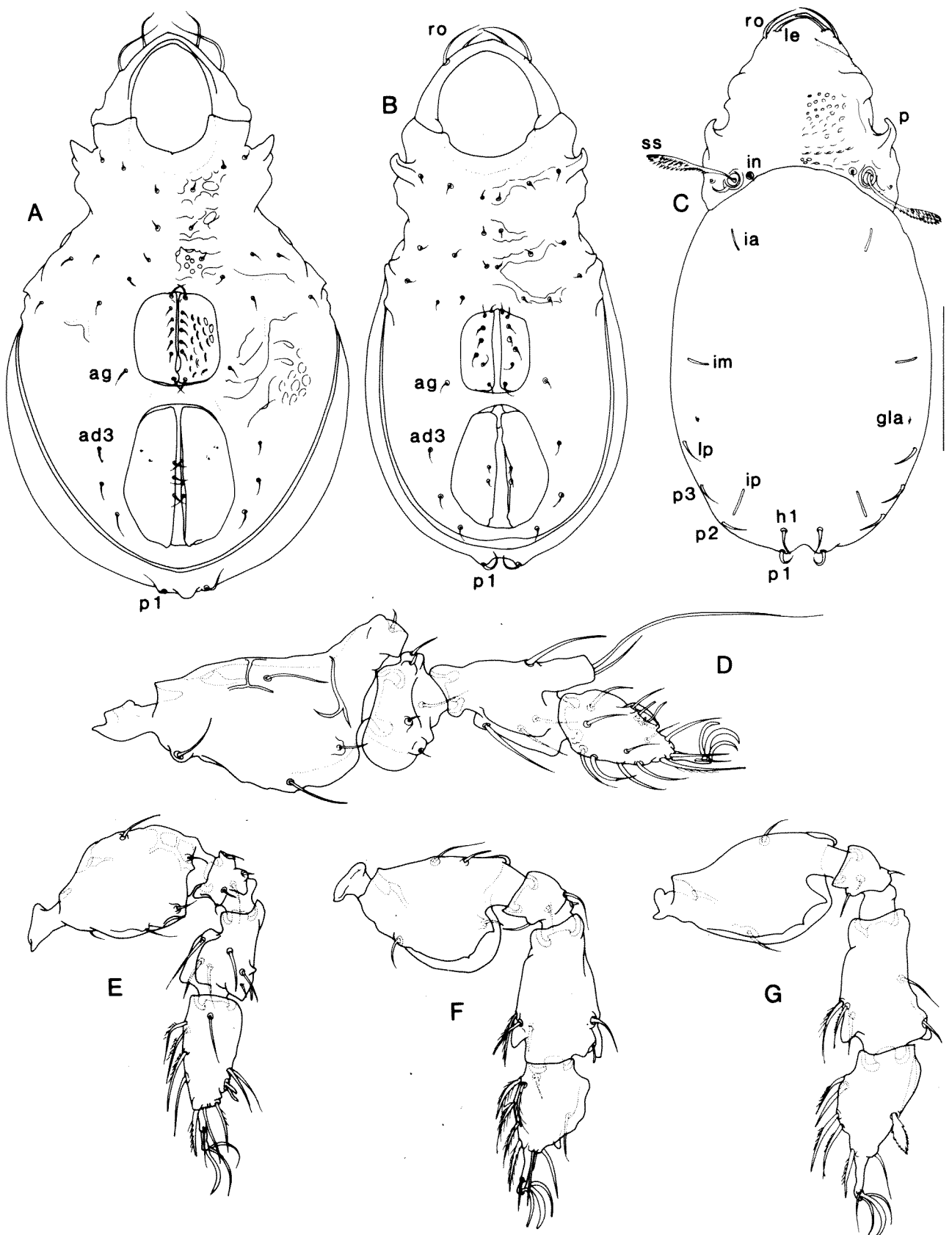


Figure 6 A, *Pheroliodes robustus* sp. nov., holotype female; B–G, *Acupedicellus cornutus* sp. nov., holotype female. A, B, whole body, ventral; C, whole body, dorsal; D–G, legs I–IV, antiaxial (anterior and anteroventral member of setal pairs not always illustrated). Scale bar: 100µm.

