

**A Revision of the Genus *Lomanella* Pocock
and its Implications for Family Level
Classification in the Travunioidea
(Arachnida: Opiliones: Triaenonychidae)**

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ABSTRACT. Genus *Lomanella* Pocock, 1903 is redescribed for type species, *L. raniceps* Pocock, and 18 other species. One new combination is established: *L. inermis* (*Callihamus*) (Roewer, 1931). Four species groups are recognised on morphological grounds for the six previously described species and 13 new species: *L. raniceps* species group comprises *L. raniceps*, *L. atrolutea* Roewer, 1915, *L. inermis* (Roewer, 1931), *L. kallista* Forster, 1949, *L. ambulatorio* n.sp., *L. balooki* n.sp., and *L. promontorium* n.sp.; *L. insolentia* species group comprises *L. insolentia* n.sp., *L. revelata* n.sp., *L. troglophilia* n.sp., and *L. alata* n.sp.; *L. exigua* species group comprises *L. exigua* V.V. Hickman, 1958, *L. parva* Forster, 1955, *L. browni* n.sp., *L. thereseae* n.sp., *L. troglodytes* n.sp., *L. quasiparva* n.sp., and *L. blacki* n.sp.; and the *L. peltonychium* species group comprises a single species, *L. peltonychium* n.sp. A lectotype male and paralectotype female are designated for *L. atrolutea*. A key to males is provided. Within the genus, tarsal claws of legs III and IV range from a simple trifurcating claw typical of many triaenonychids, to a complex multiply-branched peltonychium. There is also simplification of penis structure within species of *Lomanella*. The significance of both claw and penis structure to family level classification in the Travunioidea is discussed and it is shown that a subfamily classification of the Triaenonychidae based on claw morphology is difficult to sustain. Three species are known to inhabit caves including a second totally eyeless triaenonychid. The penis of *Nucina silvestris* V.V. Hickman is redescribed as it shows reduction in plates paralleling that in some *Lomanella* spp.

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The genus *Lomanella* Pocock is a group of unusual, highly derived harvestmen occurring predominantly in south-east mainland Australia and Tasmania, but with a single species in the south-west of Western Australia. Favoured microhabitats are under logs and rocks, and in leaf litter or moss. Three species occur in caves, though only one exclusively.

Lomanella belongs to the suborder Laniatores, the most diverse and species rich group of harvestmen in Australia. The Laniatores are characterised by strong raptorial pedipalps (Fig.1) with a movable claw and fixed spines which ensnare and impale prey. Possession of a muscle in the truncus (shaft) of the penis (Fig.11A) places *Lomanella* in the superfamily Travunioidea. In *Lomanella*, this muscle occurs along the length of the truncus (Fig.18G), placing the genus in the family Triaenonychidae. Problems in family level classification are discussed below under "Family Level Systematics".

The nature of the spines on the pedipalp readily distinguishes *Lomanella* from all other Australian triaenonychids: each consists of a short tubercular base

terminating with a very long seta (Fig.1, bottom). In other genera, the base is relatively long and spinous and the seta relatively short (Fig.1, top).

Methods and Materials

Type material of all nominal species has been examined and reassessed. The following abbreviations are used to indicate the present location of material: AM – Australian Museum, Sydney (usually denoted by the registration number prefix KS); ANIC – Australian National Insect Collection, CSIRO, Canberra; FIS – Forschungsinstitut Senckenberg, Frankfurt am Main; MOV – Museum of Victoria, Melbourne; QM – Queensland Museum, Brisbane; NHM – Natural History Museum, London; UQIC – University of Queensland Insect Collection, Brisbane; TMAG – Tasmanian Museum & Art Gallery, Hobart; WAM – Western Australian Museum, Perth.

Terminology and methods of measurement in general follow Hunt (1990). Ozopore is used for the opening of the odoriferous gland, lateral plate becomes dorsolateral plate, and shaft becomes truncus in conformity with Martens (1986). However, we use "sensillar region" instead of Martens' term "Sensillenträger" for the area of the glans carrying setae. Tergal areas are abbreviated to TA1, etc.; coxa of leg I is coxa I, claw of tarsus IV to claw IV, etc. Other abbreviations are: SL = scute length, CW = carapace width, PFL = pedipalp femur length, FIV = femur IV length, IOD = interocular distance, TF = tarsal formula. Notation and inferred homologies for pedipalp spination are given in Figure 1. An evaluation of character states has involved an assessment of whether they are plesiomorphic or apomorphic as part of a broader cladistic study of Australian Triaenonychidae (Hunt, in preparation). Measurements of males are usually presented as SL 2.27-2.50 (2.38, 5) which is scute length range (mean, sample size). Means are given for sample sizes of three or more. Normally one female is measured to give an indication of lengths relative to the male. Official numbers for caves (e.g., IB-4) follow Matthews (1985). The cavernicolous species described below are included as undescribed species in Eberhard *et al.* (1991). Table 1 is listed in the Appendix.

Morphology of *Lomanella*

Reference to Figures 1 to 8 provides an overview of characters important in the classification of *Lomanella*. Those considered important in defining the genus and its species groups, and in providing insights into higher classification are discussed here.

Pedipalp spination. Spines on the pedipalp have a short tubercular base terminating in a very long seta (Fig.1, bottom), a condition regarded as synapomorphic for the genus. A long spinose base with a relatively short seta, arising usually subterminally, is plesiomorphic

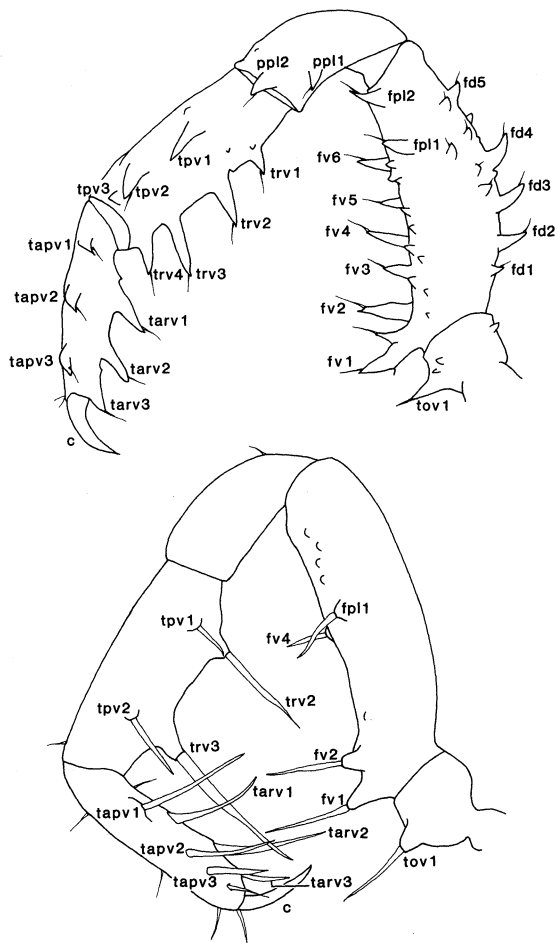


Fig.1. Inferred homology between setae on 'typical' triaenonychid (*Holonuncia cavernicola* Forster) pedipalp (top) and *Lomanella* (*L. thereseae* n.sp.) pedipalp (bottom). tov = trochanter ventral; fd = femur dorsal; fv = femur ventral; fpl = femur prolateral; ppl = patella prolateral; tpv = tibia proventral; trv = tibia retroventral; tapv = tarsus proventral; tarv = tarsus retroventral; c = claw. Not to scale.

(Fig.1, top).

Absence of spines from the dorsal surface of the femur and from the patella is synapomorphic for the genus. In *Lomanella*, the most plesiomorphic condition regarding disposition of spines is shown in Figure 1, bottom. Various degrees of spine loss are important at the species level.

Claws III and IV. The most plesiomorphic claw morphology occurs in the *L. raniceps* species group (though see discussion below of Briggs' (1971a) views). This claw consists of a strong median prong flanked at an angle by a pair of smaller lateral branches (Figs 2A, 7A), a condition originally used to define the Triaenonychidae, literally "three-claws".

The *L. insolentia* species group has an additional small, scale-like branch at the base of the each lateral branch (Figs 2B, 7B). The *L. exigua* and *L. peltonychium* species groups have between two and 12 lateral branches which are closely adpressed and form a hierarchy of size: one major branch arises from each side of the median prong and lies in a dorsolateral groove along it; a subsidiary branch arises from near the base of the major branch and lies along it; and so on, until a maximum number of branches is established for a particular species (Figs 2C-E, 7C-G).

Claw variation in *Lomanella* may be regarded as forming a transformation series (Fig.2). Implications for family level classification are discussed below.

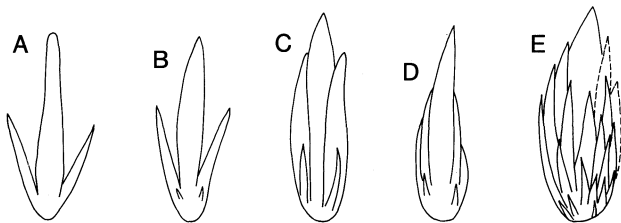


Fig.2. Hypothetical transformation series between a simple trifurcate *Lomanella* claw and a complex peltonychium (although claws of actual species are used, no direct relationship is implied). A = *L. kallista* Forster; B = *L. troglophilia* n.sp.; C = *L. blacki* n.sp.; D = *L. thereseae* n.sp.; E = *L. exigua* V.V. Hickman. Not to scale.

Penis. Extreme attenuation of the truncus (average diameter less than 15% length) is a synapomorphy for *Lomanella*.

Martens (1986) considers that a full complement of plates – dorsal, dorsolateral, and a sensillar region differentiated as a ventral plate – is the primitive triaenonychid condition, a view with which we agree. Loss of the dorsal plate is a synapomorphy for *Lomanella*.

Lomanella revelata n.sp. has the sensillar region developed as a separate ventral plate (vp, Fig.3A) and represents the most plesiomorphic condition in the genus. Other species show varying degrees of loss of a separate ventral plate and integration of the sensillar region with the stylus. Within the *L. raniceps* and *L. insolentia* species groups, the most apomorphic condition occurs in *L. raniceps* where there is complete integration (Fig.3C).

A synapomorphy for the *L. exigua* species group is

a stylus which is sickle shaped in lateral view and which forms an opposing relationship with a midventral structure which is considered here to be a homologue of the median part of the ventral plate (Figs 3D,E, 8D). Within this group, the most plesiomorphic condition occurs in *L. browni* n.sp. (inferior and superior setae separated, sensillar region with wing-like lateral extensions reminiscent of species in the *L. insolentia* species group, midventral distal extension of ventral plate with terminal notch perhaps homologous with the terminal median notch in many triaenonychid genera) (Figs 3D, 21G,H). The most apomorphic species in the group are *L. exigua* Hickman and *L. troglogytes* n.sp. (Figs 3E, 25D,E).

Ovipositor. The *Lomanella* ovipositor has an opening with a row of six to seven elongate, unevenly bifid setae inside each lateral rim (Fig.5H). The triaenonychid ovipositor typically has a fleshy, sometimes sclerotised, lobe on each side into which simple setae are inserted. We are not confident as to whether the lack of conspicuous lobes in *Lomanella* is plesiomorphic or derived. The bifid setae, however, would appear to be derived from simple setae which occur on the ovipositor in all suborders; hence bifid setae are a synapomorphy for the genus.

Position of genital operculum. In most Triaenonychidae, fused sternites 2 and 3 extend anteriorly between coxae IV and thus displace the genital opening anteriorly. In *Lomanella*, fused sternites II and III together are subequal in size and shape to sternite IV and lack a mesial anterior lengthening between coxae IV. The genital operculum in *Lomanella* thus lies relatively posteriorly, a condition regarded by us as plesiomorphic.

Size of TA1. In most Triaenonychidae TA1 is much smaller (vestigial) compared with TA2. In *Lomanella* TA1 and 2 are subequal, a condition regarded by us as plesiomorphic.

Lateral lobes on carapace. A prominent convexity on each lateral margin of the carapace above leg II is a synapomorphy for the genus. It opposes dorsal processes on coxa II (which are relatively larger in *Lomanella* than in other genera) and assists in orientating a burst of defensive secretion from the ozopore.

Systematics

Triaenonychidae Soerensen, 1886

The variations in claws III and IV and male genitalia in *Lomanella* analysed above have implications for subfamily classification of the Triaenonychidae. These are discussed in the context of a review of subfamily classifications of the group. Family classification of the Travunioidea is also reviewed.

Subfamily Classification

1. Sternum structure. Roewer (1915) established

three subfamilies on the basis of sternal morphology, namely Triaenonychinae Soerensen, Triaenobuninae Pocock and Adaeinae Pocock. Forster (1954) argued that these taxa were not natural groups (that is, not monophyletic), a view which has gained acceptance. Indeed, there are intermediates between the narrowly based sternum of the Triaenonychinae and the broadly based sternum of the Triaenobuninae, a situation which has led to closely related taxa being placed in separate subfamilies (Hunt, in preparation).

Were this traditional classification in current use, *Lomanella* would be placed in the Triaenonychinae on the basis of the narrow base of its sternum.

2. Structure of claws III and IV. Forster suggested that the Triaenonychidae should comprise two subfamilies based on the morphology of claws III and IV and on biological data: the Triaenonychinae possess claws with a pair of lateral branches shorter than the central prong; the Soerensenellinae Forster possess lateral branches equal to or longer than the central prong and females guard their eggs (Table 1).

Briggs (1969) established a third subfamily, the Paranonychinae Briggs, on the basis of two pairs of short lateral branches. Suzuki (1975b) recognised two further subfamilies. Both possess a multiply-branched peltonychium but, rather than possessing three pairs of

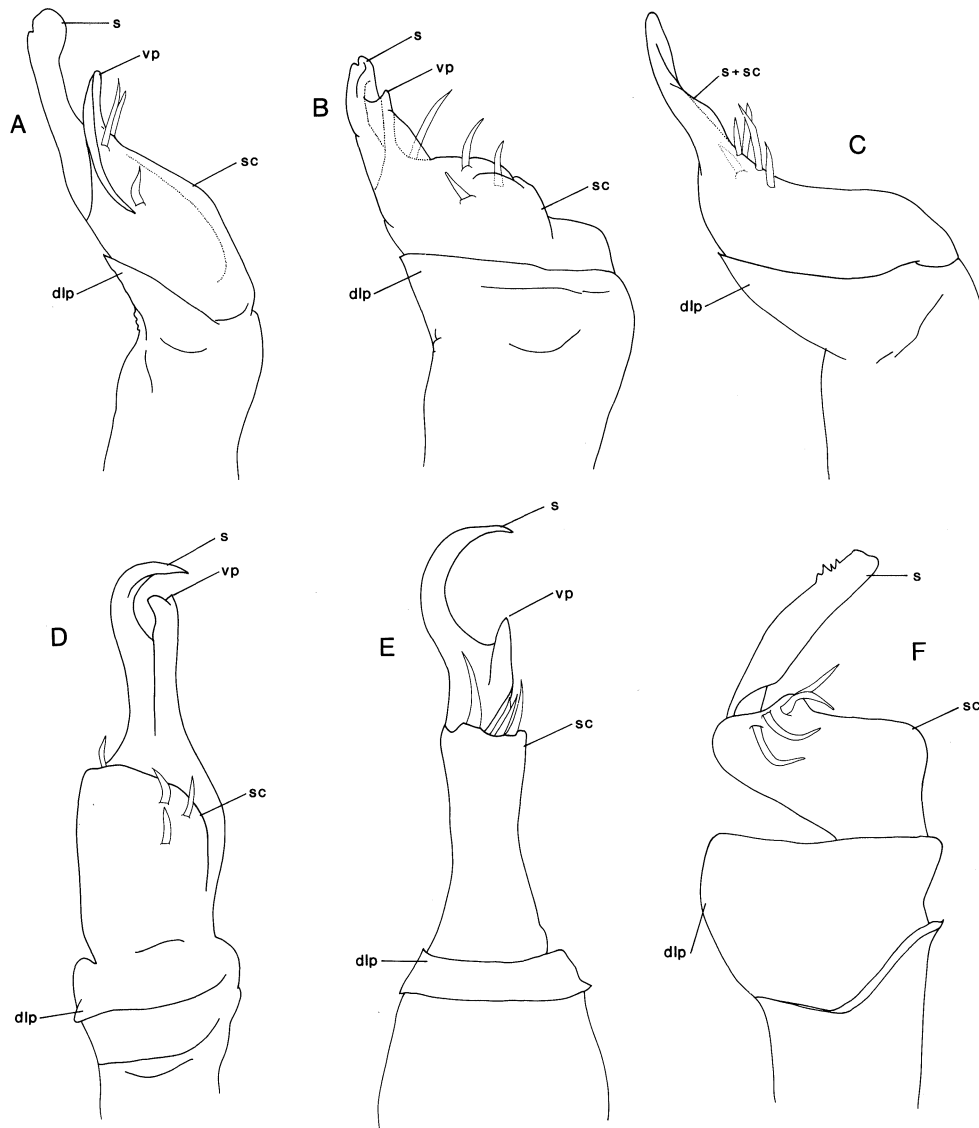


Fig.3. Penis morphology in *Lomanella* spp, lateral aspect. A = *L. revelata* n.sp with well-developed ventral plate; B = *L. balooki* n.sp with vestigial ventral plate; C = *L. raniceps* Pocock with sensillar region completely integrated with stylus and no ventral plate development; D = *L. browni* n.sp. showing presumed, terminally cleft, ventral plate homologue (vp) closely adpressed to stylus; inferior setae and superior seta widely separated; E = *L. exigua* Hickman with reduced ventral plate homologue, sensillar region reduced and all setae forming a close grouping; F = *L. peltonychium* n.sp. with no ventral plate although four setae on each side inserted on a slight mound on sensillar region, stylus clearly differentiated from sensilla carrier. s = stylus; vp = ventral plate; sc = sensillar region; dlp = dorsolateral plate. No dorsal plate present. Not to scale.

lateral branches in juveniles, the Kaolinonychinae Suzuki and the Nippononychinae Suzuki have respectively four and five pairs (Table 1). Briggs (1971a) and Suzuki (1975b) published hypothetical phylogenies of families and subfamilies in the Travunioidea based on claw morphology.

