

# AUSTRALIAN MUSEUM SCIENTIFIC PUBLICATIONS

Hunt, Glenn S., 1996. A review of the genus *Pedocortesella* Hammer in Australia (Acarina: Cryptostigmata: Pedrocortsellidae). *Records of the Australian Museum* 48(3): 223–286. [11 December 1996].

doi:10.3853/j.0067-1975.48.1996.430

ISSN 0067-1975

Published by the Australian Museum, Sydney

nature culture **discover**

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## A Review of the Genus *Pedrocortesella* Hammer in Australia (Acarina: Cryptostigmata: Pedrocortesellidae)

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**ABSTRACT.** The paper reviews the genus *Pedrocortesella* Hammer in Australia and a rediagnosis is given for the genus. *Pedrocortesella propinqua* P. Balogh and *P. temperata* P. Balogh are redescribed and adults of 17 new species are described: *P. anica*, *P. augusta*, *P. bannisteri*, *P. bithongabela*, *P. callitarsus*, *P. calmorum*, *P. conundrum*, *P. enigma*, *P. gunjina*, *P. hangayi*, *P. impedita*, *P. kanangra*, *P. leei*, *P. nortoni*, *P. obesa*, *P. subula*, and *P. truncata*. *Pedrocortesella conundrum* and *P. kanangra* are regarded as *incertae sedis*. *Acupedicellus* Hunt & Lee, 1995 becomes a junior synonym of *Pedrocortesella* and a new combination is established for its type species: *Pedrocortesella cornuta* (Hunt & Lee, 1995). *Pedrocortesella dispersa* P. Balogh and *P. queenslandica* P. Balogh are assigned to different genera in other papers. A key is given to adults of the 22 Australian *Pedrocortesella* species currently recognised. Characters of systematic value are examined. Five possible species groups are discussed. The World distribution of the genus is briefly discussed and relevant literature cited.

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The mite superfamily Plateremaeoidea (*sensu* Marshall *et al.* (1987) is an important component of the oribatid fauna of Australian soils and arboreal habitats (Hunt, 1994; Hunt & Lee, 1995; Walter, 1995). *Pedrocortesella* Hammer is currently the most speciose genus in the superfamily in Australia. The other species-rich plateremaeoid genus, *Pheroliodes* Grandjean, will be reviewed elsewhere (Hunt, 1996a), as will some less species-rich, largely arboreal taxa (Hunt, 1996b; 1996c).

Species in the genus have an essentially Gondwanan distribution with extensions into Japan and the eastern Palearctic. Four species have been described from South America (Hammer, 1961; Fernandez, 1990; Eguaras *et al.*, 1990) including the type species *Pedrocortesella pulchra* Hammer; one from New Zealand (Hammer, 1966; Paschoal, 1987b); two from New Guinea (J. Balogh, 1968; 1970); four from Africa (Pletzen, 1963; J. Balogh, 1966; P. Balogh, 1985), four from Japan (Aoki, 1984; Aoki & Suzuki, 1970; Hunt, 1996b) and eight from the eastern Palearctic (J. Balogh & Mahunka,

1965; Aoki, 1974; Golosova, 1980; Grishina, 1981; Ryabinin, 1986). This list includes species originally placed in *Pedrocortesella* Hammer (J. Balogh & Mahunka, 1965; J. Balogh, 1966; 1970; Aoki, 1974; 1984; Grishina, 1981; Ryabinin, 1986) but probably belonging in *Pedrocortesella* or at least closely allied taxa (Paschoal, 1987a regards many as *incertae sedis*).

In other papers in this series, *Pedrocortesella dispersa* P. Balogh is placed in *Hexachaetoniella* Paschoal (Hunt, 1996b) and *P. queenslandica* P. Balogh is placed in combination with a new genus, *Labiogena* (described in this volume; see Hunt, 1996c).

Aside from an Eocene fossil record possibly of the genus (O'Dowd *et al.*, 1991), 22 *Pedrocortesella* species from Australia are recognised in this work, doubling the number of species in the genus. It is probable, however, that many new species remain to be discovered in other biogeographical regions, particularly if drier habitats are sampled more intensively.

Recent debate over the separate generic status of *Pedrocortesella* is reviewed by Hunt & Lee (1995) who list its differences from *Pheroliodes*, namely: enantiophyses and seta *ex* absent on prodorsum, two pairs of anal setae, presence of a concave area on the notogaster, and a different placement of some notogastral setae. It is possible, however, that a phylogenetic analysis will reveal that *Pedrocortesella* is not monophyletic.

Debate also exists over the family placement of *Pedrocortesella*. This is polarised around the highly split classification of Paschoal (1989) in which there is a proliferation of family level taxa, and the highly lumped classification of Woas (1992). In the latter, a single family accommodates all genera in the Plateremaeoidea *sensu* Marshall *et al.* (1987), that is all genera in the Plateremaeoidea+Gymnodamaeidae of Paschoal (1989). A thorough phylogenetic analysis is needed to help resolve the higher classification.

To avoid confusing matters further, I am following Balogh & Balogh (1992) who provide the most recent world overview of oribatid mites. These authors follow Paschoal (1987b, 1989) in placing *Pedrocortesella* in the Pedrocortesellidae Paschoal.

### Methods and Materials

Descriptions are arranged in alphabetical order and apply to adults only. A Cambridge Stereoscan 120 with Robinson Detector was used for scanning electron microscopy. The holotype of the type species and holotypes of Hammer's New Zealand species and P. Balogh's Australian species have been examined. The following abbreviations are used to indicate the present location of material: AM—Australian Museum, Sydney; ANIC—Australian National Insect Collection, Canberra; CNC—Canadian National Collections of Insects, Arachnids and Nematodes, Ottawa; ELU—Zoosystematical and Ecological Institute, Eotvos Lorand University, Budapest; FMNH—Field Museum of Natural History, Chicago; QM—Queensland Museum, Brisbane; SAMA—South Australian Museum, Adelaide; WAM—Western Australian Museum, Perth; ZMK—Zoologisk Museum, Copenhagen. CALM in collection data is an acronym for Department of Conservation and Land Management, Western Australia.

Specimens are preserved in alcohol unless otherwise stated. Reference to the colloquial term "berlesates" in species data denotes the numbered series of Berlese or Tullgren funnel residues housed by some institutions.

Many structures referred to in descriptions and the key are illustrated with their abbreviations in Figure 1. For clarity, some notogastral setae are selectively labelled in the figures. Measurements are in micrometers and ratios of notogaster length to width in descriptions are given in the actual measures, e.g., 540:460, for each specimen measured. "SEM stub numbers" refer to sequentially numbered stubs on which specimens have been mounted for scanning electron microscopy (SEM). The abbreviation "ill." means the specimen was used in illustrations.

### Setal Notation

The system of notogastral setal notation that is used in this work is modified from that used by Grandjean (1964) for *Pheroliodes wehncke* Grandjean. He uses *hl*,

*p1*, *p2* and *p3* where homologies with particular setae of primitive oribatids can be reasonably inferred; he uses *lp* (lateral posterior) for the remaining seta in *Ph. wehncke* as its homology cannot be inferred with the same level of confidence (Fig. 1C). The same notation for these setae can be applied to *Pedrocortesella conundrum* n.sp. In other *Pedrocortesella* species, however, homology of only *hl* and *p1* can be inferred with confidence (Fig. 1A,D); a less certain terminology of *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* is used for the remaining three pairs to indicate possible homology with setae in *Pheroliodes* and *Pe. conundrum*. If there are six pairs of notogastral setae, *lm* (lateral median) is used here for the most anterior pair (Fig. 1A).

The system of setal notation for appendages follows Grandjean (1964) which is explained by Norton (1977), and gnathosomal terminology follows Hammen (1967). The format of reporting genitoanal chaetotaxy is based on Paschoal (1987b) in his revision of *Pedrocortesella*, namely 6-7:1:2(rarely 3):2-3 which means 6-7 genital setae, 1 aggenital seta, 2(rarely 3) anal setae and 2-3 adanal setae.

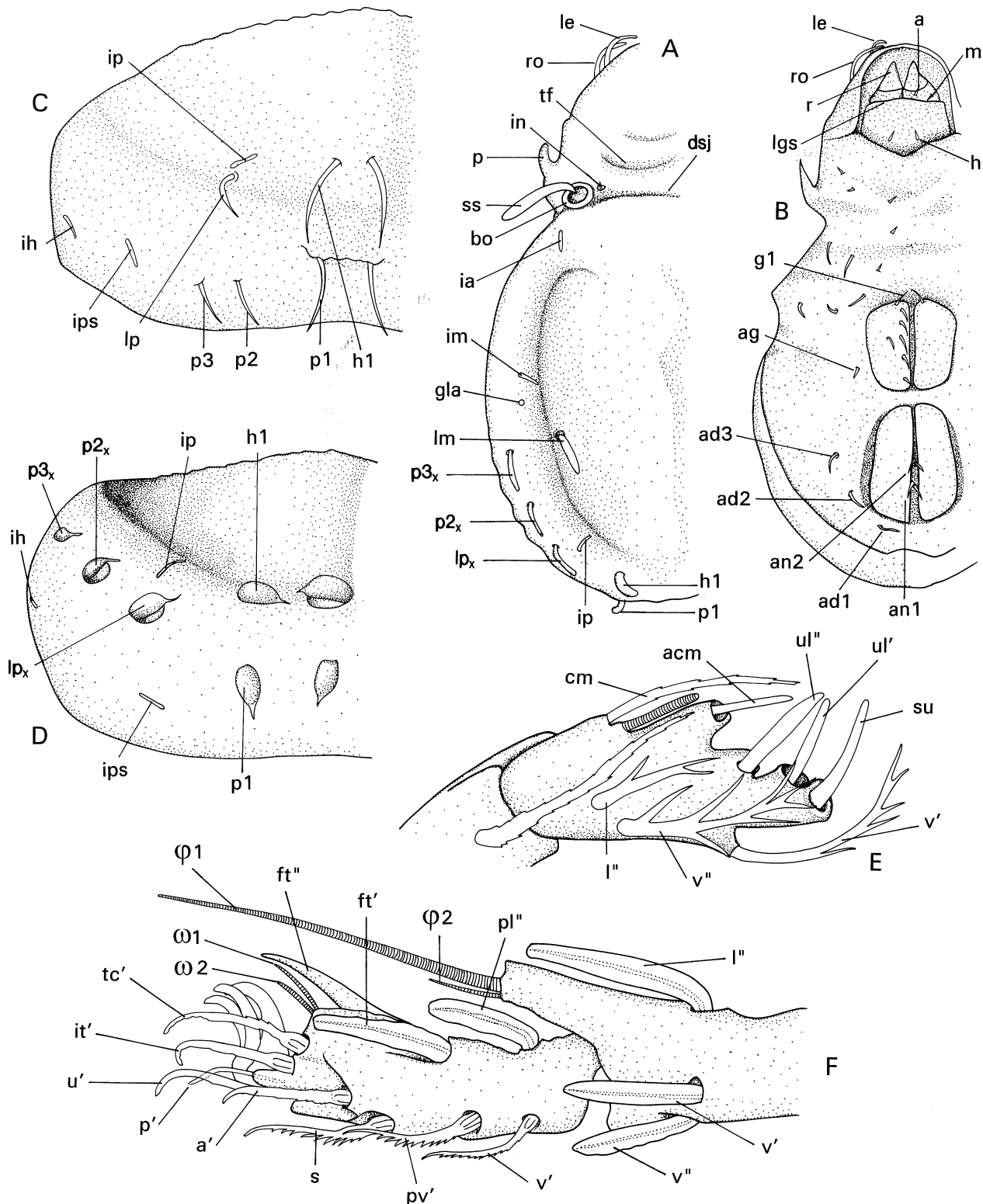
Terms used for integumental sculpturing are discussed under "Character Descriptions" below.

### Character Descriptions

**Integumental characters.** *Body*: Like many plateremaeoid genera, *Pedrocortesella* has an intricately ornamented integument which may be foveate (with more or less circular pits having flat or gently sloping floors) (Fig. 39B), alveolate (wide polygonal pits separated from adjacent pits by narrow walls) (Fig. 11A) or punctate (perforated by narrow pits with steep sides and no obvious floors) (Fig. 37A). Small foveae (foveolae) may grade into punctations. The walls separating pits may unite into a net-like or reticulate appearance (Fig. 11A), hence the term "reticulate-alveolate". The pattern on the notogaster is usually less developed in adults of species carrying exuvial scalps. In some species, the central part of the notogaster may have an irregular pattern of ridges and depressions though the basic reticulate-alveolate structure is frequently preserved on the margins and flanks. In some species, floors of foveae may be perforated by a visible pore (Fig. 39B). Punctations described for some species may prove to be these pores without the surrounding foveae. The fine structure of the integument is very useful in distinguishing species. The nominal species, *P. dispersa*, has foveae with a central raised mound of integument which seems to be a diagnostic character helping to define *Hexachaetoniella* (Hunt, 1996b).

**Leg integument.** The reticulate pattern of the leg integument varies according to species and where possible is illustrated for tarsus I in the descriptions below. The underlying reticulate pattern of the integument in *Pedrocortesella* is accentuated by the secreted cerotegument which caps it. In *Pheroliodes*, however, the cerotegument is typically distributed as separate tubercles.

**Cerotegument.** The entire integument is covered by a layer of secretion called cerotegument which tends to reflect the topography of the underlying surface. Fig. 46D illustrates



**Fig. 1.** Some structures of descriptive value. A = dorsum of *Pedrocortesella augusta* n.sp. (integumental sculpturing not shown), B = venter of *P. temperata* (integumental sculpturing not shown); C,D = posterior aspect of *Pheroliodes roblensis* (after Covarrubias (1968) and *Pedrocortesella leei* n.sp. (integumental sculpturing not shown); E = tarsus of pedipalp, antiaxial (system of notation after Grandjean, solenidion shown as striped); F = Tibia (distal) and tarsus of leg I, paraxial (system of notation after Grandjean, solenidia shown as striped). Other abbreviations: *dsj* = dorsosejugal suture; *ro*, *le*, *in* = rostral, lamellar and interlamellar setae; *p* = pedotectal tooth; *ss* = sensillus; *bo* = bothridium; *tf* = transverse furrow; *ia*, *im*, *ip* = anterior, median and posterior fissura; *ips* = lateral posterior fissura; *gla* = pore of opisthosomal gland; *h1*, *p1*, *p2*, *p3*, *p2x*, *p3x*, *lp*, *lm* = notogastral setae (see Methods); *lgs* = labiogenal suture; *h* = seta on mentum; *a*, *m* = setae on gena; *r* = rutellum; *g1* = first genital seta; *ag* = aggenital seta; *an1* = first adanal seta; *ad1* = first adanal seta. Setae on epimera I-IV shown but not labelled.



cerotegument peeled back to expose the underlying integument. Raised structures like walls between foveae usually have raised stellate deposits of cerotegument (Fig. 39B) which may coalesce into crests (Fig. 39I); raised deposits occur less frequently on the floors of foveae. The manner of cerotegumental coating of setae on the body and legs is often species specific (e.g., Figs 5D and 7B).

**Exuvial scalps.** Notogastral exuviae are carried by immatures and also habitually by adults of two Australian species: *P. temperata* P. Balogh (Fig. 43A) and *P. cryptoreticulata* Hunt & Lee.

**Bothridium.** In *Pedrocortesella*, the bothridium abuts the notogaster somewhat more closely than in *Pheroliodes*. Consequently, the posterior wall of the bothridium is largely missing in some species. The shape of the bothridium is useful in separating some species.

**Sensillus.** In *Pedrocortesella*, the sensillus nearly always has the form of a petiolate, tuberculate blade with a rounded distal margin (Fig. 39D). The blade is generally broader than in *Pheroliodes* (Hunt, 1996a). Only two species placed in *Pedrocortesella*, *P. nortoni* n.sp. and *P. enigma* n.sp., have an ovoid, clavate sensillus (Fig. 34E). Other species with an ovoid sensillus, including the nominal *P. dispersa* and *P. queenslandica*, are referable to different genera (Hunt, 1996b; 1996c). *Pedrocortesella truncata* n.sp. has an apparently uniquely truncate sensillus with a reticulate, not tuberculate, surface.

**Rostral setae (ro) and lamellar setae (le).** In most plateremaeoids, setae *le* are well anterior to setae *ro*, an atypical condition for oribatids. The relative separation of *le*, that is how dorsally they are set, can be a specific character (cf., Figs 14E and 31B).

**Interlamellar setae (in).** Each is placed on an apophysis close to the mesad wall of the bothridium and usually at the edge of the dorsosejugal suture (Fig. 1A). Their precise location is a specific character. In *Labiogena*, they are generally situated further from the bothridium than in *Pedrocortesella* (Hunt, 1996c).

**Setae ex.** These are absent in *Pedrocortesella* but one pair of exobothridial setae occurs in *Pheroliodes*.

**Pedotectal tooth (p).** This is present in nearly all plateremaeoid taxa. In *Pedrocortesella* it is a conical structure which may vary according to species. Its apex lies close to trochanter 1. The tooth may limit the posterad movement of leg I, and in some species seems to engage a cavity in the trochanter.

**Median transverse furrow.** A deep transverse furrow separates the bothridial region from the remainder of the prodorsum and may represent the division between the two prodorsal tagmata. Unlike *Pheroliodes*, there are no enantiophyses (opposing horns) on either side of the furrow, nor a prominent transverse bar immediately anterior to it. The furrow is barely visible in some taxa related to *Pedrocortesella* (Hunt, 1996c).

**Carinae.** The prodorsum is marked with crests,

particularly in the bothridial region. These were described by Paschoal (1987b) as "apodemes". They are visible in the scanning electron micrographs but are not specifically described here, except for a transverse carina between setae *ro* and *le* which occurs in some species. No costulae are present as the carinae are not associated with the lamellar setae.

**Intramarginal depression.** The notogaster appears flattish in lateral view (Fig. 34B) but is actually depressed in a roughly U- or O-shaped region inside the margin; the notogastral margin and the central area tend to be convex while the area between is concave (Fig. 34A). The shape of the depression varies according to species. A more uniformly convex notogaster occurs in *Pheroliodes*.

**Fissurae (lyrifissurae).** Three pairs of large slits occur dorsally on the notogaster and from anterior to posterior are called fissurae *ia*, *im* and *ip* (Fig. 1A). Their orientation and length are thought to be species characters, though orientation can be quite variable. The scanning electron micrographs showing detail of the integument normally include fissura *im* (e.g., Fig. 22C). Fissurae on the lateral margin and venter are not described here.

**Number of notogastral setae.** In adults of most plateremaeoid taxa, the notogastral setae lie posterior to fissura *im* and are confined to the posterolateral and posterior margins and flanks. In *Pedrocortesella* and close relatives there are usually five pairs of notogastral setae, and less commonly six pairs.

**Position of notogastral setae.** In *Pheroliodes*, all five pairs of setae lie posterior to fissura *ip* (Fig. 1C). In species of *Pedrocortesella* with five pairs of setae, one pair (*h1*) is situated mid-posteriorly on or near the notogastral margin (Fig. 1D); another pair (*p1*) lies ventral to *h1* on the posterior flank; three pairs lie just inside or on the posterolateral margin, one usually posterior to fissura *ip*, two usually anterior to *ip* (Figs 1D, 31A,B). This condition appears to have involved the migration of setae *p2* and *p3* from their nymphal position on the posterior flank.

Five Australian species have six pairs of setae. Three species referable to *Hexachaetoniella* (see Hunt, 1996b), including *H. dispersa* (P. Balogh), have a broad leaf-like seta closely mesad of each fissura *im*. *Pedrocortesella augusta* n.sp. has a sixth seta lying well inside the lateral margin mesad to the most anterior marginal seta, well posterad to fissura *im* and the opisthosomal gland opening *gla* (Fig. 1A). *Pedrocortesella kanangra* n.sp. has its additional seta in file with other posterolateral setae (Fig. 20F). *Pedrocortesella conundrum* has its sixth (most anterior) seta well inside the lateral margin, with the other setae distributed on the posterolateral flank.

The position of the sixth seta in plateremaeoids is variable and presence of the seta alone is not a generic character. However, in Australian species being referred by Hunt (1996b) to *Hexachaetoniella*, the sixth seta corresponds in position to that in the type species, *H. sexpilosa* (Hammer). Its position is regarded as a diagnostic character for that genus.

No consistent terminology of notogastral setae in *Pedrocortesella* presently exists. Aoki & Suzuki (1970,

fig. 1) use a notation that assumes homologies with setae in primitive oribatid mites are known, whilst Paschoal (1987b), Eguaras *et al.* (1990, fig. 1), Fernandez (1990, fig. 1) and Hunt & Lee (1995, fig. 6C) use notations where only some homologies are established. Additionally, these authors use differing notations for particular setae. Paschoal's interpretation of setal homology is preferred but uncertain homology with setae in *Pheroliodes* (Fig. 1C), as described by Grandjean (1964), is indicated by using  $lp_x$ ,  $p2_x$  and  $p3_x$  (see Methods, and Fig. 1).

**Form of notogastral setae.** Size and apparent shape can vary according to species or population (cf. Figs 41E and 16D, and Figs 41F and 41G). Apparent shape in scanning electron micrographs is strongly influenced by enveloping cerotegument; for example a setiform seta can appear leaf-shaped in scanning electron micrographs because of surrounding cerotegument.

**Caudal notch and carina.** A caudal concavity or notch visible from above under a dissecting microscope may be present in some species, particularly those from Western Australia (Fig. 16D). A caudal carina between setae  $p1$  occurs in some species (Fig. 2G).

**Gnathosoma.** Although not frequently studied, the gnathosoma provides some characters useful at species or higher levels. *Pedrocortesella* lacks a mental tectum except for a small tectum present in *P. nortoni*. *Labiogena* has a well-developed mental tectum (Hunt, 1996c).

On the pedipalp tarsus the presence or length of barbs on seta  $l''$ , the relative length of the apophysis supporting the eupathidial seta  $acm$  and the length of the solenidion are useful at the species and/or genus levels.

The chelicera has shelf-like processes antiaxially and paraxially near the ventral surface of the movable digit of the chela (Figs 3B,C and 26B). These are possibly equivalent to oncofyses (see Hammen, 1967). The antiaxial shelf seems to work against a notch in the rutellum (Figs 26B, 40C) and may aid in breaking food. Their structure is particularly well shown in Figs 3C, 26B. The antiaxial shelf is smaller in *Pheroliodes* but otherwise the significance of these structures as specific or generic characters is not established.

**Epimeral region.** All species in the group have a constant epimeral formula of 3:1:3:3 (setae illustrated though not labelled in Fig. 1B). The three setae of epimeron IV are arranged in a V so that one seta lies lateral to the genital aperture. This seta should not be confused with the aggenital seta which is in a more posterior position. The precise placement of epimeral setae is not considered a useful character in this group and is not described. In several species, particularly some from Western Australia (which also have a caudal notch), the epimeral region (involving epimera III and IV) is markedly convex, anterior to the genital valves, and tends to overhang them (Fig. 38A). This results in a more posterad position of genital seta  $g1$  (Fig. 38F).

**Ventral plate. Genital setae.** There are six to seven pairs of genital setae,  $g1$  being the most anterior (Fig. 1B), usually arranged either in an approximately straight file near the inner margin of each genital valve (Fig. 38F), or in an arc (Fig. 40E). Paschoal (1987b) regarded these

as diagnostic character states respectively for *Hexachaetoniella* and *Pedrocortesella*, although both states are now known for species with five notogastral setae. Additional useful specific characters are the proximity of setae to the inner anterior and posterior corners of the genital valve, and if particular genital setae occur in a marginal notch. *Pedrocortesella temperata* has a seta offset laterad from the others (Fig. 1B).

**Aggenital setae (ag).** There is one pair of aggenital setae, each of which is set lateral to the genital valve, near its posterior corner (Fig. 1B). In *Hexachaetoniella*, they are set posterior to the genital valves (Hunt, 1996b).

**Anal and adanal setae.** There are two pairs of anal setae. These are set in a groove inside the lip of each anal valve (Fig. 1B), a condition which seems common in Plateremaeoidea and Liodoidea. An exception occurs in *P. enigma* which has three pairs of anal setae.

There are usually three adanal setae,  $ad1$  being most posterior and usually occurring posterior to the anal valve (Fig. 1B). Seta  $ad3$  is usually the most laterad and its relative position is a useful specific character. *Pedrocortesella leei* n.sp. and *P. nortoni* have only two pairs of adanal setae, arranged near the posterior end of each valve suggesting  $ad3$  may have been lost.

**Separation of anal and genital vestibules.** The anal and genital vestibules are the cavities in the ventral plate which bear the anal and genital valves. The area between is bridged by integument: the mesal area of integument not affected by transverse grooves is termed the "isthmus". The separation of the vestibules in *Pedrocortesella* has three character states: (i) relatively broad with little or no interruption of ventral plate microsculpture between the vestibules (Fig. 19A); (ii) narrower with interruption to ventral plate microsculpture but with a transversely wide mesal isthmus not affected by strong transverse grooves between the vestibules (Fig. 40A); (iii) very narrow separation with deep transverse grooves and a transversely narrow isthmus (Fig. 38A).

**Legs.** Tarsus I has been surveyed for all species. The pattern of the integument and degree of cerotegumental coating of setae are specific characters (cf. Figs 10A and 19D). The spatial relationships in the tarsal cluster, e.g., whether seta  $ft''$  and the solenidia are contained within the same or separate rims, are of specific importance. A distal recess, which apparently receives the retracted claw complex, is present in some species, and the length of the stalk supporting the claw complex also varies. A condition, which may be termed "terminal compression", occurs in many species—the terminal part of the tarsus between seta  $ft''$  and the claw complex is shortened so that in the extreme case, for example *P. leei* (Fig. 33C), the solenidia *omega*, setae (*tc*), (*it*) and (*u*) come to lie almost vertically beneath one another. The cavity containing the undeveloped famulus (seta *epsilon*) is visible under the scanning electron microscope in only a few species, unlike the situation in *Pheroliodes* where a conspicuous sclerotised ring surrounds the opening of the cavity. As in Australian *Pheroliodidae*, *Pedrocortesella* species lack iter setae on the tarsus of leg IV.

***Pedrocortesella* Hammer, 1961**

*Pedrocortesella* Hammer, 1961: 38.—P. Balogh, 1985: 49.—Luxton, 1985: 37.—Paschoal, 1987b: 386; 1989: 198.—Balogh & Balogh, 1988: 92; 1992: 48.—Fernandez, 1990: 84.—Eguaras *et al.*, 1990: 276.—Hunt & Lee, 1995: 245. *Acupedicellus* Hunt & Lee, 1995: 232, **new synonym**. (Type species: *A. cornutus* Hunt & Lee, 1995 by original designation.)

**Type species.** *Pedrocortesella pulchra* Hammer, 1961, by monotypy.

**Diagnosis.** Prodorsum with deep transverse furrow, enantiophyses lacking, bothridium abutting notogaster, sensillus nearly always a petiolate blade, rarely a petiolate club; seta *ex* absent; notogaster flattish in lateral aspect, usually concave inside the margin; integument alveolate-reticulate, foveate-reticulate or punctate; 5–6 pairs of notogastral setae, 2–3 of which are anterior to fissura *ip*, setae *p2<sub>x</sub>* never lateral or posterior to *ip*; setae *p2<sub>x</sub>* and *p3<sub>x</sub>* at same level as *h1*, not on posterior flank at same level as *p1*; *lm* if present not mesad of fissura *im* but well posterior to it; seta *ag* anterior to posterior margin of genital valves; 2 (rarely 3) pairs of anal setae, 2–3 pairs adanal; tarsal cluster orientated dorsad or distodorsad, solenidion *omega 1* usually shorter than seta *ft*"; integument of legs usually reticulate or in wavy crests; iterate setae absent on tarsus of leg IV.

**Description**

Plateremaeoid mites of medium size (400–750 µm); body covered with layer of cerotegument, reticulation pattern and other high points usually with stellate cushion-like mounds of cerotegument which often coalesce into crests; notogaster of adults ovate, adult carrying exuvial scalps or scalps may be absent or missing; prodorsum with deep transverse furrow but no enantiophyses; seta *le* lateral or dorsolateral, *ro* ventrolateral; seta *ex* absent; seta *in* small, spinous and arising from apophysis; bothridium with posterolateral carina; bothridium abutting notogaster, its posterior wall sometimes incomplete; distal part of sensillus usually a flattened, tuberculate blade; notogaster flattish in lateral aspect, concave

intramarginally, concave area often U-shaped or obovate; integument alveolate-reticulate, foveate-reticulate, or punctate; 5–6 pairs of marginal setae in posterior part of notogaster, setae *h1*, *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* situated dorsally, latter two always anterior to fissura *ip*; *p1* situated on posterior flank ventral to *h1*, *lm* usually absent, if present situated well posterior to fissura *im*; pedipalp tarsus seta *l*" usually with barbs, apophysis supporting eupathidial seta *acm* short; ventral antiaxial and paraxial processes on chelicera well developed; anal and genital plates close; genitoanal chaetotaxy 6–7:1:2(rarely 3):3(rarely 2); genital setae either forming straight line near inner margin of plate, or forming an arc; seta *ag* anterior to posterior margin of genital valves; setae *ad1* usually posterior to anal plates, setae *ad3* usually most laterad; cerotegument on legs reticulate, often forming strong wavy crests; leg tarsi heterotridactylous, laterals weaker than central prong; stalk usually short and stout, tarsus sometimes with distal recess to receive retracted unguital complex; tarsal cluster of leg I with seta *ft*" and solenidia *omega 1* and 2 usually surrounded by collar, though former may be partitioned from solenidia; entrance to cavity containing undeveloped famulus (seta *epsilon*) not usually visible under SEM; *omega 1* and 2 usually shorter than *ft*"; iterate setae absent on tarsus of leg IV.

**Comments.** The belief by Aoki (1974, 1984) and Ryabini (1986) that *Pedrocortesella* is a junior synonym of *Pedrocortesia* is not accepted in this work. *Pedrocortesia* is now regarded by most authors as a junior synonym of *Pheroliodes*, whereas *Pedrocortesella* is regarded as a separate taxon (Hunt & Lee, 1995).

Hunt & Lee (1995) erected the monotypic genus *Acupedicellus* for *A. cornutus*. Increased knowledge of the Australian fauna and re-examination of the type species of *Pedrocortesella* suggest that the variation in leg I structure on which the genus was based does not warrant separate generic status. The dorsal apophysis on the femur of leg I and the tapering tarsus are best regarded as autapomorphies for the species. The species becomes *Pedrocortesella cornuta*, n.comb.

The nominal species *P. dispersa* and *P. queenslandica* each represent radiations which warrant separate generic status and are redescribed elsewhere (Hunt, 1996b; 1996c).

**Key to adults of Australian species of *Pedrocortesella***

(For identification under transmitted light the animal should be cleared. Scalps, if present, should be noted and removed to assist identification).

- 1 Terminal part of sensillus a flattened blade (Figs 39D and 39A show different aspects), curved and not truncate distally ..... 2
- Terminal part of sensillus either with a rounded club-like head (Fig. 34E) or truncate distally (Fig. 46B) ..... 21
- 2 Notogaster with large seta placed mesad of most anterior marginal seta (Fig. 1A) ..... *P. augusta* n.sp.
- Notogaster without a seta placed mesad of most anterior marginal seta (Fig. 41E) ..... 3
- 3 Notogaster with conspicuous caudal concavity or notch (when body is horizontal and viewed from above) (Fig. 22A) ..... 4

- Notogaster without conspicuous caudal concavity or notch  
(when body is horizontal and viewed from above) (Fig. 39A)..... 10
- 4 Notogaster pitted by punctations or small foveae (Fig. 41E)..... 6
- Notogaster not pitted by punctations or small foveae ..... 5
- 5 Notogaster centrodorsally with an irregular pattern of ridges  
(Fig. 25A) ..... *P. hangayi* n.sp.
- Notogaster centrodorsally reticulate, anteriorly with prominent  
mesal carina (Fig. 22A)..... *P. gunjina* n.sp.
- 6 Femur of leg I with very strong dorsal process; or tarsus of  
leg I gradually tapering to the stalk supporting claw complex  
(see fig. 6D in Hunt & Lee, 1995) ..... *P. cornuta* (Hunt & Lee) n.comb.
- Femur of leg I without a strong dorsal process; tarsus of leg  
I with abrupt transition to the stalk supporting the claw  
complex..... 7
- 7 Notogastral setae including cerotegument leaf-shaped (Fig.  
41F); northern Australia..... *P. subula* n.sp.
- Notogastral setae including cerotegument not leaf shaped (Fig.  
14B,D); northern or southern Australia..... 8
- 8 Notogastral integument with reticulate pattern of high relief,  
particularly around margins (Fig. 16A); north-west Australia ..... *P. calmorum* n.sp.
- Notogastral integument without reticulate pattern of high relief  
(Fig. 5D), most conspicuous elements of notogastral integument  
are foveae or punctations; southern Australia..... 9
- 9 Lateral notogastral setae arising from pits no larger than  
punctations or foveae (Fig. 37E); epimera III-IV form a  
prominent V-shaped fold over the genital valves (Fig. 38A) ..... *P. obesa* n.sp.
- Lateral notogastral setae arising from pits much larger than  
punctations or small foveae (Fig. 14B); epimera III-IV form  
a weak V-shaped fold over the genital valves (Fig. 15A)..... *P. callitarsus* n.sp.
- 10 Notogaster punctate (Fig. 14B); or, if foveate, at least some  
foveae perforated by pores (Fig. 39B); or pores may lie in  
small foveae between irregular transverse ridges (Fig. 2A,D)..... 11
- Notogaster not punctate and without visible pores in foveae;  
notogaster with foveae or alveoli..... 13
- 11 Notogaster with conspicuous broad foveae, or pores in small  
foveae (which may appear as punctations) lying between  
irregular transverse ridges (Fig. 2A,D)..... 12
- Notogaster without broad foveae or transverse ridges, covered  
with numerous punctations ..... *P. callitarsus* n.sp.
- 12 Notogaster without transverse ridges (Fig. 39A,B); insertion  
of seta *ad3* level with anterior 30% of anal valve (Fig. 40G) ..... *P. propinqua* P. Balogh
- Notogaster with irregular transverse ridges (Fig. 2A,D);  
insertion of seta *ad3* level with posterior 66% of anal valve ..... *P. anica* n.sp.
- 13 Notogaster with rounded foveae, (Fig. 31A); or only 2 adanal  
setae on each side ..... *P. leei* n.sp.

- Notogaster reticulate with angular (Fig. 8A) or irregular (Fig. 25A) depressions; or 3 adanal setae on each side ..... 14
- 14 Each genital valve with 6 setae close to the inner lip and with another seta offset laterad (Fig. 1B)..... *P. temperata* P. Balogh
- Each genital valve without an offset seta, all 6–7 setae arranged in straight or arcuate file..... 15
- 15 Six setae on each genital valve ..... 16
- Seven setae on each genital valve ..... 18
- 16 Notogaster with fairly uniform reticulate pattern (Figs 20F, 18A); notogaster with 6 pairs of setae ..... 17
- Notogaster with irregular pattern of reticulations and ridges (fig. 1A in Hunt & Lee, 1995); notogaster with 5 pairs of setae ..... *P. semireticulata* Hunt & Lee
- 17 3 pairs of notogastral setae inserted anterior to fissura *ip* ..... *P. kanangra* n.sp.
- Less than 3 pairs of notogastral setae inserted anterior to fissura *ip* ..... *P. conundrum* n.sp.
- 18 Reticulate pattern across entire notogaster bold and regular (Fig. 11A) ..... 20
- Reticulate pattern on central part of notogaster very subdued (fig. 3G,I in Hunt & Lee, 1995); or bold but not of regular form across entire notogaster (Fig. 27A) ..... 19
- 19 Reticulate pattern on notogaster very subdued (Fig. 3G&I in Hunt & Lee, 1995); scalps firmly held on notogaster... *P. cryptoreticulata* Hunt & Lee
- Reticulate pattern on notogaster bold but irregular (Fig. 27A); lateral notogastral setae arise from small apophyses (Fig. 27F); scalps if present loosely attached ..... *P. impedita* n.sp.
- 20 Notogastral setae long, coated with thick cerotegument (Fig. 8G); Western Australia ..... *P. bannisteri* n.sp.
- Notogastral setae short, not coated with thick cerotegument (Fig. 11G); eastern Australia ..... *P. bithongabela* n.sp.
- 21 Sensillus with a rounded club-like head (Fig. 34E); Tasmania ..... 22
- Sensillus truncate (Fig. 46B,C); 2 pairs of anal setae; eastern mainland Australia ..... *P. truncata* n.sp.
- 22 Two pairs of anal setae and 2 pairs of adanal setae ..... *P. nortoni* n.sp.
- Three pairs of anal setae and 3 pairs of adanal setae ..... *P. enigma* n.sp.

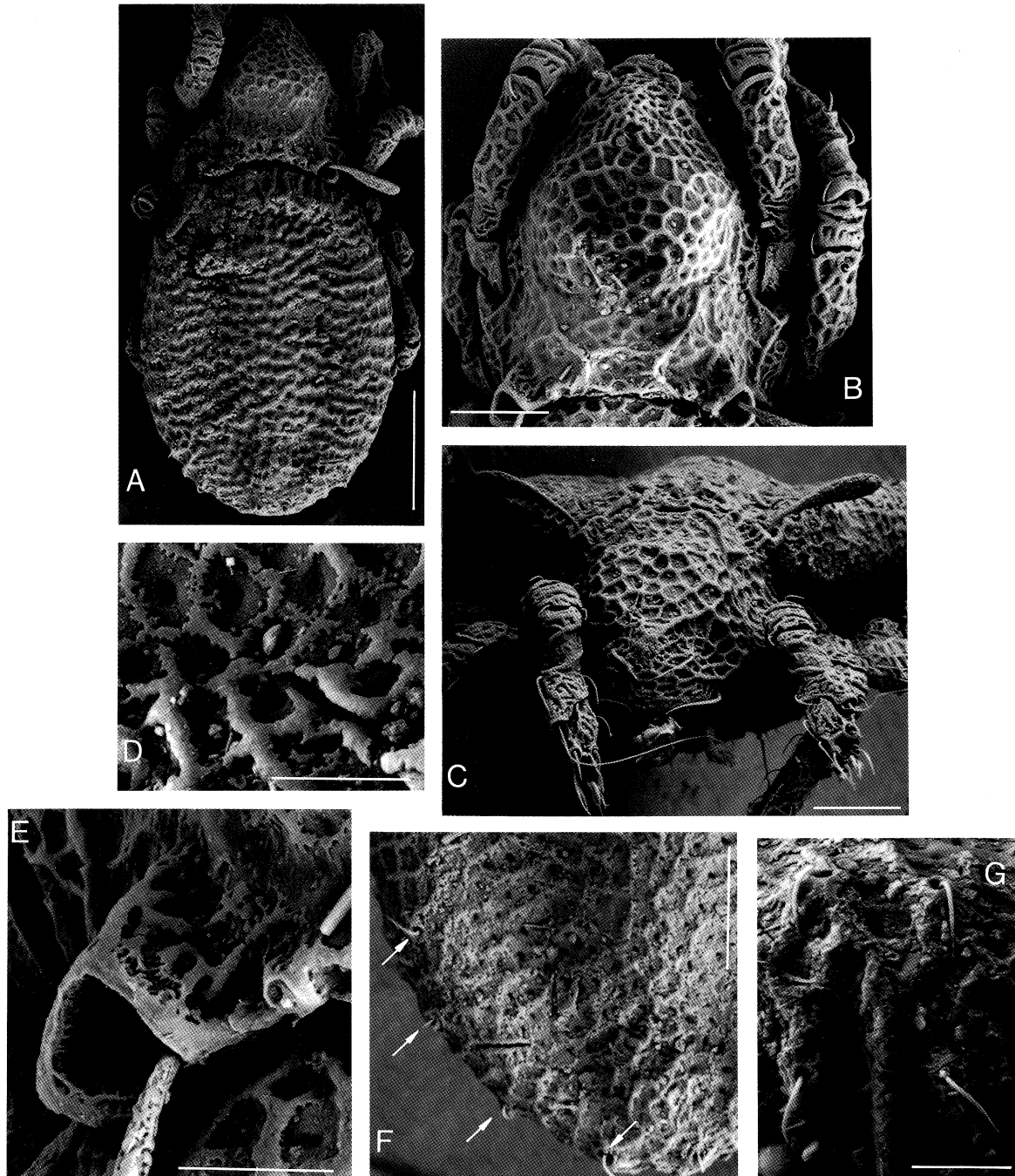
### Descriptions of *Pedrocortesella* species

#### *Pedrocortesella anica* n.sp.

Figs 2, 3, 4A–C

**Type material.** Australian Capital Territory: HOLOTYPE adult. ANIC, Black Mountain, Canberra, 35°16'S 149°06'E, open forest, extraction leaf litter, ANIC berlesate 1067, T. Weir, 20 October 1986. PARATYPE adults. ANIC, same data as

holotype, 6 adults; AM KS46544, SEM stub no. S/256 (ill.), same data 5 adults; AM KS43682, same data, 2 adults; FMNH, same data, 2 adults; CNC, same data, 2 adults; AM KS46546, SEM stub no. S/170 (ill.), beside Federal Highway, just N. of Canberra on NSW/ACT border, 35°23'S 149°23'E, open forest beneath *E. viminalis*, berlese extraction of leaf litter, G.S. Hunt, 10 May 1992, 3 adults; AM KS43683, same data, 13 adults; AM KS46557, SEM stub no. S/122 (ill.), 1 km



**Fig. 2.** *Pedrocortesella anica* n.sp. A, body, dorsal; B, prodorsum, dorsal; C, prodorsum, frontal; D, notogastral integument and fissura *im*; E, bothridium and seta *in*, dorsal; F, part of posterior of notogaster, dorsal, arrows right to left label setae *hl*, *lp*, *p2*, *p3*; G, notogastral setae *hl* and *p1*, posterior view. Scale bars: A = 100  $\mu$ m; B,C,F = 50  $\mu$ m; D,G,E = 20  $\mu$ m. A,C,F,G = Canberra; B,D,E = Mount Gingera.

N. of Mount Gingera, 35°33'S 148°47'E, berlese extraction moss, ANIC berlesate 699, A. Calder, 18 February 1981, 3 adults.

**Other material examined.** New South Wales: AM KS46558, SEM stub no. S/243, Kanangra-Boyd National Park, 34°03'S 150°05'E, closed forest, berlese extraction, litter and moss, ANIC berlesate 828, L. Hill, 20 March 1992, 2 adults; AM KS46559, SEM stub no. S/119, 4.8 km E.N.E. of Moruya, 35°55'S 150°06'E, ANIC berlesate 267, tea tree, N.J. Mitchell 30 March 1970, 2 adults; AM KS43684, Adaminaby, 36°00'S 148°47'E, ex soil in paddock, 18 June 1984, 4 adults.