margin, *p2* closest to *ip*. Epimeral chaetotaxy 3-1-3-3. Genitoanal region. Punctate. Genitoanal chaetotaxy 7-1-2-3, genital setae in arc, the central ones being well removed from inner margin of genital valve (Fig. 5C); *ad3* opposite proximal half of anal plate (Fig. 5D). Legs (Figs 5B, 6D-G). Femur of leg I dorsodistally with strong, somewhat flattened process which lies over part of prodorsum when animal at rest (Fig. 5B), tibia with less strong process; tibiae with ventral crests. Tarsal complex of leg I with omega 1 and 2 and epsilon enclosed within a collar, seta *ft''* appears to be enclosed by proximal extension of this collar. Distal part of tarsus conical, without abrupt truncation or distal recess to receive empodial claw; pedicel of pretarsus long and isodiametric. Seta *ft''* on tarsus IV flattened and serrate. Claw pedicels long. Measurements. IL = 376 (n=2). Leg lengths (FT) for IL=376: 228, 170, 175, 187. TMH for IL=376: 38, 27, 29, 29. Legs medium length (ratio mean FT to IL = 0.51) and stout (ratio mean TMH to mean FT = 0.59).

Distribution

South Australia: type locality.

Etymology

The specific epithet is Latin for "horned" and refers to the strong dorsal process on femur I.

Family Pherolioididae Paschoal

Genus *Pheroliodes* Grandjean

Pheroliodes Grandjean, 1931: 249; Grandjean, 1964: 383; Covarrubias, 1968: 692; Fernandez, 1987: 186; Paschoal, 1987a: 359; Paschoal, 1989: 197; Eguaras *et al.*, 1990: 276; Balogh and Balogh, 1992: 47; Woas, 1992: 144-146.

Phereliodes (sic): Balogh, 1972: 58; Balogh and Balogh, 1988: 92.

Pedrocortesia Hammer, 1958: 40; Ryabini, 1986: 341-2 (synonymised by P. Balogh, 1985: 51).

Type species

Cymbaeremaeus wehncke Willmann, 1930, by original designation.

Rediagnosis

Prodorsum with deep transverse furrow with enantiophyses (opposing horns); bothridium abutting notogaster; notogaster convex in lateral aspect and not concave intramarginally, usually with longitudinal anteromesal furrow; 5 pairs of notogastral setae, setae *p2* and *p3* low on the posterior flank at the same general level as seta *p1*; *lm* (*r3*) absent; 3-5 pairs of anal setae on either

valve, sometimes asymmetrical in number; *ft''* of tarsus I not enclosed in same collar as solenidia, pedicels of pretarsi usually long.

Redescription

Medium to large sized mites (500-850µm); notogaster ovate, with or without exuvial scalps; prodorsum with deep transverse furrow with enantiophyses; seta *le* lateral or dorsolateral; seta *ex* present; seta *in* small and arising from small tubercle; bothridium with strong posterolateral carina; bothridium abutting notogaster; sensillus flattened, clavate and ciliate; notogaster convex in lateral aspect, not concave intramarginally, with integument alveolate-foveolate; 5 pairs of notogastral setae around posterior margin of notogaster; *lm* (*r3*) lacking; setae *p1*, *p2* and *p3* situated low on posterior flank; epimeral chaetotaxy 3:1:3:3; anal and genital plates close; genitoanal chaetotaxy 7:1:3-5:3; genital setae forming straight line near inner margin of plate; seta *ad1* usually posterior to anal plates, seta *ad3* most laterad; cerotegument on legs usually in form of columnar tubercles, not forming strong crests; tarsi without distal recess to receive empodial claw; pretarsus heterotridactylous, its pedicel usually long. Tarsus of leg I with seta *ft''* not enclosed in same collar as omega 1 and 2.

Remarks

The synonymy of *Pedrocortesia* with *Pheroliodes* was suggested by Grandjean (1964) and Covarrubias (1968), formalised by P. Balogh (1985) and supported by Paschoal (1987a) and Fernandez (1987).

Key to adults of Australian species of *Pheroliodes*

1. Prodorsum not strongly reticulate anterior to transverse groove; distal lip of tarsal complex on leg II extended into elongate process *Pheroliodes copiosus* sp. nov.
- Prodorsum strongly reticulate anterior to transverse groove; distal lip of tarsal complex on leg II not extended into elongate process *Pheroliodes robustus* sp. nov.

Pheroliodes copiosus sp. nov.

Figures 7-8

Material Examined

Holotype

♀, Piccaninnie Ponds Conservation Park, South Australia, Australia, 38°03'S, 140°57'E, coastal closed scrubland, berlesate soil, litter, sparse grass under coastal wattle (*Acacia sophorae*), 3 August 1974, D.C. Lee (SAMA N1993255).