Maury (1988) had difficulty as to subfamily placement of a new cavernicolous Argentinian species, *Picunchenops spelaeus* Maury. It possesses a peltonychium similar to the Triaenonychidae described by Suzuki (1975b). Maury concluded that genital morphology placed the species in this family. He chose not to place the species in a subfamily and expressed reservations about basing a subfamily classification on a potentially labile character (claw structure) that was difficult to study.

Our work on *Lomanella* supports Maury's caution and Shear's (1977) earlier reservations about the heavy emphasis placed on claw morphology. If we were to apply adult claw structure, *Lomanella* would be split into three subfamilies, despite being a well-defined monophyletic group supported by several synapomorphies. Furthermore, *Lomanella* shows a 'transformation series' from simple to complex claw morphology (Fig.2). Juvenile claw structure is also unhelpful – in *Lomanella peltonychium* n.sp., the number of side branches varies according to the instar.

In summary, it is difficult to sustain the use of claw structure in subfamily classification of the Triaenonychidae.

3. Penis morphology. Martens (1986) analyses penis morphology in the Triaenonychidae and discusses, what he considers to be, a strong regional pattern: (i) Australian and South African taxa possess a full complement of plates - dorsolateral, dorsal and a "sensillentrager" differentiated as a ventral plate (1986:fig.2a); (ii) in New Zealand and North American taxa, the dorsal plate is lost and the dorsolateral plate reduced (1986:fig.2b); (iii) in some Japanese taxa, the ventral plate is also lost (Fig.2c); (iv) other North American and Japanese taxa lose even the dorsolateral plate, retaining none of the plates present in Australian and South African taxa (Fig.2d,e). Martens does not include South American triaenonychids in his analysis (see below).

An implication of Martens' work is that penis morphology may be useful in establishing a subfamily classification reflecting zoogeographical patterns. Unfortunately, *Lomanella* morphology argues against this: (i) *Lomanella*, and some other Australian genera, do not possess a dorsal plate and hence do not conform to Martens' view of Australian taxa. Other genera in Australia appear to have retained the dorsal plate but lost the dorsolateral (Hunt, in preparation); (ii) *L. revelata* n.sp. has a "sensillentrager" (sensillar region) developed as a separate ventral plate (vp in Fig.3c). *L. inermis* (Roewer) and *L. balooki* n.sp. retain a vestige of the ventral plate (Fig.3B). *Lomanella raniceps* has lost all trace of a ventral plate

(Fig.3C) and closely parallels the structure of *Nippononychus* Suzuki (Fig.2c in Martens, 1986); (iii) *Lomanella* spp. possessing a peltonychium show reduction in the ventral and dorsolateral plates (Fig.3D-F).

Parallel reductions are seen in the distantly related Tasmanian triaenonychid *Nucina silvestris* Hickman (Fig.28) where dorsal and dorsolateral plates are lost and the sensillar region is fused with the stylus without separate development of a ventral plate. *Nucina* shares none of the distinctive synapomorphies of *Lomanella*. This convergence illustrates the potential danger of basing higher level classifications on structures involving loss and/or simplification.

In summary, the biogeography of triaenonychid penis morphology seems more complex than envisaged in Martens' (1986) study. The Australian fauna has several morphologies involving plate retention and loss. A similar situation seems to apply in South America: most species appear to have lost the dorsal plate though Maury and Roig Alsina (1985) indicate its presence, with lack of a dorsolateral plate, in *Ceratomontia mendocina*; some species, for example *Nuncia chilensis* (H. Soares) (= *Chilenuncia donosoii*) and *Nuncia rostrata* Maury seem to possess all plates (Munoz Cuevas, 1971; Maury, 1990).

Family Classification of the Travunioidea

Increasing knowledge about claw structure and other characters has forced reappraisal of family and subfamily classification in the Travunioidea. The Triaenonychidae now include almost every form of claw known for the superfamily (Table 1). Study of *Lomanella* has supported the view that claw characters can be particularly labile (Table 1). Other characters used to support family level taxa, including free lateral sclerites, are now known to be shared across disparate groups.

Of the families discussed by Martens (1986), the Pentanonychidae Briggs is not supported by a unique synapomorphy (Table 1). The peltonychium of the Synthetonychidae is differentiated into branches of different morphologies (for example, the main central pair are broad, flat and tongue-like) but, nevertheless, could be derived from a *Lomanella*-type peltonychium. The bizarre habitus of the Synthetonychidae may support subfamily, rather than family status for the taxon; Martens (1986) believes that penis structure places the group in the Triaenonychidae. Penis structure also argues for sinking the Cladonychidae in the Travuniidae (Martens, 1986).

Family classification of the Travunioidea is resolving into those genera which possess a muscle along the length of the penis truncus (Triaenonychidae) and those with a muscle limited to the base of the truncus (Travuniidae). Even so, the condition in the Triaenonychidae is probably a symplesiomorphy. A search for apomorphic characters, possibly internal, is needed

to help establish a phylogenetic family and subfamily classification.

Although we assign *Lomanella* to the Triaenonychidae, we do not attempt, at this stage, to place it in a subfamily.

Correlation between Claw Structure and Penis Form – a Case of Neoteny?

Although claw structure and penis morphology present difficulties for subfamily classification of the Triaenonychidae, there is nevertheless an interesting correlation between presence of a peltonychium and plate reduction in the penis in various Travunioidea: (i) *Lomanella*, as a group, shows a tendency towards development of a peltonychium and simplification of the penis; (ii) the penis of *L. raniceps* shows striking similarities to the penis of some Japanese taxa described by Suzuki (1975b), for example *Metanippononychus* spp. which have a tendency to develop a peltonychium. *L. raniceps*, however, does not carry a peltonychium though several of its congeners do; (iii) the Synthetonychidae of New Zealand carry a complex peltonychium. Some species, for example *Synthetonychia oliveae* Forster, possess a penis of similar form to *Lomanella revelata* n.sp. in which a ventral plate is present and the dorsolateral plate is somewhat reduced. Other species, such as *S. oparara* Forster, appear to have lost the ventral and dorsolateral plates resulting in an extremely simplified penis, similar in general form to *Mutsunonychus* Suzuki from Japan and *Paranonychus* Briggs from North America, both of which have two or more side branches to the tarsal claw. The penis of *Lomanella exigua* is also greatly simplified (Fig.3E); this species possesses a complex peltonychium; (iv) the Travuniidae possess what is in essence a highly simplified penis; this group has a peltonychium.

The correlation between complex claw and simplified penis does not hold for every taxon. *Picunchenops spelaeus*, for example, combines a relatively complex penis with a peltonychial claw.

There are at least two explanations for an apparent correlation between elaboration of claw structure and simplification of the penis: (i) it points to a close phylogenetic relationship between those taxa where this correlation occurs; and (ii) the taxa are not necessarily closely related; similarities in claws and genitalia are parallelisms which tend to occur together through the mediation of some developmental process.

We favour the latter explanation. The range of variation in *Lomanella*, from simple to complex claws and relatively complex to simplified penis, can be accounted for by evolution occurring independently in Australia. Existing species reveal a transformation series which shows how the most apomorphic extremes could have evolved (Figs 2, 3).

Both claw elaboration and penis simplification may be the result of neotenic processes which tend to affect both structures. Juvenile claws in the Triaenonychidae

generally have three pairs of side branches, adult claws one pair. The peltonychium may be an elaboration of the juvenile claw condition. The dorsal, dorsolateral and ventral plates of the penis are laid down towards the end of development; inactivation of the genes responsible may result in an adult penis of juvenilised form.

Rambla (1980) was the first to point out the possibility of neoteny in the Travunioidea. She suggested that the retention of three pairs of lateral branches on the tarsal claw, free lateral sclerites and a free ninth tergite in the adult *Pentanonychus* Briggs may be manifestations of neoteny. *Yuria* Suzuki, a triaenonychid from Japan (see note under Table 1), has the combination of a peltonychium, free lateral sclerites, a free ninth tergite and a penis which has lost the dorsolateral and ventral plates. The Travuniidae of North America described by Briggs (1974) combine a peltonychium, free lateral sclerites and a penis of simplified morphology typical of the family. Again, such correlations do not always hold: *Hickmanoxyomma cavaticum* (V.V. Hickman) possesses free lateral sclerites but has a penis carrying dorsal, dorsolateral and ventral plates and has a typical triaenonychid claw (Hunt, 1990).

Both Briggs (1971a) and Suzuki (1975b) consider that the multiply-branched claws and a free ninth tergite are primitive characters and have constructed their phylogenetic trees accordingly. We agree with Rambla (1980) that such characters, if neotenic, are derived rather than primitive. The transformation series in *Lomanella* suggests the peltonychium is a complex, derived structure (Fig.2).

Lomanella Pocock

Lomanella Pocock, 1903: 411.–Roewer, 1915: 83.–Roewer, 1923: 595.–V.V. Hickman, 1958: 11.

Type species. *Lomanella raniceps* Pocock, 1903 by original designation.

Diagnosis. Dorsal surface of pedipalp femur and entire patella without spines; spines on pedipalp composed of a short tubercular base supporting a long seta; prominent distodorsal swelling of cheliceral first segment; carapace with a marked lateral lobe above each ozopore; fused sternites 2 and 3 not extending anteriorly between coxae IV; TA1 subequal to TA2; spiracle not obscured by coxa IV; penis lacking dorsal plate, ventral plate usually reduced or lacking; ovipositor lacking terminal lobes, long, uniform, unevenly bifid setae surrounding vaginal opening.

Redescription. Eyemound often rising 0.3 to 1.0 its length behind anterior margin but sometimes closer; naked or terminating in a short denticle or spine. Anterior margin usually without spines or tubercles above, inter-appendage projections either absent or weakly developed. Carapace laterally above coxa II with enlarged

projection associated with ozopore. Scutal groove distinct mesially; abdomen rounded in form, tergal areas usually marked mesially by depressions and rows of setose granules, TA1 subequal to TA2. Ninth abdominal tergite fused with anal plate; free lateral sclerites absent; scute and free tergites form a smooth (non-crenulated) semicircular rim which over-rides the venter laterally and posteriorly. Sternum long and narrow; genital operculum subtriangular, narrower in males; fused sternites II and III not extending anteriorad between coxae IV; limited movement possible at coxa IV-sternite articulation; spiracle set almost its diameter behind coxa IV. First segment of chelicera lacking a proximal boss, with deep transverse mid-dorsal groove, apical half high and rounded; second segment with a few setose granules, spines lacking. Pedipalp lacking strong teeth, but equipped with long setae each arising from a short tubercular base, proximoventral setose tubercle on femur and retrodistal on tibia largest and always present; dorsum of femur naked; tarsus much narrower than tibia; claw movable. Femur I ventrally usually with row of small setose tubercles/granules, tarsus usually with 3 articles in both sexes, rarely 2. Claws of tarsi III and IV with median prong and one pair of lateral branches forming an angle with it, or with an additional pair of scale-like branches, or with lateral branches adpressed to median prong with one or numerous scale-like side branches, if numerous claw in form of a peltonychium. Juvenile claws III and IV with 3 or more side branches, arolem absent. Penis long and narrow; dorsal plate absent, dorsolateral plates small and directed dorsad or reduced to an annulus-like rim; ventral plate usually weakly differentiated from stylus or not differentiated as a separate plate, if the latter the stylus + sensillar region broad and plate-like;

typically 3 inferior and 1 superior setae, latter reduced and sometimes lost. Ovipositor with circle of long subequal setae around vaginal opening, each seta unevenly bifurcate.

Comments. *Lomanella* as described here is almost certainly a monophyletic group based on several strong synapomorphies. Four lineages are recognised within the genus which we treat as species groups. The differences in leg claw and penis structure between the *raniceps* species group and the *exigua* species group are quite marked and *Lomanella* may eventually resolve into two or more separate, but closely related, genera. Discovery of the male of *L. blacki* n.sp. and examination of its penis should help clarify the situation. Claws III and IV of this species have a structure intermediate between the *insolentia* species group and the *exigua* and *peltonychium* species groups; the *insolentia* species group has a claw structure intermediate between *L. blacki* and the *raniceps* species group (Fig.2).

The affinities of *Lomanella* are obscure; it does not seem closely related to any other Gondwanan genus. Similarities between the simplified penis of *L. raniceps* and Japanese and North American taxa are regarded as parallelisms (discussed above).

The 19 species of *Lomanella* may be separated by the key given below.

Distribution. South-eastern mainland Australia, Tasmania, and the south-west of Western Australia. Eleven of the 19 species occur in Tasmania, six of which can be found in the Gordon-Franklin Rivers drainage basin, south-west Tasmania.

Key to Males of Species in Genus *Lomanella* Pocock

- 1. Tarsi I and II with 2 articles (Fig.22).....2
- Tarsi I and II with 3 or more articles3
- 2. Penis with 4 long setae on each side*L. parva* Forster
- Penis with 3 setae, most ventral seta short (Fig.22)*L. quasiparva* n.sp.
- 3. Blind, no lens or retina visible (Figs 6K, 25A)*L. troglodytes* n.sp.
- Not blind, lens and retina visible.....4
- 4. Body orange-yellow, little or no pigment, 4 tuberculate setae on pedipalp tibia (Fig.23E), eyemound rounded (Fig.23A)*L. thereseae* n.sp.
- Body with strong pigmentation pattern (fresh specimens), 3 or less tuberculate setae on pedipalp tibia (if 4, eyemound conical, Fig.27A)5
- 5. Tarsus II with 3 or 4 articles6
- Tarsus II with 5 articles8

6. Tarsus II with 4 articles, eyemound with small spine
(Fig.26A).....*L. blacki* n.sp.
- Tarsus II with 3 articles, eyemound rounded 7
7. Penis truncus wider than sensillar region (Fig.20C)*L. exigua* V.V. Hickman
- Penis sensillar region wider than truncus (Fig.21G).....*L. browni* n.sp.
8. Eyemound with short spine anterior to eyes or conical
(Figs 6H,D,E; 10D; 15A) (female may have spine above
or posterior to eyes, Fig.10E)..... 9
- Eyemound rounded or with small granule (Figs 6F,G; 9A;
12A,D) 17
9. Anterolateral corners with small projection or tubercle
(Figs 13B, 17B) 10
- Anterolateral corners smooth 11
10. Body length and SL more than 2 mm*L. inermis* (Roewer)
- Body length and SL less than 2 mm *L. revelata* n.sp.
11. Pedipalp tibia with 3 or 4 tuberculate setae and femur
with fv4 (Fig.27C)..... 12
- Tibia with less than 3 tuberculate setae, fv4 lacking
(Fig.13A) 14
12. TA1-5 defined by shallow grooves in lateral view
(Fig.27A)*L. peltonychium* n.sp.
- TA1-5 defined by deep grooves (Fig.18A) 13
13. Eyemound rising subvertically just behind anterior margin
(Fig.6D)*L. insolentia* n.sp.
- Eyemound rising steeply some distance behind anterior
margin (Fig.18A,C)*L. troglophilia* n.sp.
14. Penis with setae carried distolaterally on sensillar region
(Fig.15F,H)*L. promontorium* n.sp.
- Penis with setae not carried distolaterally on sensillar
region 15
15. Sensillar region with broad, parallel-sided wing-like
expansions (Fig.14D)*L. kallista* Forster
- Sensillar region narrows distally (Figs 11B,12H) 16
16. In lateral view, sensillar region with ventrodistal
projection (vp in Fig.3, middle top); in ventral view
lateral margins of sensillar region not smoothly tapering
(Fig.12H).....*L. balooki* n.sp.
- In lateral view, sensillar region without ventrodistal
projection (Fig.3, top right); in ventral view lateral
margins of sensillar region smoothly tapering (Fig.11B)..... *L. ambulatorio* n.sp.

- 17. Scute length (SL) more than 3 mm, dorsum with broad yellow stripe posterior to eyemound*L. atrolutea* Roewer
- Scute length less than 3 mm, dorsum with or without broad yellowish mesial stripe..... 18
- 18. TA1-5 not deeply divided by grooves in lateral view (Fig.4A) 19
- TA1-5 divided by deep grooves in lateral view (Fig.10D)20
- 19. Eyemound rising subvertically immediately behind anterior margin (Fig.19A), dorsum with large mesial yellow stripe/patch..... *L. alata* n.sp.
- Eyemound rising more gently a short distance behind anterior margin (Fig.4A), dorsum without large mesial yellow stripe/patch *L. raniceps* Pocock
- 20. In lateral view, sensillar region with ventrodistal projection (vp in Fig.3, middle top); in ventral view lateral margins of sensillar region not smoothly tapering (Fig.12H).....*L. balooki* n.sp.
- In lateral view, sensillar region without ventrodistal projection (Fig.3, top right); in ventral view lateral margins of sensillar region smoothly tapering (Fig.11B).....*L. ambulatorio* n.sp.

***Lomanella raniceps* species group**

South-eastern Australia and Tasmania. Claw of tarsi III and IV with a central prong and 1 pair of lateral branches forming an angle with central prong; tarsus II with 5 articles, free part of stylus (if present) less than 0.3 glans length, stylus and sensillar region almost or completely fused in some species.