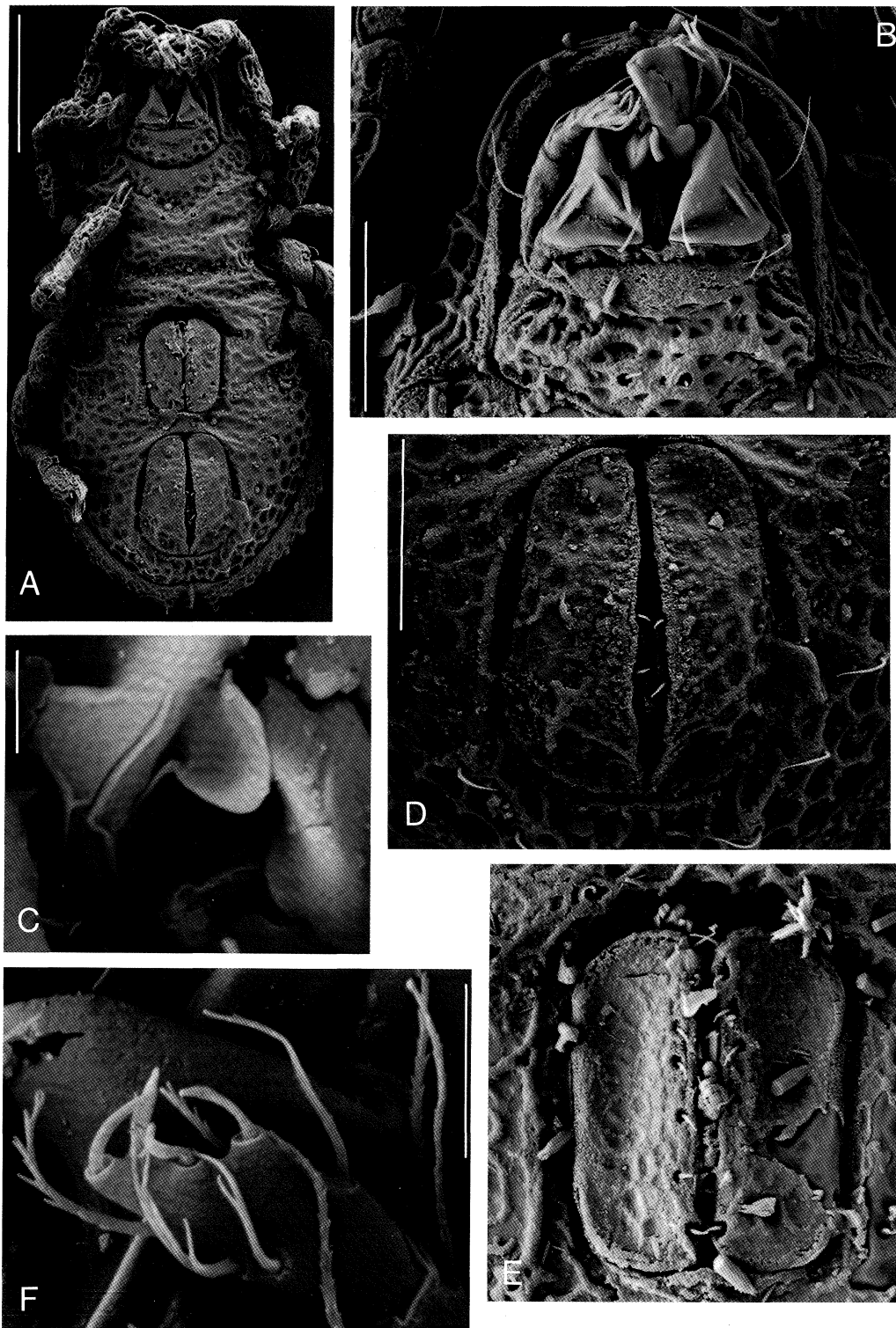
**Diagnosis.** Body medium, length about 450–550  $\mu$ m; scalps rarely (if at all) carried by adult; sensillus with long flattened tuberculate blade; notogaster reticulate-

foveate, each small fovea perforated by pore, integument with transverse ridges between lines of foveae; 5 pairs of notogastral setae, each arising from pit; genitoanal chaetotaxy 7:1:2:3, genital setae in essentially straight file, insertion of seta *ad3* adjacent to posterior half of anal valve; claw stalk very short.

### Description

**ADULT:** *Body:* brown; length ( $\mu$ m) 450, 460, 520, 530. *Cerotegument:* body generally with thin veneer of cerotegument; reticulations on prodorsum and notogaster and rim of bothridium highlighted with crests of cerotegument (Fig. 2D,E). Setae *ro* and *le* and notogastral

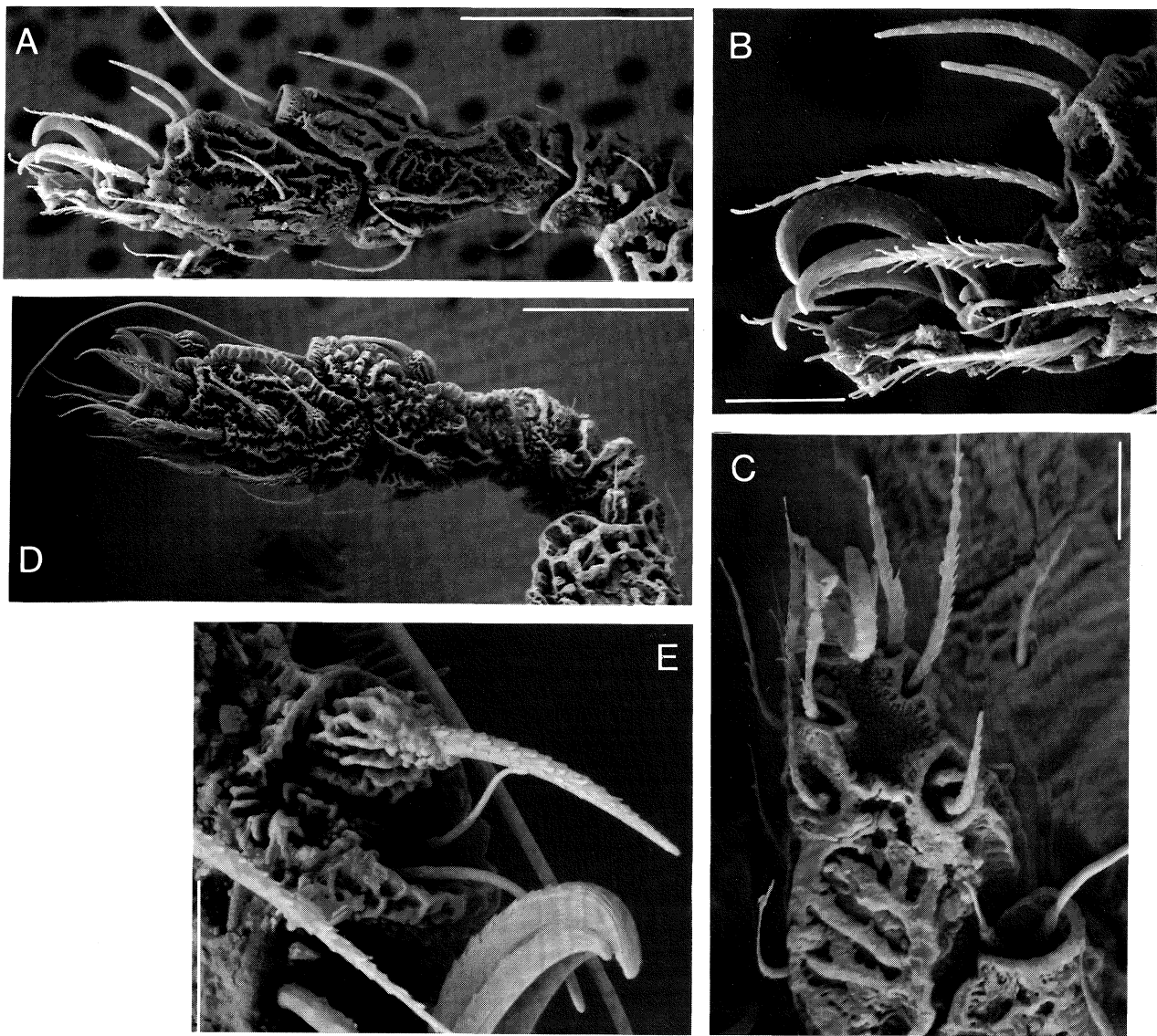




**Fig. 3.** *Pedrocortesella anica* n.sp. A, body, ventral; B, subcapitulum; C, chelicera: ventral paraxial and antiaxial processes; D, anal valves; E, genital valves; F, pedipalp. Scale bars: A = 100  $\mu$ m; B,D,E = 50  $\mu$ m; F = 10  $\mu$ m; C = 5  $\mu$ m. A,C,D,F = Canberra; B,E = Mount Gingera.

setae without obvious cerotegument. *Prodorsum*: integument reticulate-alveolate particularly anterior to median transverse groove, some alveoli with pores; carina between *le* and *ro* present or absent; *le* dorsolateral, distance between them about 0.60 distance between *ro*, not arising from large pit, *ro* ventrolateral. Pedotectal tooth tapering to more delicate point than *P. propinqua*. Bothridium closely adpressed to notogaster (Fig. 2E),

wall subtriangular and depressed posteriorly and anterolaterally, posterolateral carina moderately strong, situated close to notogaster; sensillus length about 0.9 interbothridial distance, with long flattened tuberculate blade (Fig. 2C), posterior margin of prodorsum forming a somewhat irregular arc between bothridia. *in* small, set  $>0.5 < 1.0$  bothridial diameter from bothridial wall, at edge of dorsosejugal furrow, spiniform, largely

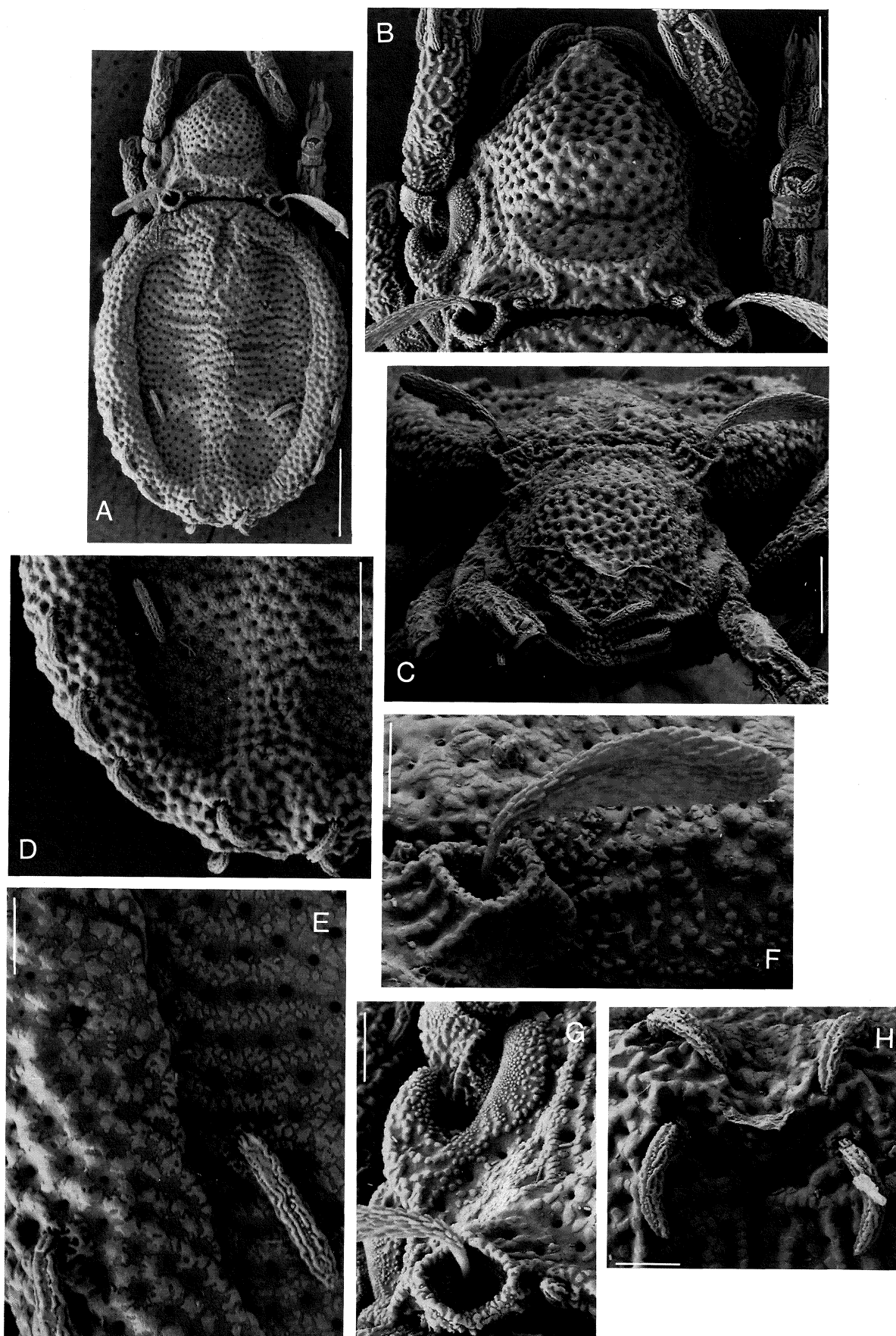


**Fig. 4.** *Pedrocortesella* spp. Leg I structures. A–C: *Pedrocortesella anica* n.sp. A, genu, tibia and tarsus, antiaxial; B, detail tarsus, distal; C, tibia (distal) and tarsus, dorsal. D,E: *Pedrocortesella callitarsus* n.sp. D, genu, tibia and tarsus, antiaxial; E, tarsal cluster, detail. Scale bars: A,D = 50 µm; B,C,E = 10 µm. A–C = Canberra; D,E = Mount Gingera.

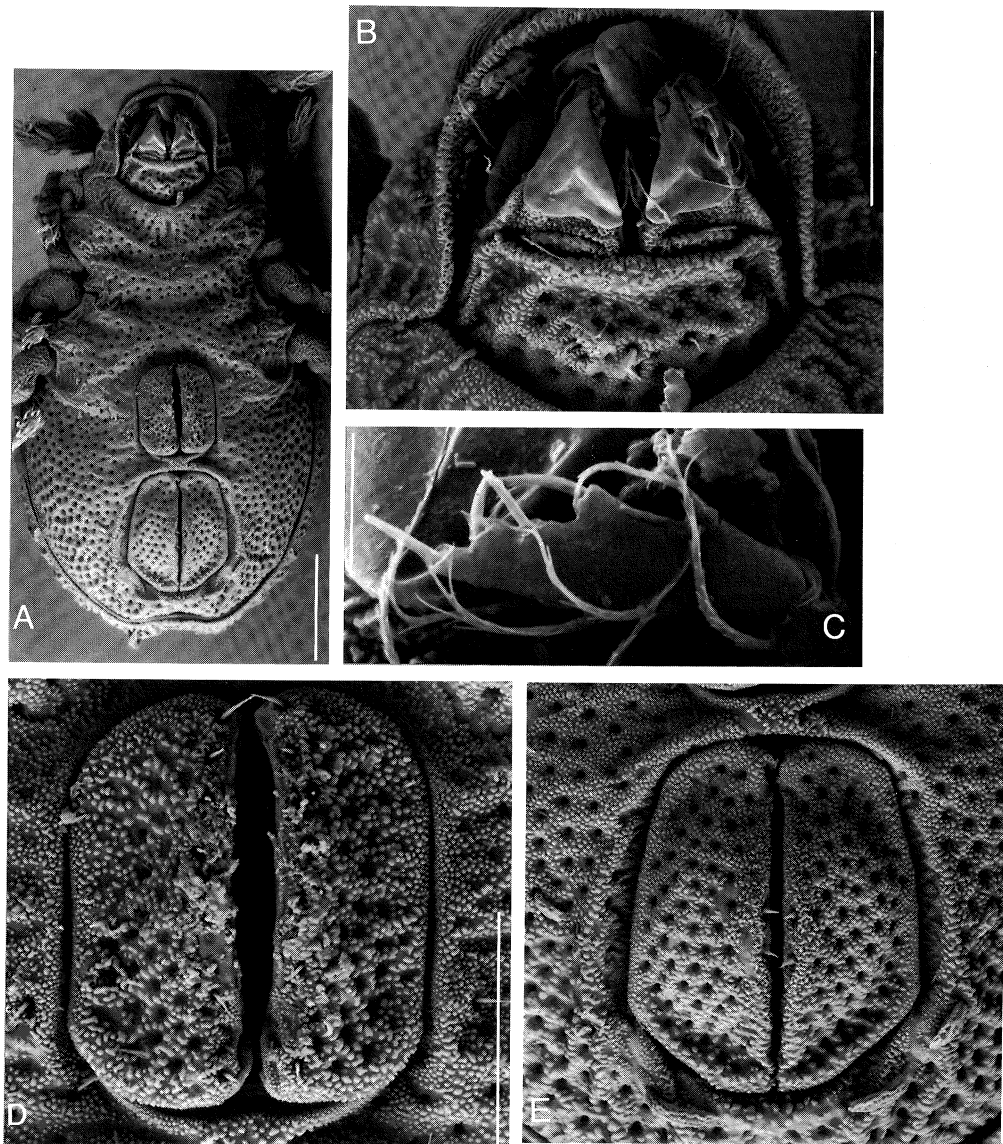
encased in cerotegument (Fig. 2E). *Exuvial scalps*: none seen. *Notogaster*: oval, length:width 320:250, 350:270. Intramarginal depression oval. Notogaster foveate-reticulate and perforated by pores, patterning of integument tending to form subtransverse wavy ridges, more pronounced laterally, connecting ridges weaker (Fig. 2A,D,F); posterior margin barely invaginate when viewed from above, with a strong carina between setae *p1* when viewed posteriorly (Fig. 2G). Fissura *ia* subparallel-oblique, *im* oblique and *ip* oblique-perpendicular to sagittal plane; 5 pairs of short notogastral setae arising from pits larger than adjacent punctations; *h1* moderately separated, each located just inside posterior margin; *p1* inserted lower than midheight on posterior flank, similarly spaced or slightly further apart than *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise just inside posterolateral flank, their insertions easily visible from above, *lp<sub>x</sub>* and *p2<sub>x</sub>* subequidistant from fissura *ip*, *lp<sub>x</sub>* inserted posterior to it (Fig. 2F). *Gnathosoma*: cheliceral movable finger ventrolaterally with prominent shelf on antiaxial surface

and larger but more flexible flap on paraxial surface. Rutella basally with moderate concave flexure and strong pair of lateral buttress, small pointed mesad processes present, transverse striations absent (Fig. 3B). Pedipalp tarsus with setae (*vt*) and *l''* with long barbs, *cm* with short barbs, apophysis supporting seta *acm* short; solenidion *omega* almost reaching to base of *acm*. *Epimeral region*: strongly convex anterior to genital valves, though not tending to overhang them. *Genitoanal region*: separation of anal and genital vestibules relatively broad but with interruption to ventral plate microsculpture, wide mesal isthmus without strong transverse grooves between the vestibules (Fig. 3A). Ventral plate reticulate-alveolate. Genitoanal chaetotaxy 7:1:2:3; genital setae essentially in straight file (Fig. 3E), *g1* subequal to other setae, at anterior corner in marginal notch; *g5* situated at about 0.5 valve length, *g7* inserted well anterior to inner posterior corner in marginal notch; setae *ag* inserted at level of *g7*; setae *ad1* distinctly postanal, *ad3* level with posterior half of anal valve; *ad1*–3 inserted





**Fig. 5.** *Pedrocortesella augusta* n.sp. A, body, dorsal; B, prodorsum, dorsal; C, prodorsum, frontal; D, posterior part of notogaster, dorsal; E, notogastral integument, fissura *im* and notogastral setae *lm* and *p3*; F, bothridium, sensillus and seta *in*, lateral; G, bothridium, seta *in* and pedotectal tooth *p*, dorsal; H, notogastral setae *hl* and *pl*, posterior view. Scale bars: A = 100  $\mu$ m; B–D = 50  $\mu$ m; E–H = 20  $\mu$ m.



**Fig. 6.** *Pedrocortesella augusta* n.sp. A, body, ventral; B, subcapitulum; C, pedipalp tarsus, antiaxial; D, genital valves; E, anal valves. Scale bars: A = 100  $\mu$ m; B,D,E = 50  $\mu$ m; C = 10  $\mu$ m.

in small pits (Fig. 3D). *Legs.* Distal apophysis of tibia overlaps about 40% of tarsus (Fig. 4A). Tarsal cluster of leg I placed distodorsally on apophysis, slightly proximodorsal to setae *tc*; *ft*", *omega* 1 and 2 enclosed in well-developed almost circular common rim, no partition separating *ft*" from *omega* 1 and 2; *ft*" longer than solenidia; tarsus with distal recess for receiving retracted unguinal complex (Fig. 4C), stalk very short (Fig. 4B).

**Variation.** The Kanangra-Boyd National Park specimen has a single buttress on the rutellum. The Moruya specimen, which has seta *in* very close to the bothridium, six pairs of genital setae, and a slightly different patterning of the notogaster, may belong to a different species.

**Etymology.** The specific epithet is the Latinised acronym of Australian National Insect Collection (ANIC) whose staff collected much of the material.

**Distribution.** SE New South Wales, and Australian Capital Territory.

### *Pedrocortesella augusta* n.sp.

Figs 1A, 5–7

**Type material.** Western Australia: HOLOTYPE adult, WAM, Augustus Island, CALM Site 26/1, 15°25'S 124°38'E, closed forest litter, ANIC berlesate 1082A, I.D. Naumann, 11–16 June 1988. PARATYPE adults. AM KS46535, SEM stub no. S/355 (ill.), same data as holotype, 1 adult; WAM, SEM stub no. S/149 (ill.), same data, 3 adults; AM KS43677, same data, 1 adult; CNC, same data, 1 adult; ANIC same data, 4 adults.

**Diagnosis.** Body medium, length about 500–600  $\mu$ m; scalps rarely (if at all) carried by adult; sensillus with long flattened tuberculate blade; notogaster reticulate-foveate, each fovea with pore, notogaster with slight caudal notch when viewed from above, anteriorly with a mesal groove, 6 pairs of long notogastral setae, seta *lm* lying well inside lateral margin mesad to most anterior marginal seta; genitoanal chaetotaxy 7:1:2:3, genital setae in slightly arcuate file, level of insertion of seta *ad*3 at about 0.5 anal valve length; claw stalk short.

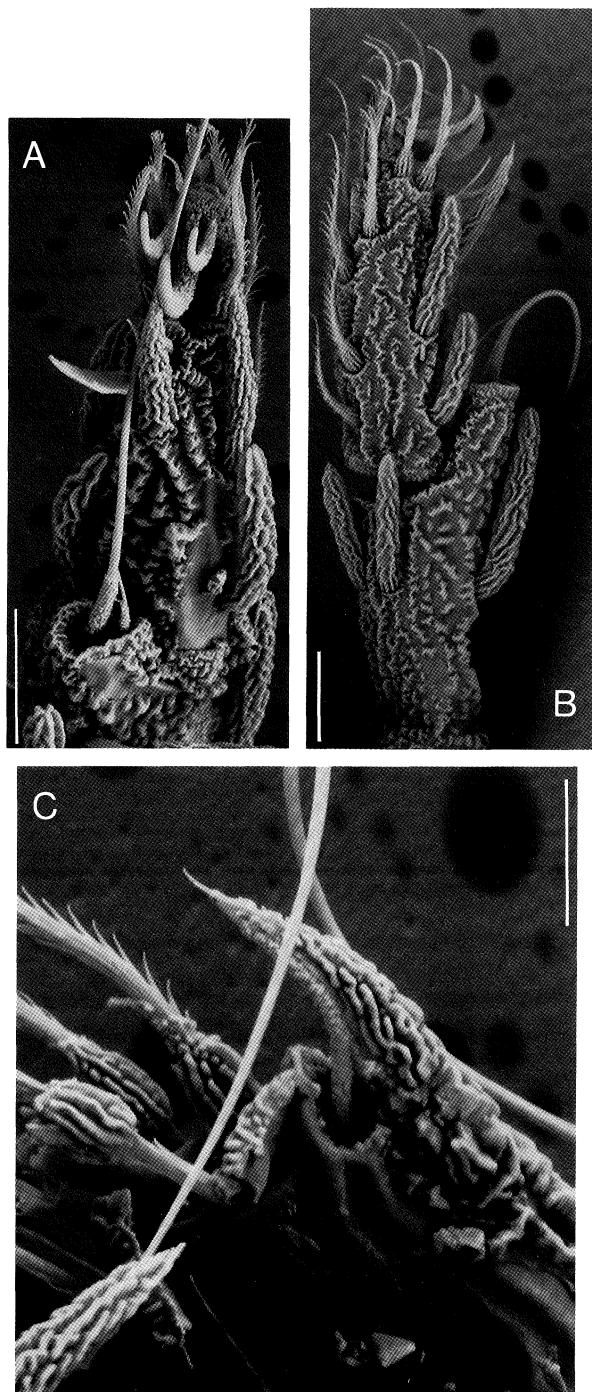


Fig. 7. *Pedrocortesella augusta* n.sp. Leg 1 structures. A, tibia (distal) and tarsus (dorsal); B, tibia and tarsus, paraxial; C, tarsal cluster, dorso-antiaxial. Scale bars: A,B = 20 µm; C = 10 µm.

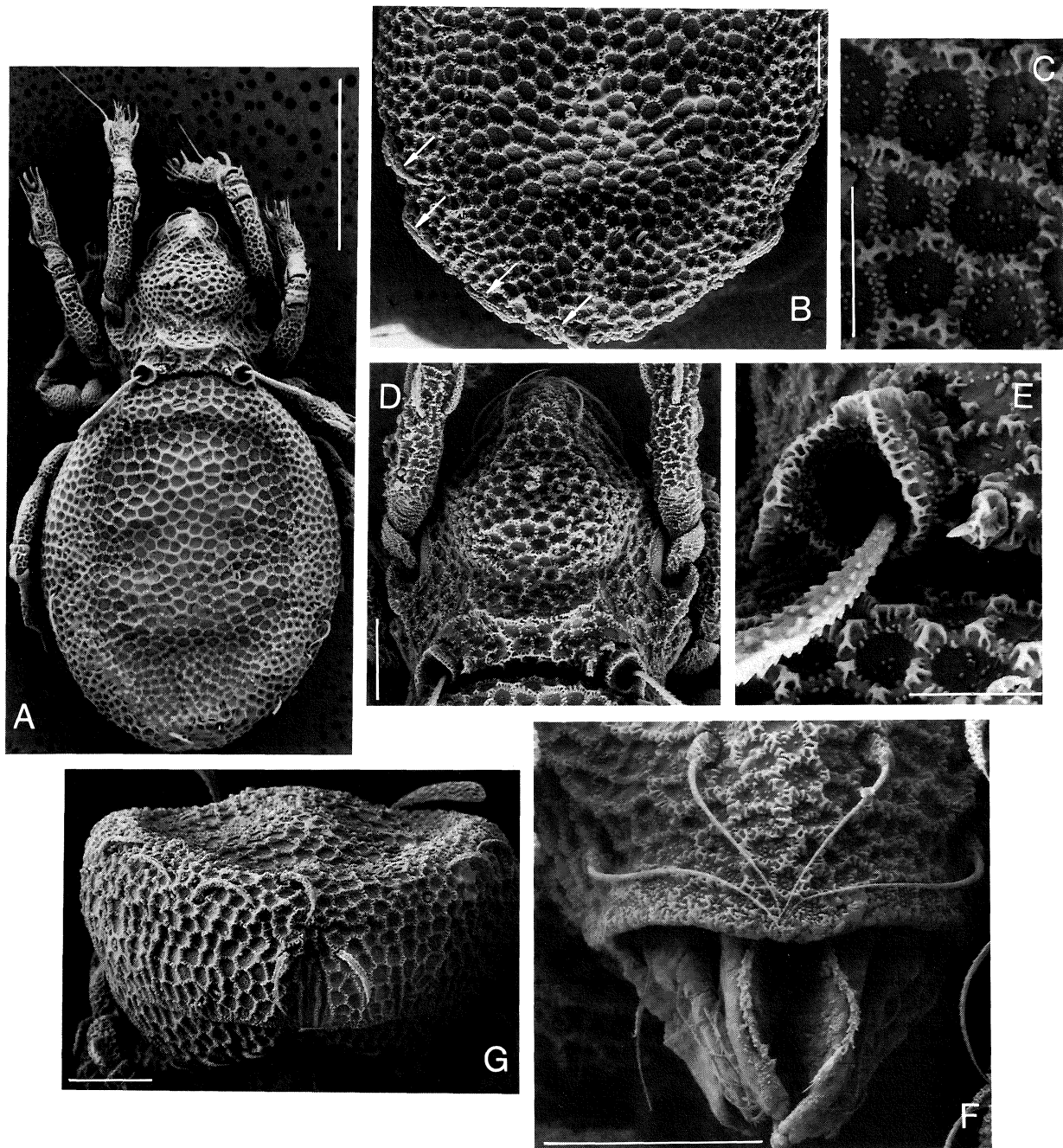
### Description

**ADULT:** *Body:* brown; length (µm) 520, 540, 550, 560. *Cerotegument:* body generally with thin veneer of cerotegument with irregular raised patches on walls surrounding punctations on notogaster (Fig. 5E) and granules on venter (Fig. 6D,E). Setae *ro* and *le*, notogastral and leg setae with longitudinal wavy ribs of cerotegument. *Prodorsum:* integument punctate (Fig. 5B). *le* dorsolateral, distance between them about 0.7 distance between *ro*, not arising from large pit, *ro* ventrolateral; weak carina between *le* and *ro*. Pedotectal tooth stouter than in *P. propinqua*, prodorsum with

prominent condyle-like surface dorsal to trochanter I. Bothridium abutting but not closely adpressed to notogaster (Fig. 5B), wall somewhat oval shaped, posterior wall not deeply excavated, posterolateral carina moderately strong, arising away from notogaster; sensillus length subequal to interbothridial distance, with long flattened tuberculate blade (Fig. 5C). *in* small, set close bothridium and at edge of dorsosejugal furrow, encased in cerotegument (Fig. 5C,F). *Exuvial scalps:* none seen. *Notogaster:* oval, length:width 370:290. Raised lateral margins very sharply delineated from intramarginal depression by distinct line; depression divided into two by mesal saddle; anterior margin with longitudinal mesal groove (Fig. 5A,C). Notogaster punctate or foveate-reticulate, each small fovea perforated by a large pore (Fig. 5E); posterior margin slightly invaginate when viewed from above, without a mesal carina when viewed posteriorly (Fig. 5H). Fissura *ia* subparallel and *im* and *ip* oblique to sagittal plane; *gla* conspicuous and close to *im*. 6 pairs of notogastral setae; *h1* widely separated, each located inside posterior margin; *p1* inserted high on posterior flank, similar distance apart to *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise just inside posterolateral flank, their insertions easily visible from above, *lm* arises well inside lateral margin within the intramarginal depression and slightly anterior to *p3* but well posterior to both fissura *im* and *gla*. *lp<sub>x</sub>* closest to fissura *ip*, inserted lateral to it (Fig. 5D), and *lm* closest to fissura *im*. *Gnathosoma:* rutella basally with strong chevron-shaped concave flexure and weak lateral buttressing, pointed mesad processes and transverse striations absent (Fig. 6B). Pedipalp tarsus with setae *l''* and (*vt*) with very long barbs, *cm* branches short; apophysis supporting seta *acm* moderately strong; solenidion *omega* short, not reaching to base of *acm*. *Epimeral region:* epimera IV very strongly convex immediately anterior and lateral to genital valves, though not overhanging them. *Genitoanal region:* separation of anal and genital vestibules relatively narrow with deep transverse grooves and a narrow isthmus between the vestibules (Fig. 6A). Ventral plate punctate. Genitoanal chaetotaxy 7:1:2:3; genital setae essentially in straight file, *g1* inserted just inside inner anterior corner, not in marginal notch; *g5* situated at about 0.5 valve length, *g7* inserted anterior to inner posterior corner, not in marginal notch; setae *ag* inserted at level posterior to *g6*; setae *ad1* distinctly postanal, *ad3* level at about 0.5 length of anal valve. *Legs.* Distal apophysis of tibia overlaps less than 30% of tarsus (Fig. 7B). Tarsal setae (*pl*) and (*ft*) almost entirely enclosed by longitudinal ribs of cerotegument. Tarsal cluster of leg I placed distodorsally on apophysis, above and slightly proximal to setae *tc*; *ft''* enclosed in poorly defined rim; *omega 1* and 2 close together with a separate rim elevated on an apophysis; *ft''* slightly longer than solenidia; tarsus lacking distal recess for receiving retracted unguital complex, stalk short.

**Comments.** The distinct separation of tarsus I seta *ft''* from the solenidia in this species is unusual for Australian *Pedrocortesella*, as is having six pairs of notogastral setae. The placement of the additional seta is very similar to that in *P. japonica* Aoki & Suzuki (subsequently placed in *Hexachaetoniella* by Paschoal (1987b) and labelled as seta *h2* by Aoki & Suzuki (1970, fig. 1). Further investigation may warrant erection of a new genus for these two species.





**Fig. 8.** *Pedrocortesella bannisteri* n.sp. A, body, dorsal; B, notogaster, posterior, dorsal, arrows right to left label setae *h1*, *lp*, *p2*, *p3*. C, notogastral integument; D, prodorsum, dorsal; E, bothridium and seta *in*, dorsal; F, rostrum, frontal; G, notogaster, posterior. Scale bars: A = 200  $\mu$ m; B,D,F,G = 50  $\mu$ m; C,E = 20  $\mu$ m.

**Etymology.** The specific epithet refers to the animal's impressive qualities and alludes to Augustus Island on which the species occurs.

**Distribution.** Augustus Island, Western Australia.

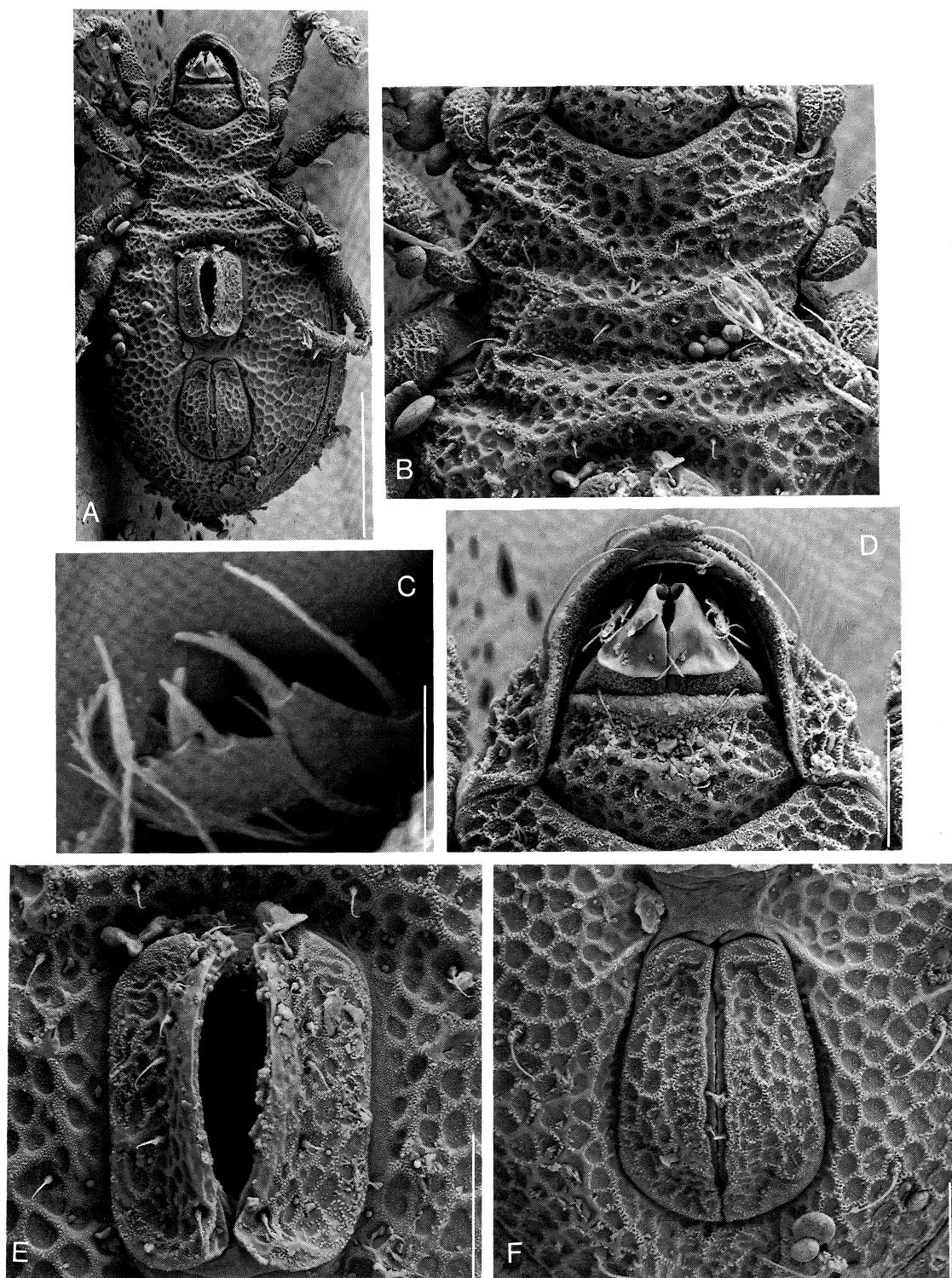
***Pedrocortesella bannisteri* n.sp.**

Figs 8, 9, 10D–E

**Type material.** Western Australia: HOLOTYPE adult. WAM, York, 31°53'S 116°46'E, Powder bark/Mallee leaf litter, berlesate, J. Bannister, 2 November 1991. PARATYPE adults. AM KS46524, SEM stub 150 (ill.), same data as holotype, 2 adults; AM KS43671, same data, 1 adult.

**Other material examined.** Western Australia: AM KS46525, SEM stub no. S/147 (ill.), Mount York, 31°53'S 116°48'E, berlesate She-oak litter, J. Bannister, 16 November 1991, 1 adult.

**Diagnosis.** Body medium-large, length about 550–700  $\mu$ m; scalps rarely (if at all) carried by adult; sensillus with long flattened tuberculate blade; notogaster entirely alveolate-reticulate, without pores in alveoli, notogaster without caudal notch when viewed from above, 5 pairs of long notogastral setae; genital and anal vestibules widely separated; genitoanal chaetotaxy 7:1:2:3, genital setae in arcuate file, level of insertion of *ad3* between proximal 30–40% of anal valve; claw stalk medium.

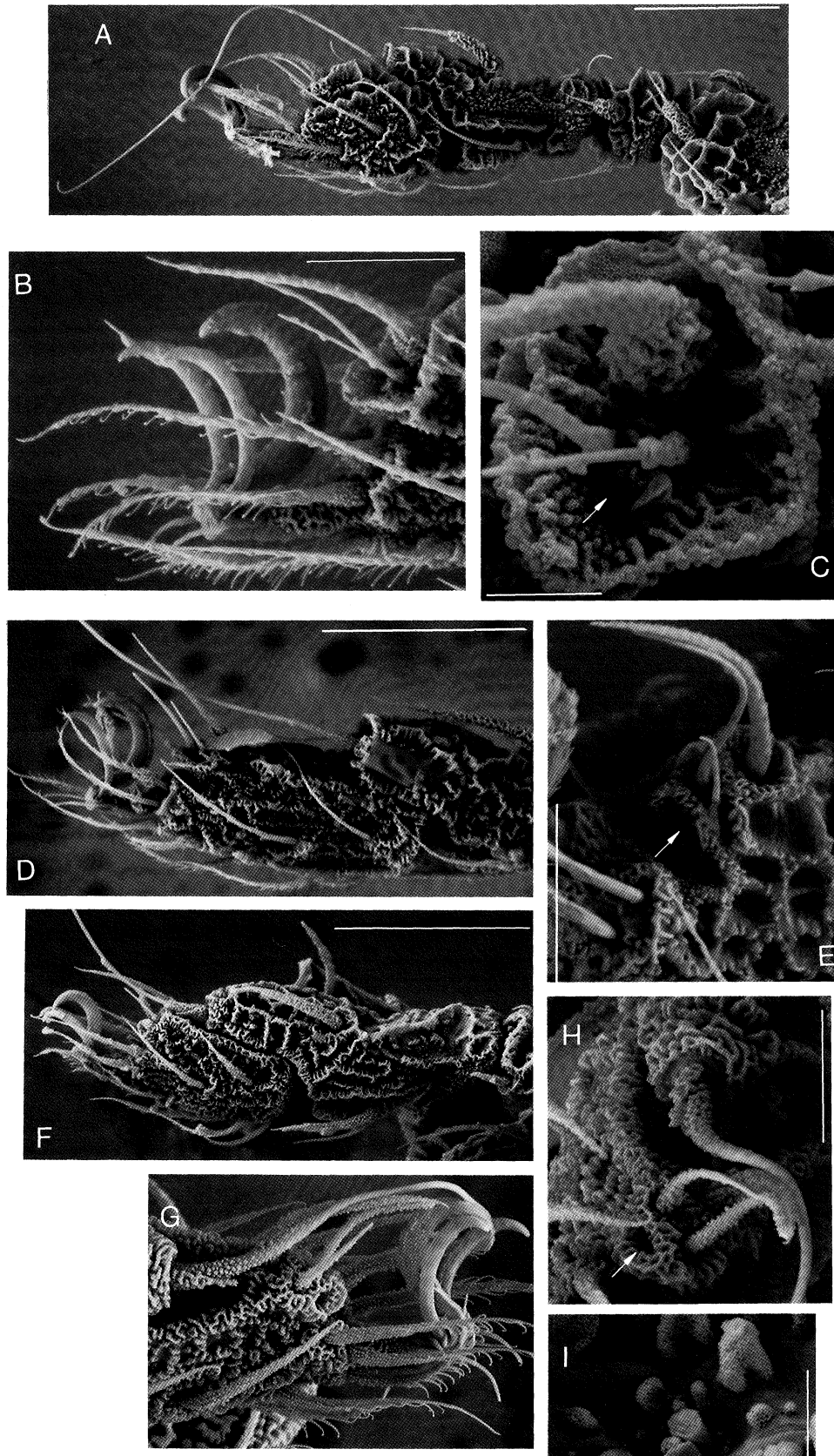


**Fig. 9.** *Pedrocortesella bannisteri* n.sp. A, body, ventral; B, epimeral region; C, pedipalp tarsus; D, subcapitulum; E, genital valves; F, anal valves. Scale bars: A = 200 µm; B,D-F = 50 µm; C = 10 µm.