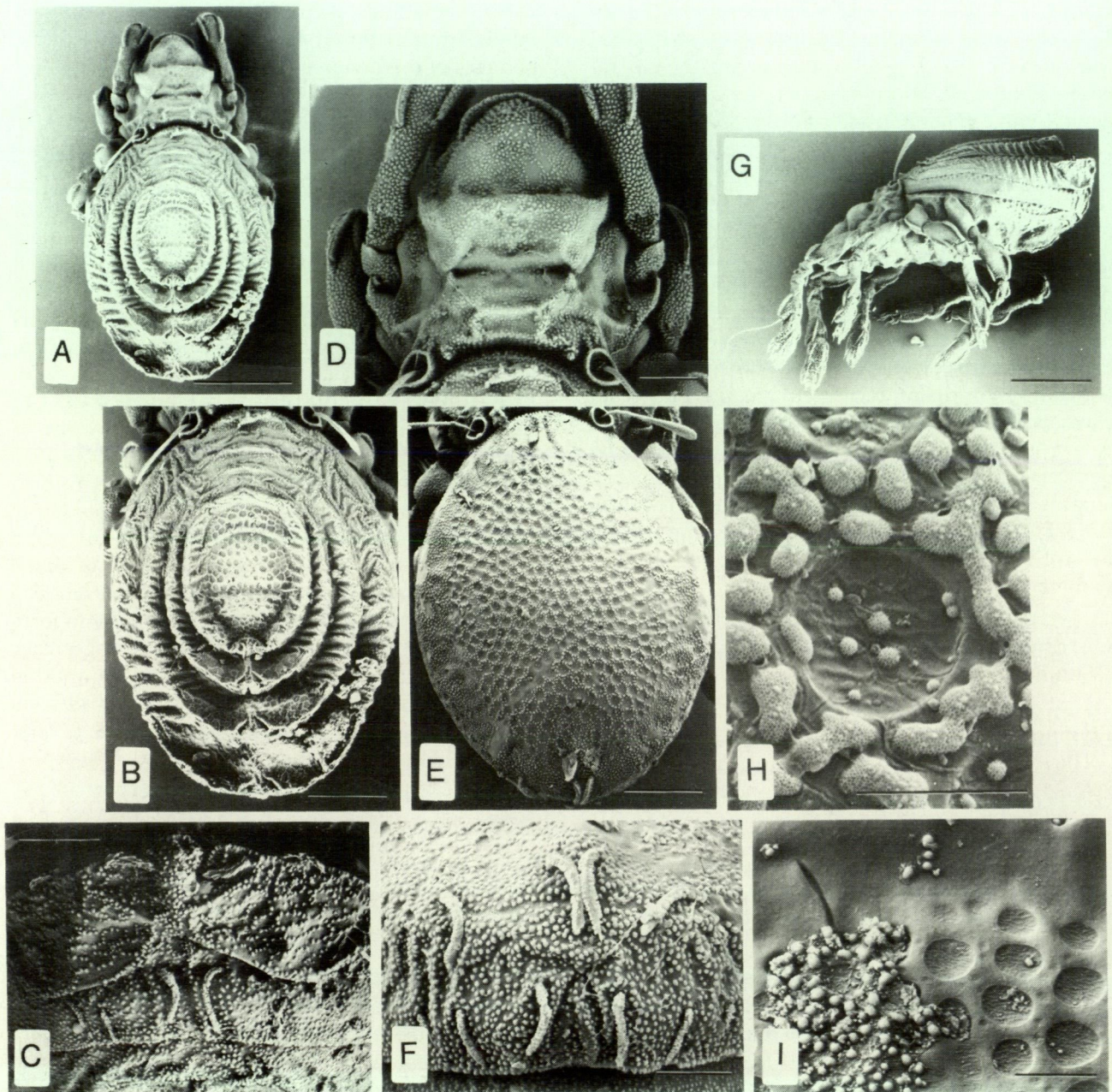


Figure 7 *Pheroliodes copiosus* sp. nov., adults. A, whole body, dorsal; B, E, notogaster, dorsal, with and without scalps; C, F, notogaster, posterior, with and without scalps; D, prodorsum, dorsal; G, whole body, lateral; H, notogastral alveolus with cerotegument; I, notogastral alveoli near fissura *im*. Scale bars: A, G = 700 μ m; B, E = 100 μ m; C, D, F = 50 μ m; I = 20 μ m; H = 10 μ m.

Paratypes

Australia: South Australia: large series of adults, same data as holotype (SAMA N1993256–N1993680); small series, same data as holotype (AM).

Diagnosis

Middle field on prodorsum a raised bar sharply sloping from more anterior rostral field; cerotegument of legs closely packed columnar tubercles, not forming an obvious reticulate pattern; distal lip of tarsal complex on leg II extended into elongate process.