***Lomanella raniceps* Pocock**

Figs 4-6, 8

Lomanella raniceps Pocock, 1903: 411.-Roewer, 1915: 84-85.-Roewer, 1923: 595-596.-V.V. Hickman, 1958: 11-13.

Type material. Tasmania: HOLOTYPE male: NHM, G.W. Peckham, no other data.

Other material examined. Numerous specimens from most areas of Tasmania (largely Hickman Collection in AM). Localities include (approximately clockwise from Launceston area): Trevallyn, Flowery Gully, The Sideling near Scottsdale, Mount Barrow, Cascades, Weldborough, Mount Michael, Mount Victoria, Lottah, Saint Columba Falls, Collinsvale, Goulds Country, Myrtle Creek near Mathinna, Mathinna Falls, Douglas River near Bicheno, Nugent, Eaglehawk Neck, Tasman Peninsula, Stonor, Mount Wellington, Highcroft, Arve Valley, Hastings Caves area, Ida Bay caves area, Gordon River area, Franklin River area, Serpentine River, Olga River, Tarraleah,

Dee Bridge on Lyell Highway, Lake Saint Clair, Mount Rufus, Rufus Weir, National Park, Navarre River, Pieman River, Hellyer Gorge, Heemskirk Falls, Forth Falls, Wilmot, Liffey, and Burnie.

Diagnosis. Eyemound without spine, covered by small granules, dorsum without large mesial yellow patch posterior to eyes, SL less than 3 mm, sensillar region and stylus completely integrated.

Redescription. MALE. *Body:* SL 2.27-2.50 (2.38, 5 from Trevallyn population); CW 1.37-1.46 (1.42). Dorsal colour dark brown relieved by yellow-orange patches; pigmentation pattern as figured; ventral pattern as figured by Roewer (1923). Eyemound rising about 0.3 IOD behind anterior margin; evenly rounded, unarmed but covered by normal surface granulation (Fig.6F). Scutal groove shallow; TA1-5 not strongly defined by grooves, each with row of small setose granules. Coxosternal region and genital operculum as illustrated (Figs 6B,4C). *Chelicerae* as in Figure 4G. *Pedipalps:* PFL 0.89-1.00 (0.94). Femur dorsally dark brown mottled with yellow and interrupted in distal half by a broad yellow band; patella and tibia yellow distally, dark brown mottled with yellow proximally; tarsus mostly mottled throughout. Size of setal bases are as follows (compare with Fig.1): tov1 tiny, fv1 broad and low, fv2 lacking, fv4 weak, fpl1 very weak, tpv1 and trv2 lacking, trv3 and tpv2 moderately large, tarsus as figured. Seta of trv3 slightly larger than seta of fv1. *Legs:* FIV 1.46-1.60 (1.54). Dark brown, femur, patella and tibia with

subdistal yellow band. Femora only slightly tuberculate ventrally; claw IV three-pronged, a pair of small lateral prongs forming an angle with large central prong; TF 3(2),5(3),4,4. *Penis*: sensillar region not differentiated as a ventral plate but completely integrated with stylus without obvious demarcation. The 3 inferior setae form a close grouping near each ventrolateral margin, superior seta inserted slightly more dorsally.

FEMALE. Similar to male except: pedipalp less robust, genital operculum broader at base, setal bases slightly larger. Ovipositor with six long terminal setae on each side; setae unevenly bifid, the short proximal prongs fringing the vaginal opening (Fig.5H); spermathecae not examined. Key measurements: SL 2.46, CW 1.34, PFL 0.76, FIV 1.45.

Variation. Body size varies across the species range

and warrants further study. The terminal part of the penis distal to the setae is long in the holotype and males from northern Tasmania, relatively short in males from southern Tasmania and the mainland population in the Brindabella Ranges, near Canberra (Fig.5). V.V. Hickman's (1958) illustration of a pedipalp shows fv4 lacking.

Comments. Pocock's type is a male, not a female as surmised by Roewer (1915, 1923). Its penis structure suggests it was collected in northern Tasmania. The Trevallyn population near Launceston, northern Tasmania was chosen for measurements; the type measurements SL 2.37, CW 1.47, PFL 0.95, FIV 1.53 fall essentially within the Trevallyn range. The species is widespread in Tasmania though tends to be replaced in the west by *L. atrolutea*. The outlying population on the mainland suggests that the species may have been replaced over

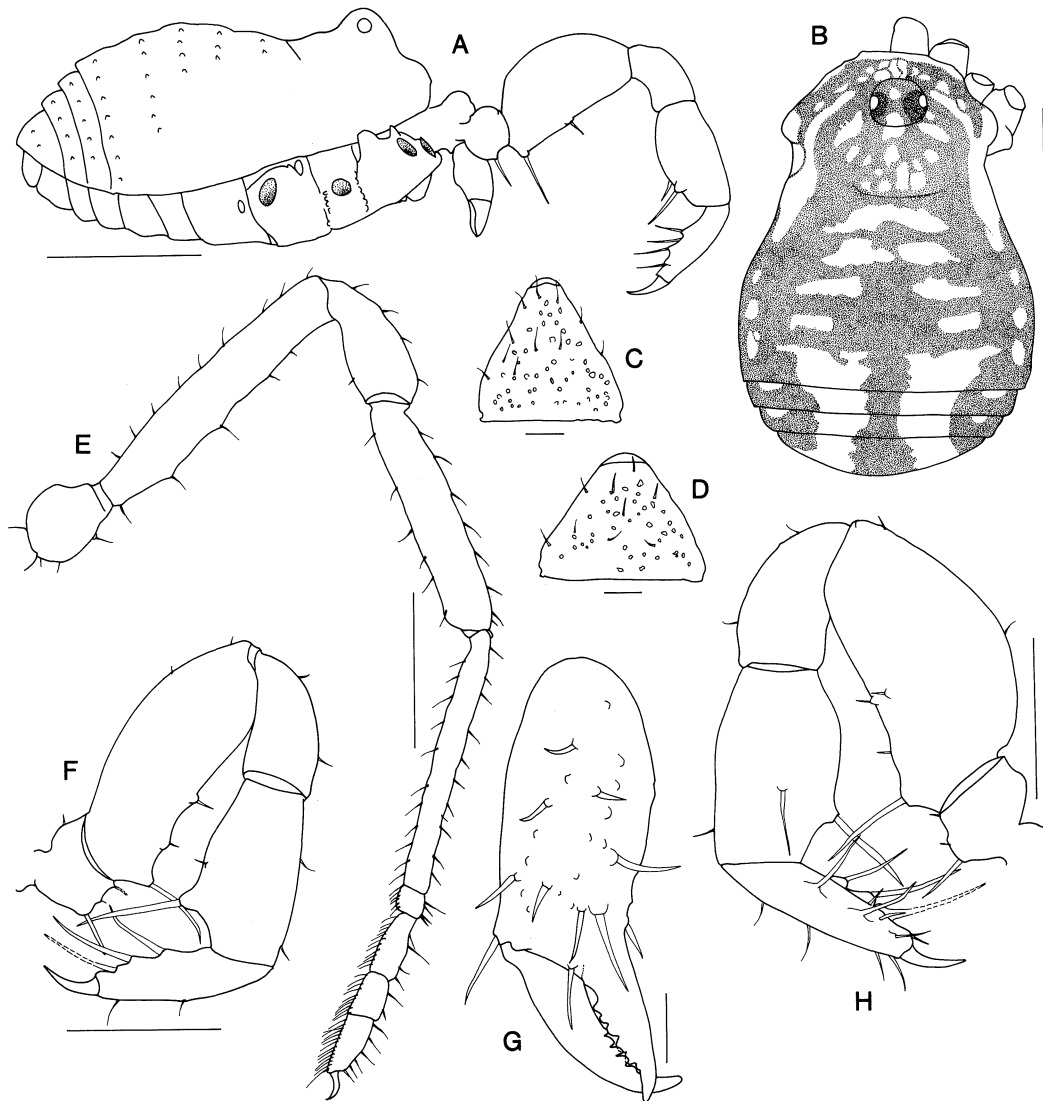


Fig.4. *Lomanella raniceps* Pocock. A,B = holotype male; C,E,G,H = male, Trevallyn population; D,F = female, Trevallyn population. A = body and pedipalp, lateral; B = dorsum with pigmentation pattern; C,D = genital operculum; E = right leg I, retrolateral; F,H = pedipalp, retro- and pro-lateral; G = second segment of right chelicera, dorsal (frontal). Scale bars: A,B = 1 mm; C,D,G = 0.1 mm; E,F,H = 0.5 mm.

much of its mainland range by *L. ambulatorio* n.sp. and related species. Alternatively, the "outlier" could represent a separate sibling species which evolved separately from the morphologically similar Tasmanian species. *Lomanella raniceps* is most closely related to *L. atrolutea* but the latter still shows a trace of join between the stylus and sensillar region. In lacking this join, *L. raniceps* can be regarded as having the most derived penis in the species group (Fig.3).

Natural history. A recent survey of Tasmanian rainforests shows that this species is predominantly ground-dwelling; very few specimens were collected on erect, mossy tree-trunks.

Distribution. Throughout Tasmania; Brindabella Ranges, near Canberra, border of NSW and ACT.

Lomanella atrolutea Roewer

Figs 6,9

Lomanella atrolutea Roewer, 1915: 86-87.—Roewer, 1923: 596.—V.V. Hickman, 1958: 13-15.

Type material. Tasmania: LECTOTYPE male (here designated): FIS, Roewer collection no. 1022, no other data.

PARALECTOTYPE female (here designated): FIS, Roewer collection no. 1022, no other data.

Other material examined. Tasmania: KS6917, Daisy Dell, 41°03'S 146°04'E, female, V.V. Hickman, Dec. 1927 (V.V. Hickman's "allotype"); KS6918, Interview River, 41°35'S 144°55'E, D. Kurth, 2 Jan. 1954, male; KS24433, Salmon River Forestry Area, Lerunna Loop site, J.L. Hickman, 27 Nov. 1974, 2 males, 2 females, 1 immature; KS24484, beside Wents Creek below Lake Chisholm, R.B.M. Richardson, 24 Jan. 1974, male, immature; KS24454, side of Duck River at Roger River West, J.L. Hickman, 9 Dec. 1973, 2 males, 2 females; KS23273, Que River Scenic Reserve, 1 km north of Que River Bridge on Murchison Highway, A. & T. Goede, 31 Jan. 1971, 4 males, 8 females, 9 immatures.

Diagnosis. SL more than 3 mm, eyemound without spine and largely devoid of surface granules, dorsum with broad elongate yellow stripe posterior to eyes, fv4 lacking.

Redescription. MALE. Similar to *L. raniceps* except: body larger, SL 3.45-3.80 (3.63, 5); CW 2.13-2.45 (2.30); dorsum with broad elongate yellow stripe posterior to eyes; eyemound set behind anterior margin at distance subequal to IOD, eye circled by small granules, eyemound otherwise smooth (Fig.6G); scutal groove deep, TA1-5 delineated by grooves; pedipalp particularly tibia more elongate and gracile, PFL 1.61-1.97 (1.79), femur almost entirely yellow on proventral surface, tibia with distal

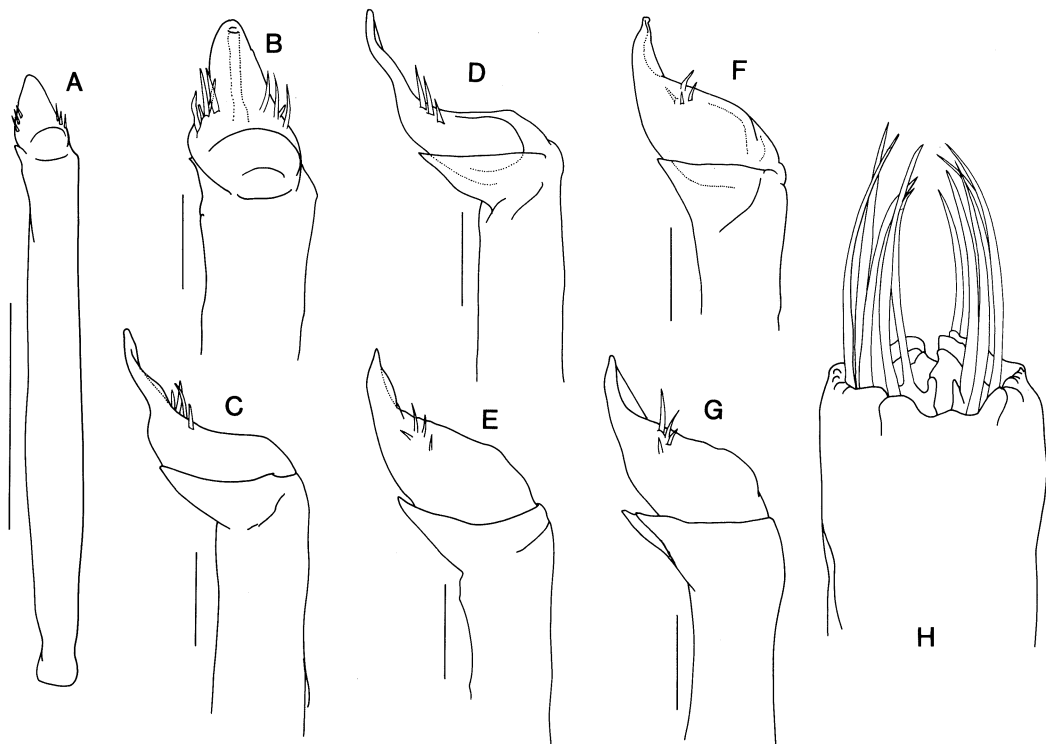


Fig.5. *Lomanella raniceps* Pocock. A-G = male genitalia; H = ovipositor. A-C = holotype male: ventral whole penis, ventral distal & lateral distal respectively; D = ex Flowery Gully, northern Tasmania: lateral distal; E = ex Arve Valley, south-east Tasmania: lateral distal; F = ex near Kutikina Cave, Franklin River valley, south-west Tasmania; G = ex Brindabella Ranges, NSW; H = ex Trevallyn, northern Tasmania. Scale bars: A = 0.5 mm; B-H = 0.1 mm.

yellow band, fv4 and fpl1 lacking, tarv3 and tapv3 short but relatively stout; FIV 2.58-2.93 (2.70); sensillar region broad in ventral view and tapering to a narrow point which may be the junction with the stylus.

FEMALE. Differs from male as in *L. raniceps*. Key measurements: SL 3.69, CW 2.27, PFL 1.60, FIV 2.63.

Variation. Yellow stripe behind eyemound often with

mesial dark brown patches.

Comments. Roewer's (1915) type series comprised a male and female, not two males. Hickman (1958) was not correct in establishing an allotype female. The species is most closely related to *L. raniceps*.

Distribution. Western Tasmania.

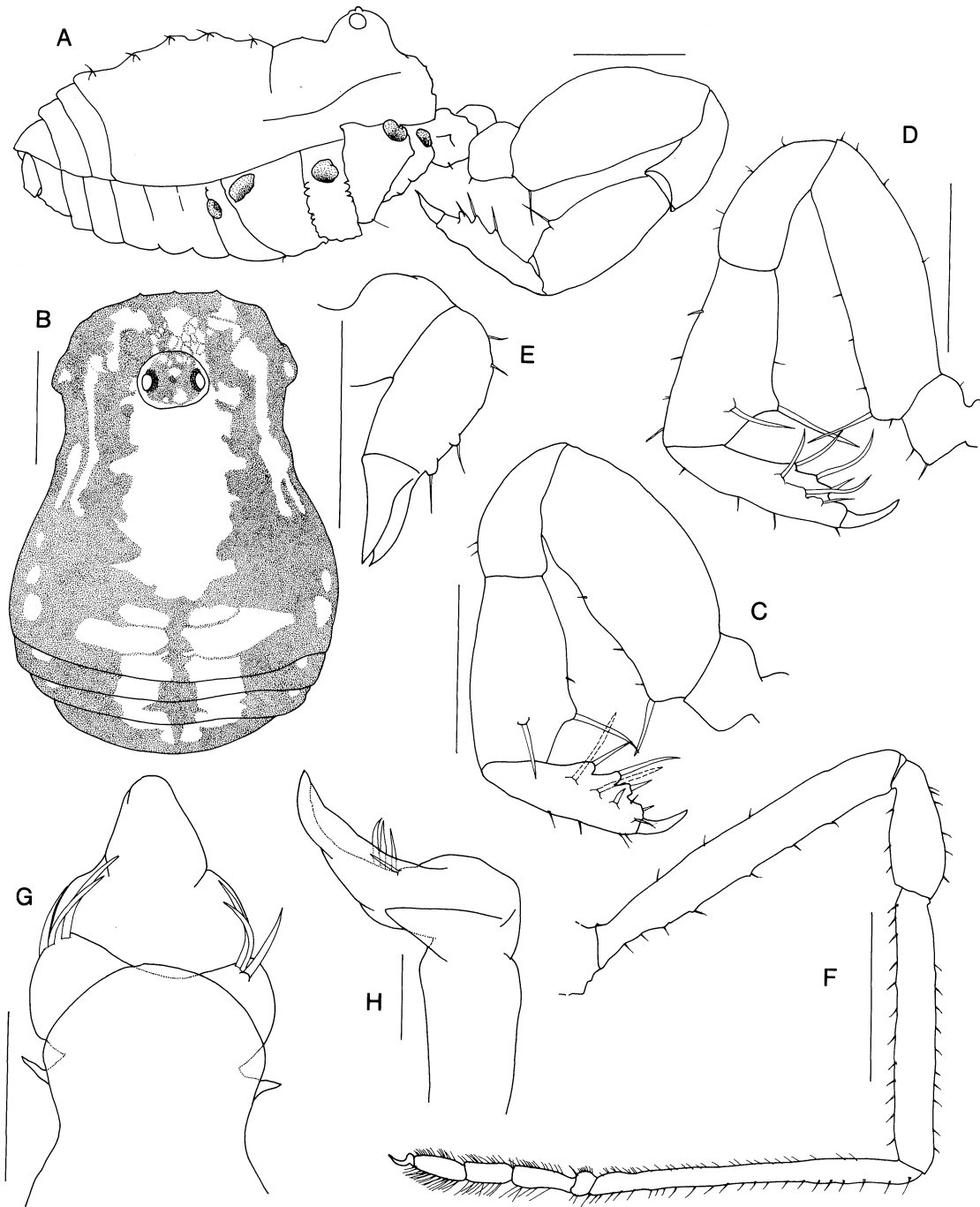


Fig.6. *Lomanella* spp. A-J = female; K = male. A, B = *Lomanella raniceps* Pocock: dorsum & venter, Trevallyn population; C = *L. exigua* V.V. Hickman: dorsum; D = *L. insolentia* n.sp.: body, lateral; E = *L. peltonychium* n.sp.: body, lateral. F-J = eyemound lateral, K = eyemound, dorsal. F = *L. raniceps*; G = *L. atrolutea* Roewer; H = *L. troglophilia* n.sp.; I = *L. exigua*; J = *L. thereseae* n.sp., ex Mystery Creek Cave, Ida Bay; K = *L. troglodytes* n.sp. Scale bars: A, B = 1 mm; C-E, G = 500 μ m; F, H = 200 μ m; I-K = 100 μ m.