### Description

**ADULT: Body:** brown; length of 4 specimens from the York area are 590, 640, 650 and 670 µm. **Cerotegument:** crests of reticulations on prodorsum and notogaster and rim of bothridium with stellate tubercles of cerotegument which may coalesce giving a "stitched" appearance (Fig. 8C); alveoli with scattered granules of cerotegument (Fig. 8C). Setae *ro* and *le* and notogastral setae with heavy, tapering ribbed encrustation of cerotegument

along most their length (Fig. 8G). Legs with cerotegument capping the reticulate surface ornamentation which is of much lower relief than in *P. propinqua*. **Prodorsum:** integument divided into 2 fields: anterior to median transverse furrow reticulate-foveate, foveae not perforated by pore, reticulations larger towards the rostrum; a bothridial field of more complex topography with reticulations and carinae (Fig. 8D). **le** dorsolateral, distance between them about 0.3–0.5 distance between *ro*, not arising from large pit, *ro* ventrolateral. Pedotectal



**Fig. 10.** *Pedrocortesella* spp. A–C, I: *Pedrocortesella propinqua* P. Balogh; A, genu, tibia and tarsus, antiaxial; B, detail of tarsus, distal; C, detail of tarsal cluster; I, alveolus of seta *in* (seta broken) and surrounding cerotegument tubercles. D–E. *Pedrocortesella bannisteri* n.sp.; D, tibia (distal) and tarsus, antiaxial; E, detail of tarsal cluster. F–H: *Pedrocortesella obesa*, n.sp.; F, tibia and tarsus, antiaxial; G, detail of tarsus, distal; H, detail of tarsal cluster. Arrows to presumed opening to cavity containing undeveloped famulus (seta *epsilon*). Scale bars: A, D, F = 50  $\mu$ m; B, E = 20  $\mu$ m; G, H = 10  $\mu$ m; C, I = 5  $\mu$ m. A = Casino; B, C = Mount Allyn; D, E = Mount York; F–H = Margaret River; I = Gulpa Island.



tooth similar to *P. propinqua*. Bothridium closely adpressed to notogaster, wall more deeply excavated posteriorly (Fig. 8E) and more rounded than in *P. propinqua*; posterolateral carina situated close to notogaster; sensillus length subequal to interbothridial distance, with long flattened tuberculate blade, broadest subdistally and rounded at end (Fig. 8G). Setae *in* small, set near bothridium at edge of dorsosejugal furrow, spiniform but basally encased in cerotegument (Fig. 8E). *Exuvial scalps*: none seen. *Notogaster*: oval but wide, length:width 2 specimens 440:360, 440:350. Intramarginal depression obovate, broadest anteriorly, not interrupted posteriorly. Dorsum entirely alveolate-reticulate, without pores in alveoli (Fig. 8C). Posterior margin not invaginate when viewed from above, with slight mesal furrow and no prominent carina (though reticulations may become linear) ventral to setae *p1* when viewed posteriorly (Fig. 8G). Fissura small; *ia* subparallel, *im* oblique and *ip* subperpendicular to sagittal plane. 5 pairs of long notogastral setae; *h1* widely separated but converging at their tips, each located just inside posterior margin; *p1* inserted high on posterior flank, slightly closer together than *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise on posterolateral flank, their insertions just visible from above, *lp<sub>x</sub>* closest to fissura *ip*, inserted posterior to it (Fig. 8B). *Gnathosoma*: pedipalp tarsus with setae (*vt*) and *l''* with very long barbs, *cm* barbs very short; apophysis supporting seta *acm* low; solenidion *omega* reaching to base of *acm*. Rutella basally with moderate concave flexure and buttressing, but without pointed mesad process; transverse striations absent (Fig. 9D). *Epimeral region*: convex immediately anterior to genital valves, but not overhanging them. *Genitoanal region*: separation of anal and genital vestibules relatively broad but with interruption to ventral plate microsculpture, wide mesal isthmus without strong transverse grooves between the vestibules (Fig. 9F). Aggenital and adanal areas and genital and anal valves reticulate-alveolate, no pores. Genitoanal chaetotaxy 7:1:2:3; genital setae in arcuate file, all except *g7* removed from mesal suture, *g5* and *g6* most so; *g1* in a notch on anterior margin slightly removed from inner anterior corner of valve; *g5* situated at about 0.5 valve length, *g7* inserted anterior to inner posterior corner, not in a notch; setae *ag* inserted at level between *g6* and *g7*; setae *ad1* postanal, *ad2* at or just posterior to posterolateral corner of anal valve, *ad3* level with proximal 0.3–0.4 of anal valve. *Legs*. Distal apophysis of tibia I overlaps about 30% of tarsus. Tarsal cluster of leg I placed distodorsally on a short apophysis, above and slightly proximal to setae *tc*; *ft''* enclosed in its own rim; *omega 1* and *2* slightly ventral to it and enclosed in a separate rim, widely separated and shorter than *ft''* (Fig. 10E), hole (presumably cavity for undeveloped *famulus*) present (Fig. 10E, arrow); tarsus lacking distal recess for receiving retracted unguital complex, stalk medium length.

**Comments.** The antieriad position of setae *ad3*, strongly arcuate placement of genital setae and broad separation of genital and anal vestibules suggest that this species is closely related to *P. propinqua*. It differs in the shape of the intramarginal depression on the notogaster, having an almost perfect oval depression which is not interrupted posteriorly. In *P. propinqua*, the depression is vase-shaped and interrupted posteriorly.

**Etymology.** The specific epithet honours John Bannister, former Director of the Western Australian Museum, who collected the material.

**Distribution.** York area, east of Perth, Western Australia.

*Pedrocortesella bithongabela* n.sp.

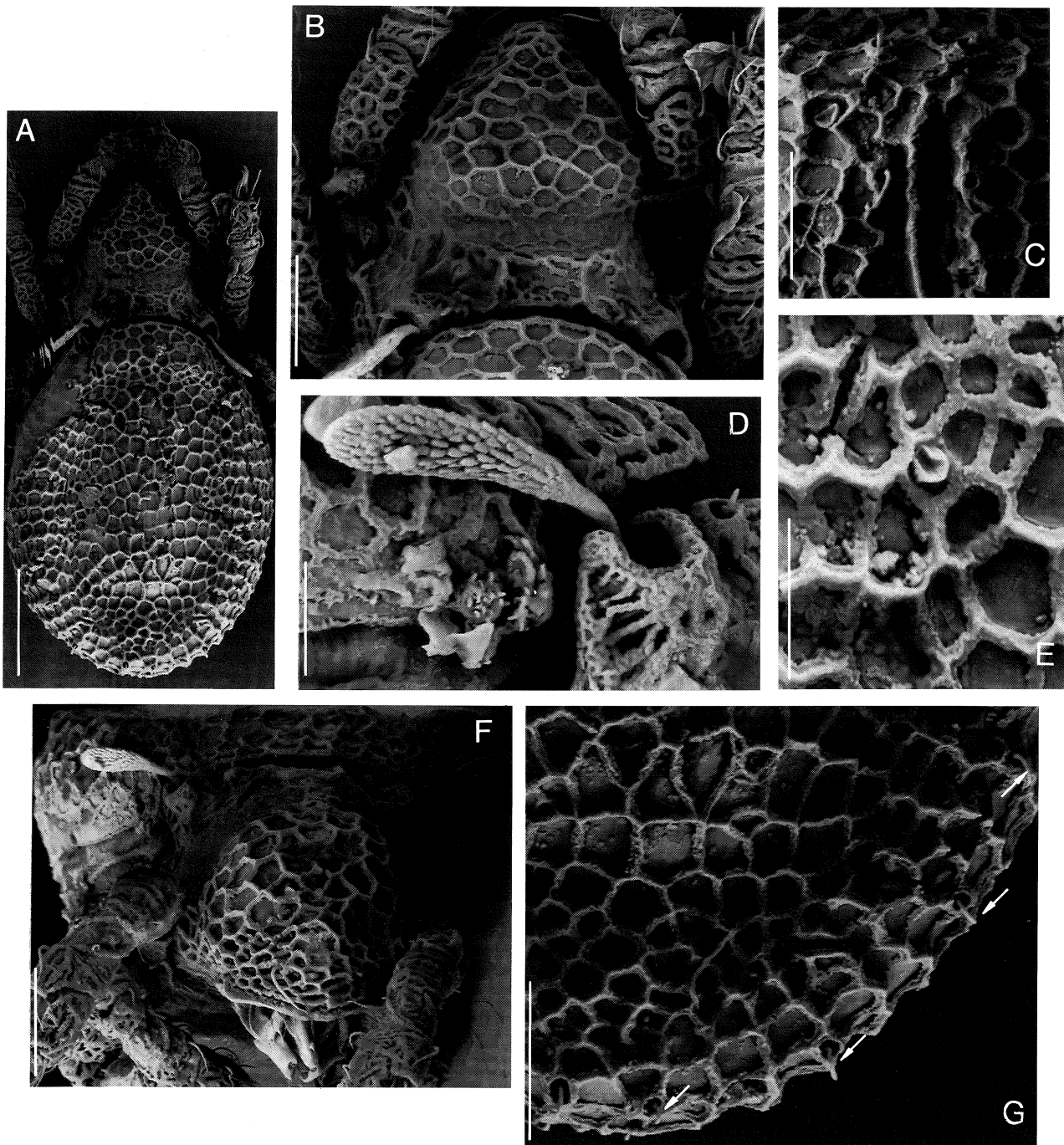
Figs 11, 12, 13B–D

**Type material.** Queensland: HOLOTYPE adult, QM, Mount Bithongabel, Lamington National Park, 28°16'S 153°10'E, *Nothofagus* forest, berlese extraction bark and moss from tree trunks and logs, G.S.Hunt, 14 July 1992. PARATYPE adults. AM KS43685, same data as holotype, 1 adult; AM KS46547, SEM stub no. S/102, same data, 4 adults.

**Diagnosis.** Body medium, length about 450–500 µm; scalps rarely (if at all) carried by adult; sensillus with long flattened tuberculate blade; notogaster strongly reticulate-alveolate; 5 pairs of notogastral setae, arising from pits; genitoanal chaetotaxy 7:1:2:3, genital setae essentially in straight file, insertion of seta *ad3* adjacent to posterior half of anal valve; claw stalk very short.

**Description**

**ADULT: Body:** brown; length 465 µm. **Cerotegument:** body with conspicuous network of cerotegument reflecting underlying reticulate pattern of integument (Fig. 11A,B). Setae *ro* and *le* and notogastral setae without obvious cerotegument. **Prodorsum:** integument reticulate, carina between *le* and *ro* absent; *le* dorsal and close to anterior of prodorsum, not arising from large pit, *ro* ventrolateral. Pedotectal tooth similar to *P. propinqua*. Bothridium closely adpressed to notogaster (Fig. 11B), wall semicircular in dorsal view, depressed anterolaterally and largely missing posteriorly, posterolateral carina weak, situated close to notogaster; sensillus length about 0.9 interbothridial distance, with long flattened tuberculate blade (Fig. 11D), posterior margin of prodorsum forming a smooth arc between bothridia. *in* small, set close about 0.5 bothridial diameter from bothridial wall, at edge of dorsosejugal furrow, spiniform (Fig. 11B,D). *Exuvial scalps*: none seen. *Notogaster*: oval, length:width 330:250. Intramarginal depression oval. Notogaster reticulate-alveolate, not perforated by pores (Fig. 11E); posterior margin not invaginate when viewed from above, with a weak carina between setae *p1* when viewed posteriorly (Fig. 11C). Fissura *ia* and *im* subparallel, *ip* perpendicular to sagittal plane; 5 pairs of short notogastral setae arising from small pits, *h1* moderately close, each located just inside posterior margin; *p1* with similar spacing to *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise just inside posterolateral flank, their insertions visible from above, *lp<sub>x</sub>* and *p2<sub>x</sub>* subequidistant from fissura *ip*, *lp<sub>x</sub>* inserted posterior to it (Fig. 11G). *Gnathosoma*: rutella basally with strong concave flexure and moderate buttresses laterally, small pointed mesad processes present, transverse striations absent (Fig. 12C). Pedipalp tarsus setae (*vt*), *l''* and *cm* smooth; apophysis supporting *acm* moderately strong; solenidion reaching beyond base of *acm* (Fig. 12D). *Epimeral region*: strongly convex a small distance anterior to genital valves and not tending to overhang them. *Genitoanal region*: separation of anal and genital vestibules relatively broad but with interruption to



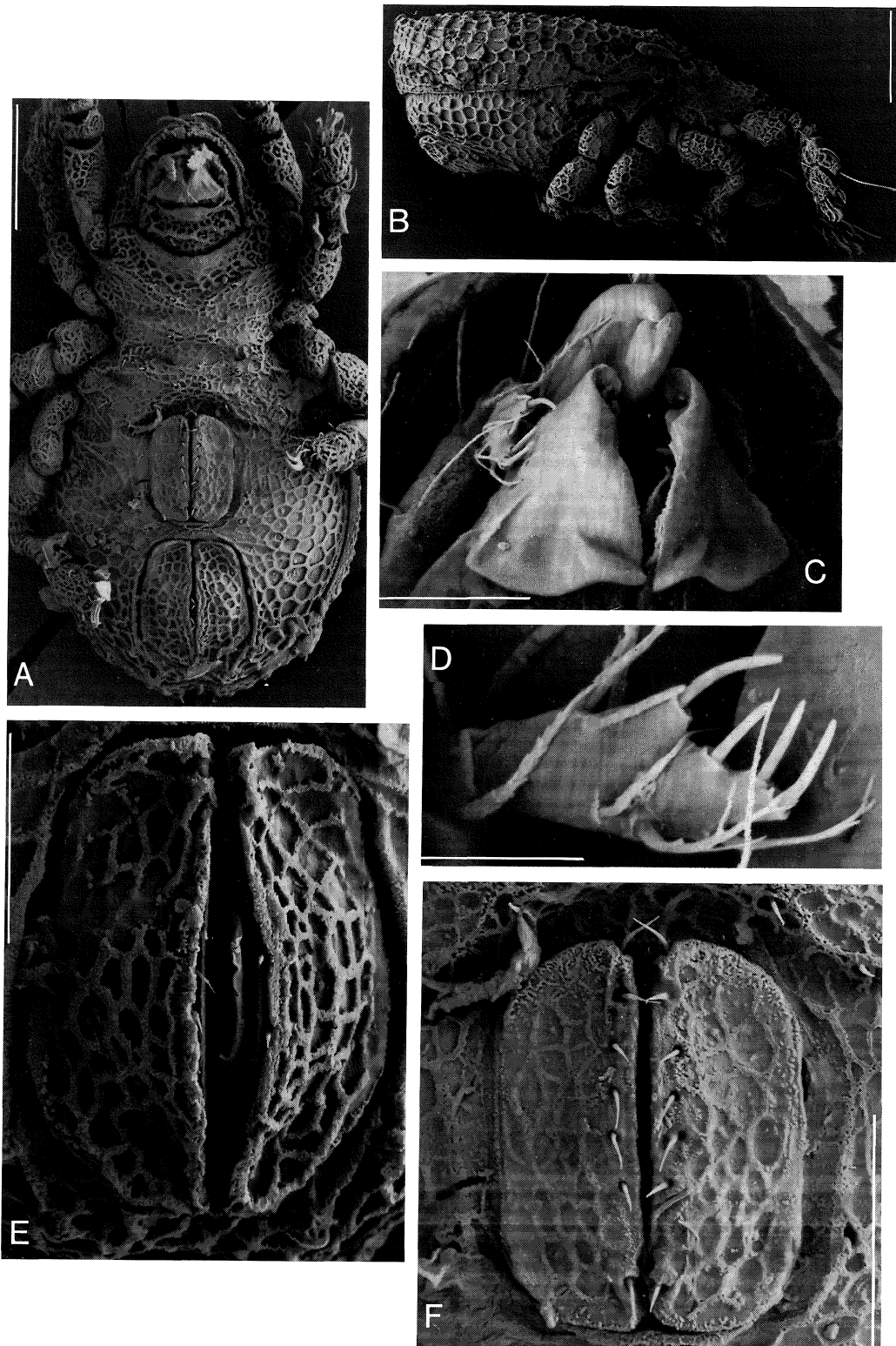
**Fig. 11.** *Pedrocortesella bithongabela* n.sp. A, body, dorsal; B, prodorsum, dorsal; C, notogastral setae *h1* and *p1*, posterior view; D, bothridium, sensillus and seta *in*, anterolateral; E, notogastral integument and fissura *im*; F, prodorsum, frontal; G, part of posterior of notogaster, dorsal, arrows left to right label setae *h1*, *lp<sub>x</sub>*, *p2<sub>x</sub>*, *p3<sub>x</sub>*; Scale bars: A = 100  $\mu$ m; B,E–G = 50  $\mu$ m; C,D = 20  $\mu$ m.

ventral plate microsculpture, wide mesal isthmus without strong transverse grooves between the vestibules (Fig. 12A). Ventral plate reticulate-alveolate. Genitoanal chaetotaxy 7:1:2:3; genital setae essentially in straight file (Fig. 12F), *g1* subequal to other setae, at anterior corner in marginal notch; *g5* situated at about 0.5 valve length, *g7* inserted well anterior to inner posterior corner in marginal notch; setae *ag* inserted posterior to *g7*; setae *ad1* postanal (Fig. 12E), *ad3* level with posterior half of anal valve. *Legs*. Distal apophysis of tibia overlaps about 30% of tarsus (Fig. 13C). Tarsal cluster of leg I placed distodorsally on apophysis, slightly

proximodorsal to setae *tc*; *ft''*, *omega 1* and 2 enclosed in well-developed almost circular common rim (Fig. 13B), no partition separating *ft''* from *omega 1* and 2; *ft''* longer than solenidia; terminal setae tend to be flattened with barbs lining their margins; tarsus with slight distal recess for receiving retracted unguinal complex, stalk very short (Fig. 13C).

**Comments.** This species is most closely related to *P. truncata* but differs in not having a truncate sensillus. The presence of flattened terminal leg setae in this species is a possible adaptation to arboreal life, perhaps





**Fig. 12.** *Pedrocortesella bithongabela* n.sp. A, body, ventral; B, body, lateral; C, rutella; D, pedipalp tarsus, antiaxial; E, anal valves; F, genital valves. Scale bars: A = 100  $\mu$ m; E–F = 50  $\mu$ m; C = 20  $\mu$ m; D = 10  $\mu$ m.

enhancing grip. Flattening also occurs in arboreal Hammeriellidae (see Hunt, 1996c), and in the Liodidae whose species are frequently arboreal.

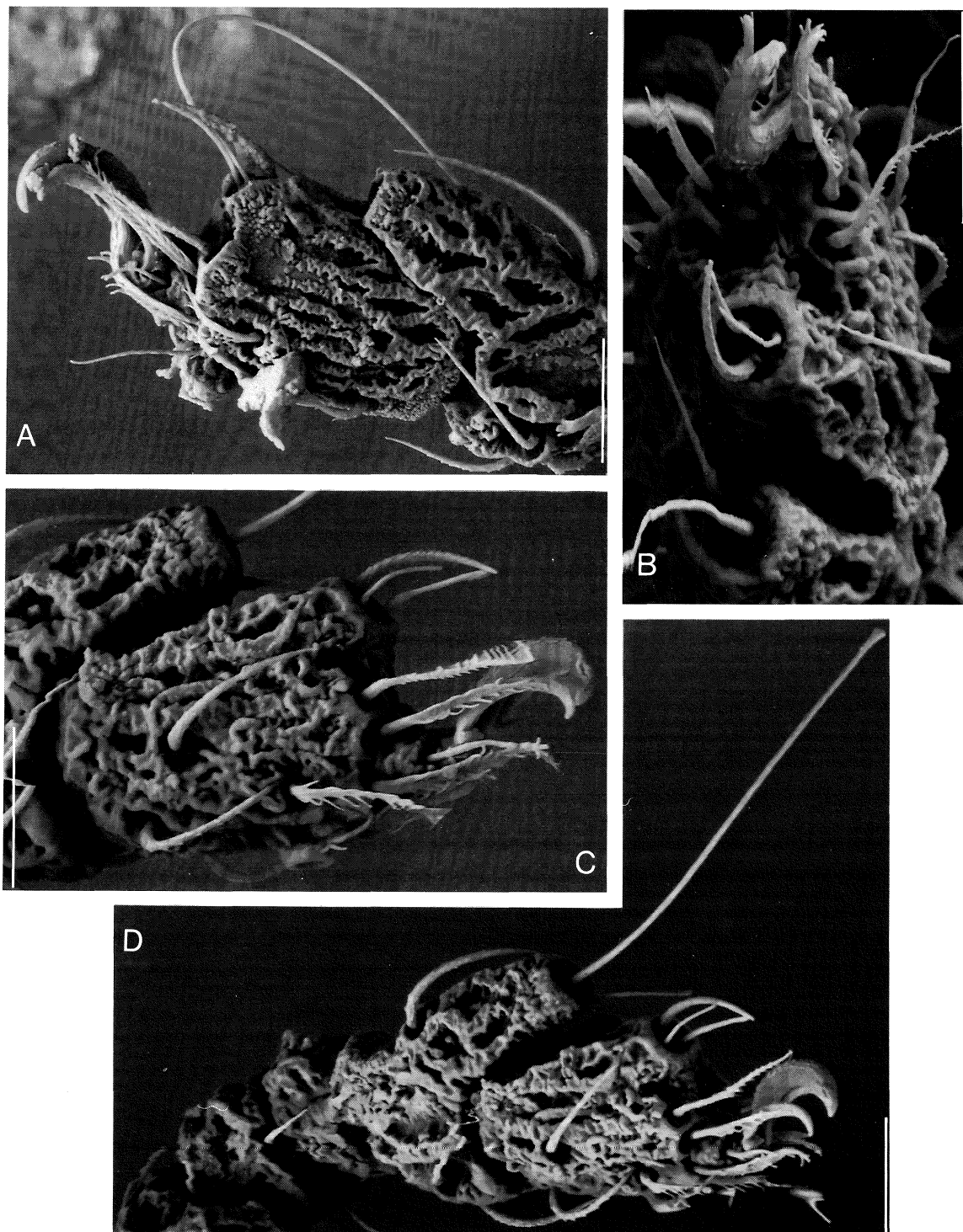
**Etymology.** The specific epithet is the Latinised noun in apposition based on the type locality.

**Distribution.** Lamington National Park, SE Queensland.

***Pedrocortesella callitarsus* n.sp.**

Figs 4D–E, 14, 15

**Type material.** South Australia: HOLOTYPE adult, ANIC, 8 km W. of Renmark, 34°13'S 140°41'E, berlese extraction Mallee litter, ANIC berlesate no. 251, I.C. Taplin, 14 May 1970. PARATYPE adults. ANIC, same data as holotype, 3



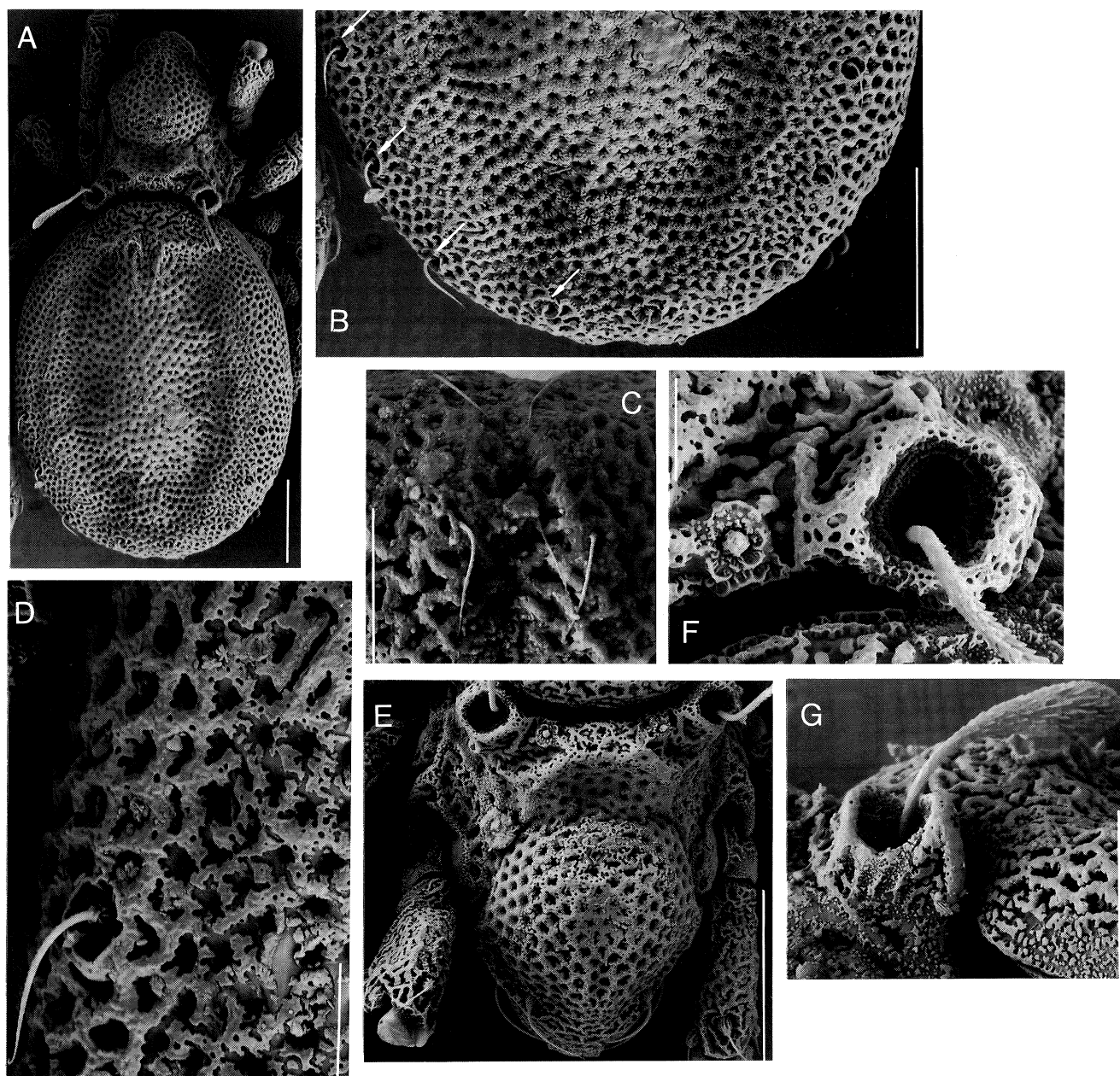
**Fig. 13.** *Pedrocortesella* spp. Leg I structures. A: *Pedrocortesella truncata* n.sp. A, tibia (distal) and tarsus, antiaxial. B–D: *Pedrocortesella bithongabela* n.sp. B, tibia (distal) and tarsus, dorsal; C, tarsus, antiaxial; D, genu, tibia and tarsus, antiaxial. Scale bars: 20  $\mu$ m.

adults; AM KS43678, same data, 2 adults; SAMA, same data, 2 adults; AM KS46536, SEM stub no. S/211 (ill.), same data, 3 adults (plus 1 non-type nymph); AM KS46537 SEM stub no. S/218 (ill.), same data, 3 adults; FMNH, same data, 1 adult; CNC, same data, 1 adult.

**Other material examined.** South Australia: AM KS46538, SEM stub no. S/224, 3.6 km E. of Monash, 34°14'S 140°33'E berlese extraction Mallee litter, ANIC berlesate no. 250, I.C. Taplin, 12 May 1970, 1 adult; AM KS46560 SEM stub no. S/217, 6.4 km E. of Paruna, 34°43'S 140°48'E berlese

extraction of Mallee litter, ANIC berlesate no. 240, R.W. Taylor, 8 February 1970, 1 adult; ANIC, Parachilna Gorge, Flinders Ranges, 10 km E. of Parachilna, 31°08'S 138°25'E ANIC berlesate 740, leaf litter at base of *Eucalyptus camaldulensis*, A. Calder, 3 Sept. 1981, 6 adults.

**Diagnosis.** Body medium-large, length about 550–700  $\mu$ m; scalps rarely (if at all) carried by adult; sensillus with long flattened tuberculate blade; notogaster reticulate-alveolate around margins, punctate centrally; 5 pairs of



**Fig. 14.** *Pedrocortesella callitarsus* n.sp. A, body, dorsal; B, notogaster, posterior, dorsal, arrows right to left label setae *h1*, *lp*, *p2*, *p3*; C, notogastral setae *h1* and *p1*, posterior view; D, notogastral integument, fissura *im* and seta *p3*; E, prodorsum, dorsal; F, bothridium and seta *in*, dorsal; G, bothridium, sensillus and seta *in*, lateral. Scale bars: A,B,E = 100  $\mu$ m; D,G = 50  $\mu$ m; C,F = 20  $\mu$ m.

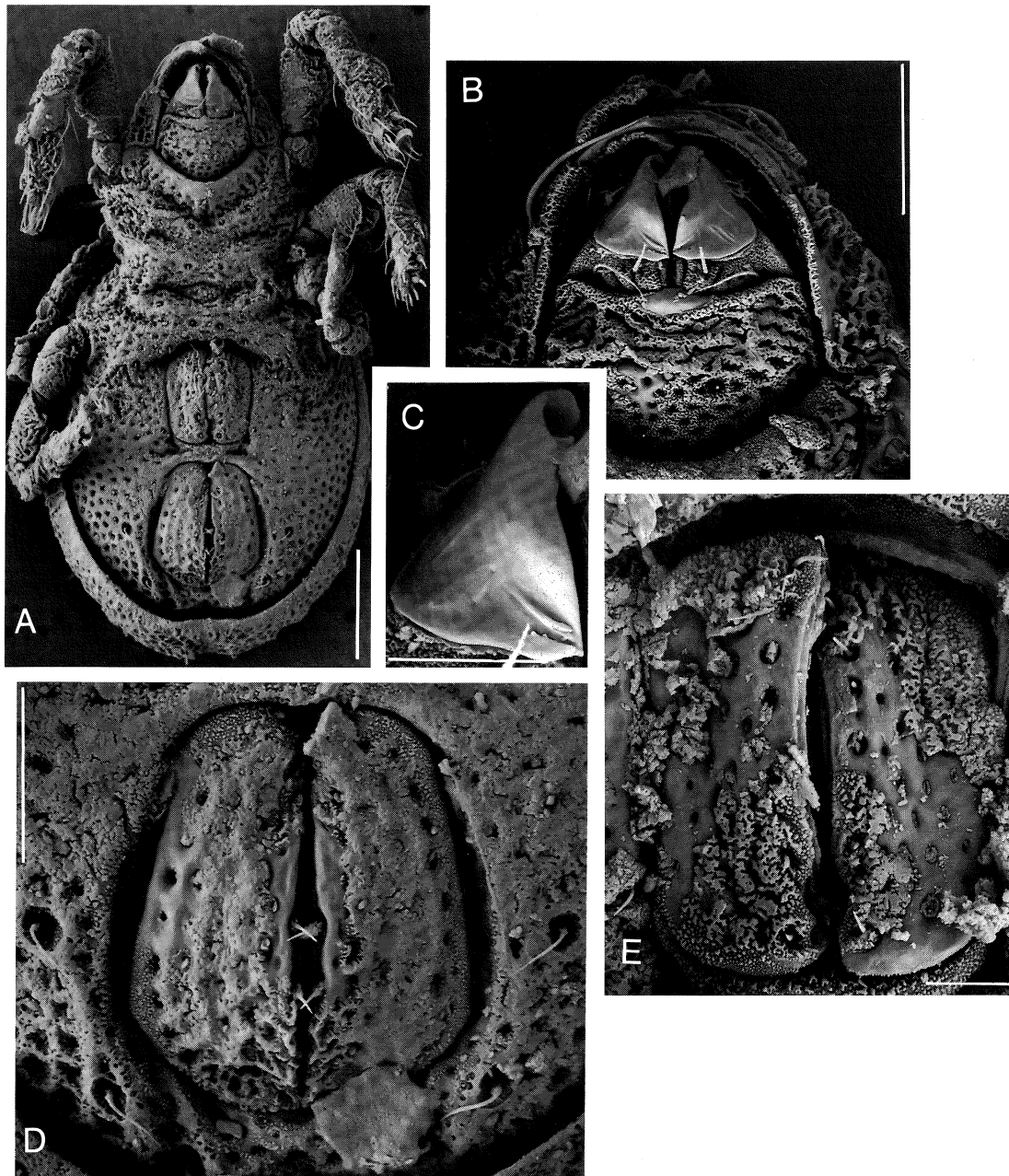
notogastral setae, genitoanal chaetotaxy 7:1:2:3, genital setae essentially in straight file, level of insertion of seta *ad3* adjacent to posterior half of anal valve; claw stalk very short.

### Description

**ADULT: Body:** brown; length ( $\mu$ m) 580, 610, 620, 670. **Cerotegument:** body generally with thin veneer of cerotegument; raised areas on body highlighted by a low encrustation of cerotegument (Fig. 14D). Setae *ro* and *le* and notogastral setae with ribbed accretion of cerotegument near base, though not as marked as *P. hangayi*. Legs with cerotegument capping surface

sculpturing, setae with striking ribbed accretions. **Prodorsum:** integument reticulate-foveolate at rostrum but tends to be punctate more posteriorly; no carina between *le* and *ro*; *le* dorsolateral, distance between them about 0.7 distance between *ro*, *ro* ventrolateral. Pedotectal tooth similar to *P. propinqua*. Bothridium abutting notogaster but not closely adpressed (Fig. 14F), wall subcircular and depressed anterolaterally, posterolateral carina weak, situated close to notogaster; sensillus length about 0.8 interbothridial distance, with long flattened tuberculate blade (Fig. 14G), posterior margin of prodorsum forming a smooth arc between bothridia. *in* small, set  $>0.5 < 1.0$  bothridial diameter from bothridial wall, near edge of dorsosejugal furrow, spiniform but





**Fig. 15.** *Pedrocortesella callitarsus* n.sp. A, body, ventral; B, subcapitulum; C, rutellum; D, anal valves; E, genital valves. Scale bars: A = 100  $\mu$ m; B,D = 50  $\mu$ m; C,E = 20  $\mu$ m.

almost entirely encased in cerotegument (Fig. 14F,G). *Exuvial scalps*: none seen. *Notogaster*: oval, length:width 400:320; 440:330; 440:330; 450:330. Intramarginal depression oval. Notogaster with median groove anteriorly; reticulate-alveolate around margins but punctate centrally (Fig. 14B,D); posterior margin slightly invaginate when viewed from above, without a carina between setae *p1* when viewed posteriorly (Fig. 14C). Fissura *ia* and *im* oblique and *ip* oblique-perpendicular to sagittal plane; 5 pairs of medium lengthed notogastral setae arising from large pits; *h1* widely separated, each located just inside posterior margin; *p1* inserted midheight on posterior flank, slightly further apart than *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise just inside posterolateral flank, their insertions easily visible from above, *lp<sub>x</sub>* closest to fissura *ip*, inserted just posterior to it (Fig. 14B). *Gnathosoma*: rutella basally with strong concave flexure and weak

lateral buttressing, transverse striations present (Fig. 15B,C). Pedipalp not studied. *Epimeral region*: strongly convex immediately anterior to genital valves, tending to overhang them. *Genitoanal region*: separation of anal and genital vestibules relatively narrow with deep transverse grooves and a narrow isthmus between the vestibules (Fig. 15A). Ventral plate punctate. Genitoanal chaetotaxy 7:1:2:3; genital setae essentially in straight file, *g1* slightly longer than other setae, inserted slightly behind anterior corner in marginal notch; *g5* situated at about 0.5 valve length, *g7* inserted well anterior to inner posterior corner, not in marginal notch; setae *ag* inserted at level posterior to *g6*; setae *ad1* distinctly postanal, *ad3* level with posterior half of anal valve; *ad1*–3 inserted in large pits. *Legs*. Distal apophysis of tibia overlaps about 30% of tarsus (Fig. 4D). Tarsal cluster of leg I placed distodorsally on apophysis, almost

directly above setae *tc*; *ft*" with base ribbed by thick cerotegument, enclosed in a rim closely abutting rim for *omega* 1 and 2 and sharing a common wall; *ft*" longer than solenidia; tarsus lacking distal recess for receiving retracted unguinal complex, stalk very short.

**Etymology.** The specific epithet means "beautiful tarsus".

**Distribution.** South Australia.

*Pedrocortesella calmorum* n.sp.

Figs 16, 17

**Type material.** Western Australia: HOLOTYPE adult, WAM, 13.5 km N.E. of Crystal Head, S.W. Osborne Island, CALM site 11/1, 14°23'S 125°57'E, rainforest litter, CALM staff, 25–31 January 1989. PARATYPE adults. WAM, 4 km W. of King Cascade, CALM site 28/3, 15°38'S 125°15'E, closed forest litter, ANIC berlesate 1078, T.A. Weir, 12–16 June 1988, 7 adults; AM KS43675, same data, 7 adults; ANIC, same data, 7 adults (plus series of non-type nymphs probably of this species); FMNH, same data, 7 adults; CNC, same data, 7 adults.

**Other material examined.** Western Australia: AM KS46531, SEM stub no. S/162 (ill.), 13.5 km N.E. of Crystal Head, S.W. Osborne Island, CALM site 11/1, 14°23'S 125°57'E, rainforest litter, CALM staff, 25–31 January 1989, 2 adults; AM KS46532, SEM stub no. S/112 (ill.), Camp Creek, 1 km S. of mining camp, Mitchell Plateau, Kimberleys, 14°51'S 125°50'E, ANIC berlesate 875, J. Balderson, 13 May 1983, 1 adult; AM KS46534, SEM stub no. S/151-04 (ill.), Prince Frederick Harbour, "Marun" CALM site 8/4, 15°00'S 125°21'E, closed forest litter, ANIC berlesate 1081, I.D. Naumann, 6–11 June 1988, 1 adult; AM KS43676, same data, 1 adult; AM KS46533, SEM stub no. S/341, Augustus Island, CALM site 26/1, 15°25'S 124°38'E, closed forest litter, ANIC berlesate 1082A, I.D. Naumann, 11–16 June 1988, 1 adult.

**Diagnosis.** Body medium-large, length about 600–700 µm; scalps rarely (if at all) carried by adult; sensillus with long flattened tuberculate blade; notogaster densely reticulate-punctate but lateral margins alveolate, with caudal notch when viewed from above, 5 pairs of notogastral setae; genital and anal vestibules close; genitoanal chaetotaxy 7:1:2:3, genital setae in slightly arcuate file, level of insertion of *ad3* at about half length of anal valve, adanal setae short; claw stalk short.

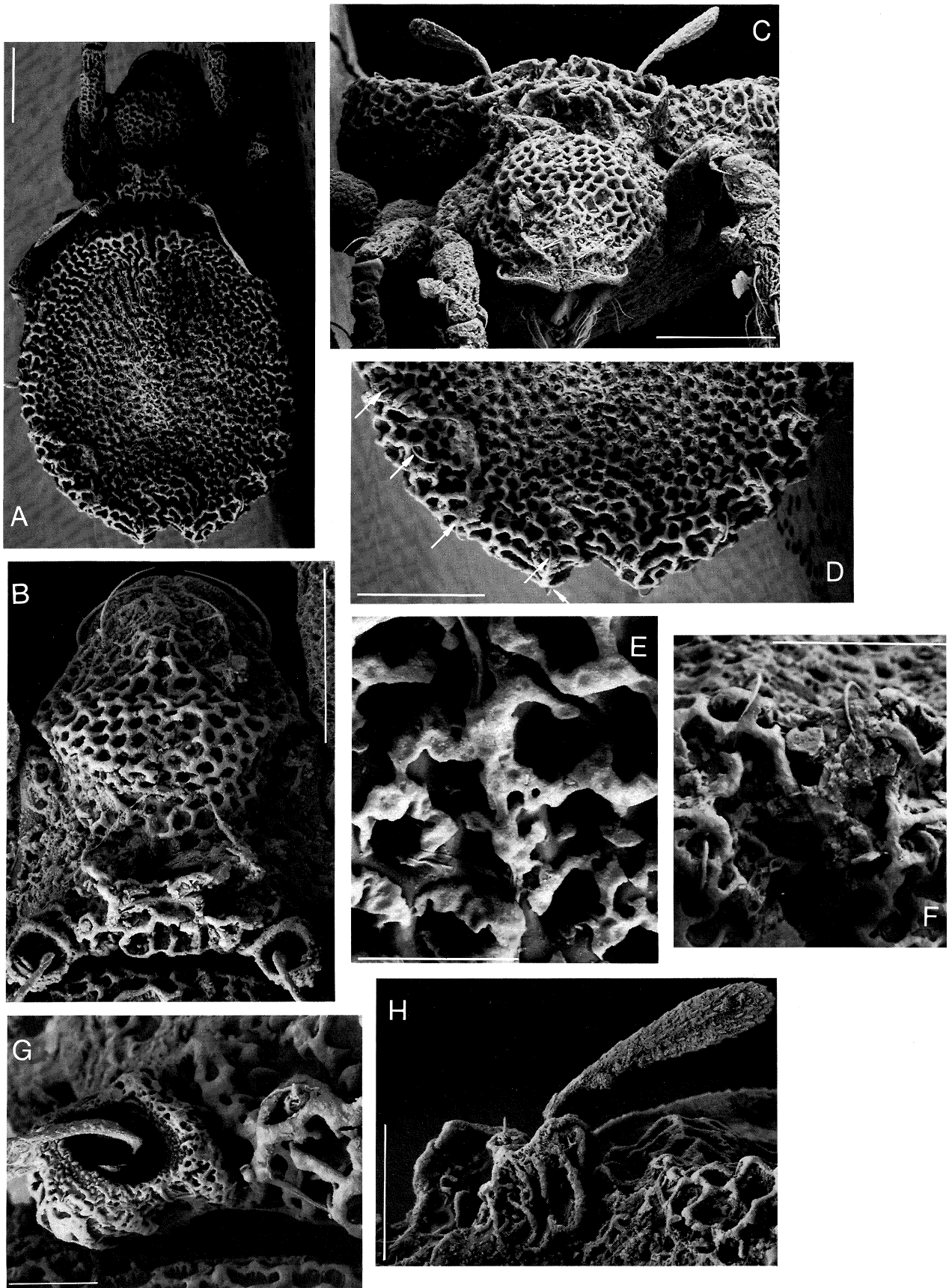
**Description**

**ADULT:** *Body:* brown; length of 3 specimens from Western Australia 630 µm, 690 µm, 690 µm. *Cerotegument:* body generally with thin veneer of cerotegument; reticulations on prodorsum and notogaster and rim of bothridium with a capping of cerotegument. Setae *ro* and *le* and notogastral setae without obvious cerotegument. Legs with cerotegument capping the reticulate surface ornamentation which is of much lower relief than in *P. propinqua*. *Prodorsum:* integument divided into 3 fields: rostral field with loose reticulations and some indication of carina between setae *le* and *ro*; anterior to median transverse groove with very deep foveolae and reticulations of high relief; a bothridial field with prominent reticulated bar between bothridia which rises subvertically from the transverse groove

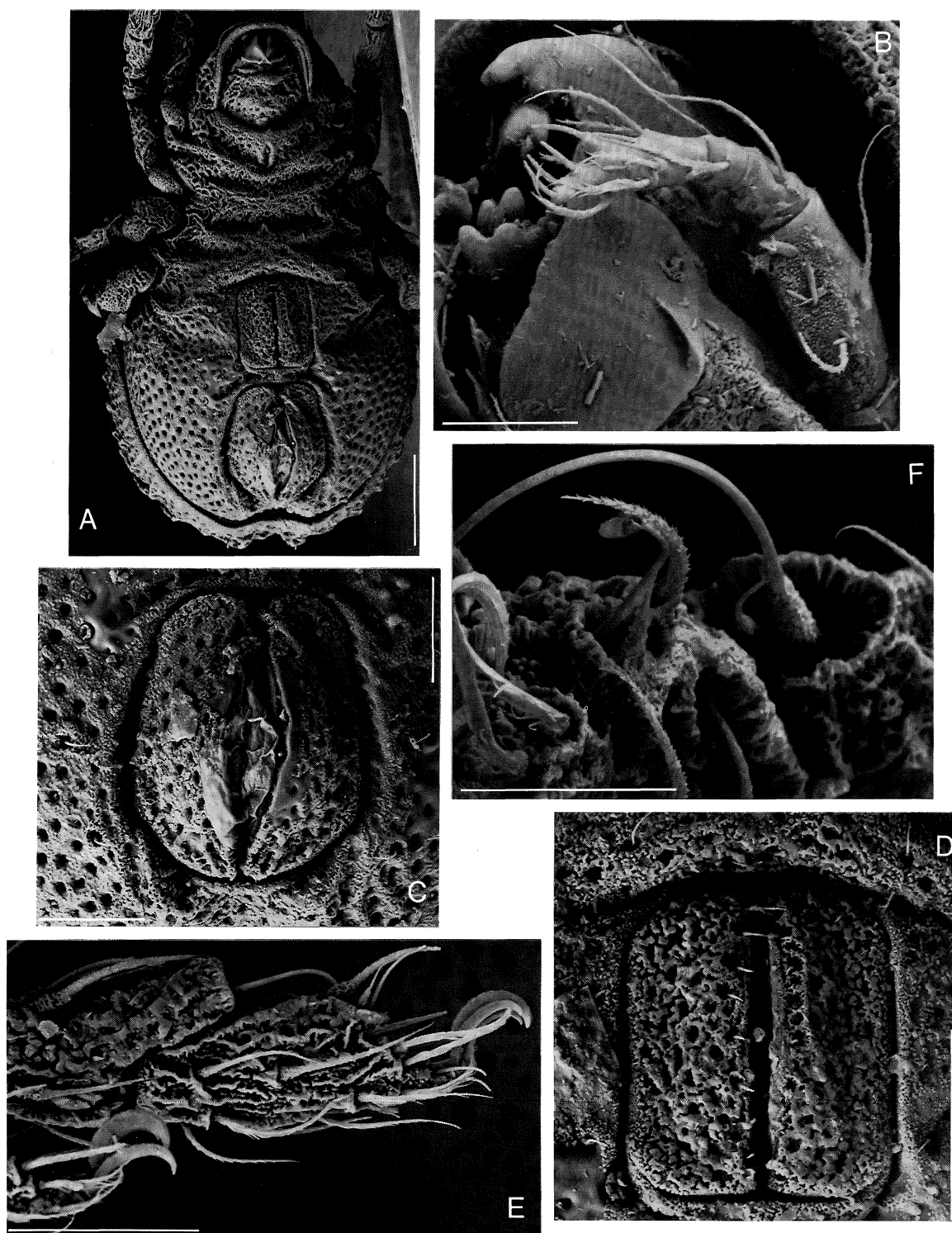
(Fig. 16H). *le* dorsolateral, distance between them about 0.7 distance between *ro*, not arising from large pit, *ro* ventrolateral. Pedotectal tooth similar to *P. propinqua*. Bothridium abutting but not closely adpressed to notogaster (Fig. 16G), wall more rounded than in *P. propinqua*; posterolateral carina weak, situated away from notogaster; sensillus length subequal to interbothridial distance, with long flattened tuberculate blade (Fig. 16H). *in* small, set about 0.5 bothridial diameter from bothridium and away from edge of dorsosejugal furrow level with anterior of bothridium, spiniform but largely encased in cerotegument, set in pit in supporting apophysis (Fig. 16G). *Exuvial scalps:* none seen. *Notogaster:* oval but wide, length:width 470:420, 420:350, 480:400. Intramarginal depression U-shaped, interrupted anteriorly by a raised area continuous with central plateau. Most of dorsum densely reticulate-punctate but lateral margins (and flanks) alveolate (Fig. 16D,E). Posterior margin invaginate when viewed from above, without a mesial carina when viewed posteriorly (Fig. 16F). Fissura short; *ia* not seen in SEM or LM, *im* subparallel-oblique and *ip* oblique to sagittal plane. 5 pairs of notogastral setae; *h1* widely separated, each located inside posterior margin; *p1* inserted high on posterior flank, further apart than *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise inside posterolateral flank, their insertions clearly visible from above, *lp<sub>x</sub>* closest to fissura *ip*, inserted lateral to it (Fig. 16D). *Gnathosoma:* pedipalp tarsus with setae (*vt*) and *l*" with long barbs, *cm* barbs short; apophysis supporting seta *acm* moderate height; solenidion *omega* almost reaching to base of *acm*. Rutella basally with weak concave flexure and lateral buttressing, without pointed mesad process; transverse striations absent (Fig. 17B). *Epimeral region:* strongly convex immediately anterior to genital valves. *Genitoanal region:* separation of anal and genital vestibules relatively narrow with deep transverse grooves and a narrow isthmus between the vestibules (Fig. 17A). Entire venter punctate. Genitoanal chaetotaxy 7:1:2:3; genital setae in slightly arcuate file, *g1* slightly longer than other setae, inserted near inner anterior corner; *g5* situated at about 0.5 valve length, *g7* inserted anterior to inner posterior corner, not in marginal notch; setae *ag* inserted at level posterior to *g6*; adanal setae short, *ad1* distinctly postanal, more so than *P. propinqua*, *ad3* level with about 0.5 length of anal valve. *Legs.* Tarsal cluster of leg I placed distodorsally on apophysis, above and slightly proximal to setae *tc*; *ft*" enclosed in its own rim; *omega* 1 and 2 within a separate rim, widely separated, shorter than *ft*", hole (presumably cavity for undeveloped *famulus*) present; tarsus lacking distal recess for receiving retracted unguinal complex, stalk short.