Description

Adult

Prodorsum. Covered in closely spaced columnar tubercles of cerotegument. Prodorsum (Fig. 7D) divided into 3 fields: rostral field smooth except for strong circumrostral carina, *le* lateral, set anterior to *ro* which may be obscured by circumrostral carina when viewed from above; middle field a raised weakly foveate bar sharply sloping from rostral field (in *P. wehncke*i and *P. roblensis* transition smooth). Transverse groove deep, the posterior horn of enantiophyses more

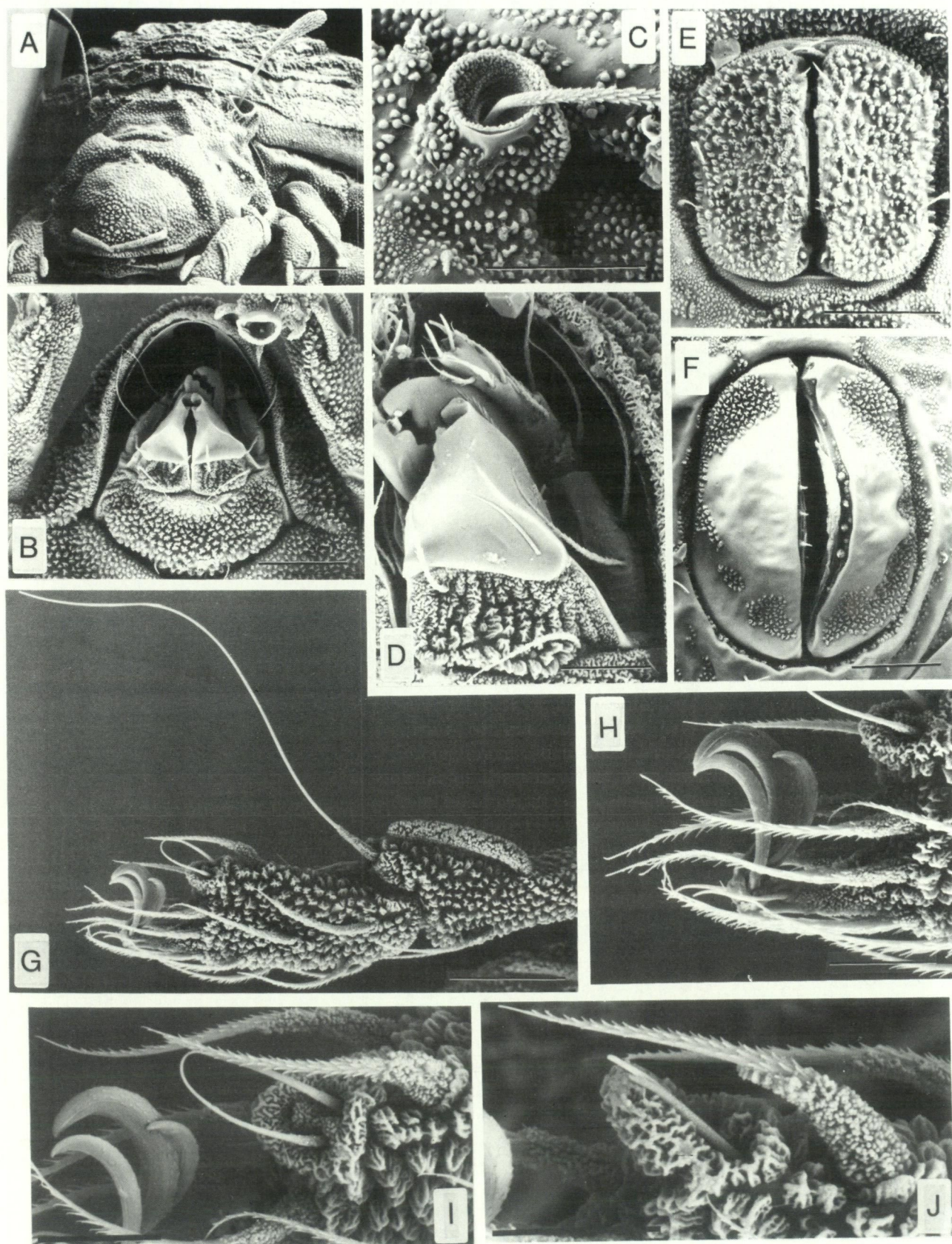


Figure 8 *Pheroliodes copiosus* sp. nov., adults. A, frontal view; B, D, gnathosoma, entire and detail; C, bothridium; E, F, genital and anal plates; G, leg I, distal, antiaxial; H, claw, leg I antiaxial; I, J, tarsal complex, legs I and II, oblique dorsal. Scale bars: A-C, E-G = 50 μ m; D, H-J = 20 μ m.