Lomanella ambulatorio n.sp.

Figs 7,8,10,11

Type material. New South Wales: HOLOTYPE male, KS23229, Geehi, wet sclerophyll forest near bottom of Hannels Spur walking trail, Kosciusko National Park, G.S. Hunt, 29

Dec. 1969. PARATYPES: KS23230, same data, 1 female; KS23231, same data, 2 males, 1 female, 2 immatures; KS23232, Moiras Flat, Hannels Spur, Kosciusko National Park, G.S. Hunt, 29 Dec. 1969, 1 female, 1 immature; KS23233, Tom Groggin, Kosciusko National Park, wet sclerophyll forest, G.S. Hunt, 2 Jan. 1970, 2 males, 1 female; KS23223, Little Peppercorn Hill, Brindabella to Rules Point road, Kosciusko National Park, G.S. Hunt, 28 Dec. 1969, 1 male; KS23225,

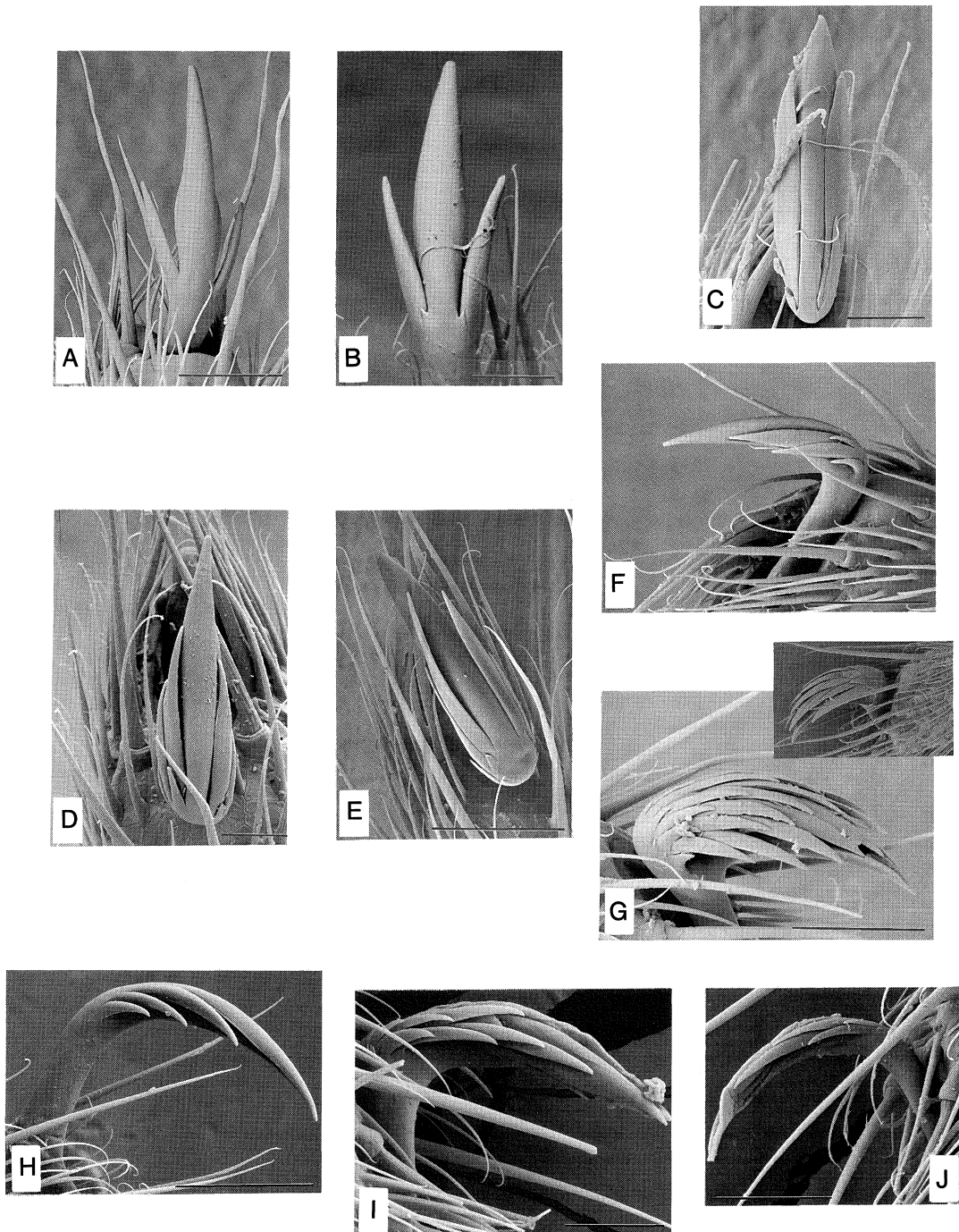


Fig.7. *Lomanella* spp. Tarsal claws of leg IV, A-E = dorsal; F-J retrolateral. A = *L. kallista* Forster; B = *L. troglophilia* n.sp.; C = *L. blacki* n.sp.; D = *L. thereseae* n.sp.; E = *L. troglodytes* n.sp.; F = *L. thereseae* n.sp.; G = *L. brownii* n.sp.; inset = *L. peltonychium* n.sp.; H = late nymph *L. ambulatorio* n.sp.; I, J = late and early nymphs of *L. peltonychium* n.sp. (the end of the claw in early nymphs is not a simple structure and has the appearance of being plaited). Scale bars: A,E-H = 50 μ m; B-D, I,J = 20 μ m.

same data, 1 female. Australian Capital Territory: KS23224, Brindabella Range, near Piccadilly Circus, G.S. Hunt, 27 Dec. 1969, 2 males, 2 females; ANIC, 1 km north of Piccadilly Circus, 1200m, C.G. Brooks, 19 Jan. 1970, Berlesate no. ANIC 229, wet sclerophyll, 1 male. Victoria: KS23234, Murrindal-Gelantipy area, wet sclerophyll, G.S. Hunt, 29 Mar. 1970, 2 males; MOV K-1032, same data, male; KS23239, Alpine National Park, 40 km south of Porepunkah, D. Black, 8 Apr. 1990, 1 female; KS23227, Mount Donna Buang, D. Black, 27 May 1990, 1 male.

Other material examined. Victoria: KS23228, Mount Donna Buang; KS23235, 1 km east of Toolangi, Toolangi State Forest; KS23237, 7 km south on Archeron Way, about 15 km east-north-east of Healesville; KS23238, 2 km south on Archeron Way, about 18 km north-east of Healesville; KS23243, 1 km north-east of Toolangi, Toolangi State Forest; KS23246, 4 km north Toolangi, Toolangi State Forest.

Diagnosis. SL about 2.5 mm, eyemound not greatly enlarged in male and occupying about 0.5 length of carapace, in ventral view lateral margin of sensillar region smoothly converging to short spatulate stylus, in lateral view without vestigial lamina of ventral plate.

Description. MALE. Similar to *L. raniceps* except: body slightly larger, SL 2.41-2.70 (2.51, 5); CW 1.49-1.78 (1.60); dorsal pigmentation pattern as figured (Fig.10B); eyemound high and very large, about 0.6 IOD behind anterior margin, armed with a small apical granule; scutal groove moderately deep, extending well towards lateral margin of carapace; TA1-5 strongly defined mesially by grooves; groove between TA4 and TA5 extending almost to lateral margin; PFL 0.98-1.18 (1.07); pedipalp patella yellow, distal half of femur yellow, clearly demarked from dark brown mottled with yellow proximal half; FIV 1.52-1.73 (1.62); leg femora strongly tuberculate ventrally, femur IV much stronger than femur I; stylus in ventral view seen as a spatulate termination to the penis, sensillar region broad but in lateral view not differentiated as a lamina separated from the stylus; inferior setae inserted in concavity and partly concealed in lateral view.

FEMALE. Similar to male except: eyemound much smaller and more removed from anterior margin, different in shape with small tubercle arising posterior to eyes (Fig.10E); pedipalp and femur IV much less robust (Fig.10G), genital operculum broader at base. Key measurements SL 2.70, CW 1.60, PFL 0.98, FIV 1.52.

Variation. The dorsal pigmentation pattern varies throughout the species range. Specimens from the central part of the range (Hannels Spur to Murrindal) have paired yellow-orange patches mesially (Fig.10B), while in the northern part of the range (Little Peppercorn Hill to Brindabella Range), the patches coalesce into a mesial yellow-orange stripe (Fig.10A). Specimens to the south, in the Dandenong Range area east of Melbourne, differ in the following: paired patches occur in TA1 and TA2, but a row of 3-4 patches occurs in TA3 and TA4 (Fig.10C); the pedipalp femur has a yellow band at about 0.5 as in *L. raniceps*, the male eyemound is not as prominent and armed with only a small granule and the spatulate termination to the penis is relatively larger (Fig.11E).

Comments. The differences in colour, eyemound shape and detailed morphology of penis shown by the Dandenong Range specimens may warrant separate species status. They are tentatively placed in *L. ambulatorio* on the basis of similar penis structure. The *L. raniceps* penis form can be easily derived from *L. ambulatorio* by complete incorporation of the spatulate stylus 'vestige' into a stylus-sensillar region complex.

Etymology. The specific epithet is a Latin noun in apposition meaning "walking place". The type locality is near the bottom of the famous Hannells Spur walking trail which descends 1800 m from the summit of Mount Kosciusko to the floor of the Geehi Valley. Most of the known distribution of the species is popular hiking country.

Distribution. New South Wales and Victoria: Brindabella Ranges in the north to Dandenong Ranges in the south.

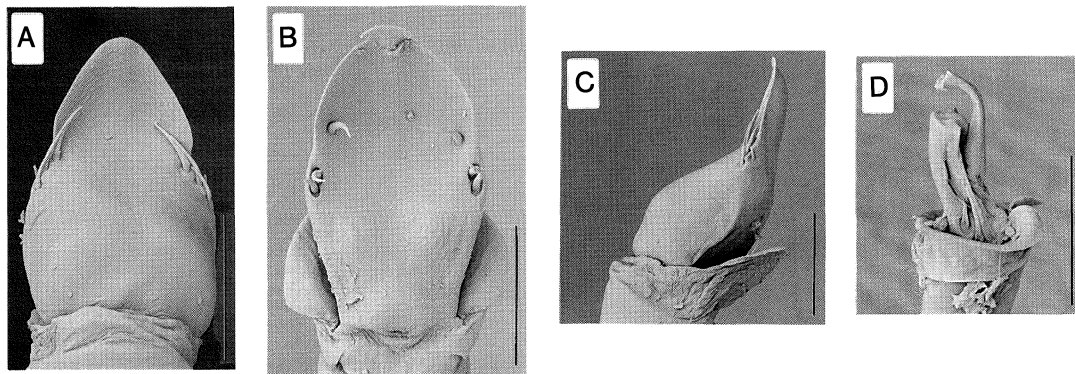


Fig.8. *Lomanella* spp. Terminal part of penis. A,B = ventral; C,D = lateral. A,C = *L. raniceps* Pocock; B = *L. ambulatorio* n.sp.; D = *L. quasiparva* n.sp. Scale bars: A-C = 100 μ m; D = 50 μ m.

Lomanella balooki n.sp.

Fig.12

Type material. Victoria: HOLOTYPE male: KS23261, 4 km west of Balook, near west entrance to Tarra-Bulga National Park, sieved litter, eucalypt forest, D. Black, 26 Jan. 1990. PARATYPES: KS23262, same data, 1 male, 1 female; UQIC, Mount Baw Baw, eastern Vic., 13 Jan. 1966, T. Weir, 1 male.

Diagnosis. Eyemound with small apical tubercle, penis in lateral view with vestigial lamina of ventral plate, sensillar region in ventral view not parallel sided and not broad distally.

Description. MALE. Similar to *L. raniceps* except: SL 2.31-2.62 (2), CW 1.51-1.79; pigmentation pattern of dorsum as figured; eyemound high and very large, rising very steeply about 0.2 IOD behind anterior margin,

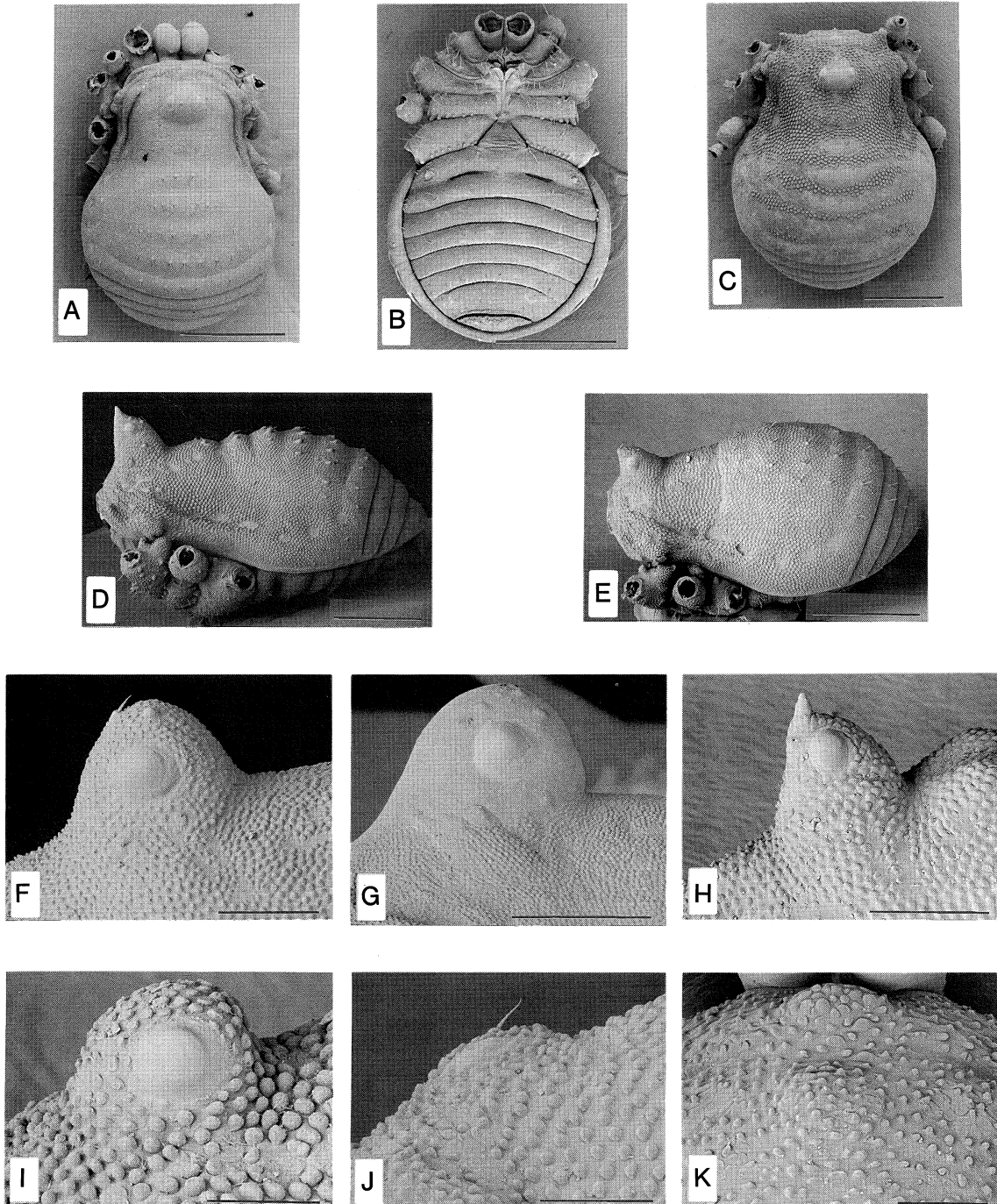


Fig.9. *Lomanella atrolutea* Roewer. B,C,G,H = lectotype male; A,E,F = male KS24454 ex Duck River at Roger River; D = female, same data. A = body and pedipalp, lateral; B = dorsum with pigmentation pattern; C,D = pedipalp, prolateral; E = chelicera, lateral; F = right leg I, retrolateral; G,H = terminal part of penis, ventral and lateral. Scale bars: A-F = 1 mm; G,H = 0.1 mm.

armed with a small apical tubercle; scutal groove moderately deep; TA1-5 strongly defined mesially by grooves, each TA with row of large setose tubercles; PFL 1.14-1.34; pedipalp patella and tibia without large yellow area in distal half; fv4 lacking; FIV 1.64-1.74; leg femora strongly tuberculate ventrally, femur IV much stronger than femur I; penis in lateral view with a small prominence distal to setae which appears to be a vestigial lamina of ventral plate; 2 pairs of

inferior setae inserted on proximal convex part of sensillar region, more distal pair inserted in concave part. In dorsal view, stylus parallel sided and rounded apically; in ventral view sensillar region very broad basally.