**Variation.** The posterior margin of the notogaster is weakly invaginate in dorsal view in the Prince Frederick Harbour specimen. Setae *h1* are furthest apart in specimens from Crystal Head.

**Comments.** As well as being close to *P. subula*, this species appears very similar to *P. hardyi* J. Balogh from Wau, Papua New Guinea. This latter species differs in having an adanal seta (probably *ad3*) placed more anteriorly than in *P. calmorum*. According to J. Balogh (1968), *P. hardyi* has only one adanal seta visible. *P.*



**Fig. 16.** *Pedrocortesella calmorum* n.sp. A, body, dorsal; B, prodorsum, dorsal; C, prodorsum, frontal; D, notogaster, posterior, dorsal, arrows right to left label setae *p1*, *hl*, *lp<sub>x</sub>*, *p2<sub>x</sub>*, *p3<sub>x</sub>*; E, notogastral integument and fissura *im*; notogaster, posterior, dorsal; F, notogastral setae *hl* and *p1*, posterior view; G, bothridium and seta *in*, dorsal; H, bothridium, sensillus and seta *in*, lateral. Scale bars: A–D = 100  $\mu$ m; E, H = 50  $\mu$ m; F, G = 20  $\mu$ m. A, D, F, G = Crystal Head; B, C, H = Mitchell Plateau; E = Prince Frederick Harbour.



**Fig. 17.** *Pedrocortesella calmorum* n.sp. A, body, ventral; B, part of gnathosoma with pedipalp, ventrolateral; C, anal valves; D, genital valves; E, leg I, tibia (distal) and tarsus, antiaxial; F, detail tarsal cluster and tibial apophysis. Scale bars: A = 100 µm; C–E = 50 µm; B, F = 20 µm. A–F = Crystal Head.

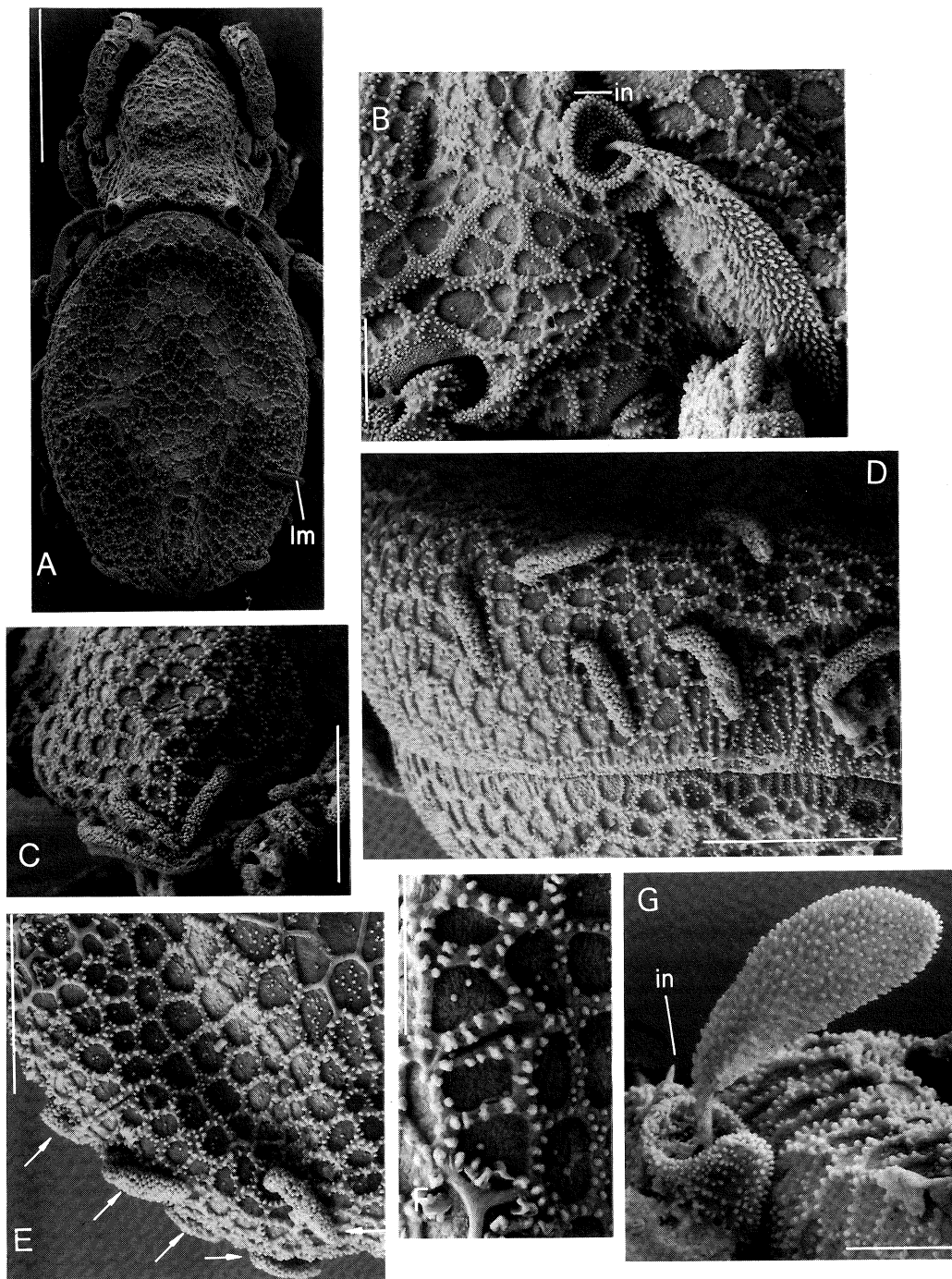
*calmorum* seems to be also closely related to a species in Japan, probably incorrectly identified and redescribed by Aoki (1984) as *P. hardyi*. This species was also incorrectly transferred to *Pedrocortesella*, which is now recognised as a junior synonym of *Pheroliodes*.

**Etymology.** The specific epithet acknowledges the research effort of the staff of the Western Australian

Department of Conservation and Land Management (CALM).

**Distribution.** Kimberley area, north-western Western Australia.





**Fig. 18.** *Pedrocortesella conundrum* n.sp. A, body, dorsal; B, sensillus, slightly frontal of true dorsal; C, prodorsum (part), frontal; D, notogastral setae, posterior view; E, posterior part of notogaster, dorsal, arrows right to left label setae *h1*, *p1*, *p2*, *lp* and *p3* (*lm* not shown); F, notogastral microsculpture, fissura *im*; G, bothridium, sensillus and seta *in*, lateral. *in* = interlamellar seta *in*; *lm* = seta *lm* (seta broken off on left side). A = specimen from Taree; B–G = specimens from type locality. Scale bars: A = 100  $\mu$ m; C, D = 50  $\mu$ m; B, E, F = 20  $\mu$ m.

***Pedrocortesella conundrum* n.sp.**

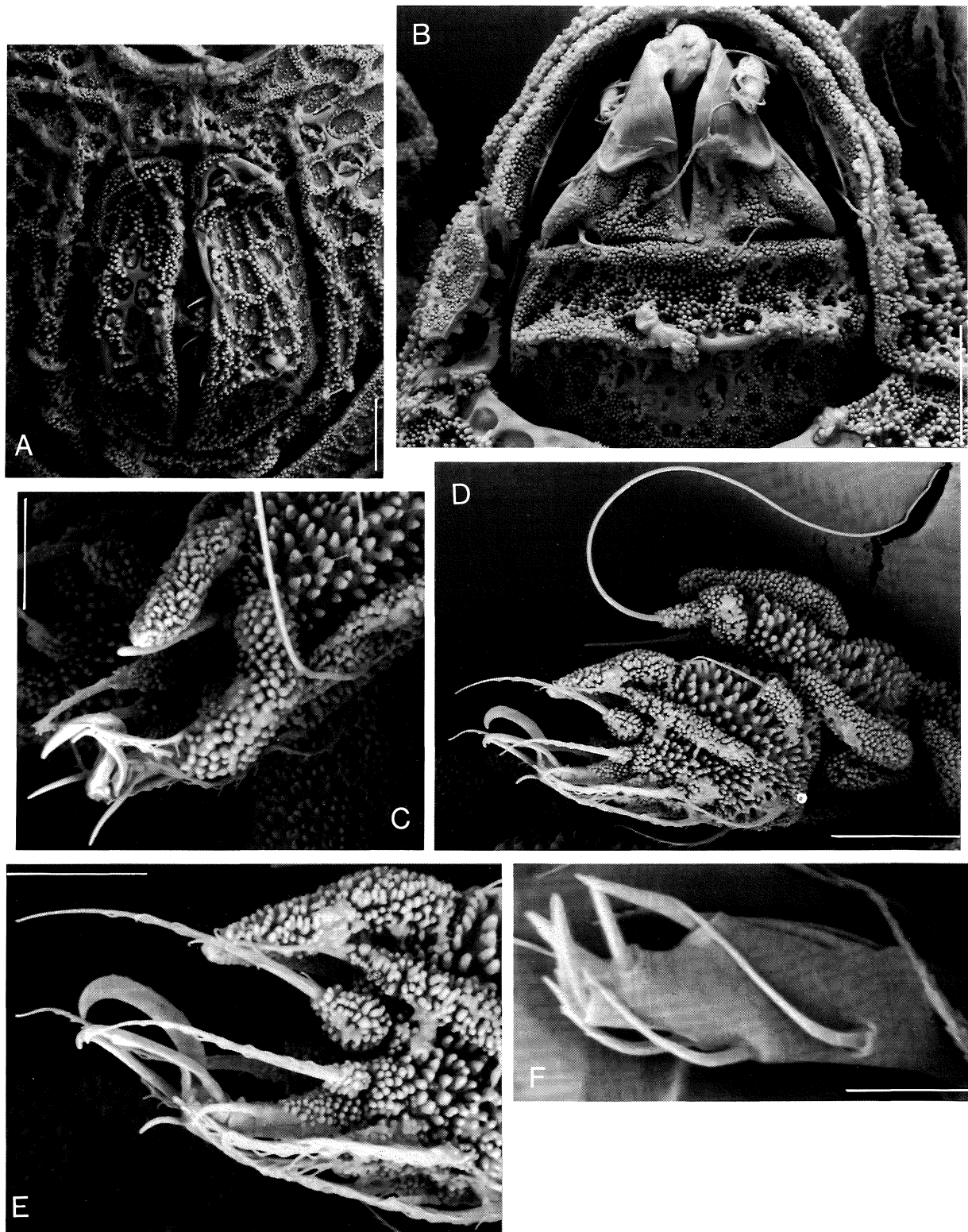
Figs 18, 19

**Type material.** New South Wales: HOLOTYPE adult, AM KS SEM stub no. S/296, Allyn River Park near crossing of Allyn River, N. of Salisbury, 32°10'S 151°30'E, subtropical rainforest, berlesate bark scraped from trees, G.S.Hunt, 5 October 1993. PARATYPE adult, AM KS SEM stub no. 419, same data.

**Other material examined.** Graham Osler, a PhD student at Macquarie University, has recently sampled this species from soil beneath the litter layer in forest near Taree, New South Wales (Osler, pers. comm., 1996).

**Diagnosis.** Body small-medium, length about 400–450  $\mu$ m; scapulae rarely (if at all) carried by adult; sensillus long flattened tuberculate blade; notogaster reticulate-alveolate, 6 pairs of notogastral setae, 4 pairs posterior





**Fig. 19.** *Pedrocortesella conundrum* n.sp. A, anal valves; B, subcapitulum; C, distal part of tarsus I, oblique view; D, tibia (distal) and tarsus of Leg I, antiaxial; E, tarsus (distal) of Leg I, antiaxial; F, pedipalp, antiaxial. Scale bars: A,B,D = 20  $\mu$ m; C,E = 10  $\mu$ m; F = 5  $\mu$ m.

to fissura *ip*, seta *p2* at same level on posterior flank as *p1*, *p3* at higher level on posterolateral flank to *p2* but not situated dorsally, genitoanal chaetotaxy 6:1:2–3:2–3, genital setae in straight file, insertion of seta *ad3* adjacent to posterior 50% of anal valve; claw stalk long.

### Description

**ADULT:** *Body:* brown; length 400  $\mu$ m, 430  $\mu$ m. *Cerotegument:* body with cerotegument tubercles and granules highlighting reticulations; alveoli with fewer and smaller granules (Fig. 18E,F). Setae *ro* and *le* and

notogastral setae entirely covered by thick deposit (Fig. 18C,D). *Prodorsum*: integument reticulate-foveate, carina between *le* and *ro* absent; *le* dorsolateral, distance between them about 0.6 distance between *ro*, not arising from large pit, *ro* ventrolateral, its insertion barely seen from above. Pedotectal tooth as in Fig. 18A,B. Bothridium abutting notogaster but not tightly adpressed (Fig. 18A,B), wall subcircular in dorsal view, slightly depressed posteriorly and anteriorly, posterolateral carina very strong, abutting notogaster (Fig. 18G); sensillus length subequal to interbothridial distance, with long flattened tuberculate blade (Fig. 18A,G), posterior margin of prodorsum forming a smooth arc between bothridia. *in* small, set close bothridial wall just inside edge of dorsosejugal furrow, spiniform (Fig. 18A,G). *Exuvial scalps*: none seen. *Notogaster*: oval, length:width 290:210, 300:220. Intramarginal depression oval, interrupted posteriorly. Notogaster centrally with raised area slightly depressed mesally in both specimens (possibly an artefact) (Fig. 18A), reticulate-alveolate, not perforated by pores (Fig. 18A,F); posterior margin not invaginate when viewed from above; without carina between setae *p1* when viewed posteriorly (Fig. 18D). Fissura *ia* subparallel, *im* and *ip* oblique to sagittal plane; 6 pairs of notogastral setae arising from small pits, *h1* widely separated, each located well inside posterior margin; *p1* with similar spacing to *h1*; *p2* at same level on posterior flank as *p1*, *p3* higher on posterolateral flank but still not dorsal; *lp* on posterodorsal flank close to fissura *ip* and inserted posterior to it (Fig. 18E), and *lm* lying dorsally well inside the lateral margin and anterior to fissura *ip*. *Gnathosoma*: rutella basally with weak concave flexure and moderate lateral buttressing, pointed mesad processes and transverse striations absent (Fig. 19B). Pedipalp tarsus with setae (*vt*), *cm* and *l*" smooth; apophysis supporting seta *acm* low; solenidion *omega* reaching to base of *acm* (Fig. 19F). *Genitoanal region*: reticulate-foveate. Separation of anal and genital vestibules broad with little or no interruption of ventral plate microsculpture between the vestibules (Fig. 19A). Genitoanal chaetotaxy 6:1:2–3:2–3; genital setae in arcuate file, most posterior inserted anterior to inner posterior corner, not in marginal notch, seta *ag* at level between *g5* and *g6*; seta *ad1* barely postanal, *ad2–3* arranged around posterior margin of anal valves (Fig. 19A). *Legs*. Cerotegument in form of tubercles, not in reticular pattern (Fig. 19D); tibia I apophysis very strong (Fig. 19C), overhangs about 40% of tarsus. Seta *ft*" completely cloaked in cerotegument, not placed on distinct apophysis or in common rim with solenidia (Fig. 19C,D); stalk long, lateral claws much weaker than central (Fig. 19E).

**Variation.** One specimen from the type locality has two pairs of anal setae, the other has three anal setae on the left side and an unknown number on the right side.

**Comments.** This species resembles *P. kanangra* in the following characters: the presence of six pairs of notogastral setae; in the wide separation of anal and genital vestibules with little interruption to continuity of ventral plate ornamentation; the reticulate-alveolate pattern on the notogaster; the presence of six pairs of genital setae; and the presence of strong ventral keels on leg femora. It differs in the arrangement of notogastral setae, the structure of tarsus I and the slender lateral

claws on the legs. The disposition of notogastral setae in *P. conundrum* is somewhat intermediate between other *Pedrocortesella* species (Fig. 1D), and the condition in *Pheroliodes*, which most closely resembles the nymphal arrangement of setae *p1* to *p3* (Fig. 1C). In *P. conundrum*, seta *p2* remains with *p1* but *p3* appears to have partly migrated towards the dorsal surface. Like *P. kanangra*, this species is tentatively placed in *Pedrocortesella*.

**Etymology.** The specific epithet is a noun in apposition referring to the doubtful generic status of this species and the puzzling mix of generic characters.

**Distribution.** Barrington Tops and Taree districts, New South Wales

### *Pedrocortesella enigma* n.sp.

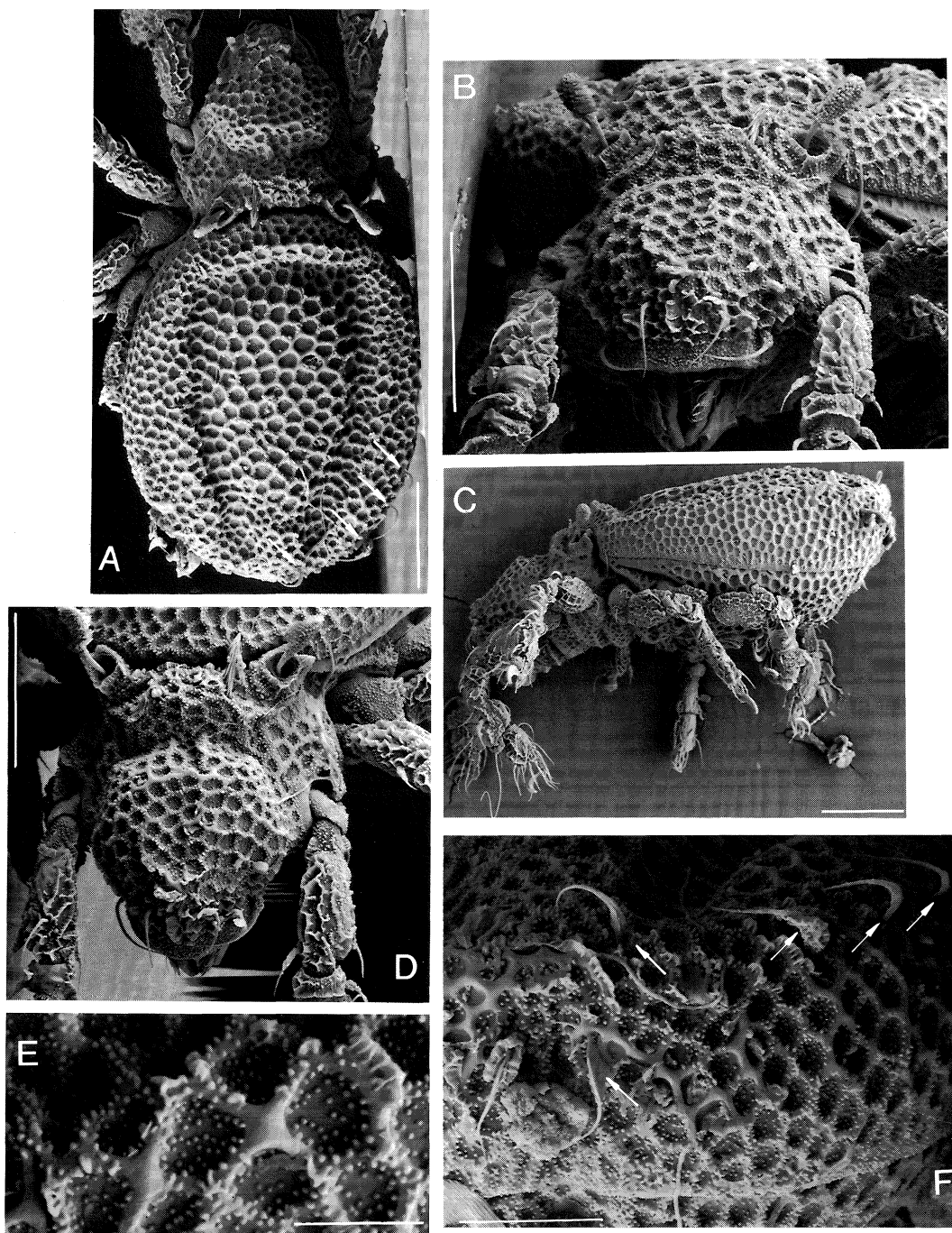
Figs 20, 21

**Type material.** Tasmania: HOLOTYPE adult, ANIC, Mount Victoria, 41°20'S 147°49'E, 900 m, pyrethrum knockdown from trees, H. Mitchell and R. Coy, 25 November 1989; PARATYPE adult, AM KS46642 SEM stub no. S/418 (ill.), Mount Michael, 41°10'S 148°00'E, pyrethrum knock-down from tree, R. Coy, 28 November 1989, 1 adult.

**Diagnosis.** Body length medium, about 540 µm; sensillus terminates in rounded club, not flattened blade; notogaster reticulate-alveolate; 5 pairs long notogastral setae, genitoanal chaetotaxy 7:1:3:3, genital setae in arcuate file, insertion of seta *ad3* adjacent to anterior 50% of anal valve; claw stalk long.

### Description

ADULT: *Body*: brown; length 540 µm. *Cerotegument*: body generally with thin veneer of cerotegument; reticulations on prodorsum and notogaster with numerous cushion-like grains of cerotegument, some stellate tubercles often coalescing into "stitched" crest (Fig. 20E–F). Setae *le*, *ro* and notogastral setae with tapering basal fringes of cerotegument. *Prodorsum*: integument more or less uniformly reticulate-alveolate including area between bothridia; foveae without visible pores; carina between *le* and *ro* absent; *le* dorsolateral and situated close to anterior of rostrum, distance between them about 0.5 distance between *ro*, not arising from large pit, *ro* ventrolateral, insertion not quite visible from above. Pedotectal tooth strongly curved antiad. Bothridium abutting notogaster but not closely adpressed, posterior wall complete, wall diamond shaped as in *P. propinqua* (Fig. 20A,D), posterolateral carina strong, close to notogaster; sensillus clavate and rounded, not with flattened blade, densely tuberculate, length about 0.5 interbothridial distance (Fig. 20B–D); posterior margin of prodorsum forming a smooth arc between bothridia; *in* vestigial, without supporting apophysis; removed from edge of dorsosejugal furrow. *Exuvial scalps*: not seen. *Notogaster*: oval, length:width without scalps 350:300. Intramarginal depression similar in shape to *P. propinqua*. Notogaster strongly alveolate-reticulate, not perforated by pores (Fig. 20D); posterior margin not invaginate when viewed from above, without carina between setae *p1* when viewed posteriorly (Fig. 20F). Fissura *ia* and *ip* oblique to sagittal plane, *im*

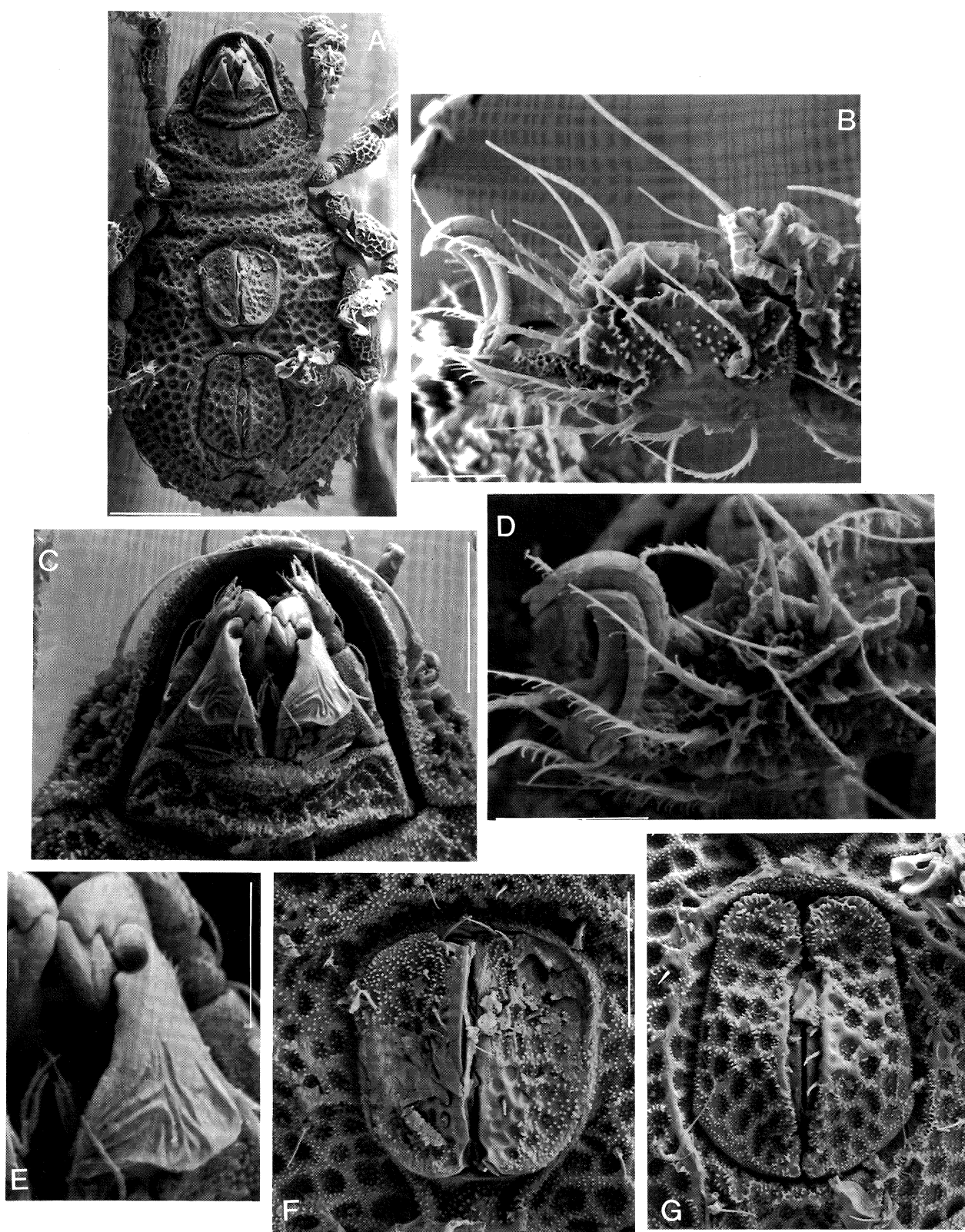


**Fig. 20.** *Pedrocortesella enigma* n.sp. A, body, dorsal, arrows left to right label setae *h1*, *lp<sub>x</sub>*, *p2<sub>x</sub>*, *p3<sub>x</sub>*; B, prodorsum, frontal; C, body, lateral; D, prodorsum, dorsal; E, notogastral integument; F, notogaster, posterior (part), arrows left to right label setae *p1*, *h1*, *lp<sub>x</sub>*, *p2<sub>x</sub>*, *p3<sub>x</sub>*. Scale bars: A–D = 100  $\mu$ m; F = 50  $\mu$ m; E = 20  $\mu$ m.

subperpendicular; 5 pairs of long notogastral setae (Fig. 20A,F), with thick cerotegument coating at base, not arising from small pits; *h1* moderately separated, each located inside posterior margin; *p1* inserted about mid-height on posterior flank, closer together than *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise along posterolateral flank, their insertions visible from above, *lp<sub>x</sub>* closest to fissura *ip* inserted just posterior to it. *Gnathosoma*: rutella basally with without concave flexure, with strong transverse striations, pointed basal mesad process absent (Fig. 21C,E); pedipalp not examined. *Epimeral region*: moderately convex anterior to genital valves, not tending to overhang them. *Genitoanal region*: separation of anal

and genital vestibules relatively broad but with interruption to ventral plate microsculpture, wide mesal isthmus without strong transverse grooves between the vestibules (Fig. 21A,G), Ventral plate reticulate-foveate. Genitoanal chaetotaxy 7:1:3:3; genital setae essentially in arcuate file but with *g5* placed about 0.5 valve length; *g1* inserted lateral to inner anterior corner of valve in marginal notch; *g7* inserted at inner posterior corner, in marginal notch; setae *ag* inserted at level between *g6* and *g7*; setae *ad1* distinctly postanal, *ad3* inserted level with anterior 30% of anal valve, subequal to *ad2* in separation from valve. *Legs*. Distal apophysis of tibia overlaps about 30% of tarsus (Fig. 21D). Tarsal cluster

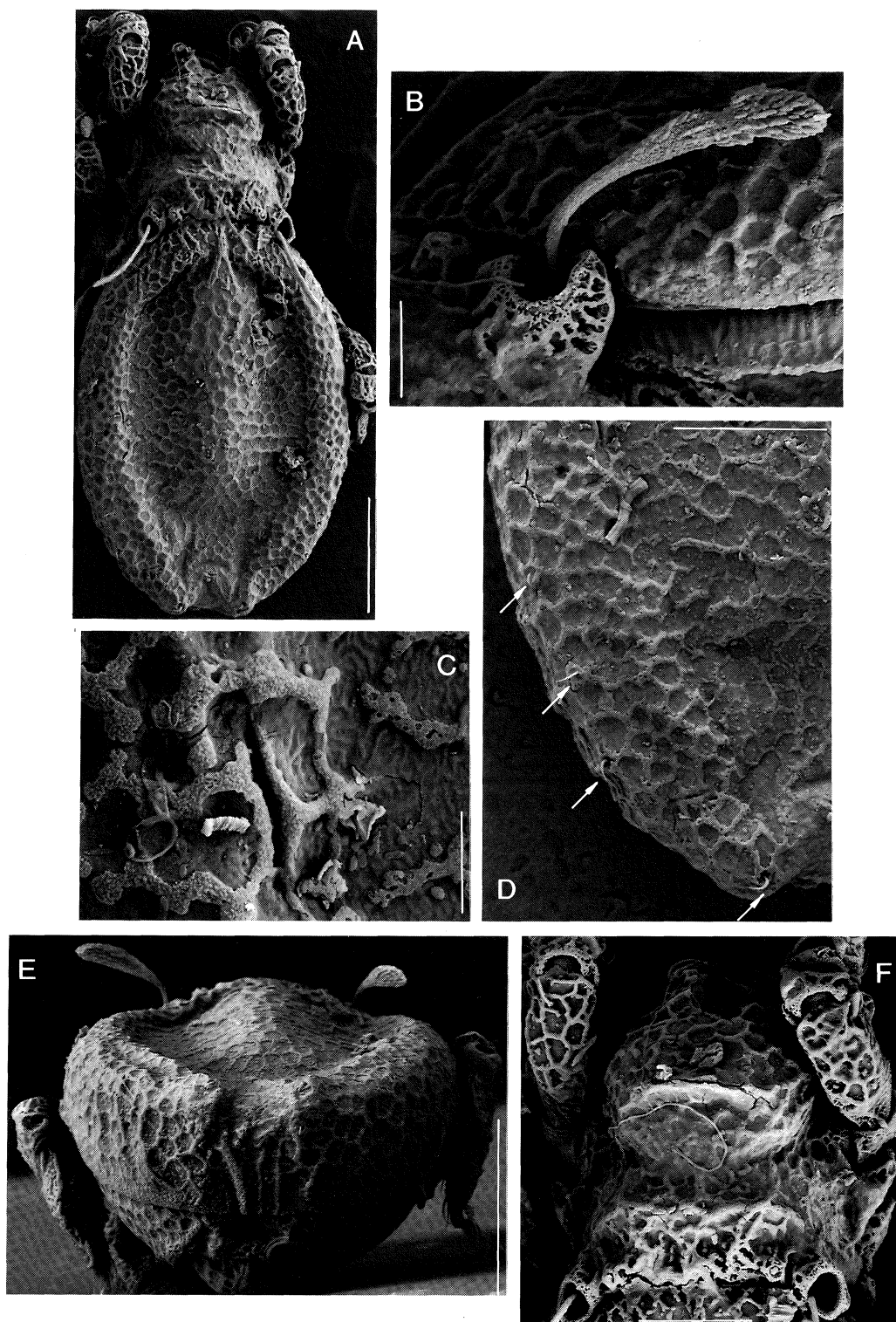




**Fig. 21.** *Pedrocortesella enigma* n.sp. A, body, ventral; B, leg 1 tibia (distal) and tarsus, antiaxial; C, subcapitulum; D, leg 1 tarsus, dorsodistal; E, rutellum; F, genital valves; G, anal valves. Scale bars: A = 100  $\mu$ m; C,F,G = 50  $\mu$ m; B,D,E = 20  $\mu$ m.

of leg I placed distodorsally on apophysis, *ft*", *omega* 1 and 2 enclosed in common rim (Fig. 21D), no partition separating *ft*" from *omega* 1 and 2, latter widely separated; tarsus without distal recess for receiving retracted unguitractor complex, claw stalk long.

**Comments.** This species strongly resembles *P. propinqua* in many respects: the wide separation of genital and anal vestibules, the arcuate arrangement of genital setae; the anterior position of setae *ad*3; the length and disposition of notogastral setae; the vestigial interlamellar setae; and

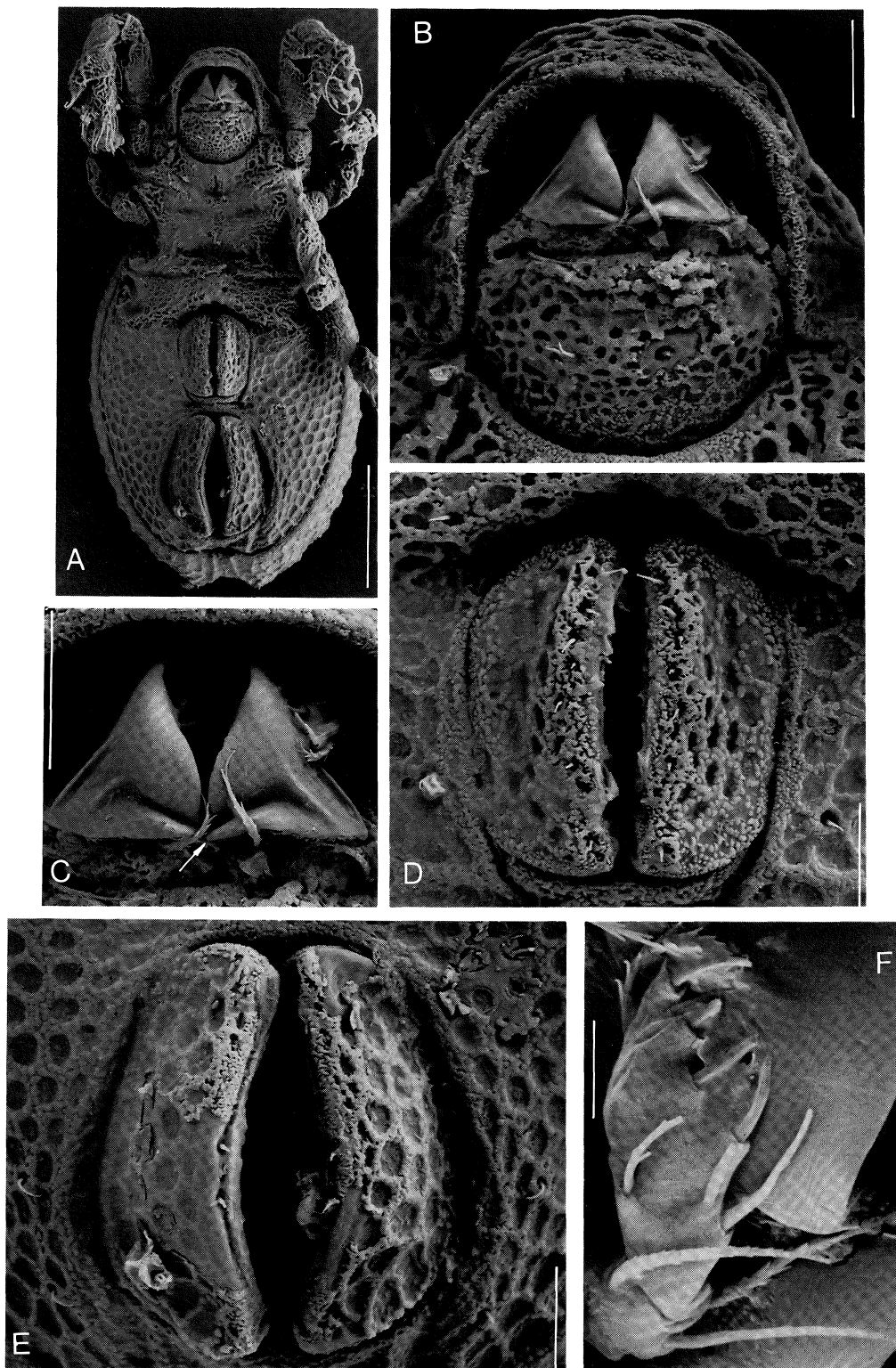


**Fig. 22.** *Pedrocortesella gunjina* n.sp. A, body, dorsal; B, bothridium, sensillus and tubercle of seta *in* (seta missing), lateral; C, notogastral integument and fissura *im*; D, notogaster, posterior view, dorsal, arrows right to left label setae *hl*, *lp*, *p2*, *p3*; E, notogaster, posterior view; F, prodorsum, dorsal. Scale bars: A,E = 100  $\mu$ m; D,F = 50  $\mu$ m; B = 20  $\mu$ m; C = 10  $\mu$ m.

the shape of the bothridium. It differs in having three pairs of anal setae and a clavate sensillus, the latter being generally regarded as an adaptation to arboreal life (O'Dowd *et al.*, 1991). The species is probably an arboreal representative of the species group suggested for *P. propinqua* and *P. bannisteri* (see General Discussion).

**Etymology.** The specific epithet refers to the puzzling three pairs of anal setae, quite uncharacteristic for *Pedrocortesella*.

**Distribution.** Mountainous rainforest areas, north-eastern Tasmania.



**Fig. 23.** *Pedrocortesella gunjina* n.sp. A, body, ventral; B, subcapitulum; C, rutella, ventral; D, genital valves; E, anal valves; F, pedipalp, antiaxial. Scale bars: A = 100  $\mu$ m; B–E = 20  $\mu$ m; F = 10  $\mu$ m.

***Pedrocortesella gunjina* n.sp.**

Figs 22, 23, 24C–D

**Type material.** Western Australia: HOLOTYPE adult, WAM, SEM stub no. S/158 (ill.) (specimen mounted on venter, dorsal side up), Gunjin Gully, Hackets Gully, Darling Range near Perth, 31°59'S 116°08'E, J.M. Waldock, 27 January 1988. PARATYPE adults, WAM, SEM stub no. S/158 (with holotype), same data, 2 adults.

**Diagnosis.** Body small-medium, length about 400–450  $\mu$ m; scalps rarely (if at all) carried by adult; sensillus with long flattened tuberculate blade; notogaster anterodorsally with mesal carina, reticulate-alveolate, with caudal notch when viewed from above, 5 pairs of notogastral setae, 3 pairs anterior to fissura *ip*; epimera III–IV strongly convex anterior to genital valves and tending to overhang them; genital and anal vestibules close; genitoanal chaetotaxy 7:1:2:3, genital setae in



slightly arcuate file, level of insertion of *ad3* adjacent to posterior half of anal valve; claw stalk long.