acute. Posterior field not obviously foveate; pedotectal tooth smooth, strongly curved anteriorly; bothridium as figured (Fig. 8C), posterior rim not depressed, anterolateral rim moderately depressed; sensillus long, clavate but not broadly so and not expanding markedly in proximal half, ciliate from bothridial rim (Fig. 8A, C); *in* small, acute, proximally with heavy cerotegument (Fig. 8C); *ex* anterolateral to base of bothridium, small, largely covered with cerotegument granules (Fig. 8C). *Notogaster*. Usually carrying exuvial scalps. When scalps removed notogaster alveolate with

cerotegument tubercles mostly forming a reticulate pattern between the alveolae (Fig. 7E, H); alveolae replaced intramarginally by dense tubercles of cerotegument. Fissura *ia* and *ip* subparallel and *im* oblique to sagittal plane. Short anteromesial carina flanked by grooves; posterior margin convex when viewed from above, with a small keel between setae *p1* when viewed posteriorly (Fig. 7F). Setae *h1* long, close together and inserted well inside posterior margin; setae *lp* inserted just inside posterior margin near *ip*. *p1*, *p2* and *p3* situated low on posterior flank, in decreasing size order.

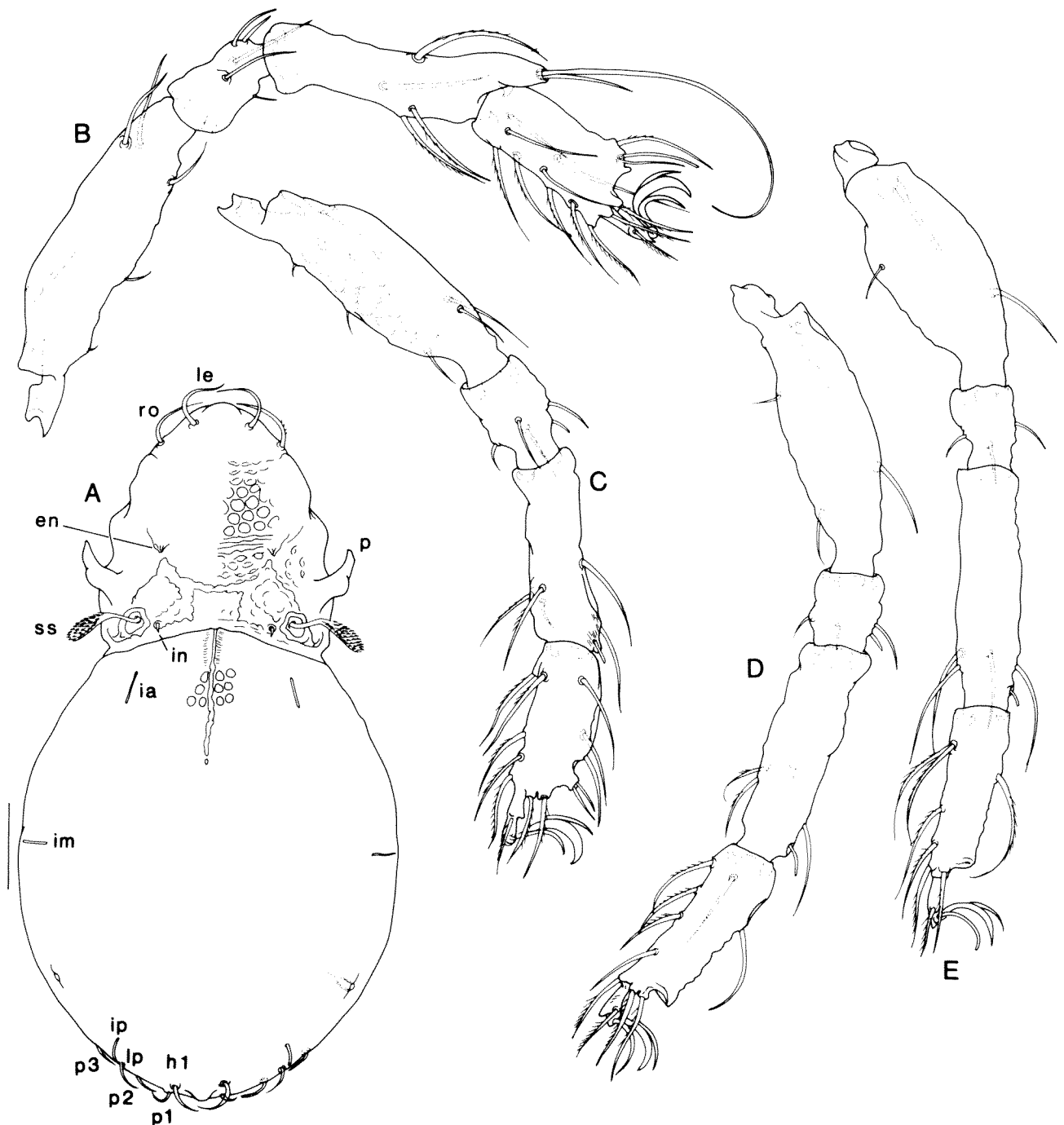


Figure 9 *Pheroliodes robustus* sp. nov., holotype female. A, whole body, dorsal; B-E, legs I-IV (anterior and anteroventral member of setal pairs not always illustrated). Scale bar = 100µm.