FEMALE. Similar to male except: eyemound much smaller and more removed from anterior margin, tubercles on TA1-5 more subdued, pedipalp and femur IV much less robust, genital operculum broader at base. Key

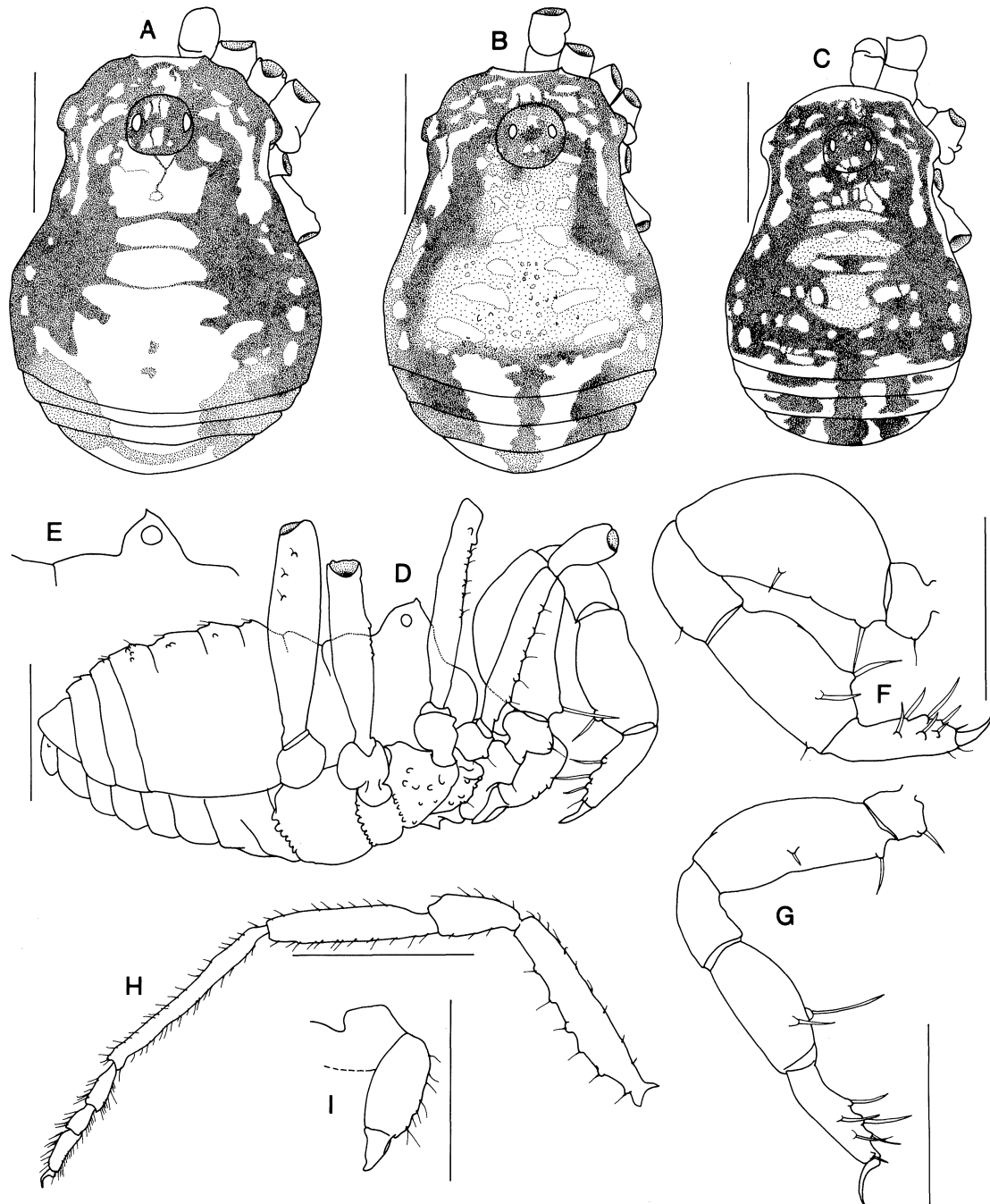


Fig.10. *Lomanella ambulatorio* n.sp. B,D,F,H,I = male KS23231 *ex* type locality; E,G = female KS23230; A = male KS23225 *ex* Little Peppercorn Hill; C = male KS23227 *ex* Mount Donna Buang. A-C = dorsum with pigmentation pattern; D = body and pedipalp, lateral; E = eyemound, lateral; F,G = pedipalp, prolateral; H = right leg I, retrolateral; I = chelicera, lateral. Scale bars: A-H = 1 mm; I = 0.1 mm.

measurements: SL 2.61, CW 1.53, PFL 1.08, FIV 1.59.

Variation. The other male from the type locality has identical genitalia but differs from the holotype in: body smaller, eyemound smaller and set further behind anterior margin, pedipalps less robust.

Comments. The penis of *L. balooki* is somewhat intermediate in form between *L. revelata* which has a well-defined ventral plate and *L. raniceps* which has no expression of a ventral plate. Genital morphology indicates the species is most closely related to *L. inermis* but it lacks processes in the anteriolateral corners of the carapace.

Etymology. The specific epithet is a latinised genitive of the type locality, Balook.

Distribution. Eastern Victoria.

Lomanella inermis (Roewer), n.comb.

Fig.13

Callihamus inermis Roewer, 1931: 162.–V.V. Hickman, 1958: 49-50.

Type material. Tasmania, Hobart: HOLOTYPE male: Roewer coll. no. 1300/42, no other data.

Other material examined. Tasmania: KS6897, Surprise Valley, Lyell Highway, V.V. Hickman, 23 May 1954, 1 female

(V.V. Hickman's "allotype").

Diagnosis. SL more than 2 mm, eyemound with short apical spine/tubercle, anteriolateral corners of carapace each with process directed forward, penis in lateral view with vestigial lamina of ventral plate.

Redescription. MALE. Similar to *L. raniceps* except: body larger, SL 2.73, CW 1.80; pigmentation pattern of dorsum as in Figure 13B; eyemound rising about 0.5 IOD behind anterior margin, armed with a small apical spine/tubercle; anteriolateral corners with process directed forward; scutal groove deep and extending almost to lateral margins; TA1-5 strongly defined mesially by grooves, each TA with row of setose tubercles; PFL 1.08; fv4 lacking; FIV 1.67; leg femora strongly tuberculate ventrally, femur IV much stronger than femur I; penis in lateral view with a small prominence distal to setae which appears to be a vestigial lamina of ventral plate, stylus with clear demarcation from sensillar region; 2 pairs of inferior setae inserted on proximal convex part of sensillar region, more distal pair inserted in concave part.

FEMALE. Similar to male except: eyemound much closer to anterior margin, tubercles on TA1-5 reduced to granules, pedipalp less robust, genital operculum broader at base. Key measurements: SL 2.94, CW 1.54, PFL 0.92, FIV 1.58.

Comments. This species possesses all *Lomanella* synapomorphies and clearly does not belong in *Callihamus* Roewer, a nominal genus with close affinities to *Calliuncus* Roewer (Hunt, in preparation). V.V. Hickman (1958) incorrectly refers to the female he

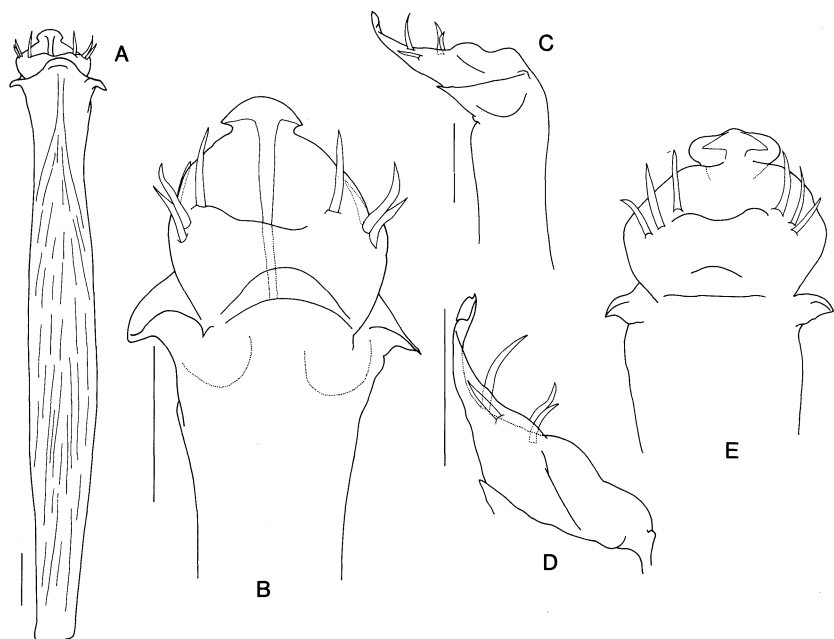


Fig.11. *Lomanella ambulatorio* n.sp. Penis. A-D = KS23231 ex type locality; E = KS23227 ex Mount Donna Buang. A = entire penis showing muscle in truncus, ventral; B = terminal part, distoventral aspect; C,D = lateral; E = ventral. Scale bars: 0.1 mm.

described as an "allotype". His illustration shows, correctly, a broken eyemound spine. He infers, perhaps correctly, the existence of a much longer spine than is present in the holotype. The difference between the holotype and Hickman's female in the placement of the eyemound (and possible difference in eyemound spine size), may represent specific rather than sexual dimorphic variation.

The penis of *L. inermis* is somewhat intermediate in form between *L. revelata* which has a well defined ventral plate and *L. raniceps* which has no expression of a ventral plate. Genital morphology indicates the

species is most closely related to *L. balooki*.

Distribution. Southern Tasmania.

Lomanella kallista Forster

Figs 7,14

Lomanella kallista Forster, 1949: 80-82.

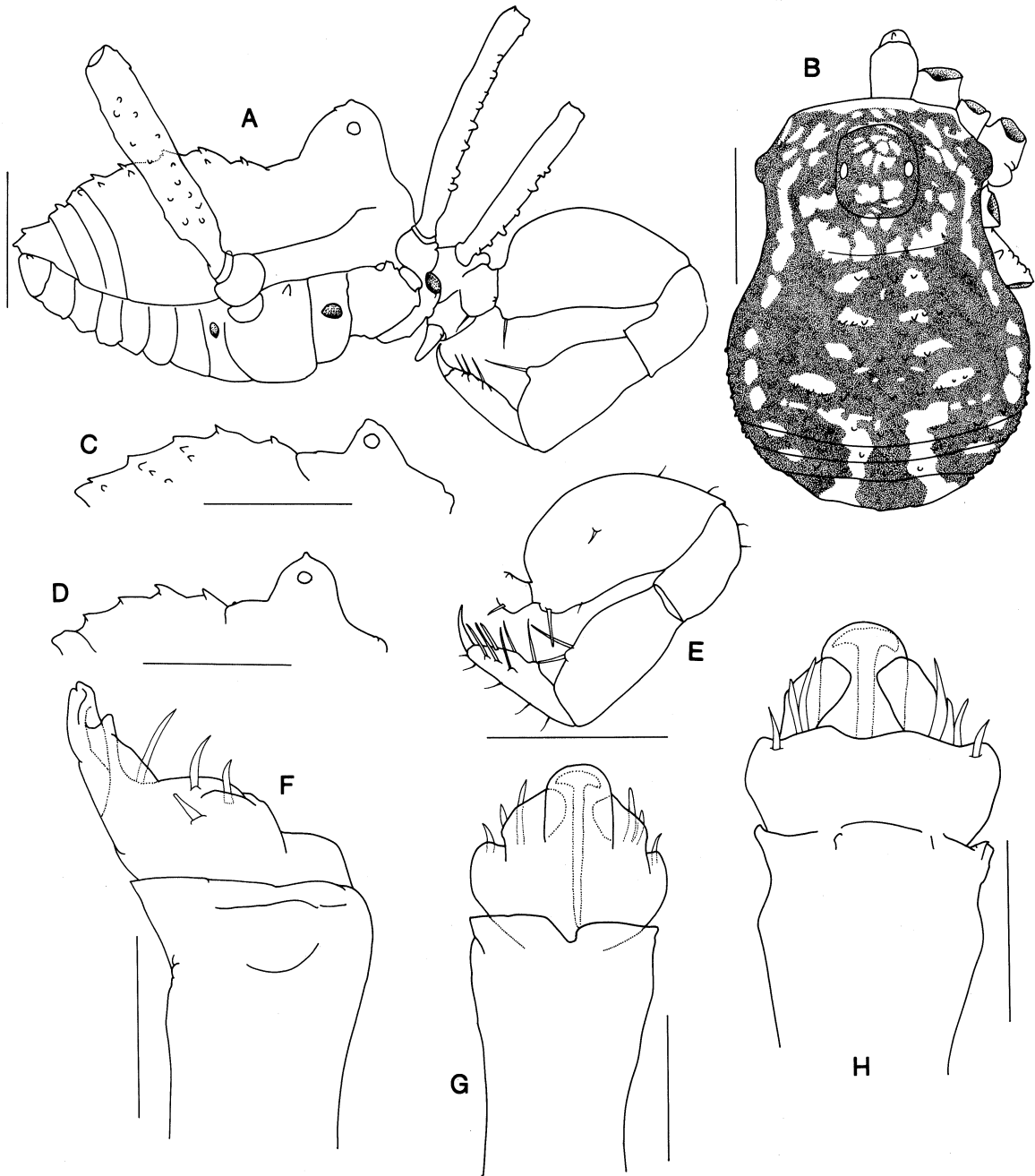


Fig.12. *Lomanella balooki* n.sp. A,B,E-H = holotype male; C = female KS23262; D = male KS23262. A = body and pedipalp, lateral; B = dorsum with pigmentation pattern; C,D = scute profile; E = pedipalp, retrolateral; F-H = terminal part of penis, lateral, dorsal and ventral. Scale bars: A-E = 1 mm; F-H = 0.1 mm.

Type material. Victoria: HOLOTYPE male: MOV K-1031, Kallista, 37.53'S 145°22'E, under log, 18 Sept. 1948, A.N. Burns.

Other material examined. Victoria: KS23226, 1 km north of Kallista, sieved tree fern litter, D. Black, 11 Feb. 1990, male, 2 females; KS 23236, 7 km south on Archeron Way, 15 km east-north-east of Healesville, 37°34'S, sieved tree fern litter, D. Black, 4 Mar. 1990.

Diagnosis. Eyemound with small apical spine/tubercle, sensillar region in ventral view parallel sided and broad distally, stylus narrow and directed distodorsally.

Description. MALE. Similar to *L. raniceps* except: body larger, SL 2.62-2.89 (2.73, 3), CW 1.66-1.78 (1.70); dorsal pigmentation pattern as figured by Forster, lateral as in Figure 14A; eyemound high and very large, rising very steeply about 0.75 IOD behind anterior margin, armed with a small apical spine/tubercle; scutal groove moderately deep and extending more towards lateral margins; TA1-5 strongly defined mesially by grooves, each TA with row of large setose tubercles; PFL 1.63-1.87 (1.78), pedipalp tibia without large yellow area in distal half; fv4 lacking; FIV 1.63-1.87 (1.78); leg femora strongly tuberculate ventrally, femur IV much stronger than femur I; sensillar region in ventral view very broad, the alate distal part apparently homologous with lamina

of ventral plate; stylus clearly differentiated from sensillar region, narrow and directed distodorsally; superior seta inserted proximally on each dorsolateral flank of sensillar region (Fig.14D).

FEMALE. Similar to male except: eyemound much smaller but apical spine larger (Fig.14B), tubercles on TA1-5 more subdued, pedipalp and leg IV femur much less robust, genital operculum broader at base. Key measurements: SL 2.72, CW 1.57, PFL 1.11, FIV 1.66.

Comments. The penis form of *L. kallista* is somewhat intermediate between *L. revelata* which has a well-defined ventral plate and *L. raniceps* which has no expression of a ventral plate. The species is very closely related to *L. ambulatorio*, *L. promontorium* and *L. balooki*, differing from each in penis morphology.

Distribution. Victoria: Kallista area near Melbourne.

Lomanella promontorium n.sp.

Fig.15

Type material. Victoria: HOLOTYPE male: QM, Wilsons Promontory, Mount Oberon berlesate, 28 Jan. 1967, G.