### Description

**ADULT: Body:** brown; length of type specimens 430 µm, 450 µm. **Cerotegument:** body generally with thin veneer of cerotegument; reticulations on prodorsum and notogaster and rim of bothridium highlighted with crests of cerotegument (Fig. 22B–D). Setae *ro* and *le* and notogastral setae without obvious cerotegument. Legs with cerotegument capping the reticulate surface ornamentation which is of much lower relief than in *P. propinqua*. **Prodorsum:** integument reticulate-alveolate, strong transverse carina both anterior and posterior to median transverse groove; no carina between *le* and *ro* though ridge of stronger reticulations at level of *le*; *le* dorsolateral, distance between them about 0.75 distance between *ro*, arising from small pit, *ro* ventrolateral. Pedotectal tooth similar to *P. propinqua*. Bothridium abutting notogaster, (Fig. 22B,F), wall subcircular and depressed anterolaterally, posterolateral carina weak, situated close to notogaster; sensillus with long flattened tuberculate blade (Fig. 22B,E), length subequal to interbothridial distance. *in* small, set about 0.5 bothridial diameter from bothridium near edge of dorsosejugal furrow, spiniform but largely encased in cerotegument (Fig. 22F). **Exuvial scalps:** none seen. **Notogaster:** oval, length:width 330:240. Intramarginal depression oval but interrupted anteriorly but strong mesal carina. Notogaster reticulate-alveolate (Fig. 22A); posterior margin strongly invaginate when viewed from above, with linear ridges rather than mesal carina when viewed posteriorly (Fig. 22E). Fissura *ia* and *im* subparallel and *ip* oblique to sagittal plane; pore to *gla* easily seen posterior to *im*; 5 pairs of short notogastral setae arising from small pits (Fig. 22D), *h1* widely separated, each located just inside posterior margin on slight convexities flanking invagination; *p1* inserted midheight on posterior flank, similar distance apart to *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise just inside posterolateral flank, their insertions visible from above (Fig. 13D), *lp<sub>x</sub>* closest to fissura *ip*, inserted anterior to it (Fig. 22D). **Gnathosoma:** pedipalp tarsus with setae (*vt*) and *l''* with long barbs, *cm* smooth; apophysis supporting seta *acm* moderate height; solenidion *omega* almost reaching to base of *acm*. Rutella basally with strong concave flexure and lateral buttressing, with pointed mesad process (Fig. 23C, arrow); transverse striations absent. **Epimeral region:** strongly convex immediately anterior to and tending to overhang genital valves. **Genitoanal region:** separation of anal and genital vestibules relatively narrow with deep transverse grooves and a narrow isthmus between the vestibules (Fig. 23A). Ventral plate reticulate-alveolate. Genitoanal chaetotaxy 7:1:2:3; genital setae in slightly arcuate file, *g1* subequal to other setae, inserted posterior to inner anterior corner, not in marginal notch; *g5* situated at about 0.5 valve length, *g7* inserted anterior to inner posterior corner, not in marginal notch; setae *ag* inserted at level posterior to *g6*; setae *ad1* distinctly postanal, more so than *P. propinqua*, *ad3* level in posterior half of anal valve. **Legs.** Distal apophysis of tibia overlaps about 50% of tarsus (Fig. 25D). Tarsal cluster of leg I placed distodorsally on apophysis, above and slightly proximal to setae *tc*; *ft''*, *omega 1* and 2 seem to arise from top

of apophysis and not enclosed by distinct rim(s) but some evidence of damage: no distal recess for receiving retracted unguinal complex, stalk long.

**Comments.** The strong fold of epimera III–IV which tends to overhang the genital valves suggests that *P. gunjina* is closely related to *P. obesa*, despite the presence of punctations in the notogaster of the latter species.

A single specimen from Coogee, a seaside settlement just south of Perth, is very similar to *P. gunjina*, except that the notogaster is punctate and the prodorsum lacks a transverse carina anterior to the transverse groove. It is somewhat intermediate in morphology between *P. gunjina* and *P. obesa*. It is not assigned to a species in this work.

**Etymology.** The specific epithet refers to the type locality, Gunjin Gully.

**Distribution.** Darling Range, Western Australia.

### *Pedrocortesella hangayi* n.sp.

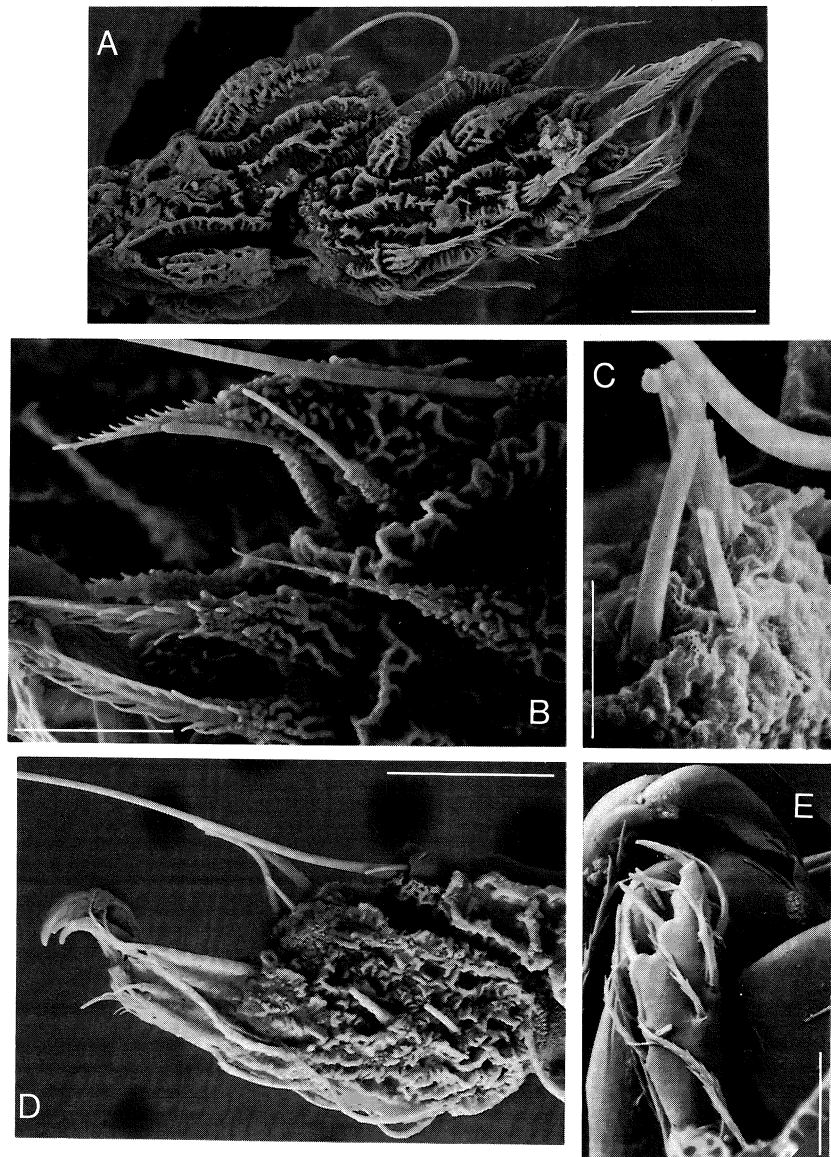
Figs 24A,B,E, 25, 26

**Type material.** New South Wales: HOLOTYPE adult, AM KS43679, Willandra Homestead via Hillston, 33°12'S 145°07'E, berlese extraction leaf litter near river, G. Hangay and T. Ralph, July 1992. PARATYPE adults. AM KS46539 SEM stub no. S/134 (ill.), same data as holotype, 1 adult; ANIC, 13 km S. of Collarenebri, 29°34'S 148°35'E, berlese extraction *Geijera* leaf litter, ANIC berlesate 88, L.A. Mound, 5 June 1968, 8 adults; AM KS43680, same data, 2 adults; AM KS46540, SEM stub no. S/248 (ill.), same data, 3 adults; FMNH, same data, 2 adults; CNC, same data, 2 adults.

**Diagnosis.** Body medium, length about 500–600 µm; scalps rarely (if at all) carried by adult; sensillus with long flattened tuberculate blade; notogaster with caudal invagination when viewed dorsally, reticulate-alveolate around margins, more open alveolate-rugose pattern centrally; 5 pairs of notogastral setae arising from large pits, genitoanal chaetotaxy 7:1:2:3, genital setae in arcuate file, insertion of seta *ad3* adjacent to posterior half of anal valve; claw stalk very short.

### Description

**ADULT: Body:** dark brown; length 530 µm, 560 µm. **Cerotegument:** body generally with thin veneer of cerotegument; reticulations on prodorsum and notogaster and rim of bothridium highlighted with cushion-like masses or crests of cerotegument (Fig. 25E–G). Setae *ro* and *le* and notogastral setae with thick ribbed accretion of cerotegument near base. Legs with cerotegument capping surface sculpturing, setae with striking ribbed accretions. **Prodorsum:** integument reticulate-alveolate particularly anterior to median transverse groove, no carina between *le* and *ro*; *le* dorsolateral, distance between them about 0.65 distance between *ro*, arising from large pit, *ro* ventrolateral. Pedotectal tooth similar to *P. propinqua*. Bothridium abutting but not closely adpressed to notogaster (Fig. 25F), wall subcircular and depressed anterolaterally, posterolateral carina weak, situated close to notogaster; sensillus with long flattened tuberculate blade (Fig. 25E), length about 0.8 interbothridial distance; posterior margin of prodorsum forming a smooth arc between

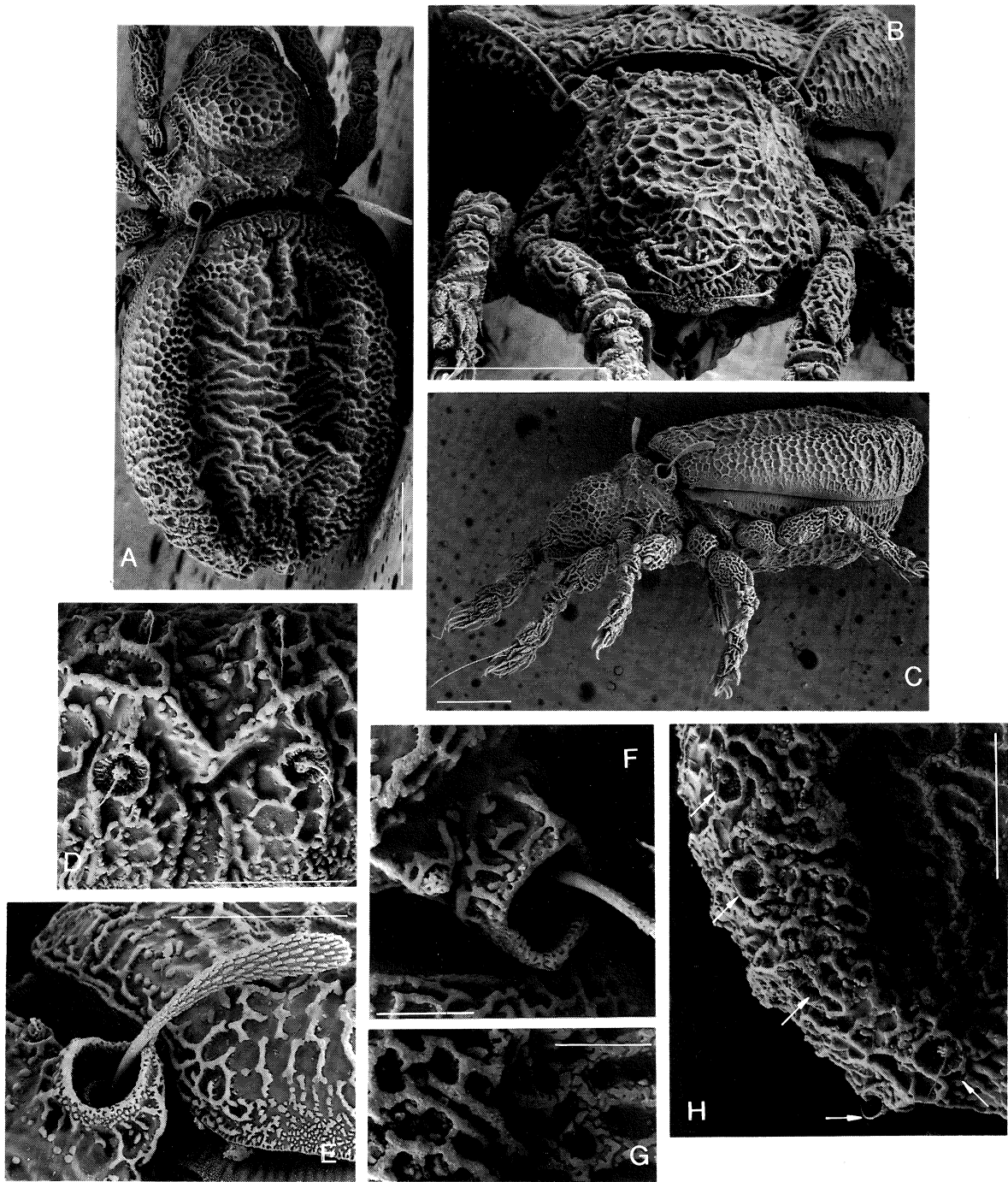


**Fig. 24.** *Pedrocortesella* spp., appendage structures. A,B,E: *P. hangayi* n.sp. A, leg I tibia (distal) and tarsus, antiaxial; B, detail of tarsal cluster; E, pedipalp. C,D: *P. gunjina* n.sp. C, leg I, tarsus; D, detail of tarsal cluster (damaged). Scale bars: A,C = 20 µm; B,E = 10 µm; D = 5 µm. A,E = Collarenabri; B = Hillston; C = Gunjin Gully.

bothridia. *in* small, set close to base of bothridial wall, at edge of dorsosejugal furrow, entirely encased in cerotegument (Fig. 25F). *Exuvial scalps*: none seen. *Notogaster*: oval, length:width 360:290, 380:295. Intramarginal depression U-shaped. Notogaster reticulate-alveolate around margins but with more open alveolate-rugose pattern centrally (Fig. 25A); posterior margin slightly invaginate when viewed from above, with a V-shaped carina between setae *p1* when viewed posteriorly (Fig. 25D). Fissura *ia* and *im* oblique and *ip* oblique-perpendicular to sagittal plane; pore to *gla* posterior to *im*; 5 pairs of moderately short notogastral setae arising from large pits (Fig. 25D,H); *h1* widely separated, each located just inside posterior margin; *p1* inserted midheight on posterior flank, further apart than *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>*, and *p3<sub>x</sub>* arise just inside posterolateral flank, their insertions easily visible from above, *lp<sub>x</sub>* and *p2<sub>x</sub>* equidistant from fissura *ip*, *lp<sub>x</sub>* inserted posterior to it (Fig. 25H). *Gnathosoma*: cheliceral movable finger ventrolaterally with prominent shelf on antiaxial surface and larger but more flexible flap on paraxial surface. Rutella basally

with strong concave flexure and moderate lateral buttressing, small pointed mesad processes present, transverse striations absent (Fig. 26B). Pedipalp tarsus with setae (*vt*), *l''* and *cm* with medium-short barbs, apophysis supporting seta *acm* short; solenidion *omega* almost reaching to base of *acm*. *Epimeral region*: strongly convex immediately anterior to genital valves, though not tending to overhang them. *Genitoanal region*: separation of anal and genital vestibules relatively broad but with interruption to ventral plate microsculpture, wide mesal isthmus without strong transverse grooves between the vestibules (Fig. 26A). Ventral plate reticulate-alveolate. Genitoanal chaetotaxy 7:1:2:3; genital setae in arcuate file, *g4* and *g5* furthest away from margin, *g1* slightly longer than other setae, inserted close to inner anterior corner in marginal notch; *g5* situated at about 0.5 valve length, *g7* inserted well anterior to inner posterior corner in marginal notch; setae *ag* inserted at level posterior to *g7*; setae *ad1* distinctly postanal, *ad3* level with posterior half of anal valve; *ad1–3* inserted in large pits. *Legs*. Distal apophysis of tibia overlaps





**Fig. 25.** *Pedrocortesella hangayi* n.sp. A, body, dorsal; B, prodorsum, frontal; C, body, lateral; D, notogastral setae *hl* and *pl*, posterior view; E, bothridium, sensillus and seta *in*, dorsolateral; F, bothridium and seta *in*, dorsal; G, notogastral integument and fissura *im*; H, notogaster, posterior, dorsal, arrows right to left label setae *hl*, *pl*, alveolus of *lp<sub>x</sub>* (seta broken), alveolus of *p2<sub>x</sub>*, setae *p3<sub>x</sub>*. Scale bars: A–C = 100 µm; D,E,H = 50 µm; F,G = 20 µm.

about 30% of tarsus (Fig. 25A). Tarsal cluster of leg I placed distodorsally on apophysis, almost directly above setae *tc*; *ft''* with very thick base ribbed by cerotegument and together with *omega 1* and 2 enclosed in common rim (partition separating *ft''* from *omega 1* and 2 not seen); *ft''* longer than solenidia; tarsus lacking distal recess for receiving retracted unguinal complex, stalk very short.

**Etymology.** This species is named after George Hangay, a former colleague at the Australian Museum, who

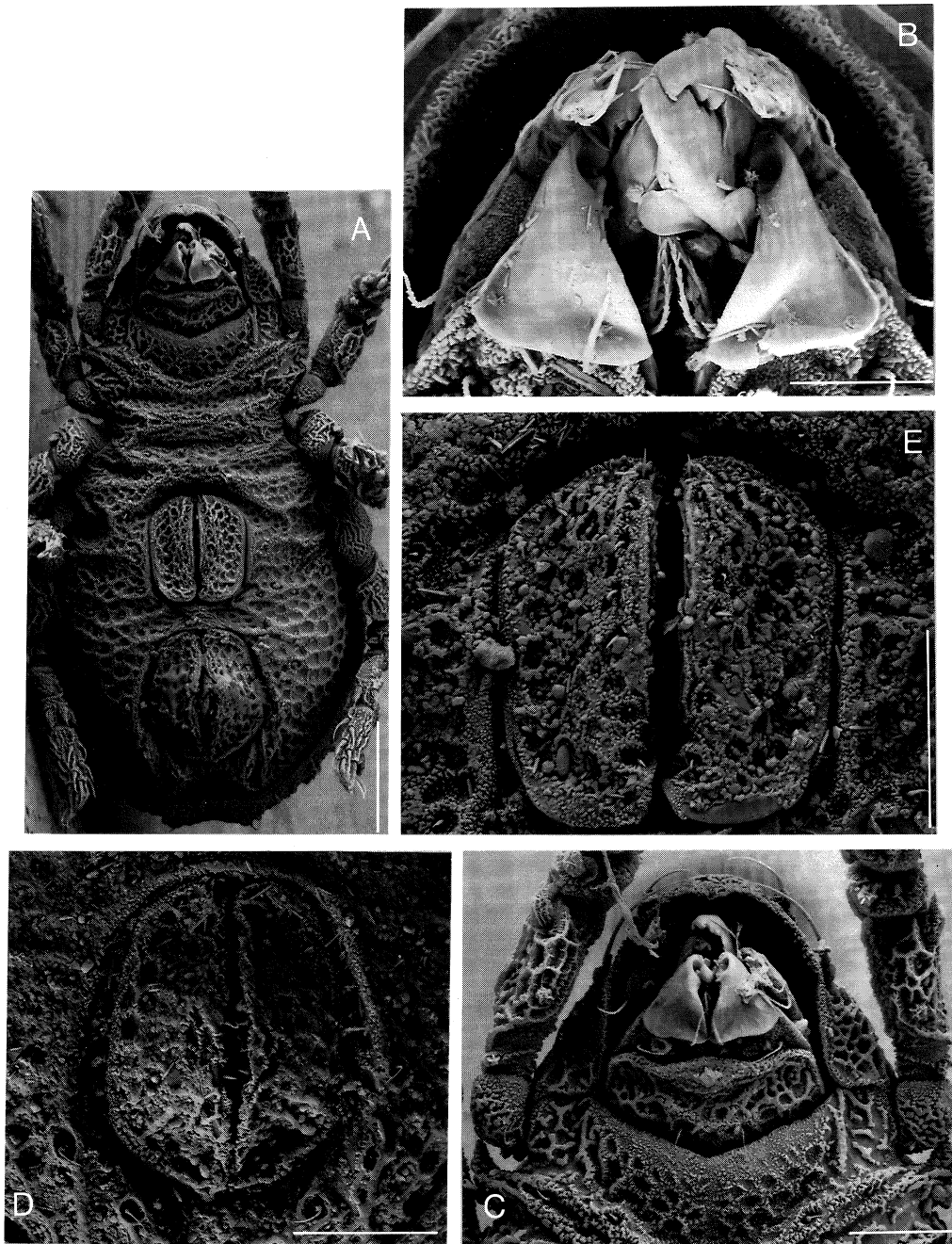
collected the holotype.

**Distribution.** Western New South Wales.

***Pedrocortesella impedita* n.sp.**

Figs 27, 28

**Type material.** Western Australia: HOLOTYPE adult, WAM, Mount York, ca 31°53'S 116°48'E, berlesate of she-oak litter, J. Bannister, 16 November 1991. PARATYPE adults. ANIC, same data as holotype, 2 adults; AM KS46541, SEM stub



**Fig. 26.** *Pedrocortesella hangayi* n.sp. A, body, ventral; B, part of gnathosoma: rutella, chelicerae with ventral paraxial and ventral anti-axial processes; C, subcapitulum; D, anal valves; E, genital valves. Scale bars: A = 100  $\mu$ m; C–E = 50  $\mu$ m; B = 20  $\mu$ m. A,B = Hillston; C–E = Collarenebri.

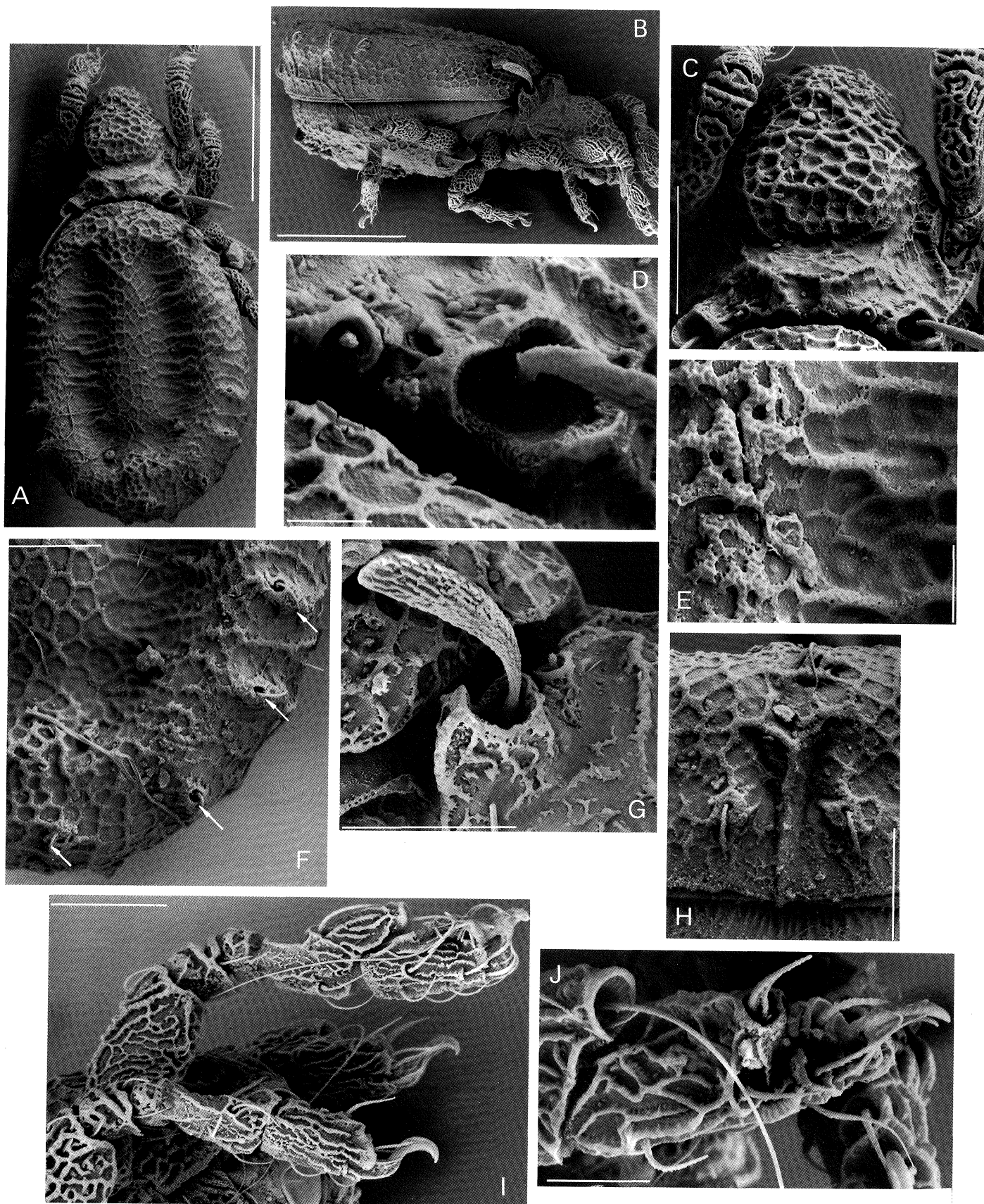
no. S/401 (ill), same data, 3 adults; AM KS46542, SEM stub no. S/420, York, 31°53'S 116°46'E, berlesate Powder bark/Mallee litter, J. Bannister, 2 November 1991, 1 adult.

New South Wales: ZMK, 9.6 km S. of Gilgandra, 31°49'S 148°39'E, dry sclerophyll, ANIC berlesate 89, L.A. Mound, 6 June 1968, 2 adults.

**Other material examined.** New South Wales: ANIC, 13 km S. of Collarenebri, 29°34'S 148°35'E, berlese extraction *Geijera* leaf litter, ANIC berlesate 88, L.A. Mound, 5 June 1968, 1 adult; ANIC, 9.6 km S. of Gilgandra, 31°49'S 148°39'E, dry sclerophyll, ANIC berlesate 89, L.A. Mound, 6 June 1968, 13 adults; AM KS43681, same data, 2 adults; FMNH, same data, 2 adults; CNC, same data, 2 adults; AM KS46543 SEM stub no. S/244, same data, 1 adult.

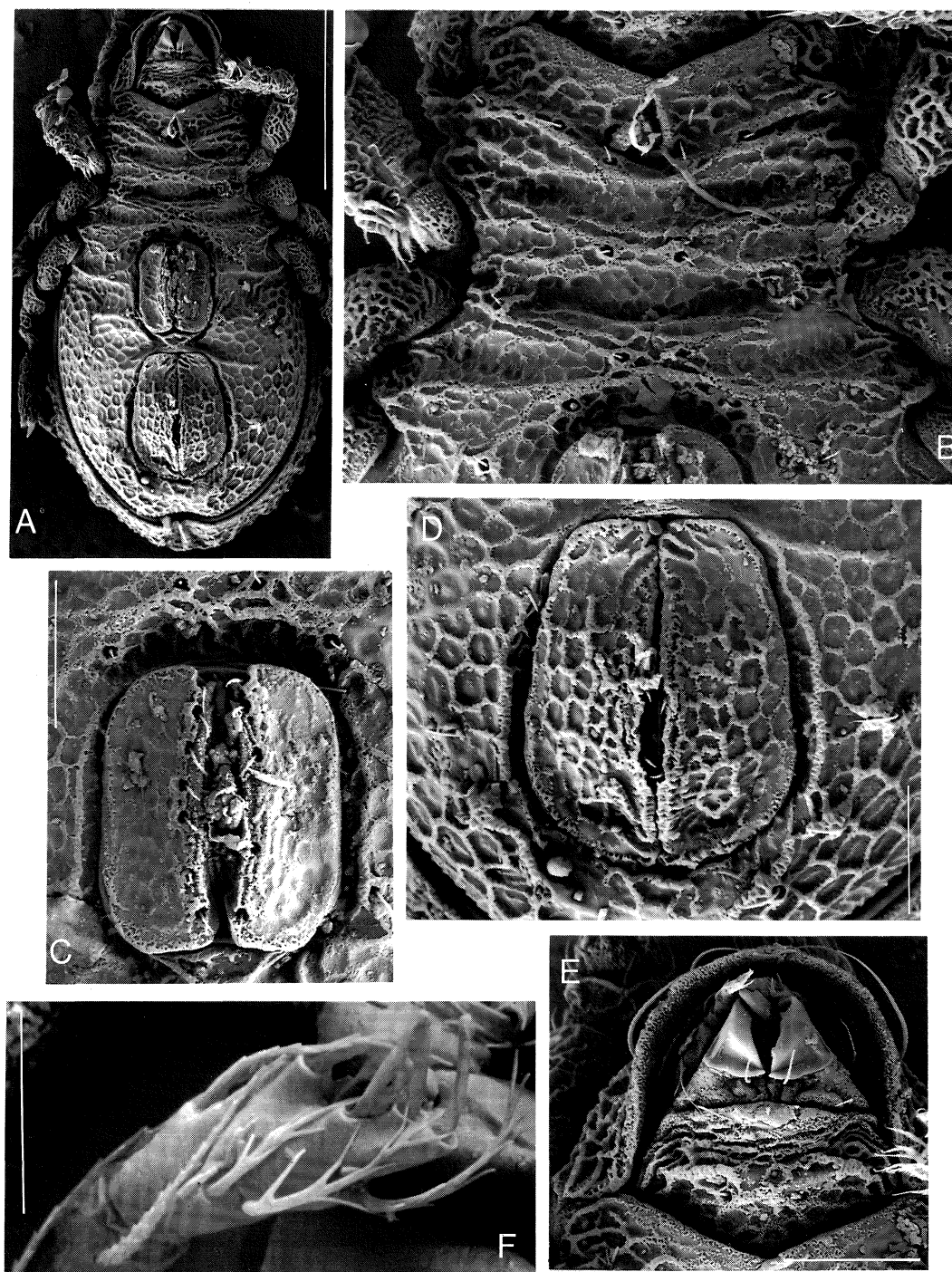
South Australia: AM KS46501, SEM stub no. S/222, 3.2 km W. Sherlock, ANIC berlesate 182, R.W. Taylor, 12 Jan 1970, 4 adults; AM KS46545, SEM stub no. S/216, 25 km E. by N. of Kimba, 33°05'S 136°41'E litter at base of Mallee, ANIC berlesate 741, A. Calder, 4 Sept. 1981 3 adults.

**Diagnosis.** Body medium, length about 500–600  $\mu$ m; scalps rarely (if at all) carried by adult; sensillus with long flattened tuberculate blade; notogaster reticulate-alveolate; 5 pairs of notogastral setae, each arising from a large pit set on a conspicuous mound, genitoanal chaetotaxy 7:1:2:3, genital setae in slightly arcuate file, insertion of seta *ad3* adjacent to posterior half of anal valve; claw stalk very short.



**Fig. 27.** *Pedrocortesella impedita* n.sp. A, body, dorsal; B, body, lateral; C, prodorsum, dorsal; D, bothridium and seta *in*, dorsal; E, notogastral integument and fissura *im*; F, part of posterior of notogaster, dorsal, arrows left to right label setae *hl*, *lp<sub>x</sub>*, *p2<sub>x</sub>*, *p3<sub>x</sub>*; G, bothridium, sensillus and seta *in*, lateral; H, notogastral setae *hl* and *pl*, posterior view; I, leg I and II, antiaxial; J, leg I tarsus, dorsal. Scale bars: A,B = 200 µm; D,F–I = 50 µm; C,E,J = 20 µm.





**Fig. 28.** *Pedrocortesella impedita* n.sp. A, body, ventral; B, epimeral region; C, genital valves; D, anal valves; E, subcapitulum; F, tarsus of pedipalp, antiaxial. Scale bars: A = 200  $\mu$ m; B–E = 50  $\mu$ m; F = 10  $\mu$ m.

### Description

**ADULT:** *Body:* brown; length 570  $\mu$ m. *Cerotegument:* body generally with thin veneer of cerotegument; reticulations on prodorsum and notogaster and rim of bothridium highlighted with crests of cerotegument (Fig. 27C–E). Setae *ro* and *le* and notogastral setae without obvious cerotegument. Legs with cerotegument capping surface sculpturing, setae without obvious cerotegument. *Prodorsum:* integument reticulate-alveolate; no carina between *le* and *ro*; *le* dorsolateral, distance between them about 0.5 distance between *ro*, arising from small pit,

*ro* ventrolateral. Pedotectal tooth similar to *P. propinqua*. Bothridium abutting notogaster (Fig. 27D,G), wall depressed posteromesad, posterolateral carina weak, situated away from notogaster; sensillus length subequal to interbothridial distance, with long flattened tuberculate blade (Fig. 27G), posterior margin of prodorsum forming a smooth arc between bothridia. *in* small, set about 0.5 bothridial diameter from bothridial wall, at edge of dorsosejugal furrow (Fig. 27D). *Exuvial scalps:* very dirty scalps loosely held on *Gilgandra* specimen (not illustrated). *Notogaster:* oval, length:width 420:300. Intramarginal depression U-shaped. Notogaster reticulate-

alveolate particularly mesally but regular pattern breaking down with horizontal crests predominantly more laterally into alveolate-rugose pattern (Fig. 27A); posterior margin not invaginate when viewed from above, with a carina between setae *p1* when viewed posteriorly (Fig. 27H). Fissura *ia* oblique, *im* and *ip* subparallel to sagittal plane; 5 pairs of moderately short notogastral setae arising from pits atop mounds; *h1* close, each located just inside posterior margin; *p1* inserted low on posterior flank, further apart than *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise just inside posterolateral flank, their insertions easily visible from above, *lp<sub>x</sub>* closest to fissura *ip*, inserted posterior to it (Fig. 27F). *Gnathosoma*: chelicera with prominent shelf ventrolaterally on antiaxial surface of movable finger. Pedipalp tarsus with setae (*vt*) and *l''* with very long barbs, *cm* barbs short; tubercle supporting seta *acm* moderate height; solenidion *omega* reaching to base of *acm* (Fig. 28F). Rutella basally with moderate concave flexure and strong lateral buttressing and with pointed mesad process, transverse striations absent (Fig. 28E). *Epimeral region*: with depressed area immediately anterior to genital valves (Fig. 28B). *Genitoanal region*: separation of anal and genital vestibules relatively broad but with interruption to ventral plate microsculpture and with mesal triangular-diamond shaped structure between vestibules (Fig. 28A). Aggenital and adanal areas alveolate-reticulate without pores; genital and anal valves with smaller alveoli of similar depth on both valves. Genitoanal chaetotaxy 7:1:2:3; genital setae in slightly arcuate file (Fig. 28C), but all placed close to mesal suture compared with *P. propinqua*, *g1* of similar size to other setae, inserted in notch at inner anterior corner; *g5* situated at about 0.5 valve length, *g7* inserted well anterior to inner posterior corner; setae *ag* inserted at level just posterior to *g6*; setae *ad1* more postanal than *P. propinqua*, *ad2* about level with posterolateral corner of anal valve, *ad3* level at about 0.5 length of anal valve. *Legs*. Distal apophysis of tibia overlaps about 40% of tarsus (Fig. 27I). Tarsal cluster of leg I placed distodorsally on apophysis, slightly proximodorsal to setae *tc*; *ft''*, *omega 1* and *2* enclosed in well-developed almost circular common rim, no partition separating *ft''* from *omega 1* and *2* (Fig. 27J); *ft''* longer than solenidia; tarsus with distal recess for receiving retracted ungual complex (Fig. 27J), stalk very short.

**Comments.** *Pedrocortesella impedita* can be mistaken for *P. semireticulata* because of a superficial similarity in notogastral sculpturing. It differs in having seven rather than six pairs of genital setae, but the two species are evidently very closely related. They share the condition of a broad separation of the genital and anal vestibules with a mesal triangular-diamond shaped structure between them. The specimens collected near Sherlock and Kimba, South Australia, were noted by Hunt & Lee (1995) under their description of *P. semireticulata* but not placed in a species.

**Etymology.** The specific epithet is Latin for "embarrassed" and refers to the fact that my technical assistant recognised two species in a sample from Western Australia where I had recognised one.

## *Pedrocortesella kanangra* n.sp.

Figs 29, 30

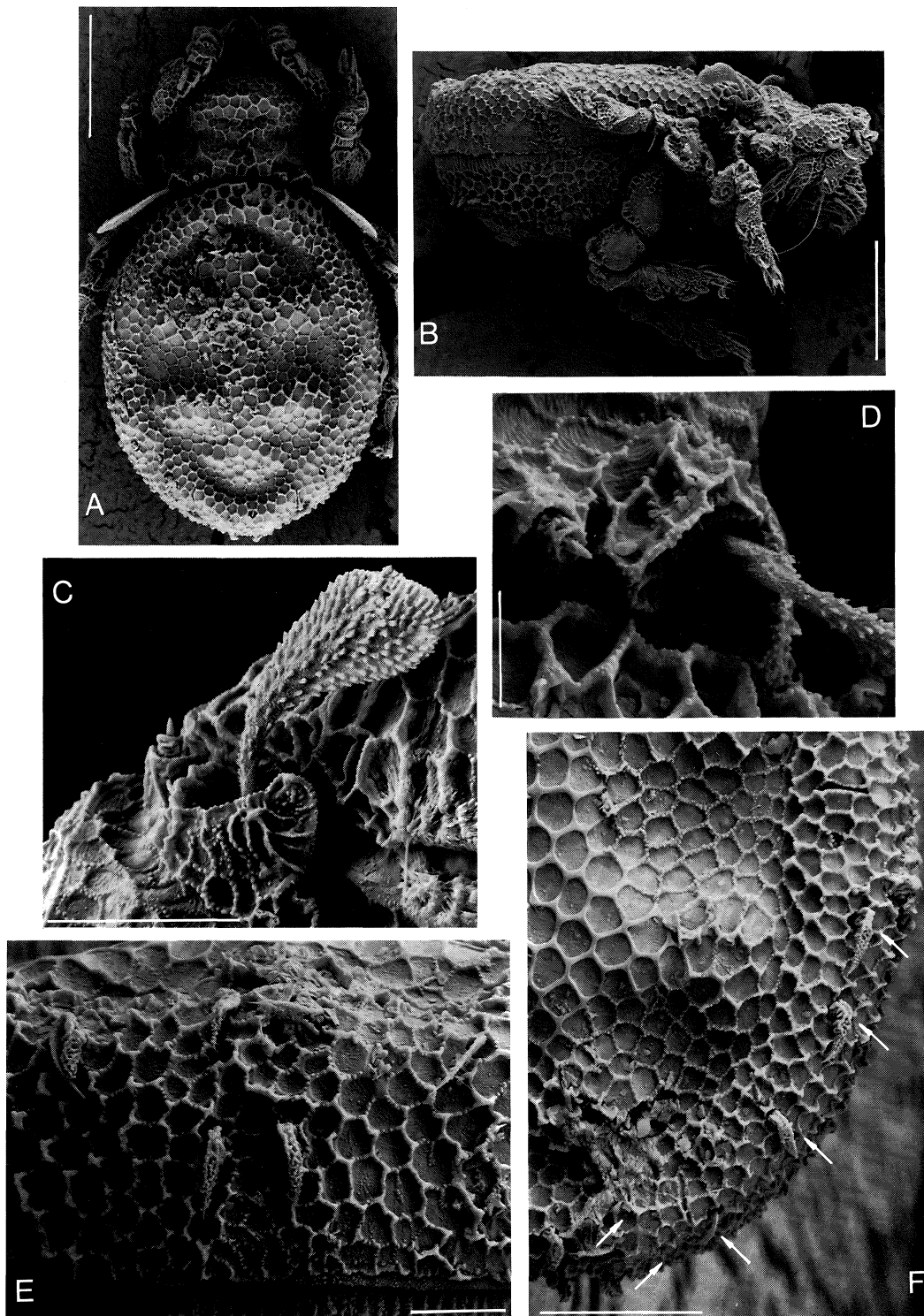
**Type material.** New South Wales: HOLOTYPE adult, ANIC, Echo Head Falls, Kanangra-Boyd National Park, 33°59'S 150°06'E, 950 m, ANIC berlesate 856, berlese extraction leaf litter near creek, L. Hill, 3 October 1982. PARATYPE adults. AM KS43691, same data as holotype, 1 adult; AM KS46554 SEM stub no. S/240 (ill.), same data, 2 adults; AM KS46555 SEM stub no. S/242 (ill.), same data, 4 adults; AM KS46556 SEM stub no. S/402 (ill.) same data, 1 adult.

**Diagnosis.** Body small-medium, length about 400–450 µm; scalps rarely (if at all) carried by adult; sensillus long flattened tuberculate blade; notogaster reticulate-alveolate, centrally with raised and depressed areas; 6 pairs of notogastral setae, 5 pairs close to posterolateral margin, one mesal pair lower on posterior flank; genitoanal chaetotaxy 6:1:2:3, genital setae in slightly arcuate file, insertion of seta *ad3* near posterior margin of anal valve; leg femora with very strong ventral crest; claw stalk moderately long.