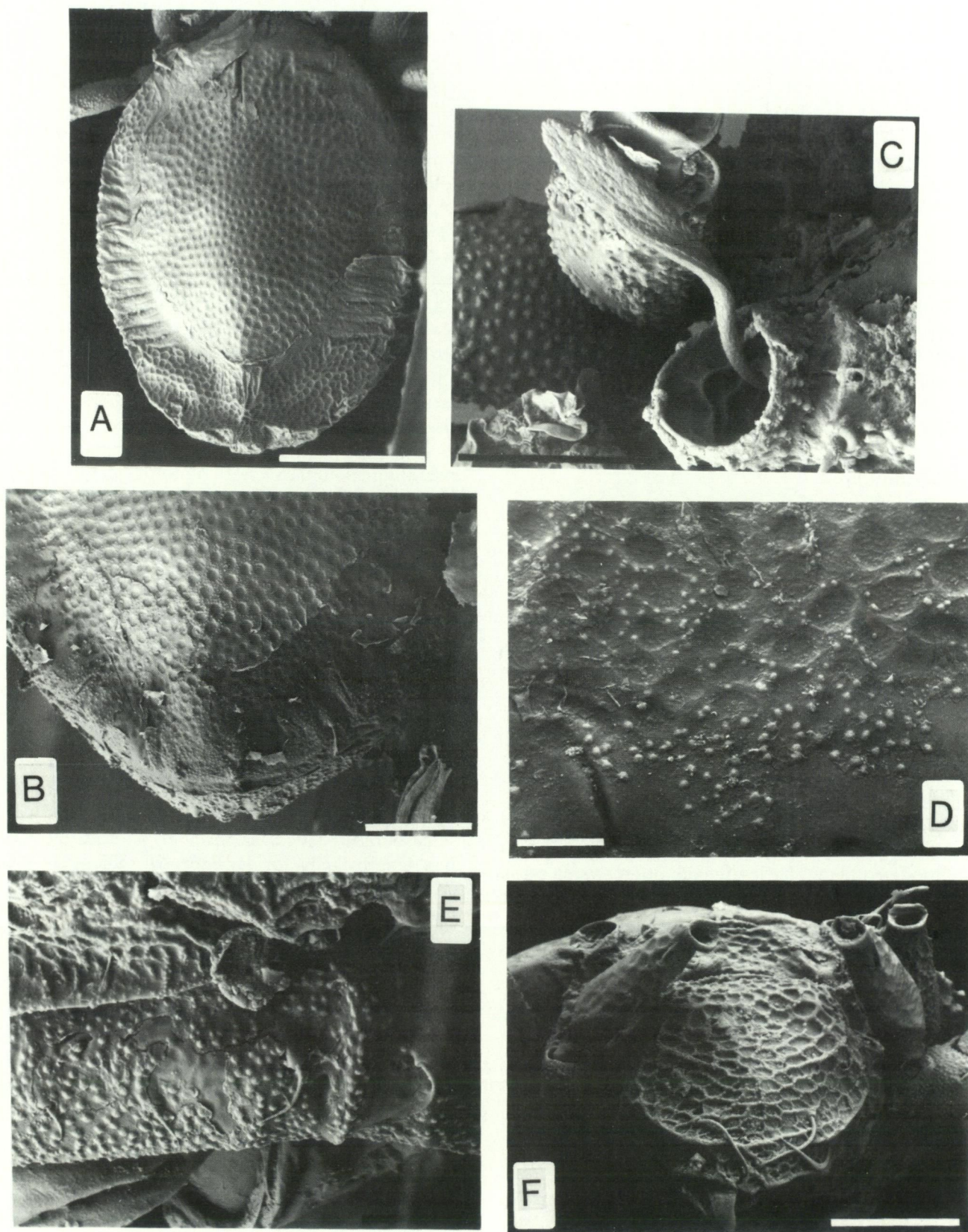


Figure 10 *Pheroliodes robustus* sp. nov., paratype female. A, notogaster, dorsal, scalps largely removed; B, notogaster, posterior portion; C, bothridium and sensillus; D, notogastral integument near fissura *im*; E, notogaster, posterior; F, prodorsum, frontal. Scale bars: A = 200 μ m; B, F = 100 μ m; C, E = 50 μ m; D = 20 μ m.