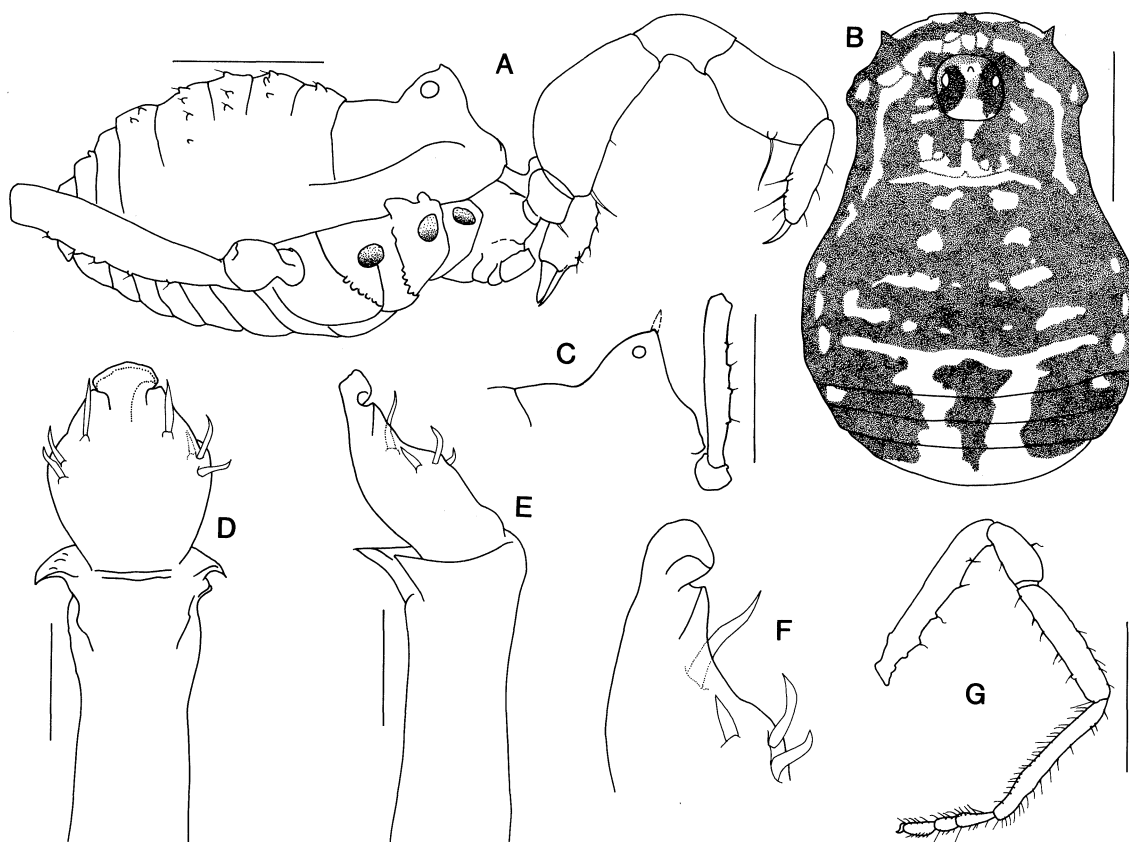


Fig.13. *Lomanella inermis* (Roewer) n. comb. A,B,D-G = holotype male; C = female KS6897. A = body and pedipalp, lateral; B = dorsum with pigmentation pattern; C = anterior part of body, profile; D-F = terminal part of penis, ventral, lateral and lateral detail. Scale bars: A-D = 1 mm; E-G = 0.1 mm.

Ettershank.

Diagnosis. Eyemound with small apical tubercle, setae on penis short and placed distolaterally on sensilla carrier, sensillar region with distal lamina lying ventral to inferior setae.

Description. MALE. Similar to *L. raniceps* except: body larger, SL 3.02, CW 1.92; pigmentation faded in preservation but appears similar to *L. balooki*; eyemound high and very large, rising very steeply about 0.5 IOD behind anterior margin, armed with a small apical tubercle; scutal groove moderately deep; TA1-5 strongly defined mesially by grooves, each TA with row of large setose tubercles; PFL 1.44, PFL: CW 0.75, pedipalp fv4 lacking; FIV 1.92; leg femora strongly tuberculate ventrally, femur IV much stronger than femur I; penis in lateral view with a sharp

lamina immediately ventral to, and arising proximal to, the 3 short inferior setae (may be homologous to the lamina part of the ventral plate but this normally lies distodorsally to setae); in lateral view inferior setae lie serially behind each other, superior seta lies more dorsally; in ventral view sensillar region expands gradually from base and distally extends as a broadly rounded lamina lying ventral to inferior setae.

FEMALE. Not known.

Comments. *Lomanella promontorium* is most closely related to *L. kallista* but penis differs in having a laminar process ventral to the inferior setae.

Etymology. The specific epithet is a Latin noun in apposition meaning "promontory", alluding to the geographic setting of the type locality.

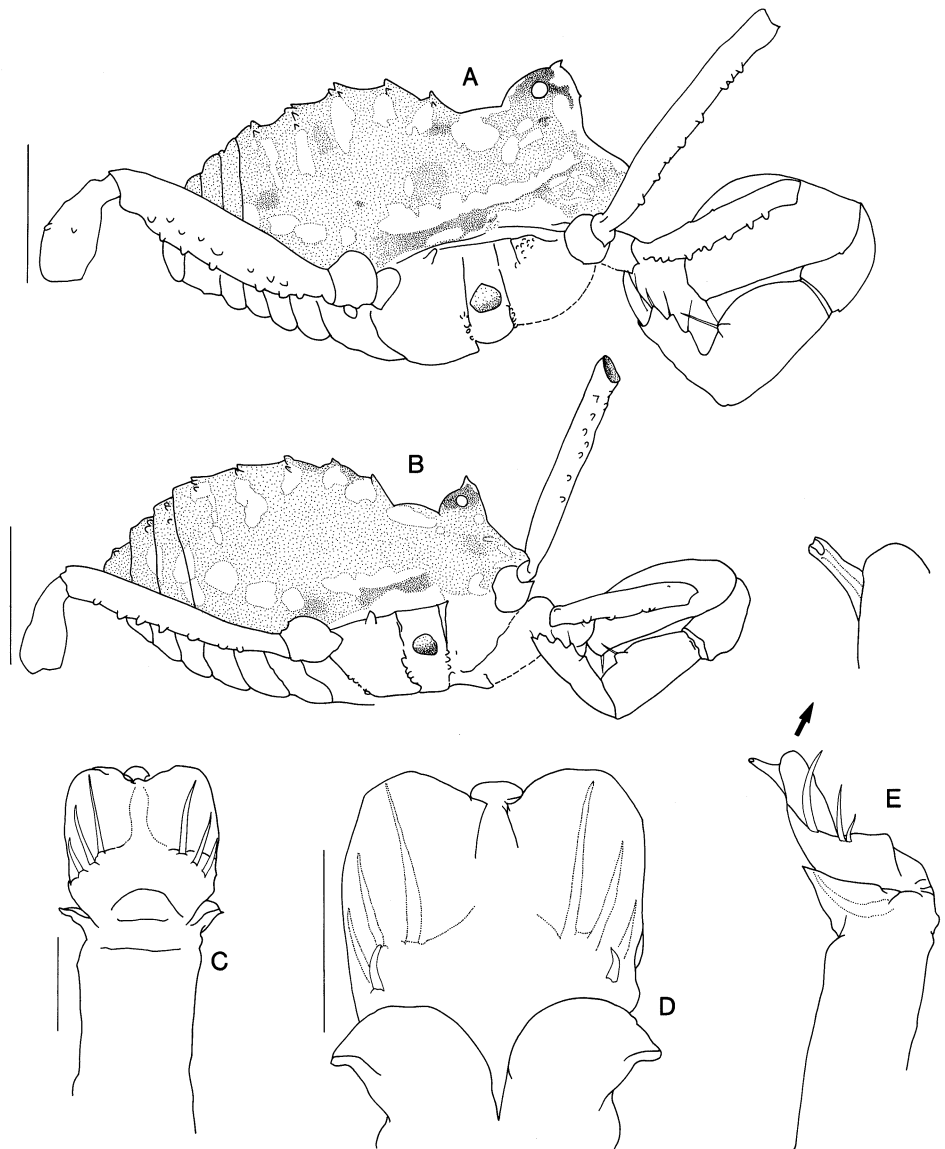


Fig.14. *Lomanella kallista* Forster. A,C-E = male KS23226; B = female KS23226. A-D = body, lateral; C,D = terminal part of penis, ventral, dorsal and lateral with detail. Scale bars: A,B = 1 mm; C-E = 0.1 mm.

Distribution. Victoria: Wilsons Promontory.

***Lomanella insolentia* species group**

South-east Australia and Tasmania; claw of tarsi III

and IV with pair of lateral branches forming an angle with central prong and with scale like branch at base of each lateral branch; penis with stylus extending beyond sensillar region by at least 0.3 sensillar carrier length; sensillar region with lateral wing-like processes; tarsus II with 5 articles.

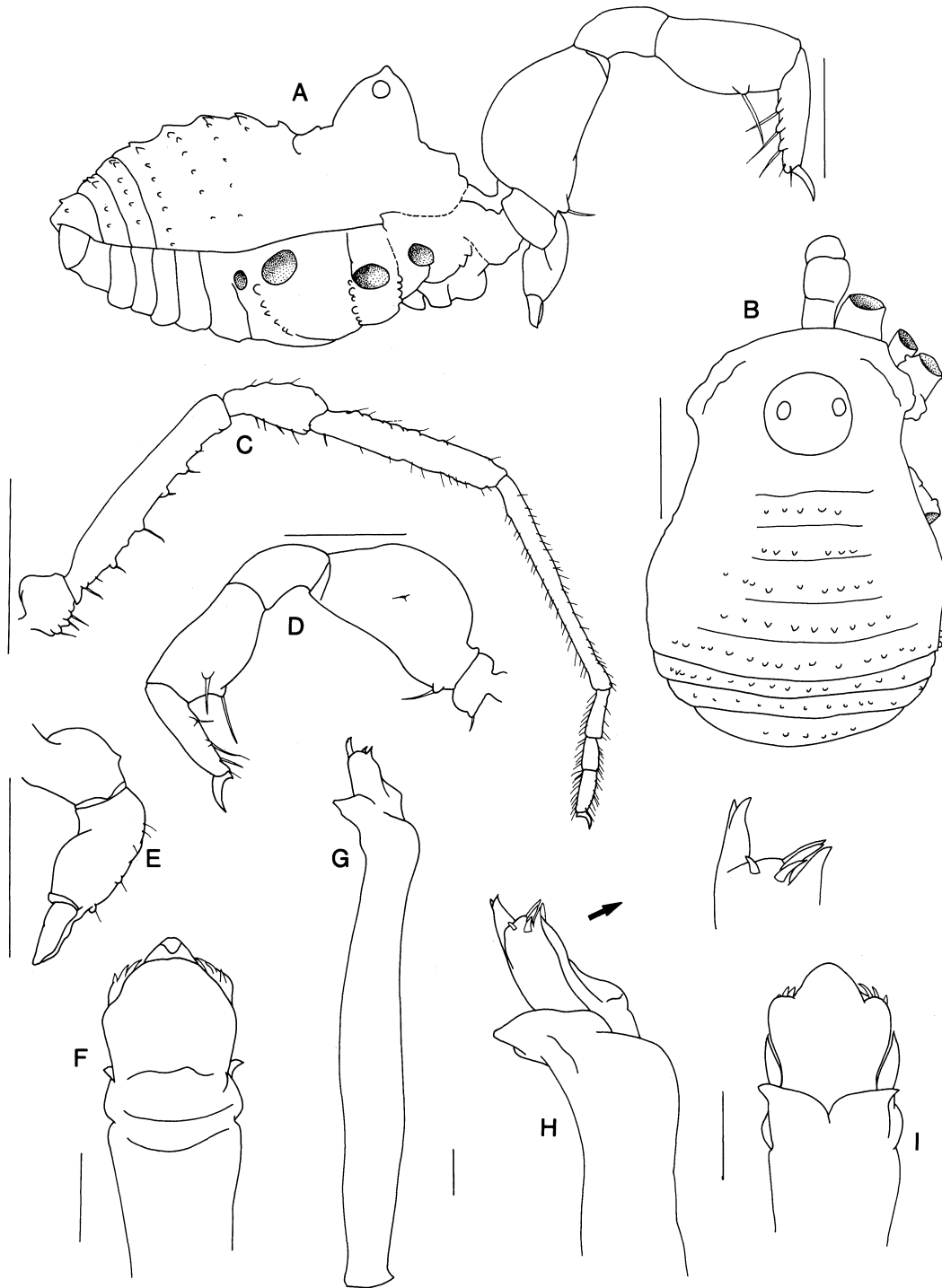


Fig.15. *Lomanella promontorium* n.sp. A-I = holotype male. A = body and pedipalp, lateral; B = dorsum; C = right leg I, retrolateral; D = pedipalp, prolateral; E = chelicera, lateral; F-I = penis, ventral, entire penis (lateral), lateral with detail and dorsal. Scale bars: A-E = 1 mm; F-I = 0.1 mm

Lomanella insolentia n.sp.

Figs 6,16

Type material. New South Wales: HOLOTYPE male, KS23218, Tom Groggin, Kosciusko National Park, 36°33'S 148°09'E under logs, wet sclerophyll, G.S. Hunt, 2 Jan. 1970. PARATYPES: KS23219, same data, 1 female; KS23220, same

data, 1 male, 1 female; KS23221, Lakeside Inn area, Kosciusko National Park, under log, snow gum woodland, G.S. Hunt, 1 Jan. 1970, 1 female. Victoria: KS23222, Bogong High Plains, under log, snow gum woodland, G.S. Hunt, 3 Jan. 1970; MOV K-1033, Errinunda Plateau, Errinunda Road, soil/litter sample, Tullgren extraction, *Eucalyptus fastigata* plantation, A.L. Yen, 15 Mar. 1982.

Other material examined. New South Wales: KS23223,

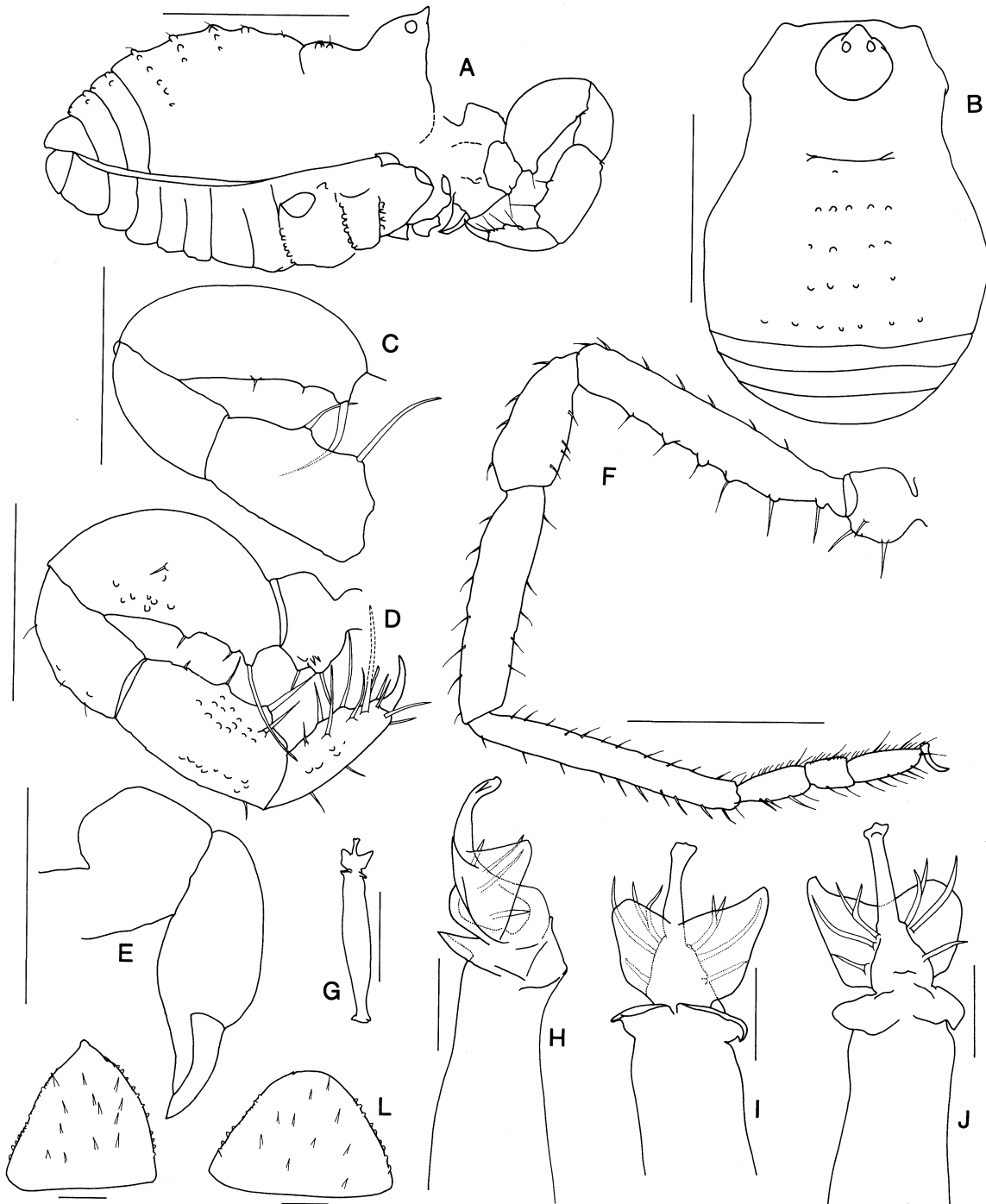


Fig.16. *Lomanella insolentia* n.sp. A,B,D-K = male KS23220; C,L = female. A = body and pedipalp, lateral; B = dorsum; C,D = pedipalp, retro- and prolateral; E = chelicera, lateral; F = right leg I, retrolateral; G-J = penis, entire (ventral), lateral, dorsal and ventral; K,L = genital operculum. Scale bars: A,B = 1 mm; C-G = 0.5 mm; H-L = 0.1 mm.

Little Peppercorn Hill, Bridabella to Rules Point Road, Kosciusko National Park, G.S. Hunt, 28 Dec. 1969, 1 male.

Diagnosis. SL about 2 mm, eyemound rising vertically immediately behind anterior margin, with small apical spine; sensillar region of penis each side with broad wing-like lamina, setae inserted towards midline.