## Description

**ADULT: Body:** brown; length 410 µm. *Cerotegument:* body with cerotegument reflecting underlying reticulate pattern of integument, hollowed areas of notogaster tend to have cushions of cerotegument on the reticulations, higher areas continuous crests. Setae *ro* and *le* with thick reticulated crust of cerotegument especially at base (Fig. 30A,C), notogastral setae thickly covered (Fig. 29E). *Prodorsum:* integument reticulate, carina between *le* and *ro* absent; *le* dorsolateral, distance between them about 0.8 distance between *ro*, not arising from large pit, *ro* ventrolateral. Pedotectal tooth similar to *P. propinqua*. Bothridium tightly adpressed to notogaster (Fig. 29D), wall triangular in dorsal view, strongly depressed posteriorly, posterolateral carina moderately strong, abutting notogaster; sensillus length subequal to interbothridial distance, with long flattened tuberculate blade (Fig. 29C), posterior margin of prodorsum forming a smooth arc between bothridia. *in* small, set close bothridial wall, at edge of dorsosejugal furrow, spiniform (Fig. 29C,D). *Exuvial scalps:* none seen. *Notogaster:* oval, length:width 310:250. Intramarginal depression oval. Notogaster centrally with raised areas in form of a "Cross of Lorraine" (Fig. 29A), reticulate-alveolate, not perforated by pores (Fig. 29A,F); posterior margin not invaginate when viewed from above; without carina between setae *p1* when viewed posteriorly (Fig. 29E). Fissura *ia* and *ip* subparallel, *im* perpendicular to sagittal plane; 6 pairs of notogastral setae arising from small pits, *h1* moderately close, each located just inside posterior margin; *p1* with similar spacing to *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>*, *p3<sub>x</sub>* and *lm* arise just inside posterolateral flank, their insertions visible from above, *lp<sub>x</sub>* closest to fissura *ip*, inserted lateral to it (Fig. 29F). *Gnathosoma:* pedipalp not studied. *Epimeral region:* strongly convex a small distance anterior to genital valves and not tending to overhang them. *Genitoanal region:* reticulate-alveolate. Separation of anal and genital vestibules broad with little or no interruption of ventral plate microsculpture between the vestibules (Fig. 30F). Genitoanal chaetotaxy 6:1:2:3;

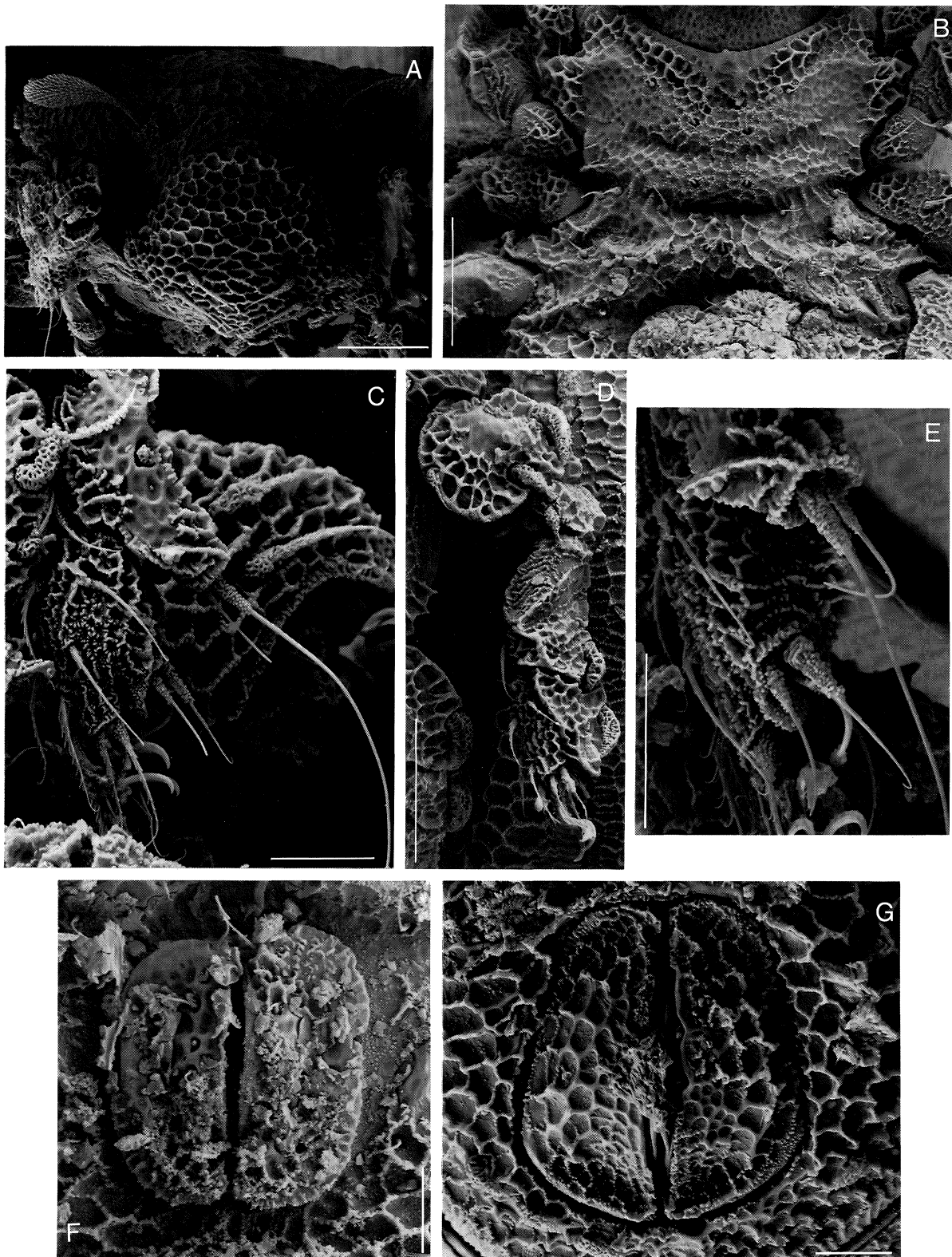




**Fig. 29.** *Pedrocortesella kanangra* n.sp. A, body, dorsal; B, body, lateral; C, bothridium, sensillus and seta *in*, lateral; D, bothridium and seta *in*, dorsal; E, notogastral setae *h1*, *p1*, and *lp1*, posterior view; F, notogaster, posterior, dorsal, arrows left to right label setae *h1*, *p1*, *lp1*, *p2<sub>x</sub>*, *p3<sub>x</sub>*, *lm*. Scale bars: A,B = 100  $\mu$ m; F = 50  $\mu$ m; C–E = 20  $\mu$ m.

genital setae in arcuate file, most posterior inserted anterior to inner posterior corner, not in marginal notch (Fig. 30F), seta *ag* at about level of *g6*; seta *ad1* distinctly postanal, *ad2–3* arranged around posterior margin of anal valves. *Legs*. Leg femora with very strong ventral crest giving femur almost circular appearance in lateral view (Fig. 30D); tibia I apophysis very strong (Fig. 30C), overhangs about

40% of tarsus. Tarsal cluster of leg I placed distodorsally on apophysis, well proximodorsal to setae *tc*; *ft''*, *omega 1* and 2 enclosed in common rim which is produced into a distal lip (Fig. 30C,E), no partition separating *ft''* from *omega 1* and 2; setae including solenidia with encrusting cerotegument at base; tarsus without distal recess for receiving retracted ungual complex, stalk moderately long.

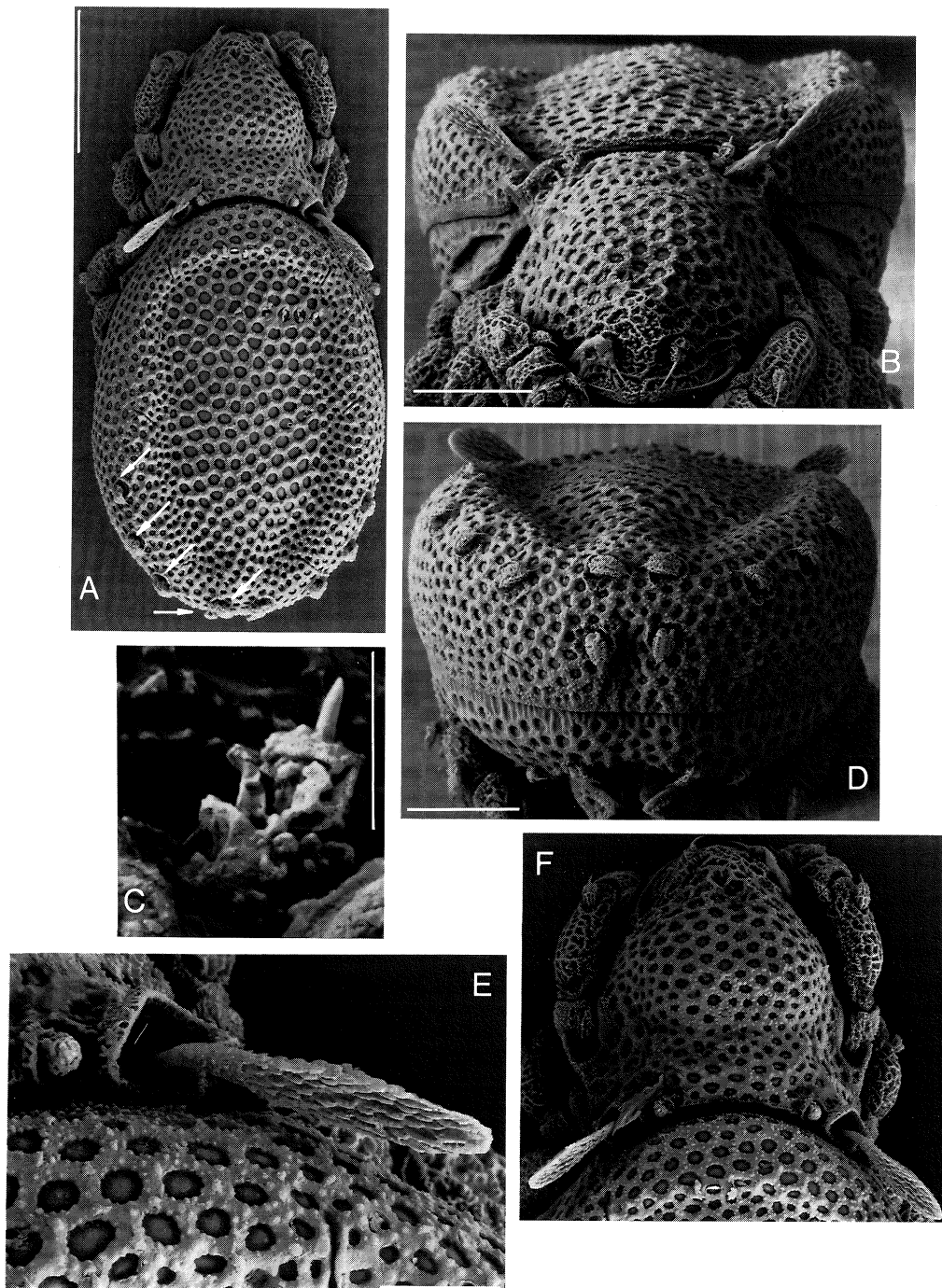


**Fig. 30.** *Pedrocortesella kanangra* n.sp. A, prodorsum, frontal; B, epimeral region; C, leg I tibia and tarsus, antiaxial; D, leg IV, antiaxial; E, leg I tibia (distal) and tarsus, dorsal; F, genital valves; G, anal valves. Scale bars: A,B,D = 50 µm; C,E-G = 20 µm.

**Comments.** This species appears to be closely related to *P. conundrum* but differs in the distribution of notogastral setae, the pattern of raised areas on the notogaster, in details of leg structure and in the form of cerotegument on the legs. This species is tentatively placed in *Pedrocortesella*.

**Etymology.** The specific epithet is a noun in apposition referring to Kanangra Walls, located near the type locality.

**Distribution.** Known only from the type locality in south-eastern New South Wales.



**Fig. 31.** *Pedrocortesella leei* n.sp. A, body, dorsal, arrows right to left label setae *h1*, *p1*, *lp<sub>x</sub>*, *p2<sub>x</sub>*, *p3<sub>x</sub>*; B, body, frontal; C, interlamellar seta *in*; D, body, posterior; E, bothridium, sensillus and seta *in*, dorsal; F, prodorsum, dorsal. Scale bars: A = 100 µm; B,D,F = 50 µm; E = 20 µm; C = 10 µm.

***Pedrocortesella leei* n.sp.**

Figs 1D, 31–33

**Type material.** New South Wales: HOLOTYPE adult, AM KS43690 Mount Allyn, near Barrington Tops, via Salisbury, 32°08'S 151°26'E berlese extraction bark scraped from *Nothofagus moorei*, temperate rainforest, G.S.Hunt, 20 September 1993. PARATYPE adults. ANIC, same data as holotype, 1 adult; SAMA, same data, 1 adult; AM KS46553 SEM stub. no 337 (ill.), same data, 3 adults.

**Diagnosis.** Body small-medium, length about 400–450 µm; scalps rarely (if at all) carried by adult; prodorsum

without carinae; sensillus a flattened tuberculate blade though length less than interbothridial distance; notogaster foveate; 5 pairs notogastral setae, with cerotegument they are leaf-shaped; genitoanal chaetotaxy 6:1:2:2, genital setae essentially in straight file, both pairs adanal setae near posterior margin of anal valve; claw stalk very short.

**Description**

**ADULT: Body:** brown; length 410 µm, 420 µm. **Cerotegument:** body generally with thin veneer of cerotegument; reticulations on prodorsum and notogaster with numerous cushion-like grains of cerotegument (Fig.



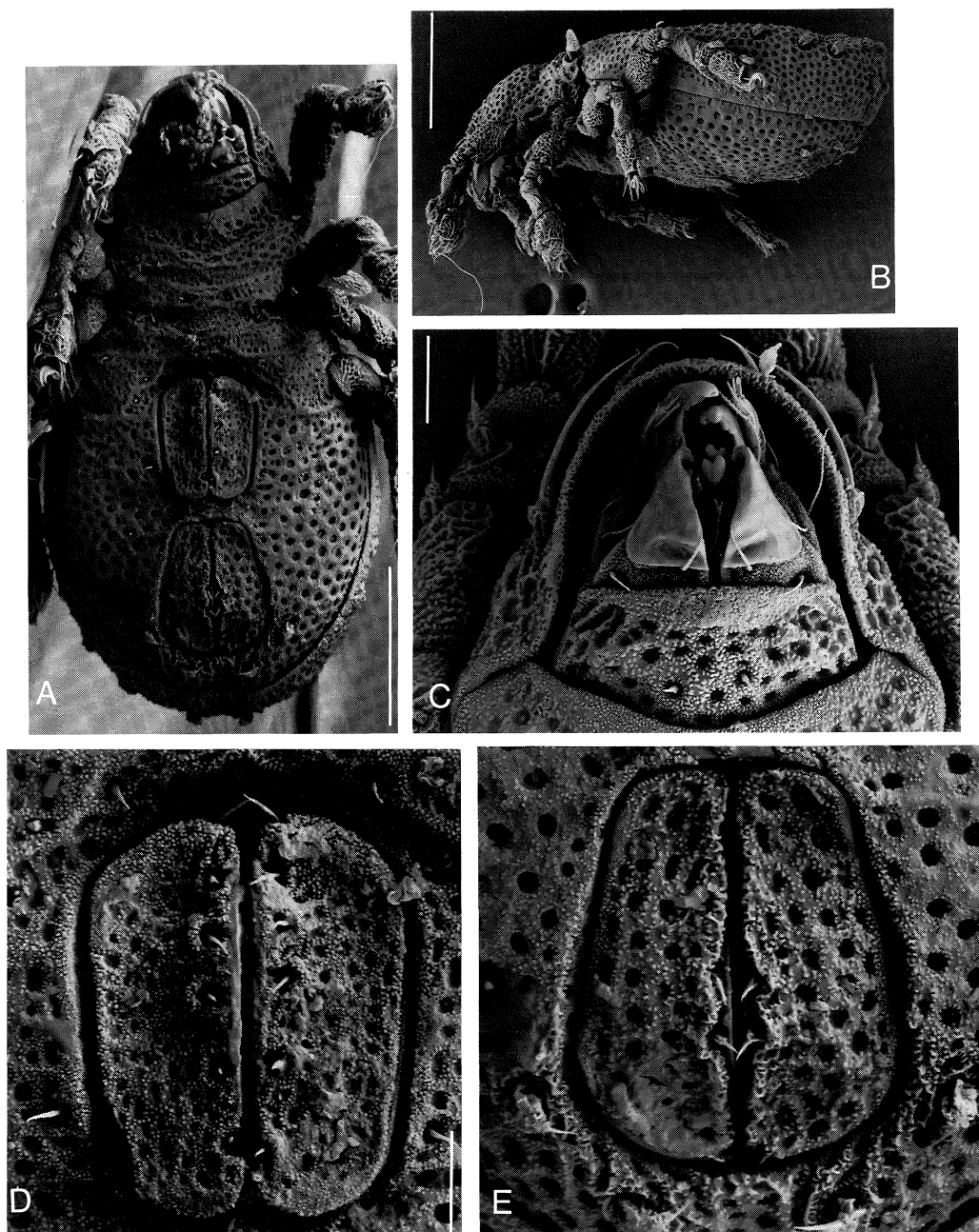
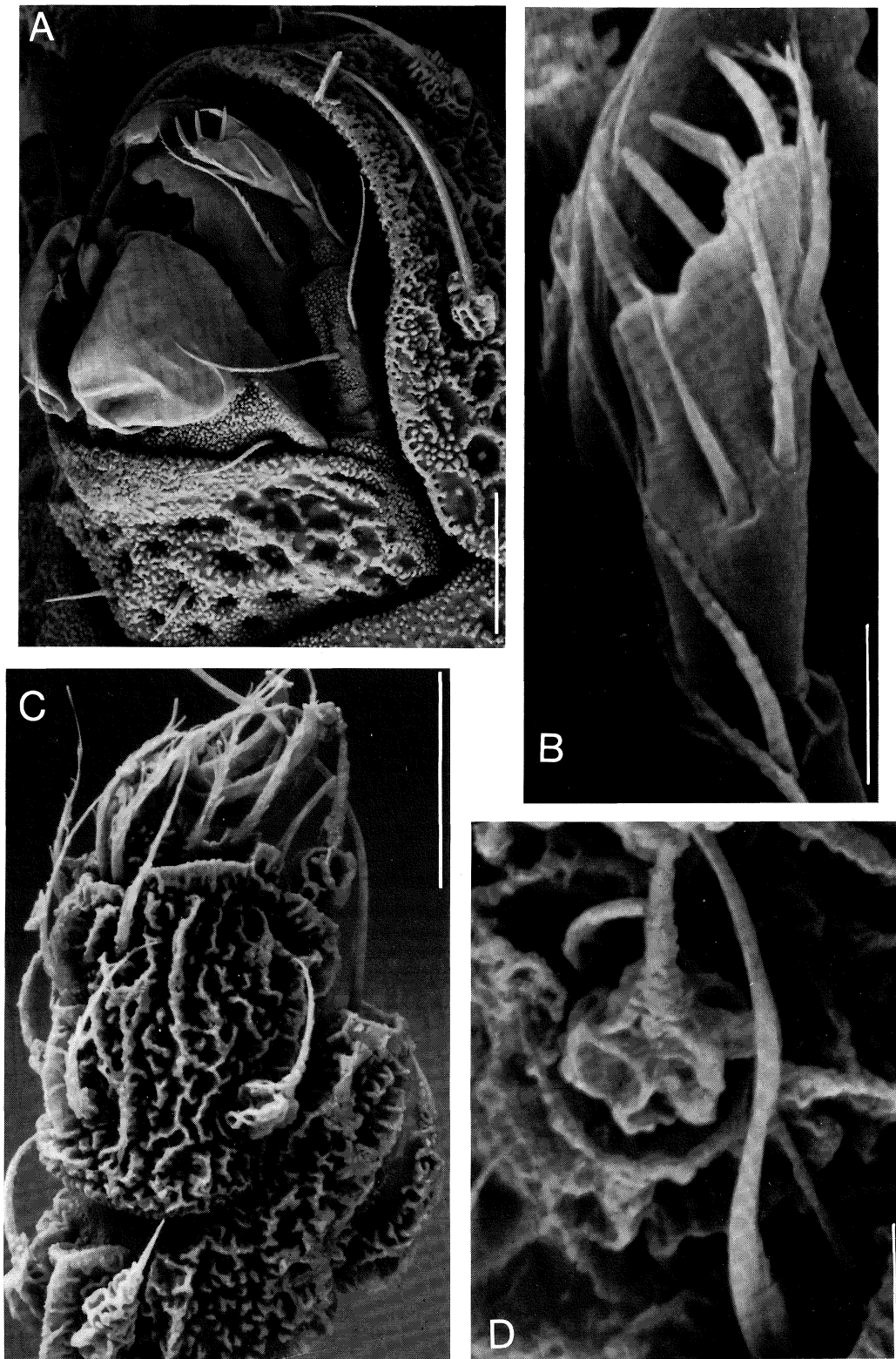


Fig. 32. *Pedrocortesella leei* n.sp. A, body, ventral; B, body, lateral; C, subcapitulum; D, genital valves; E, anal valves. Scale bars: A,B = 100  $\mu$ m; C-E = 20  $\mu$ m.

31E). Setae *ro* and *le* and notogastral setae with cerotegument at their bases; notogastral setae with thick lateral fringes of cerotegument giving the seta a tapering leaf-like appearance. *Prodorsum*: integument more or less uniformly reticulate-foveate including area between bothridia; foveae without visible pores; carina between *le* and *ro* absent; *le* dorsolateral and situated close to anterior of rostrum, distance between them about 0.5 distance between *ro*, not arising from large pit, *ro* ventrolateral. Pedotectal tooth strongly curved anteriorly, tapering abruptly near its base into a long delicate spine. Bothridium abutting notogaster but not closely adpressed (Fig. 31E), wall diamond-shaped, posterolateral carina weak, away from notogaster; sensillus length about 0.8 interbothridial distance, with long flattened tuberculate blade (Fig. 31B), posterior margin of prodorsum forming

a smooth arc between bothridia; area between bothridia and elsewhere on prodorsum smoothly contoured (Fig. 31F), without carinae; *in* small, its supporting apophysis abutting bothridial base; at edge of dorsosejugal furrow, spiniform, base encased in cerotegument (Fig. 31C,E). *Exuvial scalps*: none seen. *Notogaster*: oval, length:width 290:210. Intramarginal depression oval but narrower posteriorly. Notogaster strongly foveate-reticulate, not perforated by pores; foveae with slightly raised central area (Fig. 31E); posterior margin not invaginate when viewed from above, without carina between setae *pl* when viewed posteriorly (Fig. 31D). Fissura *ia*, *im* and *ip* oblique to sagittal plane; 5 pairs of short notogastral setae, with broad tapering fringe of cerotegument, arising from pits; *hl* close to each other and directed mesad, each located at posterior margin; *pl* inserted

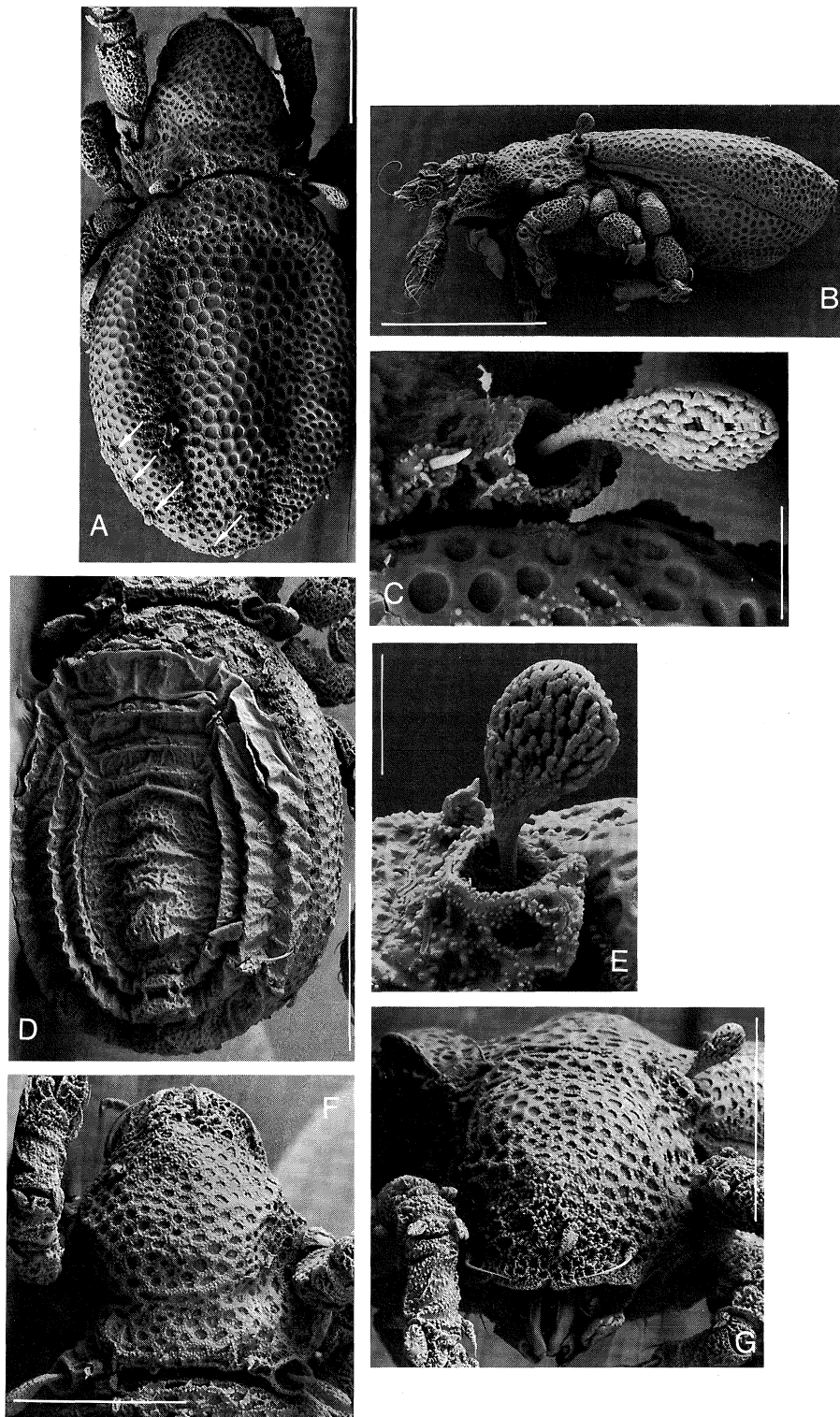




**Fig. 33.** *Pedrocortesella leei* n.sp. A, subcapitulum, ventrolateral; B, pedipalp tarsus, antiaxial; C, leg I tibia (distal) and tarsus, antiaxial; D, leg I tarsal cluster, distodorsal. Scale bars: A,C = 20  $\mu$ m; B,D = 5  $\mu$ m.

mid-height on posterior flank, similarly spaced to *hl*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise along posterolateral flank, their insertions visible from above, *lp<sub>x</sub>* closest to fissura *ip*, inserted just posterior to it (Fig. 31A). *Gnathosoma*: rutella basally with moderate concave flexure and moderate lateral buttressing, pointed mesad processes and transverse striations absent (Figs 32C, 33A); Pedipalp

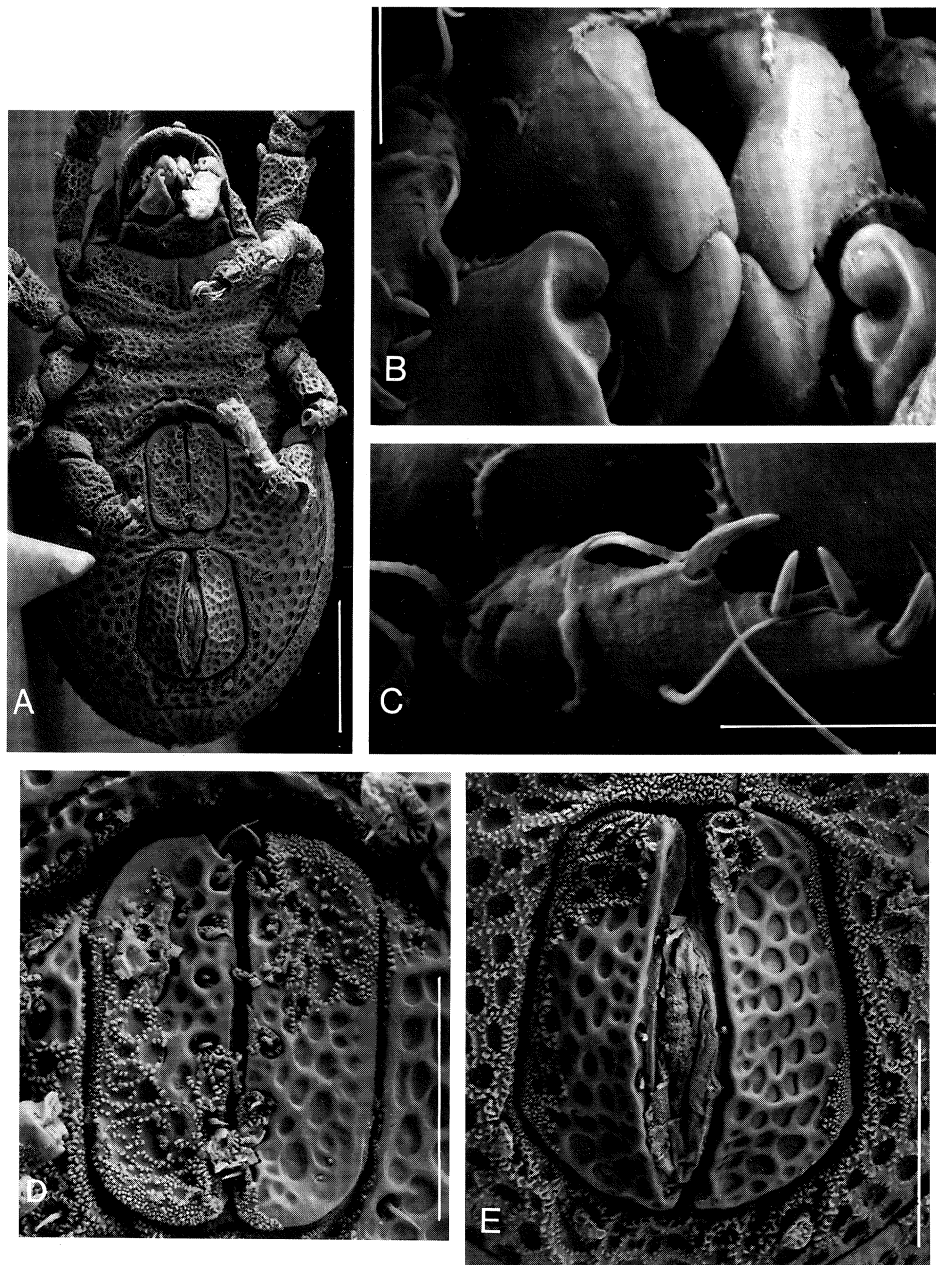
tarsus with setae (*vt*) with short side branches, *cm* branches very short; *l''* smooth; apophysis supporting seta *acm* low; solenidion *omega* reaching to base of *acm* (Fig. 33B). *Epimeral region*: weakly convex anterior to genital valves, not tending to overhang them. *Genitoanal region*: separation of anal and genital vestibules relatively broad but with interruption to ventral plate microsculpture



**Fig. 34.** *Pedrocortesella nortoni* n.sp. A, body, dorsal (scalps removed); B, body, lateral; C,E, bothridium, sensillus and seta *in*, dorsal and lateral; D, exuvial scalps, dorsal; F,G, prodorsum, dorsal and frontal. Scale bars: A,B,D,F,G = 100  $\mu$ m; C,E = 20  $\mu$ m.

but there is a wide mesal isthmus without strong transverse grooves between the vestibules (Fig. 32A). Ventral plate reticulate-foveate. Genitoanal chaetotaxy 6:1:2:2; genital setae essentially in straight file but with *g5* placed  $>0.5$  valve length; *g1* inserted at anterior margin of valve close to its inner corner; *g6* inserted well anterior to inner posterior corner, in marginal notch; setae *ag* inserted at level between *g5* and *g6*; setae *ad1* distinctly postanal, *ad3* presumably not present.

**Legs.** Distal apophysis of tibia overlaps more than 50% of tarsus (Fig. 33C), partly due to extreme terminal compression of the tarsus. Tarsal cluster of leg I placed distodorsally on apophysis, *ft''*, *omega 1* and *2* enclosed in common rim, no partition separating *ft''* from *omega 1* and *2*, latter close together, *ft''* with heavy cerotegument at base (Fig. 33D); tarsus without distal recess for receiving retracted unguitractor complex, stalk very short.



**Fig. 35.** *Pedrocortesella nortoni* n.sp. A, body, ventral; B, chelicerae and distal part of rutella; C, pedipalp tarsus, dorso-antiaxial; D, genital valves; E, anal valves. Scale bars: A = 100  $\mu$ m; D–E = 50  $\mu$ m; B, C = 10  $\mu$ m.

**Comments.** In this species, the presence of a smoothly contoured prodorsum, two pairs of adanal setae and a smooth seta *l*' on the pedipalp tarsus is very unusual for *Pedrocortesella*. The species is close to *P. nortoni* but differs from this species in having a longer sensillus, six pairs of genital setae, and in lacking a mental tectum.

**Distribution.** Known only from the type locality in the Barrington Tops area, central eastern New South Wales.

***Pedrocortesella nortoni* n.sp.**

Figs 34–36

**Type material.** Tasmania: HOLOTYPE adult. ANIC, Cradle Mountain Camping Ground, 41°35'S 145°55'E, 880 m, pyrethrum knockdown from trees, H. Mitchell, 15 November 1989. PARATYPE adults. AM KS43746, same data as holotype,

1 adult. AM KS46569 SEM stub no. 274 (ill.), Cradle Mountain Camping Ground, 41°35'S 145°55'E, pyrethrum knockdown from trees, R. Coy, 17 November 1989, 1 adult; AM KS46570 SEM stub no. 275 (ill.), same data, 1 adult.

**Diagnosis.** Body medium, length about 450–500  $\mu$ m; scalps loosely carried by adult and may be missing; sensillus terminates in rounded club not flattened blade; notogaster foveate, 5 pairs notogastral setae, with cerotegument they are leaf-shaped; mental tectum present; genitoanal chaetotaxy 7:1:2:2; both adanal setae near posterior margin of anal valve; claw stalk very short.

**Description**

**ADULT:** *Body:* brown; length 470  $\mu$ m, 480  $\mu$ m. *Cerotegument:* body generally with thin veneer of cerotegument; reticulations on prodorsum and notogaster

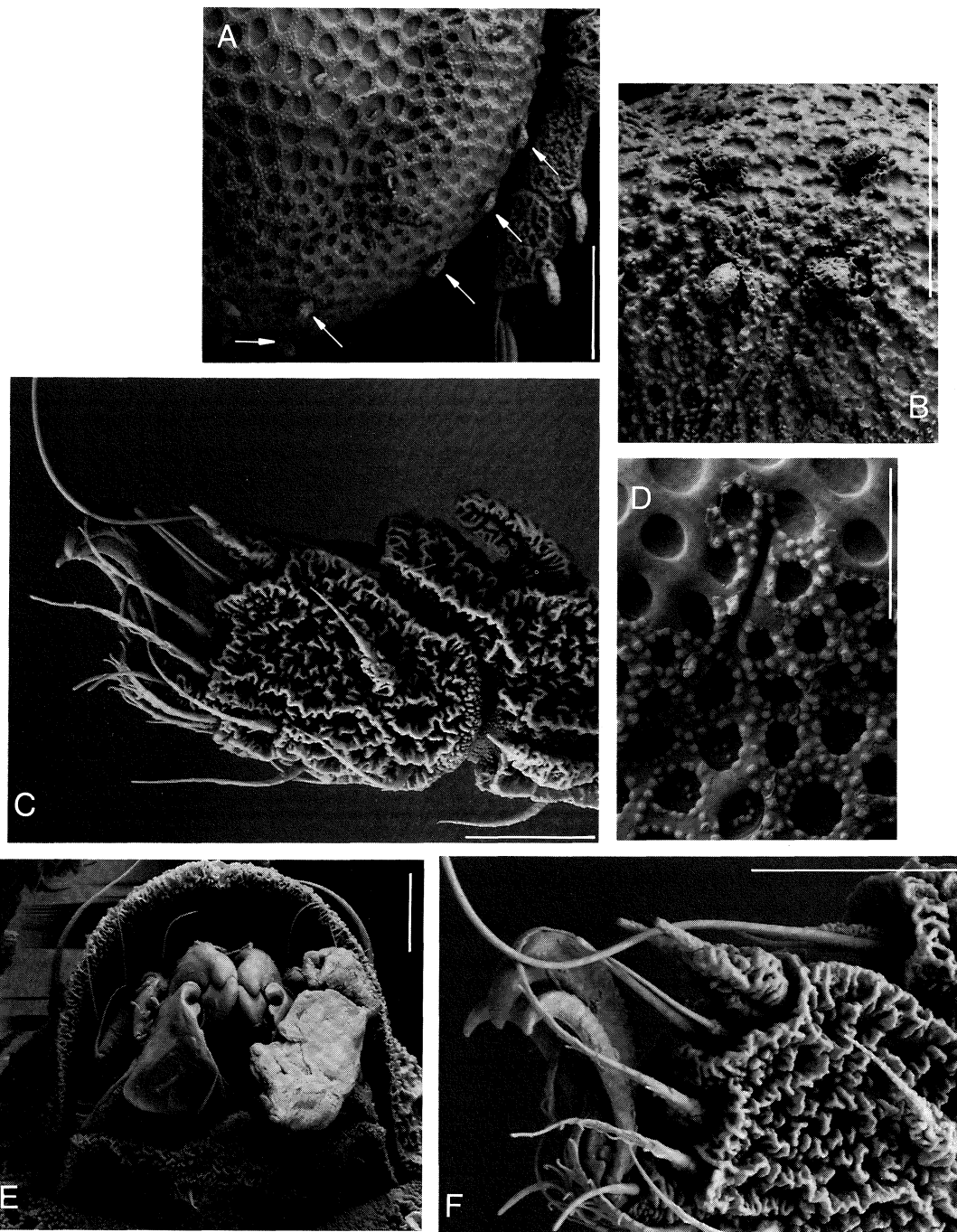


Fig. 36. *Pedrocortesella nortoni* n.sp. A, part of posterior of notogaster, dorsal; B, setae *hl* and *pl*, posterior view; C, leg I tibia (distal) and tarsus, antiaxial; D, ornamentation of notogaster and fissura *im*, lateral at top of SEM. E. Subcapitulum; F, leg I, distal view. Scale bars: A,B = 50  $\mu$ m; C,D,F = 20  $\mu$ m.

with numerous cushion-like grains of cerotegument (Fig. 36D). Setae *le* and notogastral setae with thick lateral fringes of cerotegument giving the seta a tapering appearance (Fig. 34G); *ro* with cerotegument at its base. *Prodorsum*: integument more or less uniformly reticulate-foveate including area between bothridia; foveae without visible pores; carina between *le* and *ro* absent; *le* dorsolateral and situated close to anterior of rostrum, distance between them about 0.4 distance between *ro*, *ro* ventrolateral, insertion just visible from above. Pedotectal tooth strongly curved anteriad, tapering abruptly near its base into a long spine. Bothridium abutting notogaster but not closely adpressed (Fig. 34F), wall oval; posterolateral carina moderate, close to

notogaster; sensillus length about 0.3 interbothridial distance, and rounded, densely tuberculate (Fig. 34E); posterior margin of prodorsum forming a smooth arc between bothridia; *in* small, its supporting apophysis abutting bothridial base; just inside edge of dorsosejugal furrow, spiniform, base encased in cerotegument (Fig. 34C,E). *Exuvial scalps*: loosely carried or lost; anterior margins of scalps not tightly compressed against neighbouring ones. *Notogaster*: oval, length:width without scalps 340:250. Intramarginal depression similar in shape to *P. propinqua*. Notogaster strongly foveate-reticulate, not perforated by pores (Fig. 36D); posterior margin not invaginate when viewed from above, without carina between setae *pl* when viewed posteriorly (Fig.



36B). Fissura *ia* and *im* oblique to sagittal plane, *ip* subperpendicular; 5 pairs of short notogastral setae (Fig. 36A), with thick cerotegument coating, arising from small pits; *h1* moderately separated, each located at posterior margin; *p1* inserted about mid-height on posterior flank, slightly closer together than *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise along posterolateral flank, their insertions seen from above, *lp<sub>x</sub>* closest to fissura *ip*, inserted just posterior to it (Figs 34A, 36A). *Gnathosoma*: rutella basally with weak concave flexure and moderate lateral buttressing, weak transverse striations present (Fig. 36E). Pedipalp tarsus with setae (*vt*) with short side branches, *cm* branches very short; *l''* smooth; apophysis supporting seta *acm* weak, <0.5 seta length; solenidion *omega* reaching to base of *acm* (Fig. 35C). *Epimeral region*: weakly convex anterior to genital valves, not tending to overhang them. Epimeral chaetotaxy 3,1,3,3. *Genitoanal region*: separation of anal and genital vestibules relatively broad but with interruption to ventral plate microsculpture, wide mesal isthmus without strong transverse grooves between the vestibules (Fig. 35A). Ventral plate reticulate-foveate. Genitoanal chaetotaxy 7,1,2,2; genital setae essentially in straight file (Fig. 35D); *g1* inserted at anterior corner of valve in marginal notch; *g7* inserted well anterior to inner posterior corner, in marginal notch; setae *ag* inserted at level posterior to *g7*; setae *ad1* distinctly postanal, *ad3* presumably not present. *Legs*. Apophysis of tibia I overrides about 0.5 of tarsus (Fig. 36C). Tarsal cluster of leg I placed distodorsally on apophysis, *ft''*, *omega 1* and 2 enclosed in common rim (Fig. 36F), no partition separating *ft''* from *omega 1* and 2, latter close together, *ft''* with heavy cerotegument at base; opening of cavity containing undeveloped seta *epsilon* not seen; tarsus without distal recess for receiving retracted ungual complex, stalk very short.

**Comments.** This species resembles *P. leei* in having two pairs of adanal setae but differs in having seven pairs of genital setae, an ovoid, clavate sensillus, and a weakly developed mental tectum. It resembles *P. enigma* in having a clavate sensillus and transverse striations on the rutella but differs in only having two pairs of adanal setae and two pairs of anal setae.

**Etymology.** This species is named for Professor Roy Norton's in recognition of his contribution to acarology, and the encouragement he has given me.

**Distribution.** Known only from the type locality, north-western Tasmania.

### *Pedrocortesella obesa* n.sp.

Figs 10F–H, 37, 38

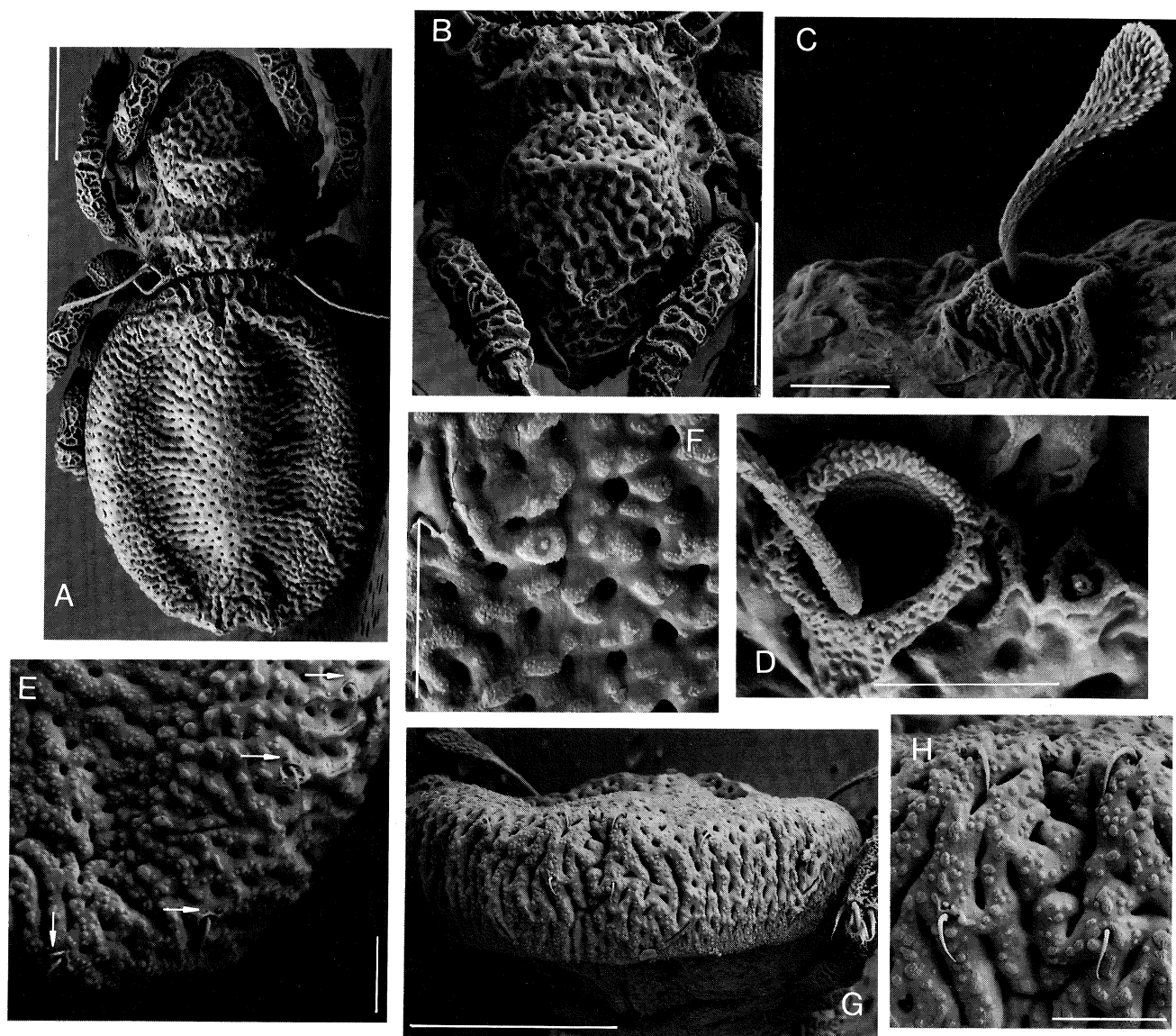
**Type material.** Western Australia: HOLOTYPE adult, WAM, SEM stub no. S/421 (ill.), 4.75 km E.S.E. of Margaret River, 33°57'52"S, 115°27'22"E, Marri forest with *Agonis flexuosa*, berlesate leaf litter, M. Peterson, 8–14 February 1992. PARATYPE adult, WAM, SEM stub no. S/157 (ill.), same data as holotype, 1 adult.