Gnathosoma. As illustrated Fig. 8B and in Lee (1984, fig. 5, right), pedipalp (Fig. 8D) similar to *P. wehnckeii*. Epimeral chaetotaxy 3-1-3-3. Genitoanal region. Sparsely foveolate, covered with dense tubercles of cerotegument. Chaetotaxy 7-1-3 (rarely 4)-3. *ad3* level with proximal half of anal plate; *ag1* at about 0.7 anterior-posterior length of genital plate. Legs (Figs 8G-J). Cerotegument of closely packed columnar tubercles (Fig. 8G), not forming an obvious reticulate pattern. Tibia and tarsus I very similar to *P. wehnckeii* except (*v*) on tibia and *ft''*, (*tc*), (*it*) of tarsus not clothed in as much cerotegument, and distal lip of tarsal complex in leg II extended into elongate process (Fig. 8J). *Measurements*. IL = 600-650 (n=25). Leg lengths (FT) for IL=630: 427, 341, 362, 446. TMH for IL=630: 41, 29, 29, 31. Legs long (ratio mean FT to IL = 0.62) and slender (ratio mean TMH to mean FT = 30).

Distribution

South Australia: type locality.

Etymology

The specific epithet refers to the numerous specimens collected at the type locality.

Pheroliodes robustus sp. nov.

Figures 6A, 9-10

Material Examined

Holotype

♀, Piccaninnie Ponds Conservation Park, South Australia, Australia, 38°03'S, 140°57'E, coastal closed scrubland, berlesate soil, litter, sparse grass under coastal wattle (*Acacia sophorae*), 3 August 1974, D.C. Lee (SAMA N1993681).

Paratype

Australia: South Australia: 1 ♀, same data as holotype (AM).

Diagnosis

Prodorsum strongly reticulate anterior to transverse groove; circumrostral carina weak; narrow anteromesial groove extending about 0.25 length of notogaster; sensillus length about 0.5 interbothridial distance, not ciliate near bothridial rim.

Description

Female

Prodorsum. Prodorsum divided into two main fields: strongly reticulate anterior to transverse

furrow, very weakly so posterior to it. Circumrostral carina weak, in the form of an enlarged crest continuous with reticulations (Fig. 10F), possibly not homologous to carina in *P. copiosus* sp. nov.; *le* dorsolateral, set anterior to *ro* which are not obscured by circumrostral carina when viewed from above. Enantiophyses weaker than in *P. copiosus* sp. nov. Posterior rim of bothridium not depressed, anterior rim moderately depressed; sensillus much shorter than in *P. copiosus* sp. nov., length about 0.5 interbothridial distance, clavate, twisted at junction of smooth stalk and ciliate blade (Fig. 10C); *in* small, acute; *ex* not seen. *Notogaster*. Carries exuvial scalps. When scalps removed notogaster alveolate with cerotegument granules between the alveoli; alveoli replaced intramarginally by smooth integument carrying granules of cerotegument (Fig. 10D). Fissura *ia* and *ip* subparallel and *im* perpendicular to sagittal plane. Narrow anteromesial groove extending about 0.25 length of notogaster (Fig. 9A); posterior margin with keel flanked by grooves between setae *p1*. Setae *h1* shorter and further apart than in *P. copiosus* sp. nov., inserted near posterior margin; setae *lp* inserted just inside posterior margin near *ip*. *p1*, *p2* and *p3* situated low on posterior flank, in decreasing size order. Epimeral chaetotaxy 3-1-3-3. Genitoanal region. Sparsely foveolate, covered with film of cerotegument. Chaetotaxy 7-1-3-3. *ad3* level with proximal half of anal plate; *ag1* near posterior corner of genital plate. Legs (Fig. 9B-E). Cerotegument reticulate. Solenidia omega 1 and 2 on tarsus II set in cavity atop prominent process, distal lip of which is not elongate distad. Otherwise setae as figured. *Measurements*. IL = 782-816 (n=2). Leg lengths (FT) for IL=816: 474, 437, 451, 463. TMH for IL=816: 48, 36, 29, 29. Legs long (ratio mean FT to IL = 0.56) and slender (ratio mean TMH to mean FT = 0.22).

Distribution

South Australia: type locality.

Etymology

The specific epithet refers to the large body size of this species.

ACKNOWLEDGEMENTS

This research was conducted with the assistance of an Australian Biological Resources Study grant to one of us (G.H.). Roy Norton, State University of New York, and Dan Bickel, Australian Museum, commented on the manuscript. Sue Lindsay took the SEMs and Roger Springthorpe did the illustrations and camera ready layouts.