Description. MALE. *Body:* small, SL 1.81-2.10 (1.95, 3), CW 1.13-1.24 (1.19); dorsal pigmentation pattern faded in preservation; eyemound rising almost vertically immediately behind anterior margin, armed with a small apical spine, more rounded posterior to spine. Carapace posterior to eyes with mesial granules (Fig.6D). Scutal groove moderately deep; TA1-5 defined by mesial grooves, each TA and free tergite with row of small setose granules; otherwise dorsum evenly granulate; genital operculum triangular and pointed at apex. *Pedipalps:* PFL 0.65-0.73 (0.69); size of setal bases are as follows (compare with Fig.1): fv1, fv2, fv4, fpl1 weak, trv2, trv3, tpv2 weak, tpv1 lacking, tarsus as figured; seta of trv3 smaller than seta of fv1. *Legs:* FIV 1.12-1.23 (1.17); femora tuberculate ventrally; claw of tarsus IV with a small scale-like lateral prong at the base of each lateral prong, TF 3(2),5(3),4,4. *Penis:* sensillar region of penis clearly differentiated from stylus, in ventral view composed of a central area bearing 4 pairs of setae, and lateral wing-like laminae apparently homologous to ventral plate.

FEMALE. Similar to male except: pedipalp less robust, genital operculum broader at base and rounded apically (Fig. 16L); ovipositor with unevenly bifid setae fringing vaginal opening. Key measurements: SL 1.97, CW 1.14, PFL 0.61, FIV 1.10.

Variation. Pedipalp spine trv2 lacking in some specimens. The single male from Little Peppercorn Hill (KS23223) is at the northern limit of the known species range. The eyemound is similar and the penis of the same general form except that the lateral wing-like processes are not as extended distad and the setae are relatively shorter. The pedipalp femur lacks fv4 and the tibia lacks tpv2. Despite these differences, this specimen is tentatively assigned to *L. insolentia*.

Comments. This species is very close to *L. troglophilia* which it resembles in the general form of the eyemound, the claw of tarsus IV, and tibial spination. It evidently is also close to *L. revelata* but in the latter species the ventral plate is fully differentiated from the stylus mesially as well as laterally.

Etymology. The specific epithet is a Latin noun in apposition meaning "arrogance" and refers to the haughty nature of the high eyemound topped with a short curved spine.

Distribution. South-east New South Wales and north-east Victoria, "Australian Alps" region.

Lomanella revelata n.sp.

Fig.17

Type material. New South Wales: HOLOTYPE male, ANIC, Fern Glen, 3 km south of Bundanoon, rainforest 650 m, ANIC berlesate no. 139, Britton & Upton, 6 May 1969. PARATYPES: Clyde Mountain, rainforest, 800 m: ANIC berlesate no. 469, R.J. Kohout, 15 Jul. 1973, 1F; ANIC berlesate no. 2, leafmould, R.W. Taylor, 24 Dec. 1966, 1F.

Diagnosis. SL between about 1.3 and 1.6 mm, eyemound armed with a short tubercle, anteriolateral corner of carapace with small tubercle, penis with fully expressed ventral plate.

Description. MALE. Similar to *L. insolentia* except: body smaller, SL 1.43, CW 0.93; dorsal pigmentation pattern as figured, eyemound rising steeply about 0.5 IOD behind anterior margin, anterior margin with a small tubercle inside each corner; dorsal mound on cheliceral first segment slightly coriaceous; PFL 0.54; pedipalp with fv4 and trv2 lacking; FIV 0.88; lateral laminae of sensillar region meet midventrally resulting in a fully expressed ventral plate clearly differentiated from the stylus in lateral view (Fig.17I).

FEMALE. Similar to male. Key measurements: SL 1.44, CW 0.79, PFL 0.49, FIV 0.89.

Comments. This is the most northerly known species of *Lomanella*. The penis is of the general form with a fully developed ventral plate discussed by Martens (1986: fig.2b) (see also our Fig.3 and discussion above). The disposition of setae on the penis and general body form indicate that this species is most closely related to *L. insolentia* despite the fact that the latter does not have a fully expressed ventral plate.

Etymology. The specific epithet is a past participle of the Latin verb "to reveal" and refers to the role of the animal's penis in revealing phylogenetic trends in *Lomanella*.

Distribution. New South Wales: Bundanoon to Clyde Mountain area.

Lomanella troglophilia n.sp.

Figs 6,7,18

Type material. Tasmania: HOLOTYPE male: KS23247, Kutikina Cave (F34), Franklin River, 42°30'S 145°45'E, on dry substrate in deep threshold zone, S. Eberhard, 23 Mar, 1988. PARATYPES: KS23249, same data, 2 males; KS23248, same data, 5 females; KS23250, Kutikina Cave, dark zone and twilight zone, S. Eberhard, 21 Mar. 1989, 2 males; KS23251, Kutikina Cave, End Chamber, S. Eberhard, 21 Mar. 1989, female.

Other material examined. Tasmania: KS24854, Gordon River, transect 10R213, HEC Survey, under log, J.L.H. & P.J.S., 3 Feb. 1976, male; KS23253, Bubs Hill, Minimoria Cave (BH-202), caught in drift net in flood, dark zone, S. Eberhard, 31 Dec. 1986, male; KS23254, Bubs Hill, Cave BH-16, A. Clarke, 9 Mar. 1988, KS23255, Bubs Hill, Cave BH-

13, dark zone, A. Clarke, 9 Mar. 1988, female; KS23256, Andrew River, "Cave No.1", S. Eberhard, 23 Mar. 1988, female; KS23252, Nicholls Range, 42°40'S 145°50'E, Bill Nielsen Cave (NR-1), S. Eberhard, 19 Feb. 1987; KS 23259, Mount Cripps, 41°35'S 145°46'E, Philrod Cave (CR-3), S. Eberhard, 1990, male, 2 females.

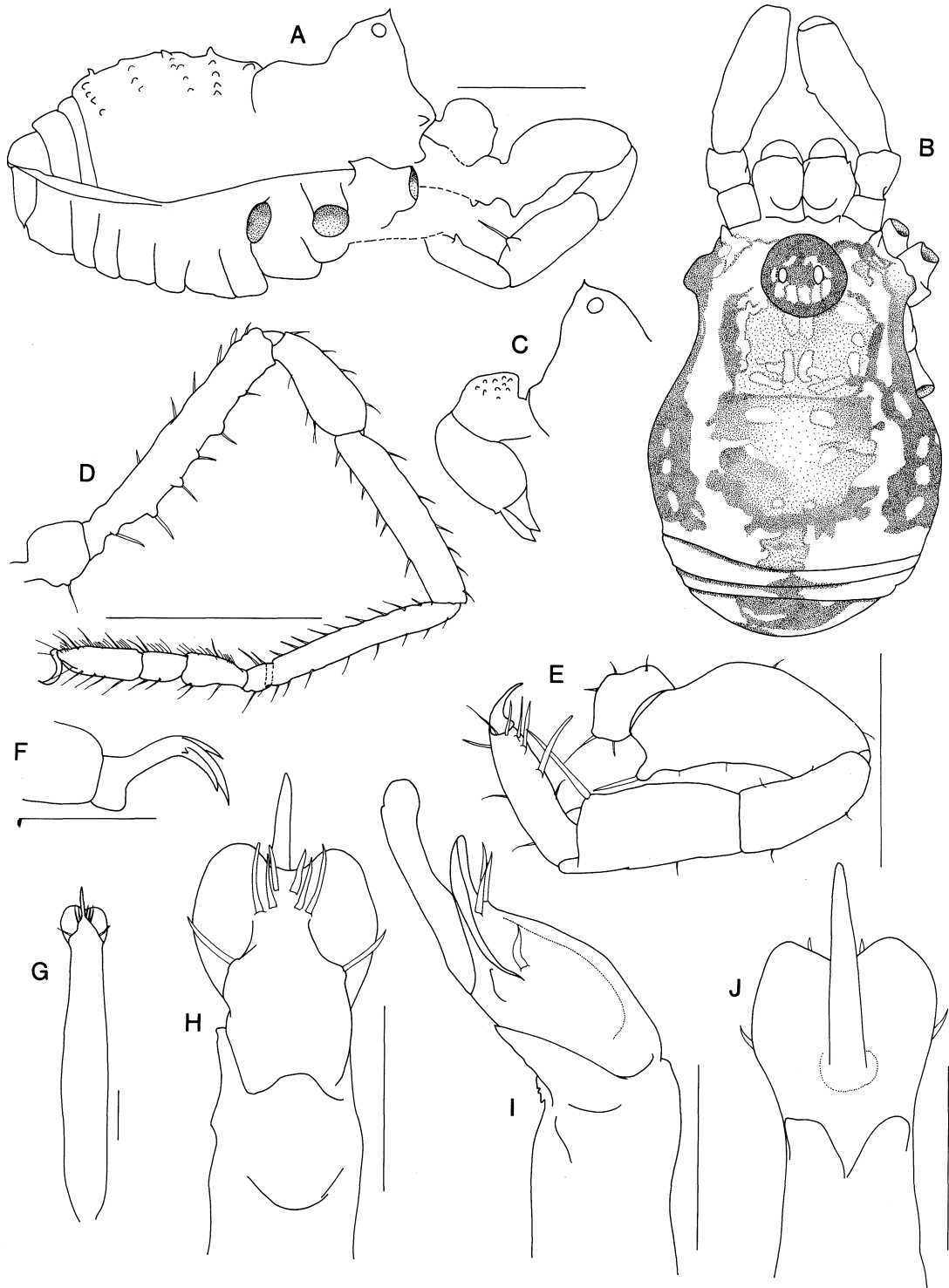


Fig.17. *Lomanella revelata* n.sp. Holotype male. A = body and pedipalp, lateral; B = dorsum with pigmentation pattern; C = chelicera and eyemound, lateral; D = right leg I, retrolateral; E = pedipalp, retrolateral; F = claw IV, retrolateral; G-J = penis, entire (ventral), ventral, lateral and dorsal. Scale bars: A-E = 0.5 mm; F-J = 0.1 mm.

Diagnosis. Frequently cavernicolous, eyemound with spine and rising at about 45° well behind anterior margin, TA1-5 delineated by deep grooves, dorsum mostly dark brown, pedipalp femur with fv4 present, tibia with 3 setose tubercles, namely trv2, trv3 and tpv2, lateral wing-like lobes of sensillar region with

predominantly dorsoventral orientation.

Description. MALE. Similar to *L. insolentia* except: body smaller, SL 1.72-1.84 (1.78, 4), CW 0.98-1.06 (1.03); pigmentation pattern of dorsum as figured; eyemound rising at about 45° about 1.0 IOD behind

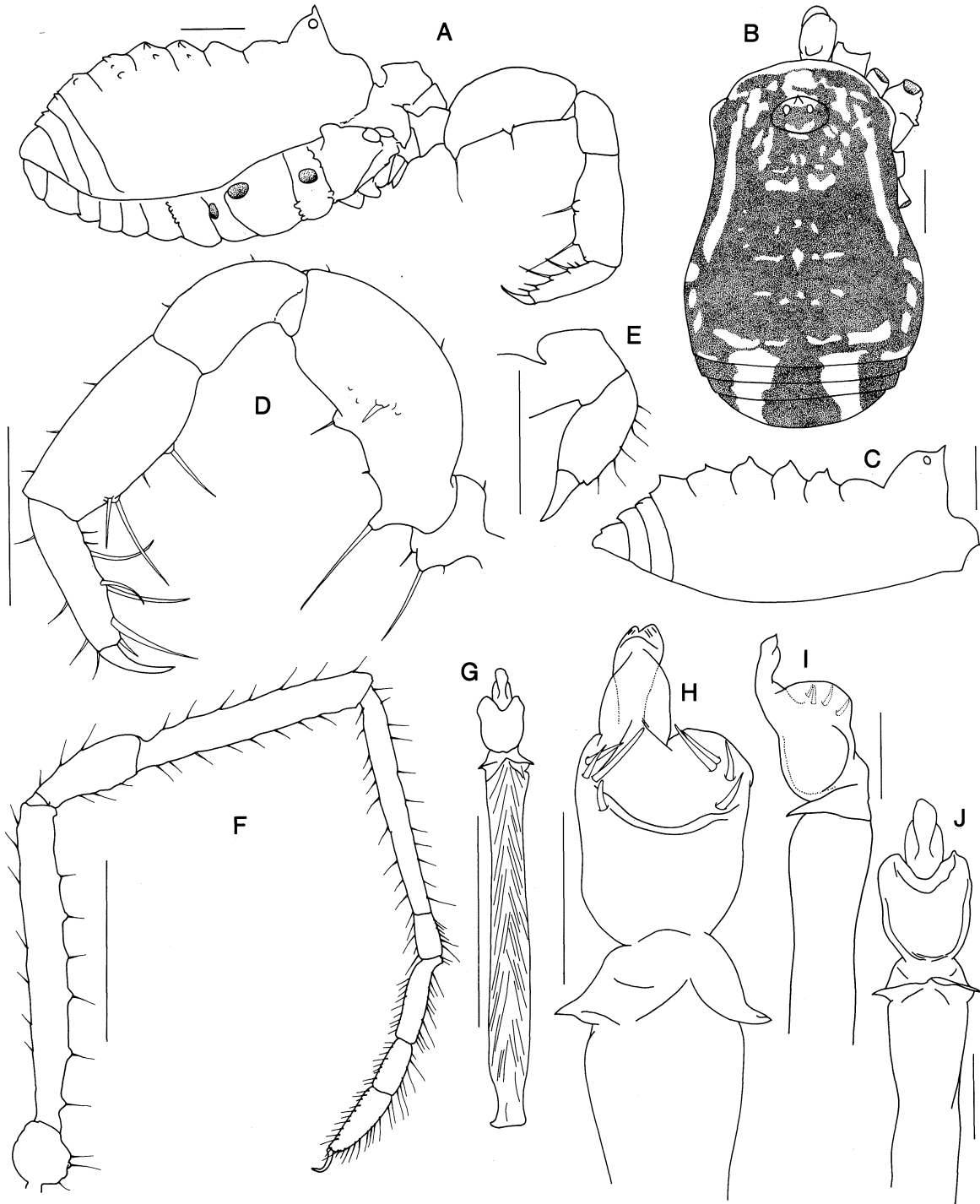


Fig.18. *Lomanella troglophilia* n.sp. A,B, D-J = male *ex* Kutikina Cave; C = male KS24854 *ex* surface, Gordon River. A = body and pedipalp, lateral; B = dorsum with pigmentation pattern; C = scute, lateral; D = pedipalp, prolateral; E = chelicera, lateral; F = right leg I, retrolateral; G-J = penis, entire (ventral) showing muscle in truncus, ventral, lateral and dorsal. Scale bars: A-G = 0.5 mm; H-J = 0.1 mm.

anterior margin; carapace with mesial groove at posterior margin of eyemound, followed by mesial hump which is slightly depressed at its midline (Fig.6H); scutal groove deep, TA1-5 delineated mesially by deep grooves, each TA with rows of strong setose granules; PFL 0.72-0.78 (0.76); legs elongate in cave specimens, FIV 1.33-1.44 (1.39); TF 3(2),5(3),4,4; sensillar region concave ventral to stylus but laterally with raised lobes with strong ventrodorsal orientation bearing 4 setae, lobes apparently homologous to ventral plate, at least its lateral sectors; dorsolateral plate in lateral view orientated

perpendicular to axis of penis.

FEMALE. Similar to male except: pedipalps slightly less robust, genital operculum wider at base. Key measurements: SL 1.87, CW 1.03, PFL 0.73, FIV 1.32.

Variation. Specimens from Bill Nielson Cave, Nicholls Range, have yellow pedipalps with no clear trace of pigmented reticulations present in other populations. Mean measurements for 4 males from Bubs Hill Caves are: SL 1.66, CW 0.99, PFL 0.75, FIV 1.42. The surface specimen from the Gordon

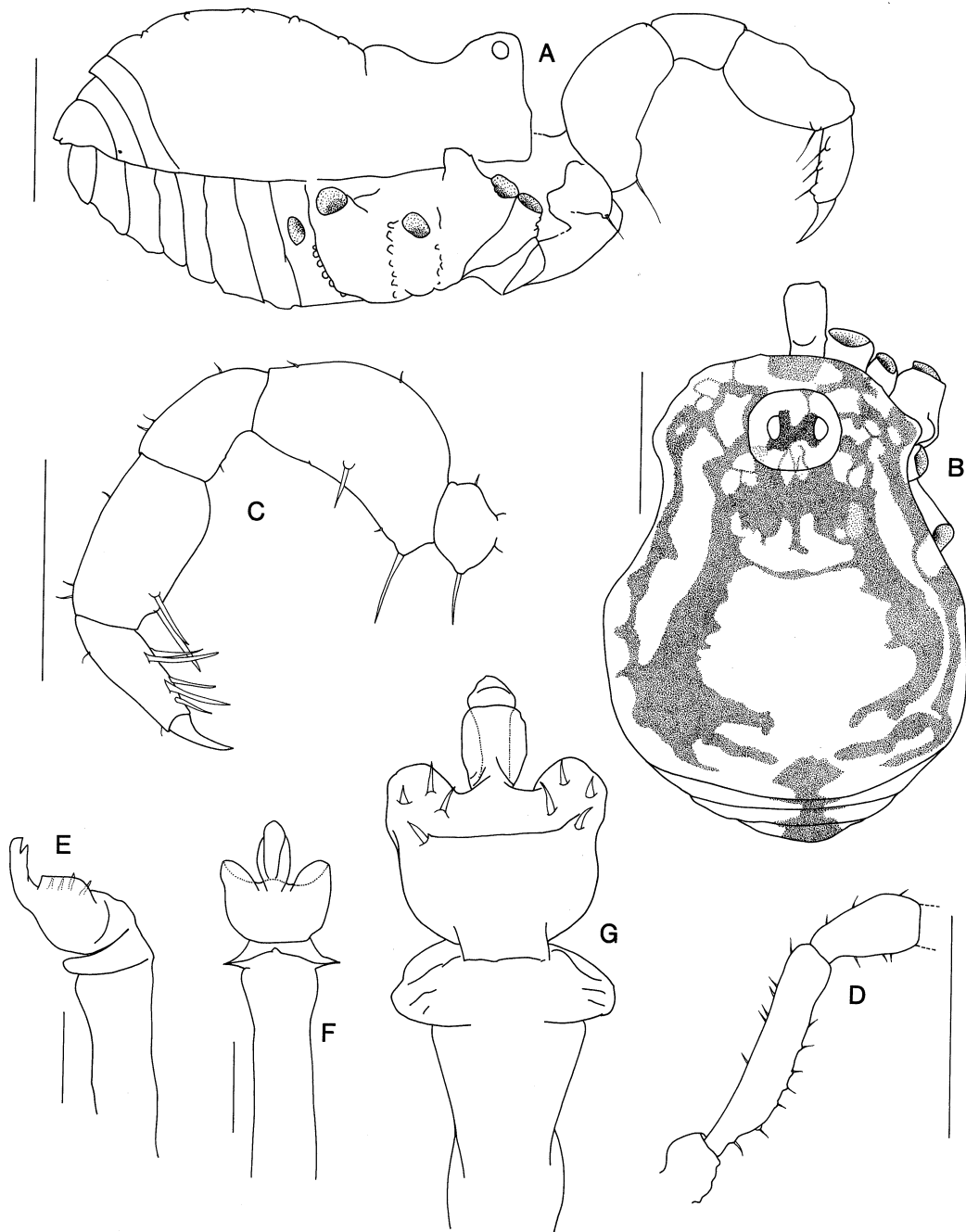


Fig.19. *Lomanella alata* n.sp. Holotype male. A = body and pedipalp, lateral; B = dorsum with pigmentation pattern; C = pedipalp, retrolateral; D = right femur and patella I, retrolateral; E-G = penis, lateral, dorsal and ventral. Scale bars: A,B = 1 mm; C,D = 0.5 mm; E,F = 0.1 mm.