**Diagnosis.** Body small-medium, length about 400–450 µm; scalps rarely (if at all) carried by adult; sensillus with long flattened tuberculate blade; notogaster punctate,

with caudal notch when viewed from above, 5 pairs of notogastral setae, epimera III–IV strongly convex anterior to valves and tending to overhang them; genital and anal vestibules close; genitoanal chaetotaxy 7:1:2:3; genital setae in essentially straight file, level of insertion of *ad3* adjacent to posterior half of anal valve; claw stalk short.

### Description

**ADULT: Body:** brown; length of type specimens 430 µm, 440 µm. **Cerotegument:** body generally with thin veneer of cerotegument; reticulations on prodorsum and notogaster and rim of bothridium highlighted with cushion-like tubercles of cerotegument which may coalesce into crests (Fig. 37D,F). Setae *ro* and *le* with layer of cerotegument giving a granular appearance; notogastral setae without obvious cerotegument. Legs with cerotegument capping the reticulate surface ornamentation which is of much lower relief than in *P. propinqua*. **Prodorsum:** integument divided into 3 fields: rostral field with reticulations; anterior to median transverse groove a somewhat irregular field perforated by pores and with a strong transverse carina; a bothridial field with pores on carinae (Fig. 37B). *le* dorsolateral, distance between them about 0.6 distance between *ro*, not arising from large pit, *ro* ventrolateral. Pedotectal tooth similar to *P. propinqua*. Bothridium abutting but not closely adpressed to notogaster (Fig. 37D), wall somewhat diamond shaped, posterolateral carina weak, situated away from notogaster; sensillus length subequal to interbothridial distance, with long flattened tuberculate blade. *in* small, set about 0.5 bothridial diameter from bothridium at edge of dorsosejugal furrow, spiniform but largely encased in cerotegument (Fig. 37D). **Exuvial scalps:** none seen. **Notogaster:** oval, length:width holotype 320:250. Intramarginal depression U-shaped, interrupted anteriorly by a raised area continuous with central plateau. Notogaster punctate, punctations tending to be arranged in lines more laterally (Fig. 37A,F); posterior margin slightly invaginate when viewed from above, without a mesal carina when viewed posteriorly (Fig. 37G). Fissura *ia* subparallel *im* subparallel-oblique and *ip* perpendicular to sagittal plane. 5 pairs of notogastral setae; *h1* widely separated, each located inside posterior margin; *p1* inserted midheight on posterior flank, similar distance apart to *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise just inside posterolateral flank, their insertions visible from above, *lp<sub>x</sub>* closest to fissura *ip*, inserted posterior to it (Fig. 37E). *Gnathosoma*: rutella basally with strong concave flexure and lateral buttressing, without pointed mesad process, transverse striations absent (Fig. 38C). Pedipalp not examined. *Epimeral region*: epimera IV very strongly convex immediately anterior and lateral to genital valves, tending to overhang them. *Genitoanal region*: separation of anal and genital vestibules relatively narrow with deep transverse grooves and a narrow isthmus between the vestibules (Fig. 38A,E). Punctate. Genitoanal chaetotaxy 7:1:2:3; genital setae essentially in straight file, *g1* subequal to other setae, inserted posterior to inner anterior corner, not in marginal notch; *g5* situated at about 0.5 valve length, *g7* inserted anterior to inner posterior corner, not in marginal notch; setae *ag* inserted at level posterior to *g6*; setae *ad1* distinctly postanal, more so than *P. propinqua*, *ad3* level in



**Fig. 37.** *Pedrocortesella obesa* n.sp. A, body, dorsal; B, prodorsum, dorsal; C, bothridium, sensillus and seta *in*, lateral; D, bothridium and seta *in*, dorsal; E, notogaster, posterior, right side, dorsal, arrows left to right label setae *hl*, *lp*, *p2*, *p3*; F, notogastral integument and fissura *im*; G, notogaster, posterior view; H, notogastral setae *hl* and *pl*, posterior view. Scale bars: A,B,E,G = 100  $\mu$ m; C,D,F,H = 20  $\mu$ m.

posterior half of anal valve. *Legs.* Distal apophysis of tibia overlaps about 50% of tarsus (Fig. 10F). Tarsal cluster of leg I placed distodorsally on apophysis, above and slightly proximal to setae *tc*; *ft* enclosed in its own rim (Fig. 10H); *omega 1* and 2 within a separate rim, widely separated, hole (presumably cavity for undeveloped *famulus*) present ventral to solenidia (Fig. 10H, arrow); tarsus lacking distal recess for receiving retracted unguinal complex, stalk short.

**Etymology.** The specific epithet alludes to the prominent bulge which tends to overhang the genital area.

**Distribution.** Known only from the type locality, south-western Western Australia.

### *Pedrocortesella propinqua* P. Balogh

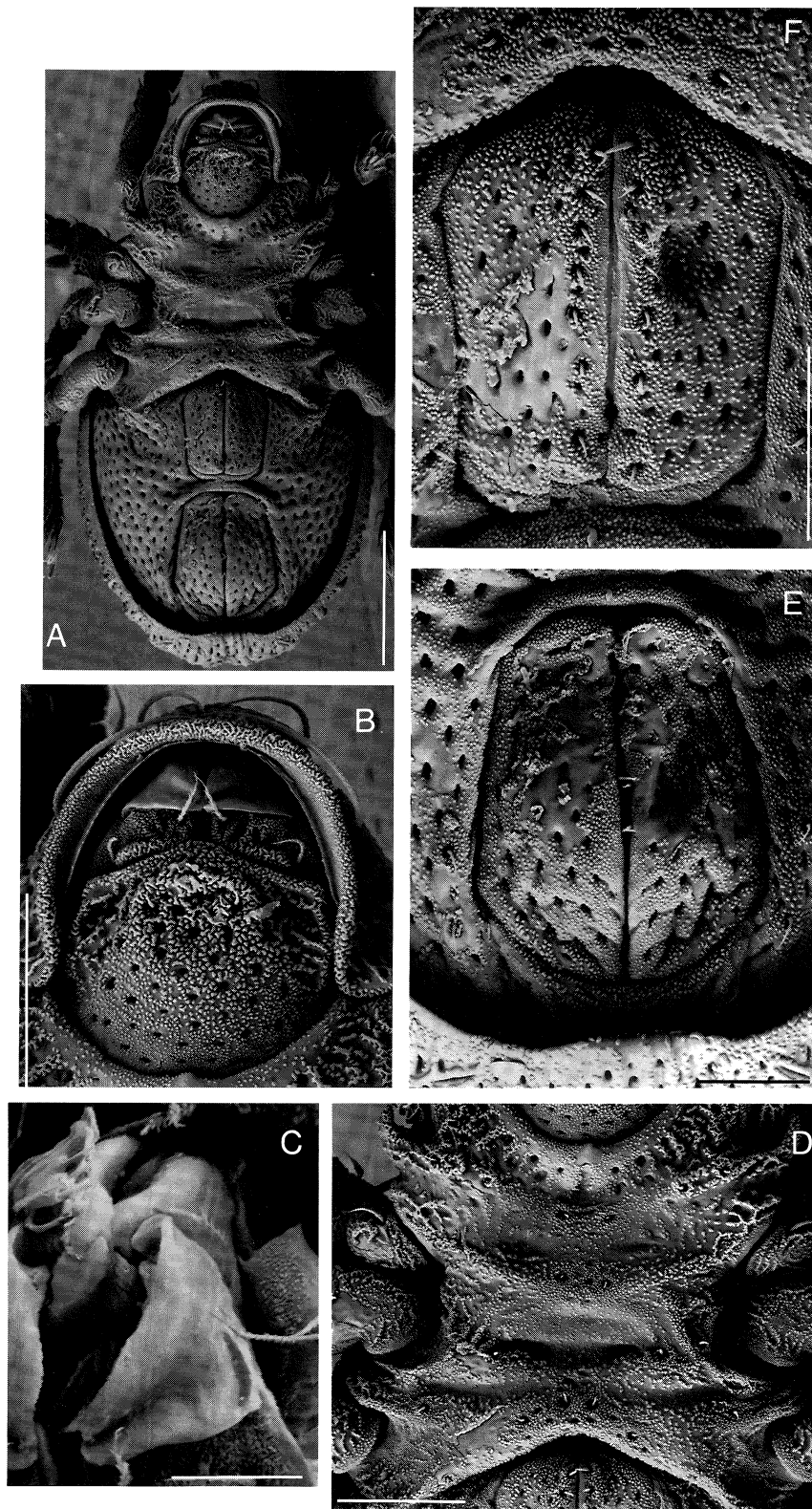
Figs 10A–C,I, 39, 40

*Pedrocortesella propinqua* P. Balogh, 1985: 51, fig. 2A–D.

*Pheroliodes propinqua*.—Woas, 1992: 144.

**Type material.** New South Wales: HOLOTYPE adult, ANIC, Barrington Tops, near Salisbury, *Nothofagus moorei* leaf litter, temperate rainforest, 1520 m, G.B. Monteith, 10 February 1965.

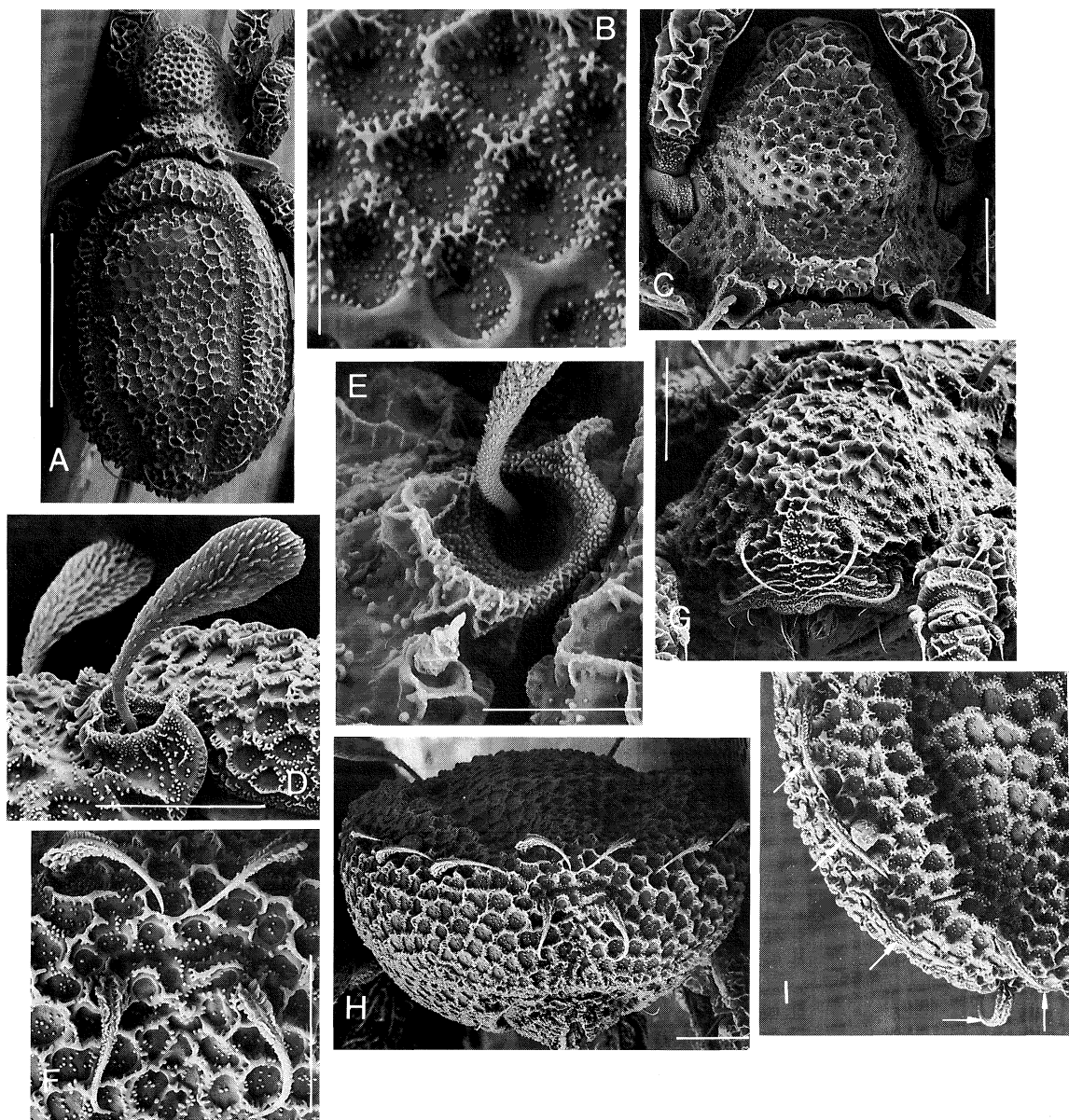
**Material examined.** New South Wales: AM KS46510, SEM stub no. S/295, Allyn River Park near crossing of Allyn River, N. of Salisbury, 32°10'S 151°30'E, subtropical rainforest, berlesate bark scraped from trees, G.S. Hunt, 5 October 1993, 1 adult; AM KS43669 Mount Allyn, near Barrington Tops, 32°08'S 151°26'E bark scraped from *Nothofagus*, temperate rainforest, G.S. Hunt, 20 Sept. 1993, 13 adults; AM KS46518, SEM stub no. S/333 (ill.), same data, 3 adults; AM KS46511, SEM stub no. S/132, 15 km S. Kempsey beside Pacific



**Fig. 38.** *Pedrocortesella obesa* n.sp. A, body, ventral; B, subcapitulum; C, rutellum, ventral; D, epimeral region; E, anal valves; F, genital valves. Scale bars: A = 100  $\mu$ m; B,D,F = 50  $\mu$ m; C,E = 20  $\mu$ m.

Highway, 32°12'S 151°49'E, dry sclerophyll, berlesate leaf and bark litter from base of *Eucalyptus*, G.S.Hunt, 18 July 1992, 1 adult; AM KS43665, S. of Grafton beside Pacific Highway, 30°00'S 153°06'E, dry sclerophyll, berlesate leaf and bark litter, G.S.Hunt, 18 July 1992, 1 adult; AM KS46512, SEM stub no. S/145, same data, 3 adults; AM KS46513, SEM stub no. S/151-05 (ill.), S. of Casino beside Casino-Grafton road, 29°06'S 153°00'E, dry sclerophyll, berlesate leaf and bark

litter, G.S.Hunt, 18 July 1992, 1 adult; AM KS43668, same data, 1 adult; AM KS46514, SEM stub no. S/239, Echo Head Falls, Kanangra-Boyd National Park, 33°59'S 150°06'E, ANIC berlesate 856, litter near creek, L.Hill, 3 October 1982, 1 adult; AM KS46515 SEM stub no. S/249, same data, 1 adult; ANIC, same data, 1 adult; AM KS46516, SEM stub no. S/246 (ill.), 9.6 km S. Gilgandra, 31°49'S 148°39'E, ANIC berlesate 89, L.A.Mound, 6 June 1968, 2 adults; AM KS43667



**Fig. 39.** *Pedrocortesella propinqua* P. Balogh. A, body, dorsal; B, notogastral integument; C, prodorsum, dorsal; D, bothridium and seta *in*, lateral; E, bothridium and seta *in*, dorsal; F, caudal region of notogaster, setae *h1* and *p1*; G, prodorsum, frontal; H, notogaster, posterior; I, notogaster, dorsal, arrows right to left label setae *h1*, *p1*, *lp<sub>x</sub>*, *p2<sub>x</sub>*, *p3<sub>x</sub>*. Scale bars: A = 200  $\mu$ m; C,D,F–I = 50  $\mu$ m; B,E = 20  $\mu$ m. A,C,E = Mount Allyn; B = Harley Vale; D,F–I = Casino.

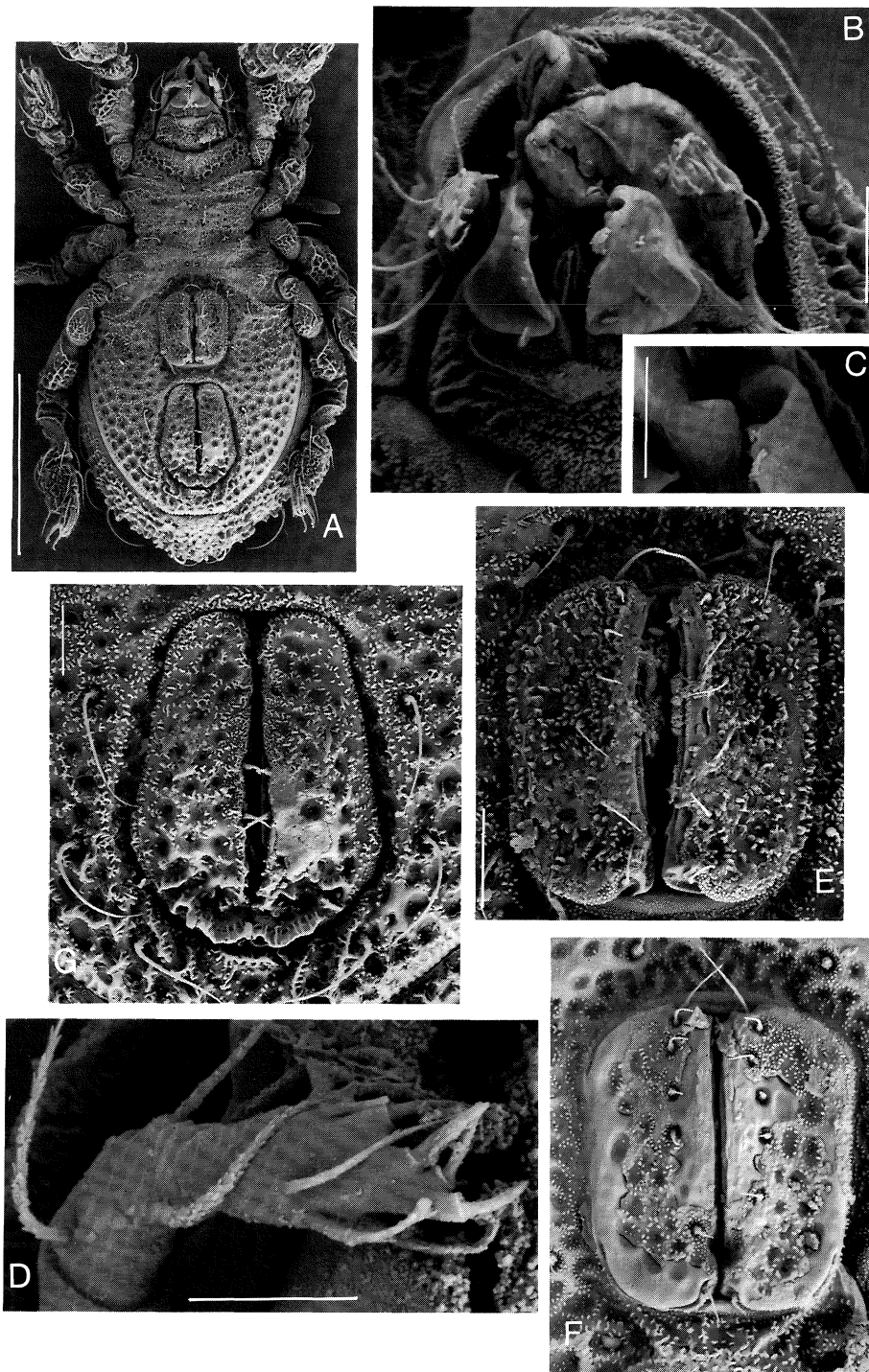
same data, 3 adults; ANIC, same data, 6 adults; AM KS46517, SEM stub no. S/002 (ill.), Gulpa Island State Forest, Deniliquin, 35°43'S 145°00'E, River Red Gum flood plain, berlesate grass and soil, G.S.Hunt, July 1991, 1 adult; AM KS43668, same data but from base of tree in dry plot, 8 adults; AM KS46519, SEM stub no. S/338 (ill.), Hartley Vale Beck, 33°32'S 150°14'E, leaf litter at foot of eucalypt in old cemetery, berlesate, G.S. Hunt, Easter 1992, 1 adult; AM KS43670, Tilbuster Hill, N. of Armidale, beside the New England Highway, 30°19'S 151°42'E, leaf litter, G.S. Hunt, 11 June 1995, 1 adult; ANIC, 13 km S. of Collarenebri, 29°34'S 148°35'E, berlese extraction *Geijera* leaf litter, ANIC berlesate 88, L.A. Mound, 5 June 1968, 35 adults plus nymphs; AM KS46520 SEM stub no. S/432, same data, 1 adult; AM KS46521, SEM stub no. S/431, Liverpool Ranges, New England Highway near Murrurundi, 31°45'S 150°48'E, leaf litter, G.S. Hunt, 11 June 1995, 1 adult.

Queensland: AM KS46522, SEM stub no. S/269, Bulburin State Forest, via Builyan, 24°34'S 151°29'E, dry sclerophyll, berlesate bark scraped from trunks and litter, G.S.Hunt, 6 July 1993 3 adults; QM, same data, 1 adult.

South Australia: AM KS46523, SEM stub no. S/208, 4.8 km W. Parilla, 35°18'S 140°39'E, Mallee, ANIC berlesate 184, R.W. Taylor, 12 January 1970, 3 adults.

**Diagnosis.** Body medium sized, length about 500–550  $\mu$ m; scalps rarely (if at all) carried by adult; sensillus with long flattened blade; bothridium diamond-shaped; notogaster entirely foveate-reticulate, many foveae with pore; 5 pairs of long notogastral setae, notogaster without caudal notch when viewed from above; broad separation of genital and anal vestibules; genitoanal chaetotaxy 7:1:2:3, genital setae in arcuate file, level of





**Fig. 40.** *Pedrocortesella propinqua* P. Balogh. A, body, ventral; B, subcapitulum; C, detail of chelicera; D, pedipalp tibia and tarsus; E, genital valves; F, genital valves without some cerotegument; G, anal valves. Scale bars: A = 200 µm; B,E–G = 25 µm; C,D = 10 µm. A,D,E,G = Mount Allyn; B = Casino; C = Gilgandra.

insertion of *ad3* adjacent to proximal 30–40% of anal valve; claw stalk short.

### Redescription

**ADULT: Body:** brown; length (µm) of 6 eastern coast specimens 520, 530, 530, 540, 550, 550 (mean 537). **Cerotegument:** crests of reticulations on prodorsum and notogaster and rim of bothridium with stellate tubercles of cerotegument which may coalesce giving a “stitched” appearance (Fig. 39B) or “buttressed-wall” appearance

(Fig. 39ID,F); foveae with scattered granules of cerotegument (Fig. 39B). Setae *ro* and *le* and notogastral setae usually with heavy, tapering ribbed encrustation of cerotegument along most their length (Fig. 39F–I). Legs with strong buttressed walls of cerotegument forming an intricate, irregular “honey-comb” of high relief on all segments. **Prodorsum:** integument divided into 3 fields: anterior rostral field patterned by relatively loose polygonal reticulations; a larger middle field anterior to median transverse furrow with closely spaced, deep foveae each perforated by a pore and separated from

each other by polygonal reticulations of high relief; a bothridial field of more complex topography with carinae and reticulations. *le* dorsolateral, distance between them about 0.66 distance between *ro*, not arising from large pit, *ro* ventrolateral. Pedotectal tooth gradually curving to blunt point. Bothridium closely abutting notogaster but wall not deeply excavated posteriorly (Fig. 39E), more or less diamond shaped with angles directed anterad, posterad, mesad and laterad; strong posterolateral carina arising from laterad angle removed from notogaster; sensillus length subequal to interbothridial distance, with long flattened tuberculate blade, broadest subdistally and rounded at end (Fig. 39D). Setae *in* small, set close to mesad angle of bothridium just inside edge of dorsosejugal furrow (Fig. 39E), spiniform but largely encased in cerotegument (Fig. 40E). *Exuvial scalps*: none seen. *Notogaster*: oval, length:width 370:260, 370:260, 390:310, 390:300, 410:310, 425:325. Intramarginal depression suboval or "vase-shaped", broadest and somewhat angular anteriorly, interrupted posteriorly; with steep external margin, internally sloping more gradually to central plateau. Dorsum entirely foveate-reticulate, many foveae with small eccentric pore (Fig. 39B). Posterior margin not invaginate when viewed from above, with slight mesal furrow and no prominent carina (though reticulations may become linear) ventral to setae *pl* when viewed posteriorly. Fissura *ia* subparallel and *im* and *ip* oblique-subperpendicular to sagittal plane. 5 pairs of long notogastral setae; *hl* widely separated but converging at their tips, each located well inside posterior margin at posterior end of intramarginal depression; *pl* inserted high on posterior flank, closer together than *hl*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise at or just inside posterolateral margin, their insertions seen from above, *lp<sub>x</sub>* closest to fissura *ip*, inserted lateral to it (Fig. 39I). *Gnathosoma*: pedipalp tarsus with setae (*vt*) with short barbs, *cm* and *l'* barbs very short; apophysis supporting seta *acm* low; solenidion *omega* reaching to base of *acm*. Rutella basally with moderate concave flexure and buttressing, but without pointed mesad process; transverse striations absent (Fig. 40B). *Epimeral region*: with depressed area immediately anterior to genital valves. *Genitoanal region*: separation of anal and genital vestibules relatively broad but with interruption to ventral plate microsculpture, wide mesal isthmus without strong transverse grooves between the vestibules (Fig. 40A). Aggenital and adanal areas reticulate-foveate, some foveae with pores; genital and anal valves with smaller foveae of similar depth on both valves, no pores; posterior margin of anal valves often crenellate. Genitoanal chaetotaxy 7:1:2:3; genital setae in arcuate file, all except *g7* removed from mesal suture, *g5* most so; *g1* long and overlapping, inserted in a notch on anterior margin slightly removed from inner anterior corner of valve; *g5* situated at about 0.5 valve length, *g6* usually closer to *g7* than to *g5*, *g7* inserted in notch in inner posterior corner; setae *ag* inserted at level between *g6* and *g7*; setae *ad1* immediately postanal, *ad2* at or just posterior to posterolateral corner of anal valve, level of insertion of seta *ad3* adjacent to proximal 30–40% of anal valve; *ad3* subequal to *ad2* in distance from valve. *Legs*. Distal apophysis of tibia overlaps about 50% of tarsus. Tarsal cluster of leg I placed distodorsally on a short apophysis, above and slightly proximal to setae

*tc*; *ft''*, *omega 1* and 2 enclosed in same major rim, *omega 1* and 2 widely separated and shorter than *ft''*, hole (presumably cavity containing undeveloped *famulus*) visible (arrow, Fig. 10C), *ft''* longer than solenidia; tarsus lacking distal recess for receiving retracted unguinal complex, stalk medium length.

**Variation.** The number of notogastral foveae perforated by a pore is variable. There are very few in the Mount Allyn population, whereas a pore is present in almost every fovea in the Gulpa Island population. Seta *in* is more vestigial in the Gilgandra and Gulpa Island populations (riverine plains of western New South Wales) and tends to lack a supporting apophysis (Fig. 10I). Aggenital and adanal setae are very long in the Mount Allyn population (Fig. 40G), and relatively short in Gulpa Island population. Side barbs on non-eupathidic setae of the pedipalp tarsus are longer in the Gulpa Island population.

**Comments.** This species is quite variable, both in its morphology and habitat requirements, even within its eastern coastal range. Further material and research may reveal that more than one species exists. For example, the Gulpa Island and Gilgandra populations may belong to a separate species.

This species is morphologically close to *P. gymnonota* Hammer, described from New Zealand (Hammer, 1966), but differs in lacking a caudal notch in the notogaster and in the shorter length of the stalk supporting the claw complex.

**Distribution.** Coastal plains and ranges of northern New South Wales and southern Queensland; riverine plains of western New South Wales; Parilla area, South Australia.

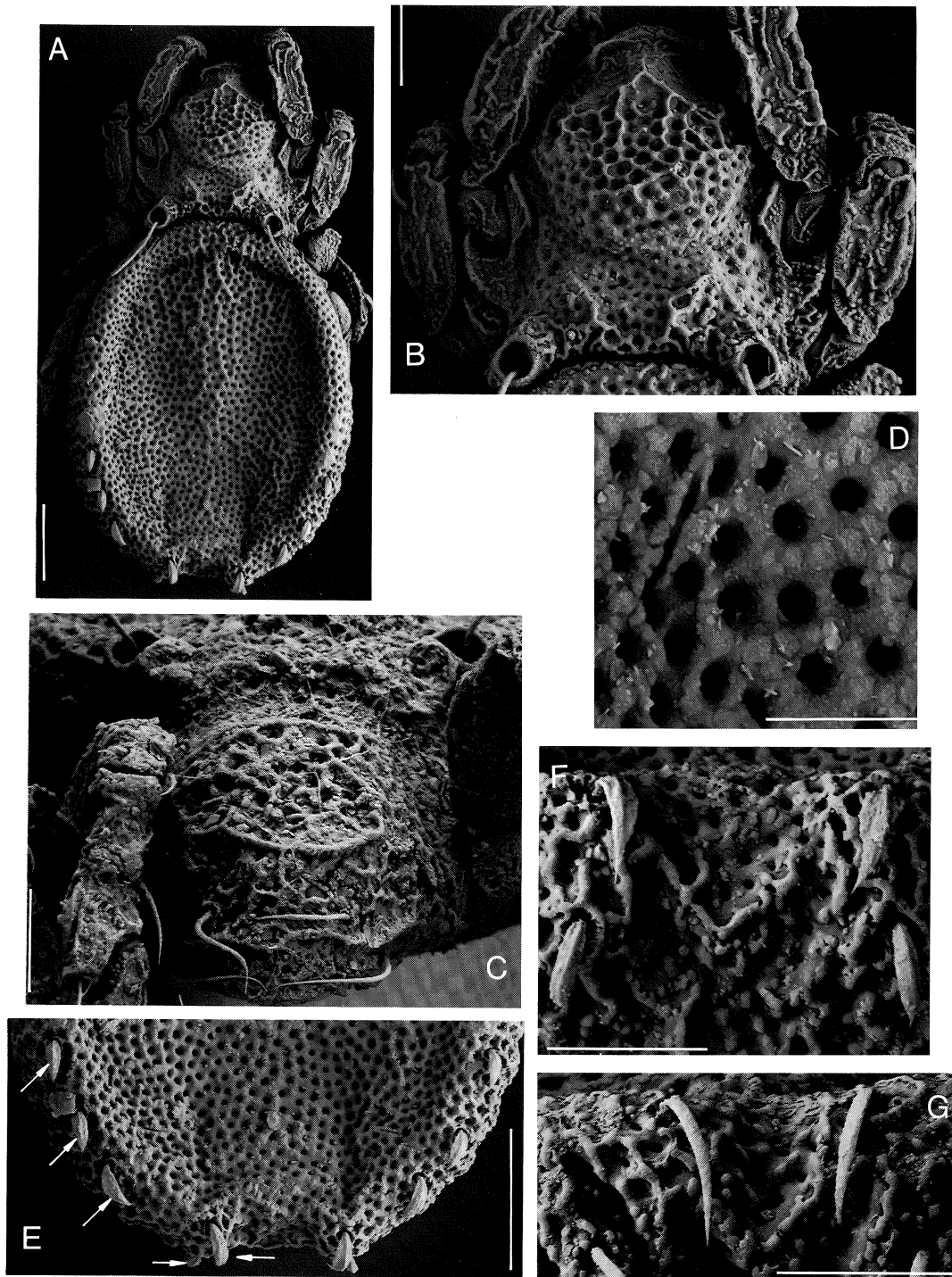
### *Pedrocortesella subula* n.sp.

Figs 41, 42

**Type material.** Queensland: HOLOTYPE adult, ANIC, 2 km W. of Chillagoe, 17° 09'S 144°31'E, deciduous vine thicket, 330 m, ANIC litter berlesate 341, Taylor & Feehan, 28 June 1971. PARATYPES: AM KS43672, same data as holotype, 2 adults; QM, same data, 2 adults; WAM, same data, 2 adults; ANIC, same data, 44 adults; FMNH, same data, 2 adults; CNC, same data, 2 adults; AM KS46526 SEM stub no. S/203 (ill.), same data, 4 adults; AM KS46527 SEM stub no. S/206 (ill.), same data, 3 adults; AM KS46528 SEM stub no. S/342 (ill.), same data, 3 adults.

**Other material examined.** Western Australia: AM KS46529, SEM stub no. S/110 (ill.), 14 km S. by E. of Kalumburu Mission, CALM site 4/3, 14°25'S 128°40'E, closed forest, litter, ANIC berlesate 1076, T.A. Weir, 3–6 June 1988, 5 adults; AM KS43673, same data, 8 adults; WAM, same data 7 adults; ANIC, same data, 10 adults; AM KS46530, SEM stub no. S/159 (ill.), 5.6 km W. of Evelyn Island, 14°07'S. 127°31'E, rainforest, berlesate litter, CALM site 10/2, CALM staff, 25–31 January 1989, 4 adults; WAM, same data, 1 adult; AM KS43674, same data, 2 adults.

**Diagnosis.** Body medium sized, length about 600–650 µm; scalps rarely (if at all) carried by adult; sensillus with long flattened tuberculate blade; notogaster densely punctate, with caudal notch when viewed from above, 5 pairs of notogastral setae, with cerotegument they are



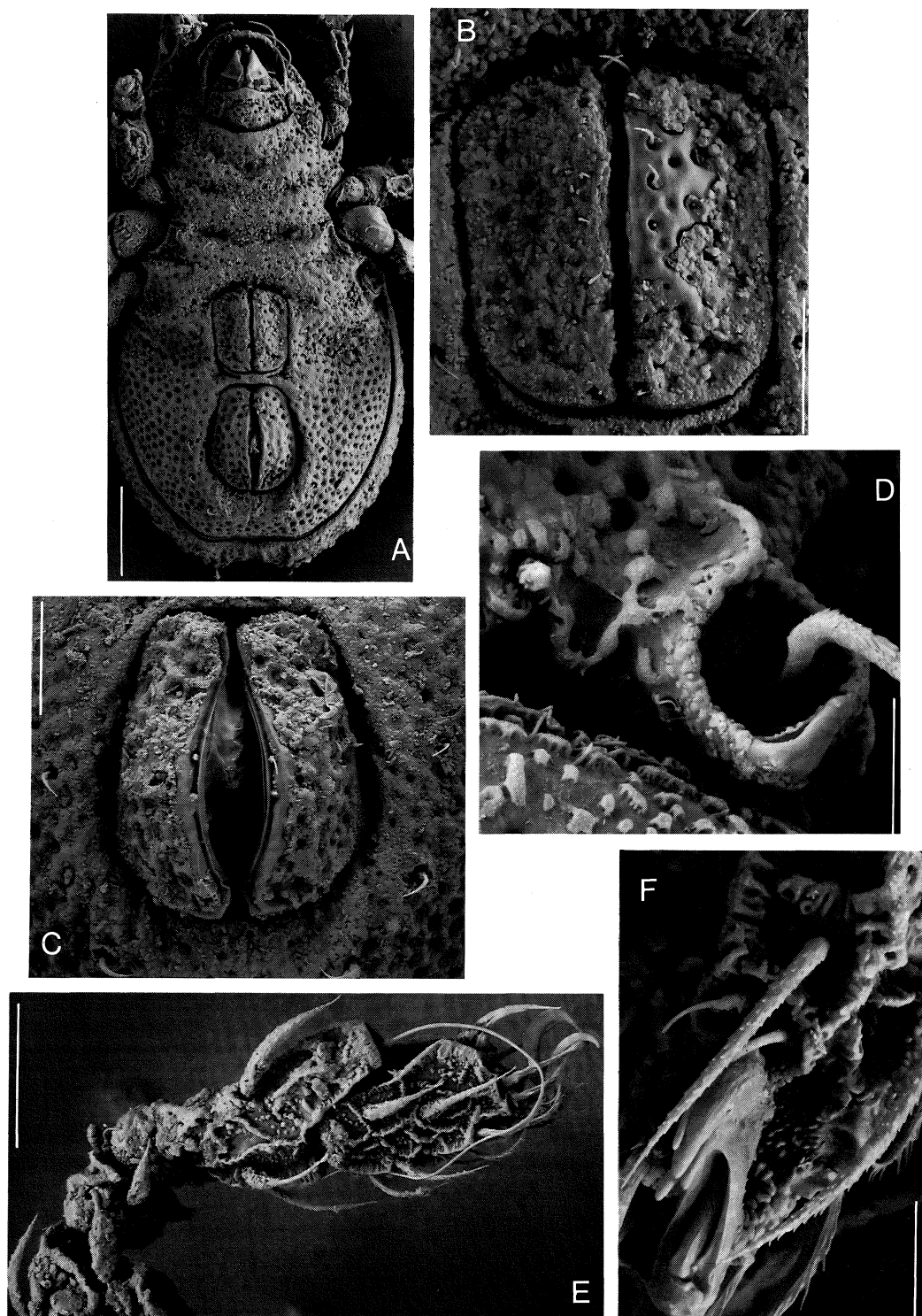
**Fig. 41.** *Pedrocortesella subula* n.sp. A, body, dorsal; B, prodorsum, dorsal; C, prodorsum, frontal; D, notogastral integument and fissura *im*; E, notogaster, posterior, dorsal, arrows right to left label setae *h1*, *p1*, *lp*, *p2*, *p3*; F–G, notogastral setae *h1* and *p1*, posterior view. Scale bars: A = 100  $\mu$ m; B,C,F,G = 50  $\mu$ m; D = 20  $\mu$ m. A,B,D–F = Chillagoe; C = Evelyn Island; G = Kalumbure Mission.

leaf-shaped; genital and anal vestibules close; genitoanal chaetotaxy 7:1:2:3, genital setae in slightly arcuate file, level of insertion of *ad3* at about half length of anal valve; claw stalk short.

### Description

**ADULT: Body:** brownish; length of 2 specimens from Chillagoe is 600  $\mu$ m, 645  $\mu$ m. **Cerotegument:** body generally with thin veneer of cerotegument; reticulations on prodorsum and notogaster and rim of bothridium

highlighted with cushion-like tubercles of cerotegument which may coalesce into crests; basic stellate nature of tubercles evident in side view (Fig. 42D). Setae *ro* and *le* and notogastral setae without obvious cerotegument. Legs with cerotegument capping the reticulate surface ornamentation which is of much lower relief than in *P. propinqua*. **Prodorsum:** integument divided into 3 fields: rostral field with loose reticulation pattern with some crests coalescing into a carina anterior to and posterior to setae *le*; a strongly reticulate-alveolate field anterior to median transverse furrow, alveoli perforated



**Fig. 42.** *Pedrocortesella subula* n.sp. A, body, ventral; B, genital valves; C, anal valves. D, Bothridium and seta *in*, dorsal; E, leg I, genu, tibia and tarsus, antiaxial; F, detail tarsal cluster, dorsal. Scale bars: A = 100  $\mu$ m; B,C,E = 50  $\mu$ m; D,F = 20  $\mu$ m. A–C,E,F = Chillagoe; D = Kalumbure Mission.

by pore; a bothridial field with reticulations, pores and carinae (Fig. 41B). *le* dorsolateral, distance between them about 0.7 distance between *ro*, not arising from large pit, *ro* ventrolateral. Pedotectal tooth similar to *P. propinqua*. Bothridium abutting notogaster (Fig. 42D), wall more rounded than in *P. propinqua*; posterolateral carina weak, carina of similar strength anteriorly, bothridium abutting but not closely adpressed to notogaster; sensillus length about 0.75 interbothridial

distance, with long flattened tuberculate blade. *in* small, set almost one bothridial diameter from bothridial rim and somewhat away from dorsosejugal suture level with anterior of bothridium, spiniform but largely encased in cerotegument (Fig. 42D). *Exuvial scalps*: none seen. *Notogaster*: oval but wide, length:width 425:330. Intramarginal depression oval; central plateau weakly developed. Dorsum densely punctate (Fig. 41A,D). Posterior margin weakly invaginate when viewed from



above, with weak mesal carina ventral to setae *p1* when viewed posteriorly. Fissura small; *ia* and *im* oblique and *ip* perpendicular to sagittal plane. 5 pairs of conspicuous awl-shaped notogastral setae; *h1* very widely separated, not converging at their tips, each located just inside posterior margin; *p1* inserted high on posterior flank, further apart than *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise inside posterolateral flank, their insertions clearly visible from above, *lp<sub>x</sub>* and *p2<sub>x</sub>* equidistant to fissura *ip*, *lp<sub>x</sub>* inserted posterior to it (Fig. 41E). *Gnathosoma*: pedipalp not examined. Rutella basally with moderate concave flexure and moderate lateral buttressing, pointed mesad processes and transverse striations absent. *Epimeral region*: convex immediately anterior to genital valves though not tending to overhang them. *Genitoanal region*: separation of anal and genital vestibules relatively narrow with deep transverse grooves and a narrow isthmus between the vestibules (Fig. 42A). Entire venter punctate, though less densely than notogaster. Genitoanal chaetotaxy 7:1:2:3; genital setae in slightly arcuate file, *g1* slightly longer than other setae, inserted near inner anterior corner; *g5* situated at about 0.5 valve length, *g7* inserted anterior to inner posterior corner, not in notch; setae *ag* inserted at level posterior to *g6*; setae *ad1* distinctly postanal, more so than *P. propinqua*, *ad3* level with about 0.5 length of anal valve. *Legs*. Distal apophysis of tibia overlaps about 50% of tarsus (Fig. 42E). Tarsal cluster of leg I placed distodorsally on apophysis, above and slightly proximal to setae *tc*; *ft* enclosed in its own rim; *omega 1* and 2 within a separate rim, widely separated and shorter than *ft*; tarsus lacking distal recess for receiving retracted unguinal complex, stalk short.

**Variation.** The two populations in Western Australia have thinner leaf-shaped notogastral setae due to a lesser accumulation of cerotegument (Fig. 41G).

**Comments.** *Pedrocortesella subula* appears most closely related to another northern Australian species, *P. calmorum*, in the form of the notogaster, but differs in having leaf-shaped notogastral setae and less body cerotegument.

**Etymology.** The specific epithet is a Latin noun in apposition meaning "awl" in reference to the shape of the notogastral setae.

**Distribution.** Tropical northern Australia.

### *Pedrocortesella temperata* P. Balogh

Figs 1B, 43–45

*Pedrocortesella temperata* P. Balogh, 1985: 51–53, fig. 3.

**Type material.** New South Wales: HOLOTYPE adult, ANIC, Barrington Tops, near Salisbury, *Nothofagus moorei* leaf litter, temperate rainforest, 1520 m, G. B. Monteith, 10 February 1965. PARATYPES, ELU, same data, 10 adults. Not examined.