REFERENCES

- Balogh, J. (1972). *The Oribatid Genera of the World*. Akademiai Kiado, Budapest.
- Balogh, J. and Balogh, P. (1983). Oribatid mites from Australia (Acari: Oribatei). *Acta Zoologica Academia Scientiarum Hungarica* **29**(1-3): 81-105.
- Balogh, J. and Balogh, P. (1988). *Oribatid Mites of the Neotropical Region I*. (The Soil Mites of the World 2, series editor J. Balogh). Elsevier, Amsterdam.
- Balogh, J. and Balogh, P. (1992). *The Oribatid Mites Genera of the World*, 1. Hungarian Natural History Museum, Budapest.
- Balogh, P. (1985). New oribatids from Australia (Oribatei). *Opuscula Zoologica, Budapest* **19-20**: 49-56.
- Covarrubias, R. (1968). Observations sur le genre *Pheroliodes*. I. *Pheroliodes roblensis* n.sp. (Acarina, Oribatei). *Acarologia* **10**: 657-695.
- Eguaras, M.J., Martinez, P.A. and Fernandez, N.A. (1990). The genre *Pedrocortesella* Hammer, 1961, dans la Republique Argentine II. *Pedrocortesella monicai* et *Pedrocortesella tristius* especies nouvelles. *Acarologia* **31**: 263-278.
- Fernandez, N.A. (1987). Contribution a la connaissance de la faune oribatologique d'Argentine VII. Les genres *Pheroliodes* and *Pedrocortesia*. *Acarologia* **28**: 177-186.
- Fernandez, N.A. (1990). Le genre *Pedrocortesella* Hammer, 1961, dans la Republique Argentine. I. *Pedrocortesella montis* n.sp. *Acarologia* **31**: 73-84.
- Grandjean, F. (1931). Le genre *Licneremaeus* Paoli (Acariens). *Bulletin de la Société Zoologique de France* **56**: 221-250.
- Grandjean, F. (1964). *Pheroliodes wehncke* (Willmann) (Oribates). *Acarologia* **6**: 353-386.
- Hammer, M. (1958). Investigations on the oribatid fauna of the Andes Mountains I. The Argentine and Bolivia. *Biologiske Skrifter udgivet af det Kongelige Danske Videnskabernes Selskab* **10**(1): 1-122.
- Hammer, M. (1961). Investigations on the oribatid fauna of the Andes Mountains II. Peru. *Biologiske Skrifter udgivet af det Kongelige Danske Videnskabernes Selskab* **13**(1): 1-150.
- Hammer, M. (1966). Investigations on the oribatid fauna of New Zealand Part I. *Biologiske Skrifter udgivet af det Kongelige Danske Videnskabernes Selskab* **15**(2): 1-101.
- Lee, D.C. (1984). A modified classification for oribate mites (Acari: Cryptostigmata). In D.A. Griffiths and C.E. Bowman (eds), *Acarology VI*, 1: 241-248. Ellis Horwood, Chichester.
- Lee, D.C. and Pajak, G.A. (1990). *Scheloribates* Berlese and *Megascheloribates* gen. nov. from southeastern Australia, with comments on Scheloribatidae (Acarida: Cryptostigmata: Oripodoidea). *Invertebrate Taxonomy* **4**: 205-246.
- Luxton, M. (1985). *Cryptostigmata (Arachnida: Acari) - a concise review*. Fauna of New Zealand. Science Information Publishing Centre, DSIR, New Zealand.
- Paschoal, A.D. (1987a). A revision of the Pherolioididae, fam. n. (Acari: Oribatei). *Revista Brasileira de Zoologia, Sao Paulo* **3**: 357-384.
- Paschoal, A.D. (1987b). A revision of the Pedrocortesellidae, fam. n. (Acari: Oribatei). *Revista Brasileira de Zoologia, Sao Paulo* **3**: 385-395.
- Paschoal, A.D. (1989). Recharacterization of Gymnodamaeioidea and erection of the Plateremaeoidea (Acari: Oribatei), with key to families and genera. *Revista Brasileira de Zoologia, Sao Paulo* **6**: 191-200.
- Ryabinin, N.A. (1986). Beetle mites of the genus *Pedrocortesia* (Acariformes, Oribatei) in fauna of the USSR [in Russian]. *Russkii Zoologiceskij Zhurnal* **65**: 341-348.
- Tragardh, I. (1931). Acarina of the Juan Fernandez Islands. *Natural History of the Juan Fernandez and Easter Islands* **3**: 553-628.
- Woas, S. (1992). Beitrag zur Revision der Gymnodamaeidae Grandjean, 1954 (Acari, Oribatei). *Andrias* **9**: 121-161.