**Other material examined.** New South Wales: AM KS43686, Mount Allyn, near Barrington Tops, 32°08'S 151°26'E, bark scraped from *Nothofagus*, temperate rainforest, G.S. Hunt, 20 Sept. 1993, 18 adults; AM KS46549 SEM stub no. S/332 (ill.) same data, 4 adults; QM, same data, 2 adults; ANIC, same data, 2 adults; SAMA, same data, 2 adults; WAM, same data, 2 adults; FMNH, same data, 2 adults; CNC, same data, 2 adults; ZMK, same data, 2 adults; ANIC, Mount Banda

Banda, 42 km W.S.W. Kempsey, 31°10'S 152°26'E, 1050 m, moss under *Nothofagus*, ANIC berlesate 672, K.R. Pullen, 5 November 1980, 14 adults; AM KS46550, SEM stub no. S/116 (ill.), same data, 4 adults; AM KS43687, 15 km S. of Kempsey, 32°12'S 151°49'E, dry sclerophyll, berlesate leaf and bark litter under *Eucalyptus*, G.S. Hunt, 18 July 1992, 17 adults; AM KS46551, SEM stub no. S/143 (ill.), same data, 1 adult; AM KS46552, SEM stub no. S/146 (ill.), same data, 3 adults; AM KS43688 3 km E. of Bell, Bells Line of Road, 33°30'S 150°17'E, berlesate leaf litter, dry sclerophyll, G.S. Hunt, 21 June 1992, 39 adults; AM KS43689, West Head, Ku-ring-gai Chase National Park, Challenger Track, ca 33°35'S 151°18'E, remnant gully rainforest, berlesate, J. Thompson and M. Gray, 24 November 1992, 1 adult; ANIC, Echo Head Falls, Kanangra-Boyd National Park, 33°59'S 150°06'E, ANIC berlesate 856, litter near creek, L.Hill, 3 October 1982, 27 adults.

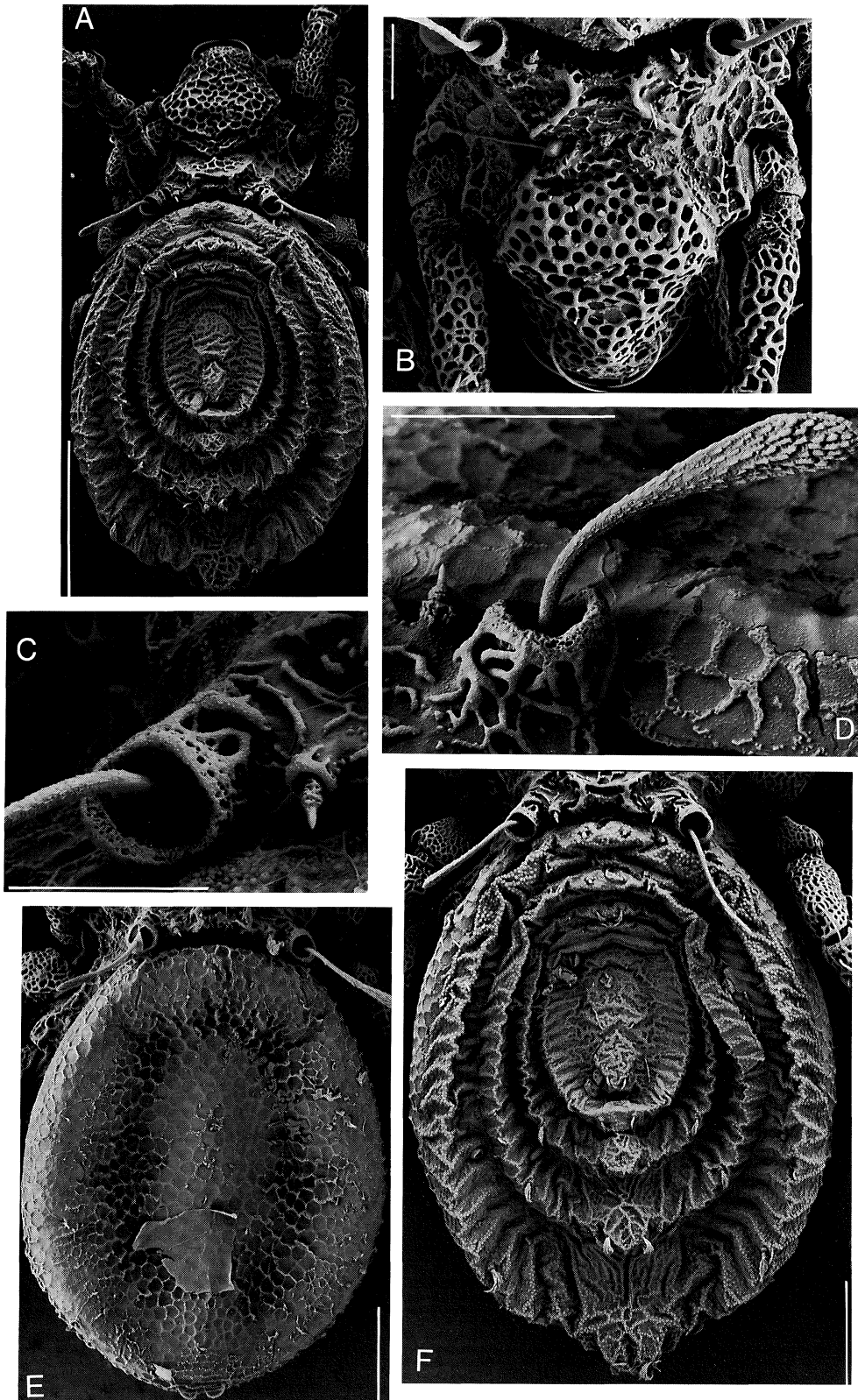
Victoria: CNC, Mitchell River Site MR1A-6, Mitchell River Environmental Survey of Museum of Victoria, 1 October 1975, 1 slide-mounted adult.

South Australia: ANIC, 86 km S of Meningie, ca 36°22'S 139°45'E, leaf litter in sandy soil, ANIC berlesate 74, E.B. Britton, 30 April 1968, 2 adults.

**Diagnosis.** Body medium-large, length about 650–750 µm; scalps carried by adult, scalps with caudal apophysis bearing setae; sensillus long flattened tuberculate blade; notogaster reticulate-alveolate, 5 pairs of notogastral setae; genitoanal chaetotaxy 7:1:2:3, 6 pairs genital setae essentially in straight file near inner lip, *g5* markedly offset laterad to *g4*, insertion of seta *ad3* adjacent to anterior 50% of anal valve; claw stalk very short.

### Description

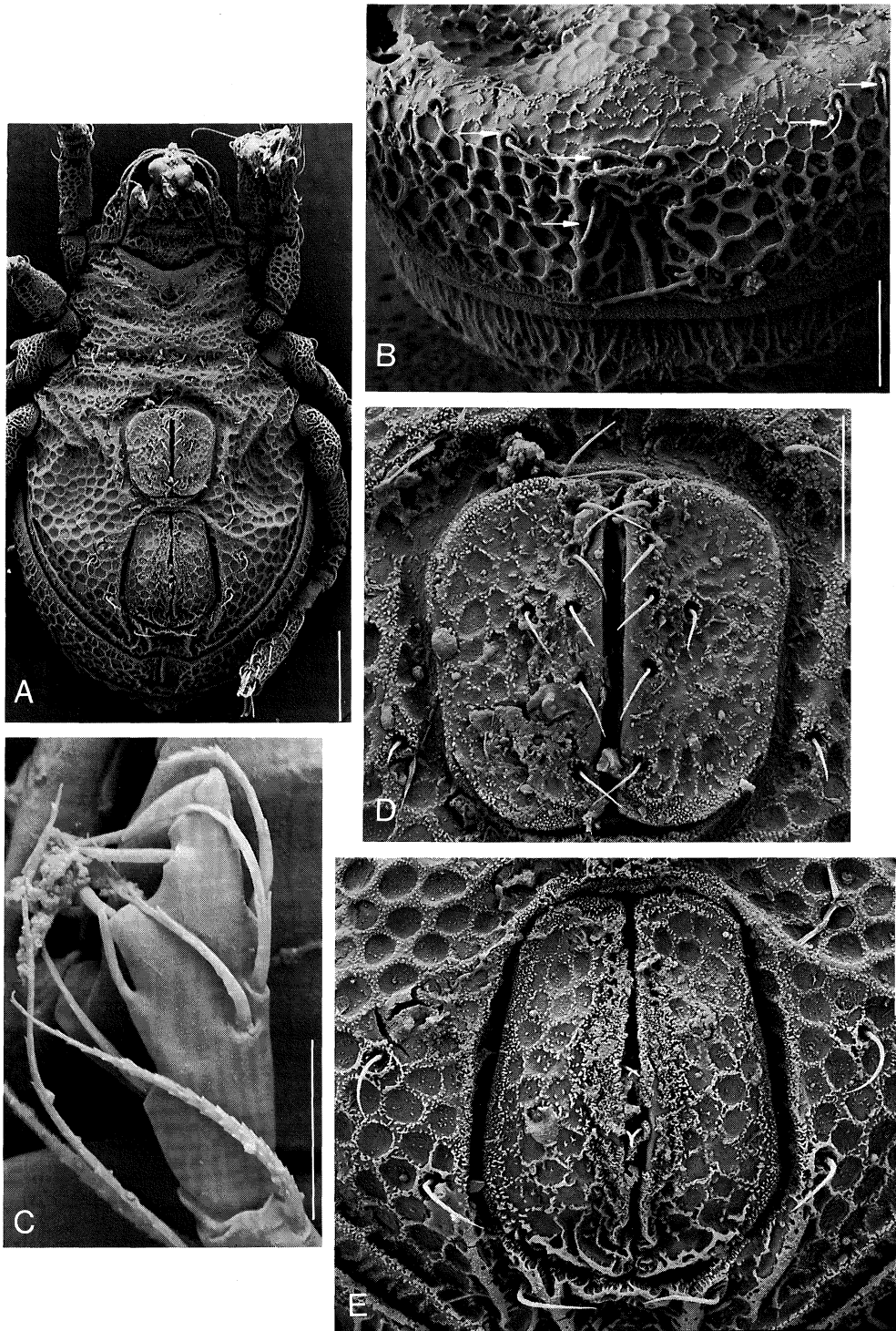
**ADULT: Body:** dark brown; length (µm) with scalps 710, 710, 740, 760, 770; without scalps 650, 660, 670, 670, 710, 720. **Cerotegument:** body generally with thin veneer of cerotegument; reticulations on prodorsum, notogaster, rim of bothridium and legs highlighted with crests of cerotegument (Fig. 43D), though subdued on notogaster beneath scalps. Setae *ro* and *le* and notogastral setae with cerotegument at their bases. **Prodorsum:** integument reticulate-alveolate particularly anterior to median transverse groove but less so on rostrum, alveoli without visible pores; carina between *le* and *ro* absent; *le* dorsolateral, distance between them about 0.60 distance between *ro*, not arising from large pit, *ro* ventrolateral. Pedotectal tooth strongly curved anteriad, tapering abruptly subapically. Bothridium abutting notogaster but not closely adpressed (Fig. 43C), wall subcircular and depressed posteromesally and anterolaterally, posterolateral carina very weak, situated close to notogaster; sensillus length subequal to interbothridial distance, with long flattened tuberculate blade (Fig. 43D), posterior margin of prodorsum forming a smooth arc between bothridia. *in* small, set >0.5<1.0 bothridial diameter from to bothridial wall, at edge of dorsosejugal furrow, spiniform, base encased in cerotegument, directed largely posteriad (Fig. 43C). **Exuvial scalps:** habitually carried; tritonymphal scalp with prominent caudal process bearing conspicuous setae *p1* (Fig. 43F) **Notogaster:** oval, length:width without scalps 430:360, 440:360, 500:380, 520:400. Intramarginal depression oval. Notogaster weakly alveolate-reticulate beneath scalps but sculpturing more pronounced around flanks, not perforated by pores



**Fig. 43.** *Pedrocortesella temperata* P. Balogh. A, body, dorsal; B, prodorsum, dorsal; C, bothridium and seta *in*, dorsal; D, bothridium, sensillus and seta *in*, lateral; E, notogaster (scalps removed); F, exuvial scalps. Scale bars: A = 200  $\mu$ m; B,E,F = 100  $\mu$ m; B-D = 50  $\mu$ m. A,C,D,F = Mount Allyn; B = Mount Banda Banda; E = Kempsey.

(Fig. 44B); posterior margin not invaginate when viewed from above, with weak carina between setae *p1* when viewed posteriorly (Fig. 44B). Fissura *ia*, *im* and *ip* subparallel-slightly oblique to sagittal plane; 5 pairs of short notogastral setae arising from small pits; *h1* close

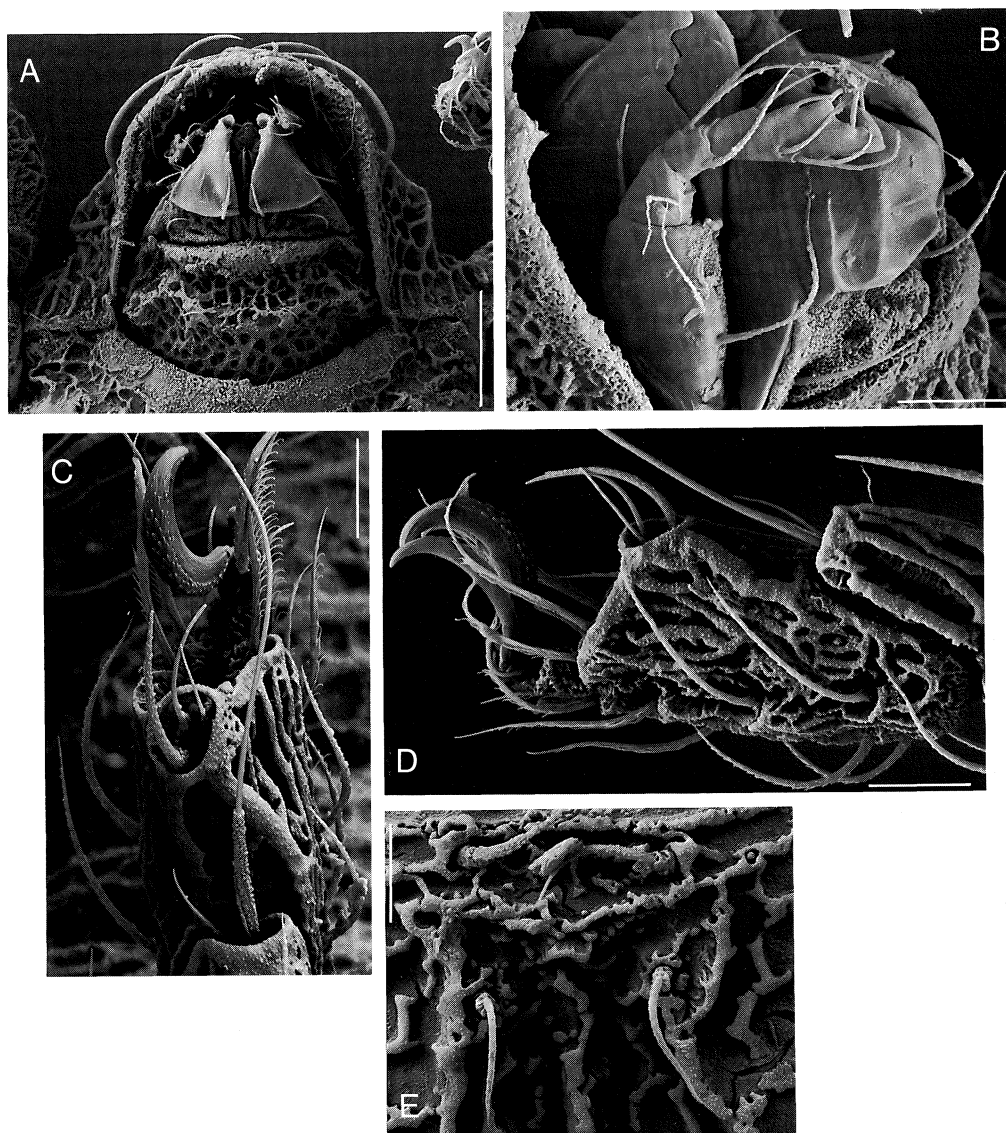
to each other and strongly curved mesad, each located at posterior margin; *p1* inserted high on posterior flank, slightly further apart than *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise along posterolateral flank, their insertions barely visible from above, *lp<sub>x</sub>* closest to fissura *ip*, inserted posterior



**Fig. 44.** *Pedrocortesella temperata* P. Balogh. A, body, ventral; B, body, posterior, arrows right to left label setae  $p3_x$ ,  $p2_x$  (on right side) and  $h1$ ,  $p1$  and  $lp_x$  (on left side); C, pedipalp tarsus, antiaxial; D, genital valves; E, anal valves. Scale bars: A = 100  $\mu$ m; B,C,E = 50  $\mu$ m; D = 10  $\mu$ m. A,C,D,E = Mount Allyn; B = Kempsey.

to it (Fi. 34B). *Gnathosoma*: rutella basally with weak concave flexure and moderate lateral buttressing, pointed mesad processes and transverse striations absent (Fig. 45A). Pedipalp tarsus with setae  $l''$  and ( $vt$ ) with moderately long side branches,  $cm$  branches very short; apophysis supporting seta  $acm$  low, solenidion  $\omega$  reaching above base of  $acm$  (Fig. 44C). *Epimeral region*: epimeral region weakly convex anterior to genital valves, not tending to overhang them (Fig. 44D). *Genitoanal region*: separation of anal and genital vestibules relatively

narrow with moderately wide isthmus between the vestibules (Fig. 44A). Ventral plate reticulate-alveolate. Genitoanal chaetotaxy 7:1:2:3; genital setae long, essentially in straight file but with  $g5$  markedly offset laterad to  $g4$  (Fig. 44D),  $g1$  long somewhat longer than other setae, inserted at anterior margin of valve well lateral to its inner corner;  $g7$  inserted well anterior to inner posterior corner, not in marginal notch; setae  $ag$  inserted at level between  $g6$  and  $g7$ ; setae  $ad1$  distinctly postanal,  $ad3$  level with anterior half of anal valve;  $ad1$ –



**Fig. 45.** *Pedrocortesella temperata* P. Balogh. A,B, subcapitulum, ventral and lateral; C,D, leg I tarsus, dorsal and lateral; E, notogastral setae *hl* and *pl*, posterior view. Scale bars: A = 50  $\mu$ m; B–E = 20  $\mu$ m. A,E = Mount Banda Banda; C–D = Mount Allyn.

3 inserted in small pits (Fig. 44E). *Legs*. Distal apophysis of tibia overlaps about 50% of tarsus (Fig. 45D). Tarsal cluster of leg I placed distodorsally on strong apophysis, *fi''*, *omega 1* and 2 enclosed in well-developed almost circular common rim (Fig. 45C), no partition separating *fi''* from *omega 1* and 2; tarsus with marked distal recess for receiving retracted unguinal complex, stalk very short (Fig. 45D).

**Comments.** The specimens from Ashbourne and Meningie in the semiarid mallee country of South Australia are very similar to the populations in the eastern coastal ranges of New South Wales. Within the coastal zone, populations occur in temperate and subtropical rainforest but also in dry sclerophyll habitats. The species can apparently tolerate a wide range of conditions and possibly has a continuous distribution between the eastern ranges of New South Wales and the occurrence in South Australia. This peculiar distribution is similar to that of *P. propinqua* and, as with this species, further study may reveal separate species. The Mitchell River

record in Victoria may represent an introduced or relictual population.

*Pedrocortesella temperata* can easily be confused with *P. cryptoreticulata* which also habitually retains its scalps, but differs in having a caudal apophysis on the scalps and in having a laterad seta on the genital valves. Scalp retention and a caudal apophysis also characterise *Labiogena queenslandica* (see Hunt, 1996c).

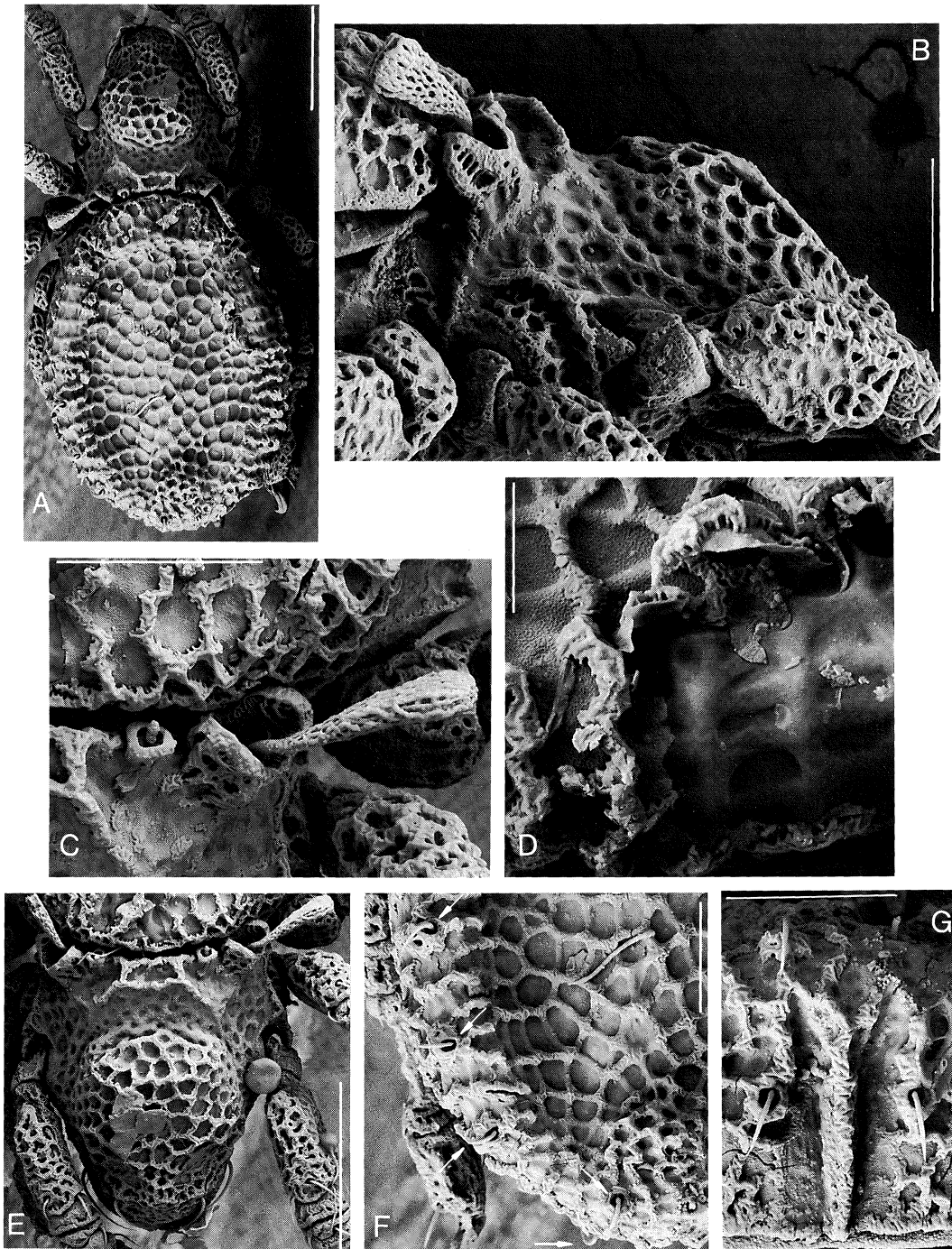
**Distribution.** Eastern New South Wales from Kanangra Walls area northwards to Kempsey area, with possible disjunct occurrences in South Australia and Victoria.

***Pedrocortesella truncata* n.sp.**

Figs 13A, 46, 47

**Type material.** New South Wales: HOLOTYPE adult, AM KS46548, SEM stub no. S/133 (ill.), beside Pacific Highway, 15 km S. of Kempsey, 32°12'S 151°49'E, dry sclerophyll, berlese extraction leaf and bark litter at base of tree, G.S.Hunt, 18 July 1992.





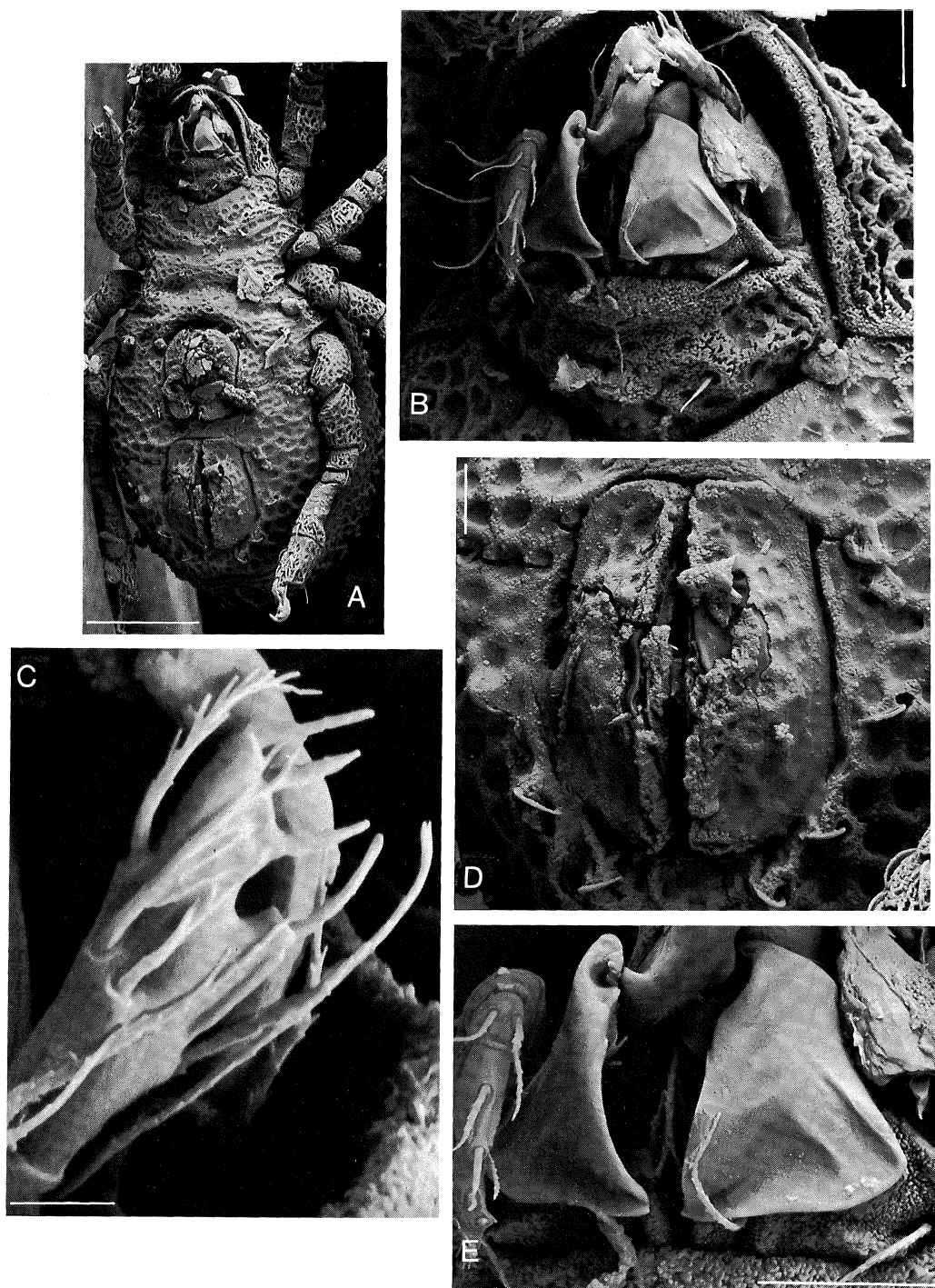
**Fig. 46.** *Pedrocortesella truncata* n.sp. A, body, dorsal; B, prodorsum, lateral; C, bothridium, sensillus and seta *in*, dorsal; D, notogastral integument; E, prodorsum, dorsal; F, part of posterior of notogaster, dorsal, arrows right to left label setae *hl*, *p1*, *lp*, *p2*, *p3*; G, notogastral setae *hl* and *p1*, posterior view. Scale bars: A, E = 100  $\mu$ m; B, C, F, G = 50  $\mu$ m; D = 20  $\mu$ m.

**Diagnosis.** Body medium, length about 500–550  $\mu$ m; scalps rarely (if at all) carried by adult; sensillus not long flattened blade, distally truncate and covered with a reticulate pattern, not tuberculate; notogaster strongly reticulate-alveolate; 5 pairs of notogastral setae, arising from pits; genitoanal chaetotaxy 7:1:2:3, genital setae essentially in straight file, level of insertion of seta *ad3* at about 0.5 anal valve length; claw stalk very short.

#### Description

**ADULT: Body:** brown; length 520  $\mu$ m. **Cerotegument:** body with conspicuous network of cerotegument reflecting

underlying reticulate pattern of integument (Fig. 46A,D). Setae *ro* and *le* and notogastral setae without obvious cerotegument. **Prodorsum:** integument reticulate, carina between *le* and *ro* absent; *le* dorsolateral and close to anterior of prodorsum, distance between them about 0.6 distance between *ro*, not arising from large pit, *ro* ventrolateral. Pedotectal tooth similar to *P. propinqua* (Fig. 46A,B). Bothridium strongly adpressed to notogaster (Fig. 46C), wall semicircular in dorsal view, strongly depressed anterolaterally and largely missing posteriorly, posterolateral carina strong, situated close to notogaster (Fig. 46B); sensillus length about 0.7 interbothridial



**Fig. 47.** *Pedrocortesella truncata* n.sp. A, body, ventral; B, subcapitulum; C, pedipalp tarsus, antiaxial; D, anal valves; E, rutella. Scale bars: A = 100 µm; B,D,E = 20 µm; C = 5 µm.

distance, cuneiform with truncated lamina and reticulate surface ornamentation (Fig. 46B,C), posterior margin of prodorsum forming a smooth arc between bothridia. *in* small, set close bothridial wall, at edge of dorsosejugal furrow, spiniform (Fig. 46C). *Exuvial scalps*: none seen. *Notogaster*: oval, length:width 330:250. Intramarginal depression oval. Notogaster reticulate-alveolate, not perforated by pores (Fig. 46D); posterior margin not invaginate when viewed from above, with a strong carina between setae *p1* when viewed posteriorly (Fig. 46G). Fissura *ia* and *im* subparallel-oblique, *ip* perpendicular to sagittal plane; 5 pairs of short notogastral setae

arising from small pits, *h1* moderately close, each located just inside posterior margin; *p1* with slightly wider spacing than *h1*; *lp<sub>x</sub>*, *p2<sub>x</sub>* and *p3<sub>x</sub>* arise just inside posterolateral flank, their insertions visible from above, *lp<sub>x</sub>* closest to fissura *ip*, inserted posterior to it (Fig. 46F). *Gnathosoma*: rutella basally with strong concave flexure and a pair of strong buttresses laterally, small pointed mesad processes present, transverse striations absent (Fig. 47E). Pedipalp tarsus setae (*vt*) and *l''* with long barbs, *cm* short; apophysis supporting *acm* moderately strong; solenidion not reaching base of *acm* (Fig. 47C). *Epimeral region*: strongly convex a small distance

anterior to genital valves and not tending to overhang them. *Genitoanal region*: separation of anal and genital vestibules relatively broad but with interruption to ventral plate microsculpture, wide mesal isthmus without strong transverse grooves between the vestibules (Fig. 47A). Ventral plate reticulate-alveolate. Genitoanal chaetotaxy 7:1:2:3; genital setae essentially in straight file, *g1* at anterior corner in marginal notch; *g5* situated at about 0.5 valve length, *g7* inserted well anterior to inner posterior corner in marginal notch; setae *ag* inserted at similar level to *g7*; setae *ad1* postanal, *ad3* level at about 0.5 anal valve length (Fig. 47D). *Legs*. Distal apophysis of tibia overlaps about 40% of tarsus (Fig. 13A). Tarsal cluster of leg I placed distodorsally on apophysis, slightly proximodorsal to setae *tc*; *ft*", *omega 1* and *2* enclosed in well-developed almost circular common rim, no partition separating *ft*" from *omega 1* and *2*; terminal setae tend to be flattened with barbs lining their margins; tarsus with slight distal recess for receiving retracted unguinal complex, stalk very short.

**Comments.** This species is very closely related to *P. bithongabela*, on the basis of integumental sculpturing and the presence of flattened terminal leg setae. It differs principally in having a truncated sensillus.

**Etymology.** The specific epithet refers to the unusual truncated sensillus.

**Distribution.** Known only from the type locality, central eastern New South Wales.

### General Discussion

Most of the 22 Australian species in *Pedrocortesella* can be arranged into five species groups.

The *propinqua* species group contains *P. propinqua* (south-eastern Australia), *P. bannisteri* (Western Australia), *P. cornuta* (South Australia), *P. enigma* (Tasmania) and *P. gymnonota* (New Zealand). The type species, *P. pulchra*, from Peru, may also be referable to this group of *Pedrocortesella*. This species group has genital setae arranged in an arcuate file, a wide separation of genital and anal vestibules and a relatively anterior position for setae *ad3*.

The *subula* species group contains *P. hardyi* from New Guinea and several of the species described in this work, particularly from Western Australia: *P. subula*, *P. calmorum*, *P. obesa*, *P. gunjina* and *P. callitarsus*. This group is based on a very narrow separation of anal and genital vestibules, genital setae arranged in a straight file, a tendency for a caudal notch in the notogaster, and a median position of setae *ad3*. *Pedrocortesella augusta*, which carries six pairs of notogastral setae, is tentatively placed in this group.

The *semireticulata* species group contains *P. semireticulata* (South Australia), and the following new species from south-east Australia: *P. impedita*, *P. anica*, *P. bithongabela* and *P. truncata*. It is characterised by having a wide separation of anal and genital vestibules, a median position for setae *ad3* and notogastral setae arising from pits.

The *leei* species group contains *P. leeii* (New South Wales) and *P. nortoni* (Tasmania). It is characterised by two pairs of adanal setae and a relatively short and thick sensillus.

The *kanangra* species group contains *P. kanangra*

(New South Wales) and *P. conundrum* (Tasmania). It is characterised by having a very wide separation of anal and genital vestibules with little interruption to the ventral plate microsculpture, six pairs of notogastral setae, six pairs of genital setae in an arcuate file, a posterior position for setae *ad3*, a reticulate-alveolate notogaster, and ventral keels to leg femora. The group appears to be closely related to three South American species, *P. montis* Fernandez, *P. monicai* Eguaras, Martinez & Fernandez and *P. tristius* Eguaras, Martinez & Fernandez which have genital setae in an arcuate file, six pairs of notogastral setae and a reticulate-alveolate notogaster. These species, however, have a more narrow separation of anal and genital vestibules, seven pairs of genital setae and lack strong ventral keels on the leg femora.

The relationships of *P. cryptoreticulata* and *P. temperata* are more uncertain and they do not fall clearly into any of the above species groups. Although both habitually carry scalps, the difference in separation of anal and genital vestibules in the two species, suggest they are not very closely related to each other. Furthermore, the caudal setae of the tritonymphal scalp in *P. temperata* are on apophyses, a condition resembling that in *Labiogena queenslandica* (see Hunt, 1996c).

The five putative species groups discussed above suggest there have been at least an equal number of radiations within *Pedrocortesella*. A phylogenetic analysis may provide justification for elevating some of the groups to the status of subgenera or genera. Present day distributions suggest that the *propinqua* group radiation may have had an origin which predated the split of the Gondwanan fragment of South America-Antarctica-Australia-New Zealand.

The disposition of notogastral setae in *P. conundrum* is of interest as a possible case of neoteny. The form of the notogaster in this species is typical of *Pedrocortesella* but the nymphal distribution of setae *p2* and *p3* is largely retained in the adult, as occurs in *Pheroliodes*. Normally in *Pedrocortesella*, these setae occur on the posterior flank in nymphs but migrate to the dorsal surface during development of the adult. Alternatively, this species may retain less derived positions for setae *p2* and *p3*.

*Pedrocortesella* species in Australia are readily extracted from leaf-litter and soils in drier habitats, for example dry sclerophyll forest and semiarid woodland. They are uncommon in ground samples in moister environments, such as rainforest. In these latter environments, however, some species can be readily extracted from bark samples from trees where the moisture regime is probably more similar to ground situations in the drier habitats. Thus, *P. temperata* is common both in soils in dry sclerophyll forest and on tree trunks in rainforest. However, only two species, *P. nortoni* and *P. enigma*, seem to have evolved the rounded, ovoid sensillus, regarded as an adaptation to the arboreal habitat.

Collections of oribatids studied by taxonomists in South America and southern Africa seem to have been made mostly from soils in moister habitats. It is predicted that greater effort in drier soils and on trees in moister environments will reveal a richer *Pedrocortesella* fauna in these areas. The small amount of work done on the group in the eastern Palearctic suggests that a diverse fauna occurs there as well.

A phylogenetic analysis of the World fauna is likely to lead to a reappraisal of generic boundaries in the Plateremaeoidea, including those in *Pedrocortesella*.

ACKNOWLEDGMENTS. I wish to thank the Australian Biological Resources Study for providing a grant for my research on oribatid mites. The late Dr David Lee, South Australian Museum, gave me much help and encouragement in the short time we were able to work together. Bruce Halliday, Australian National Insect Collection, and Robert Raven, Queensland Museum, provided much encouragement and help in locating berlesates. Dan Bickel, Australian Museum, and the anonymous referees provided useful comments on the manuscript. Henrik Enghoff of the University Zoological Museum, Copenhagen, loaned Hammer's plateremaeoid types and curators of other collections provided valuable help. Graham Osler, Macquarie University, drew my attention to the presence of *P. conundrum* in the Taree area and provided the negative for Fig. 18A. Sue Lindsay did the SEM work, Robert Wallace the photographic processing, and Roger Springthorpe the camera ready illustrations and layouts.

### References

- Aoki, J., 1974. Oribatid mites from Korea. I. Acta zoologica Academiae Scientiarum Hungaricae 20(3-4): 233-241.
- Aoki, J., 1984. New and unrecorded oribatid mites from Amami-Oshima Island, southwest Japan. Zoological Science 1(1): 132-147.
- Aoki, J., & K. Suzuki, 1970. A new species of *Pedrocortesella* from Japan. Bulletin of the National Science Museum 13(2): 117-120.
- Balogh, J., 1966. On some oribatid mites from Tsad and east Africa collected by Prof. H. Franz, Vienna. Opuscula Zoologica, Budapest 6(1): 69-77.
- Balogh, J., 1968. New oribatids (Acari) from New Guinea. Acta Zoologica Academiae Scientiarum Hungaricae 14(3-4): 259-285.
- Balogh, J., 1970. New oribatids (Acari) from New Guinea. II. Acta Zoologica Academiae Scientiarum Hungaricae 16(3-4): 291-344.
- Balogh, J., & P. Balogh, 1988. Oribatid Mites of the Neotropical Region I. (The Soil Mites of the World 2, series editor J. Balogh), Elsevier, Amsterdam, 335 pp.
- Balogh, J., & P. Balogh, 1992. The Oribatid Mites Genera of the World, Vols I and II, Hungarian Natural History Museum, Budapest, 263 and 375 pp.
- Balogh, J., & S. Mahunka, 1965. Ergebnisse der zoologischen Forschungen von Dr. Z. Kaszab in der Mongolei 34. Acarina: Oribatei. Annales Historico-naturales Musei Nationales Hungarici. Pars Zoologica 57: 451-465.
- 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., P.A. Martinez & N.A. Fernandez, 1990. Le genre *Pedrocortesella* Hammer, 1961, dans la République Argentine II. *Pedrocortesella monicai* et *Pedrocortesella tristius* espèces nouvelles. Acarologia 31(3): 263-278.
- Fernandez, N.A., 1990. Le genre *Pedrocortesella* Hammer, 1961, dans la République Argentine. I. *Pedrocortesella montis* n.sp. Acarologia 31(1): 73-84.
- Golosova, L.D., 1980. New species and interesting findings of oribatid mites from the Far East Marine Territory and Kurile Islands [in Russian]. Zoologicheskii Zhurnal 59(5): 782-786.
- Grandjean, F., 1964. *Pheroliodes wehncke* (Willmann) (Oribates). Acarologia 6: 353-386.
- Grishina, L.G., 1981. New species of oribatid mites (Sarcoptiformes, Oribatei) from southern regions of Siberia [in Russian]. Novye Maloizvestnye Vidy Fauny Sibiri: 23-32.
- Hammen, L. van der, 1967. The gnathosoma of *Hermannia convexa* (C.L. Koch) (Acarida: Oribatida) and comparative remarks on its morphology in other mites. Zoologische Verhandelingen uitgegeven door het Rijksmuseum van Natuurlijke Historie te Leiden 94: 3-45.
- 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, 42 plates.
- 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, 45 plates.
- Hunt, G.S., 1994. Oribatids—a mite biodiverse (Acarina). Memoirs of the Queensland Museum 36(1): 107-114.
- Hunt, G.S., 1996a. A review of the family Pheroliodidae Paschoal in Australia (Acarina: Cryptostigmata: Plateremaeoidea). Records of the Australian Museum 48(3): 325-358 [this issue].
- Hunt, G.S., 1996b. A review of the genus *Hexachaetoniella* Paschoal in Australia (Acarina: Cryptostigmata: Pedrocortesellidae). Records of the Australian Museum 48(3): 287-302 [this issue].
- Hunt, G.S., 1996c. Description of predominantly arboreal plateremaeoid mites from eastern Australia (Acarina: Cryptostigmata: Plateremaeoidea). Records of the Australian Museum 48(3): 303-324 [this issue].
- Hunt, G.S., & D.C. Lee, 1995. Plateremaeoid mites (Arachnida: Acarina: Cryptostigmata) from South Australian soils. Records of the Western Australian Museum, Supplement no. 52: 225-241.
- Luxton, M., 1985. Cryptostigmata (Arachnida: Acari)—a concise review. Fauna of New Zealand, Vol. 7, Science Information Publishing Centre, DSIR, New Zealand, 106 pp.
- Marshall, V.G., R.M. Reeves & R.A. Norton, 1987. Catalogue of the Oribatida (Acari) of continental United States and Canada. Memoirs of the Entomological Society of Canada 139: 1-418.
- Norton, R.A., 1977. A review of Grandjean's system of leg chaetotaxy in the Oribatei and its application to the Damidae. Pp. 33-62. In Dindal, D.L. (ed.) Biology of the Oribatid Mites, State University of New York College of Environmental Science and Forestry, Syracuse, New York State.
- O'Dowd, D.J., C.R. Brew, D.C. Christophel & R.A. Norton, 1991. Mite plant associations from the Eocene of southern Australia. Science 252: 99-101.
- Paschoal, A.D., 1987a. A revision of the Pheroliodidae, fam. n. (Acari: Oribatei). Revista Brasileira de Zoologia, São Paulo 3(6): 357-384.
- Paschoal, A.D., 1987b. A revision of the Pedrocortesellidae, fam. n. (Acari: Oribatei). Revista Brasileira de Zoologia, São Paulo 3(6): 385-395.
- Paschoal, A.D., 1989. Recharacterization of Gymnodamaeidae and erection of the Plateremaeoidea (Acari: Oribatei), with key to families and genera. Revista Brasileira de Zoologia, São Paulo 6(2): 191-200.
- Pletzen, R. van, 1963. Studies on South African Oribatei (Acarina) II: Plateremaeidae Trägårdh 1931; Genus: *Pedrocortesella* Hammer 1961. Acarologia 5(3): 438-442.
- Ryabinin, N.A., 1986. Beetle mites of the genus *Pedrocortesella* (Acariformes, Oribatei) in fauna of the USSR [in Russian]. Zoologicheskij Zhurnal 65: 341-348.
- Walter, D.E., 1995. Dancing on the head of a pin: mites and the rainforest canopy. Records of the Western Australian Museum, Supplement no. 52: 49-52.
- Woas, S., 1992. Beitrag zur Revision der Gymnodamaeidae Grandjean, 1954 (Acari, Oribatei). Andrias 9: 121-161.