River area has a larger and higher eyemound and very deep grooves between the tergal areas.

Comments. Penis in lateral view very similar to that in *L. alata*. The legs of cave specimens are somewhat elongate but the dorsum remains heavily pigmented.

Natural history. Cave specimens were frequently observed in pairs on dry walls and dry silt floors (S. Eberhard, label note). The species appears to be rare on the surface.

Etymology. The specific epithet refers to tendency for this animal to live in caves, 'troglophile' being a facultative cavernicole which may spend some or all of its life cycle in caves, but can also live on the surface.

Distribution. Known from south-west Tasmania, and Mount Cripps, central northern Tasmania.

Lomanella alata n.sp.

Fig.19

Type material. Tasmania: HOLOTYPE male: KS23146, Transect 2L.1140, south-west Tasmania, 42°43'S 145°49'E, moss, L. Hill & party, 16 Feb. 1978.

Diagnosis. Eyemound rising immediately behind anterior margin, without spine; dorsum with a large yellow mesial patch, TA1-5 not separated by deep grooves; sensillar region in ventral view with a distolateral wing-like expansion on each side which carries the setae.

Description. MALE. Similar to *L. insolentia* except: SL 1.49, CW 0.91; dorsal pigmentation pattern as figured, dorsum predominantly yellow with mesial area flanked by irregular stripes of dark brown pigmentation which tend to meet posteriorly in TA5; PFL 0.54, PFL: CW 0.59, fv4 and trv2 lacking; FIV 0.81, FIV: CW 0.89, claw of leg IV not examined; sensillar region of penis narrow basally and expanding distally into large wing-like lobes each group of 4 setae, lobes apparently homologous to ventral plate, at least its lateral sectors.

FEMALE. Unknown.

Comments. This species is very close to *L. troglophilia* in genital morphology but differs in several external characters including pigmentation pattern, lack of a spine on the eyemound and spination of pedipalp tibia.

Etymology. The specific epithet refers to the wing-like lobes seen in ventral view on the sensillar region of the penis.

Distribution. South-west Tasmania.

Lomanella exigua species group

South-eastern Australia, especially Tasmania; claw of tarsi III and IV a peltonychium; tarsus I with 2-3 articles, tarsus II with 3-5 articles; sensillar region with same axis as penis truncus (when penis not expanded); sensillar region extending as a narrow mesial process beyond level of setae and lying against the stylus.

Lomanella exigua V.V. Hickman

Figs 6,20

Lomanella exigua V.V. Hickman, 1958: 15-16.

Type material. South-east Tasmania: HOLOTYPE male: KS6919, Arve Forest, Geevestown, 43°10'S 146°55'E, V.V. Hickman, 1 Dec. 1955. ALLOTYPE female: KS17865, same data.

Other material examined. South-east Tasmania, Arve Forest: KS24243, J.L. & V.V. Hickman, 11 Dec. 1955, 3 males, six females; KS24244, J.L. & V.V. Hickman, 22 Nov. 1955, 3 males, 1 female.

Diagnosis. Dorsum brown-orange, eyemound rounded, without spine, anteriolateral corner of carapace with forward projection, TA1-5 and free tergites without rows of granules/tubercles, claw of

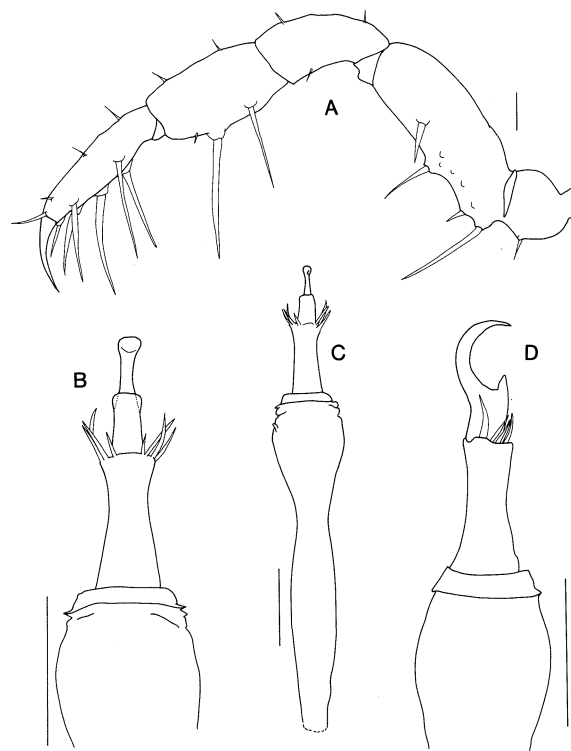


Fig.20. *Lomanella exigua* Hickman. Male KS24244. A = pedipalp, prolateral; B-D = penis, ventral, entire (ventral) and lateral. Scale bars: A-D = 0.1 mm.

tarsus IV a complex peltonychium, shaft of penis very broad distally, broader than sensillar region, distal extension of sensillar region with flat termination in ventral view.

Redescription. MALE. *Body*: small, SL 1.48-1.53 (1.52, 6); CW 0.90-0.94 (0.92). Pigmentation pattern as figured by V.V. Hickman (1958) and similar to that of *L. browni* n.sp. (Fig.21B), dorsum brown-orange relieved by yellow patches including a stripe down each flank and a mesial area posteriorly. Eyemound rounded and smooth except for normal but large surface granules (Fig.6I), rising about 1.0 IOD from anterior margin; carapace with an angular projection in each anteriolateral corner; scutal groove distinct mesially, TA1-5 separated by shallow depressions in which some surface granulation occurs; TA themselves with areas devoid of surface granules, particularly TA 3-5; free tergites also smooth (Fig.6C); genital operculum triangular. *Pedipalps*: PFL 0.52-0.55 (0.54); yellowish with brown reticulations; fv1, fv4 and fpl1 moderately developed, fv2 small, trv2 and tpv2 lacking (unless tpv2 has migrated to position of tpv1), trv3 larger than fv1, tarv2 slightly larger than tarv1, tarsus with 3 proventral and 4 retroventral setose tubercles. *Legs*: FIV 0.76-0.81 (0.79); ventral surface of femur I with weak development of setose tubercles in proximal half; tarsal claw of legs III and IV in form of a peltonychium (see Fig.7G for claw of related species) with about 12 scale-like accessory branches on each side; TF 3(2),3(2),4,4. *Penis*: truncus very swollen distally and terminates at a rim which may be homologous to the dorsolateral plate, sensillar region elongate and carries subdistally 4 setae on each side (V.V. Hickman mentions 2); sensillar region extends distoventrally beyond setae, terminating bluntly in ventral view, in lateral view terminating sharply (this structure apparently homologous to ventral plate); stylus sickle shaped in lateral view.

FEMALE. Similar to male, pedipalps slightly more slender, genital operculum wider at base. Key measurements: SL 1.43, CW 0.87, PFL 0.50, FIV 0.75.

Variation. V.V. Hickman (1958) records one female with tarsal formula 2,2,4,4.

Comments. *Lomanella exigua* is very difficult to distinguish on external characters from another surface species, *L. browni* n.sp., but is readily distinguishable on genital morphology. It appears to have a much more restricted distribution than the latter species.

Distribution. Tasmania: Geeveston area.

Lomanella browni n.sp.

Figs 7,21

Type material. South Tasmania: HOLOTYPE male: KS24899,

Huon River, 43°06'S 146°44'E, wet sclerophyll, Australian Biological Resources Study Survey vial 2964, J.L. Hickman *et al.*, 29 May 1974. PARATYPES: Australian Biological Resources Study Survey, southern Tasmania: KS24898, wet sclerophyll, vial 3053, J.L. Hickman *et al.*, 29 May 1974, male; 43°05'S 146°44'E, wet sclerophyll, J.L. Hickman *et al.*, 20 May 1974, male; Hydro-Electricity Commission South-west Tasmania Survey: KS24855, 42°31'S 145°46'E, mixed rainforest, transect 3R 10, L. Hill & party, 9 Jan. 1978, female; KS24874, 42°34'S 145°43'E, moss, open forest, transect 10R 1055, C. Howard *et al.*, 2 Feb 1976, female; TMAG, J3031, same data, female; KS24856, 42°31'S 145°45'E, Transect 3R 1300, C.L. Howard, 8 Feb. 1977, F; KS24857, 42°43'S 145°49'E, scrub rainforest, transect 2R 70, C.J. Howard & party, 8 Feb. 1977, female; KS24858, 42°41'S 145°54'E, wet scrub, moss transect 4.2200, C. Howard & party, 14 Feb. 1977, male; KS24859, 42°48'S 145°51'E, wet scrub, transect 5R 400, L. Hill & party, 4 Mar. 1977, female; KS24860, 42°41'S 145°48'E, scrub rainforest, transect 1L 50, female; KS24872, 43°05'S 146°44'E, wet sclerophyll, vial 3012, J.L. Hickman & party, 20 May 1974, male.

Diagnosis. Dorsum brown-orange, eyemound rounded, without spine, anteriolateral corner of carapace with forward projection, TA1-5 and free tergites without rows of granules/tubercles, claw of tarsus IV a complex peltonychium, truncus of penis not very broad distally, narrower than sensillar region, distal extension of sensillar region with mesial terminal V-shaped notch in ventral view.

Description. MALE. Very similar to *L. exigua* except: SL 1.57-1.61 (1.58, 3); CW 0.93-0.94 (0.94); PFL 0.52-0.56 (0.54); FIV 0.80-0.81 (0.81); shaft of penis not swollen distally, separated from sensillar region by two broad flanges which are presumed homologous to dorsolateral plate; sensillar region broader than distal end of truncus and carrying a group of 3 inferior setae towards each distolateral corner and a superior seta placed dorsally, distal extension of sensillar region with terminal V-shaped notch.

FEMALE. Differs from male as in *L. exigua*. Key measurements SL 1.62, CW 0.94, PFL 0.55, FIV 0.80.

Comments. The penis of this species seems more plesiomorphic in form than that of *L. exigua*. The arrangement of setae into a clearly identifiable superior seta and group of inferior setae is closer to that of other Australian Triaenonychidae.

Etymology. The specific epithet is in recognition of the work of Dr Bob Brown, Member of the Parliament of Tasmania, in leading the effort to secure World Heritage status for south-west Tasmania, the region in which this species occurs.

Distribution. South-west and southern Tasmania.

Lomanella parva Forster

same data.

Lomanella parva Forster, 1955: 390-392.—V.V. Hickman, 1958: 15.

Type material. Tasmania: HOLOTYPE male: QM, no. W1897, Wallaby Beach, Port Davey, ex leafmould, E.N. Marks, 29 Jan. 1954 (genitalia on slide). ALLOTYPE female: QM, no. W1898,

Comments. Both types have been subject to desiccation and fungal attack, and the holotype has also suffered mechanical damage. As there is no further material available, the species is not redescribed here. The permanent mount of the penis clearly shows the four pairs of long setae illustrated by

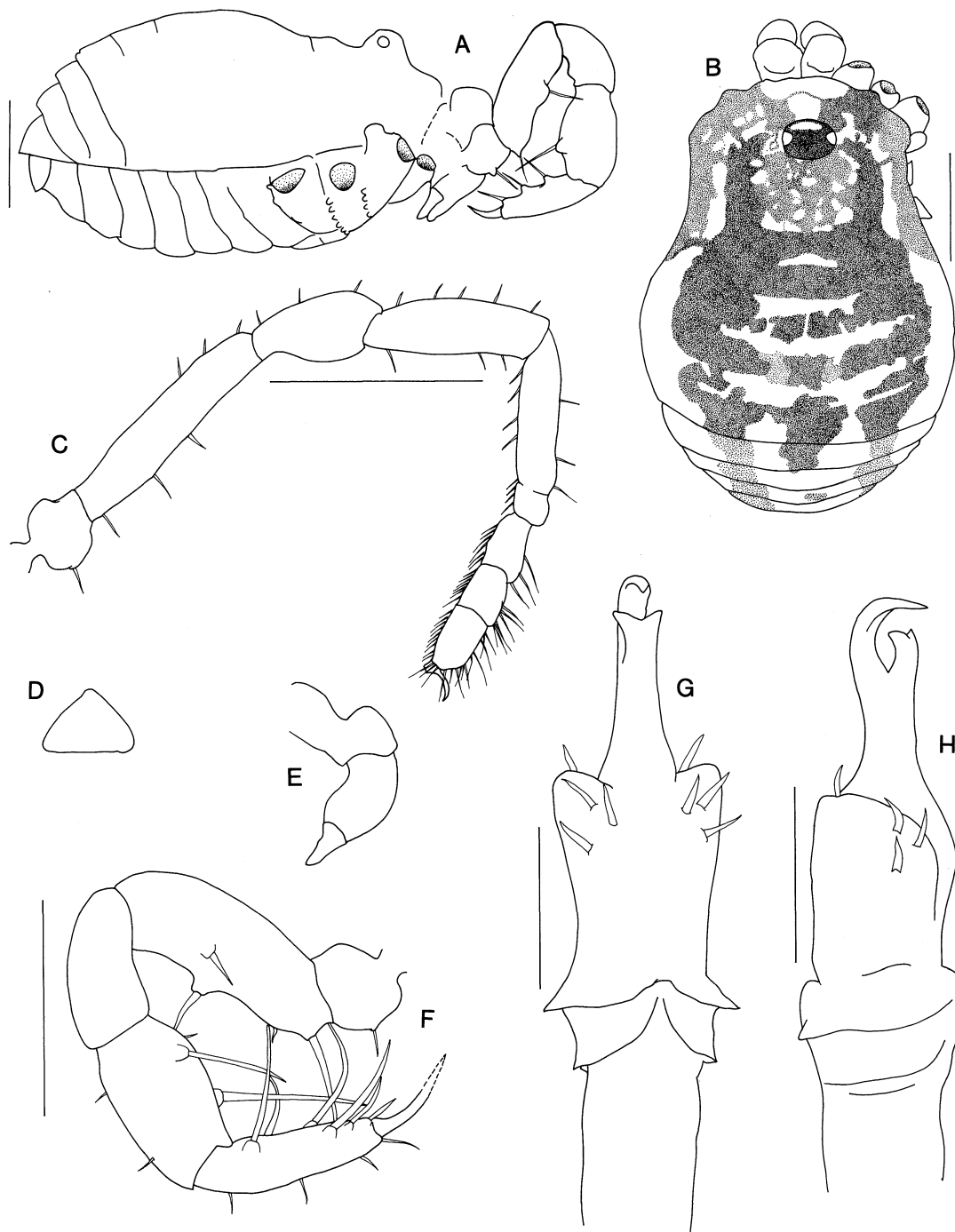


Fig.21. *Lomanella browni* n.sp. A-F = male KS19750. A = body and pedipalp, lateral; B = dorsum with pigmentation pattern; C = right leg I, retrolateral; D = genital operculum; E = chelicera, lateral; F = pedipalp, prolateral; G,H = penis, ventral and lateral. Scale bars: A-C,F = 0.5 mm; G,H = 0.1 mm. D,E same scale as F.

Forster. The species is very close to *L. quasiparva*, differing in details of penis morphology and pedipalp spination.

Distribution. South-west Tasmania: Port Davey.

Lomanella quasiparva n.sp.

Figs 8,22

Type material. South-west Tasmania: HOLOTYPE male: KS20035, 42°37'S 145°45'E, in moss, *Eucalyptus nitida* woodland, C. Howard & party, 5 Feb. 1976. PARATYPES: South-west Tasmania Hydroelectricity Commission Survey: KS23145, 42°34'S 145°43'E, moss, open forest, C. Howard & party, 2 Feb. 1976, female. KS24862, 42°43'S 145°50'E, moss, wet scrub, C. Howard & party, 8 Feb. 1977, female; KS24863, 42°41'S 145°53'E, scrub rainforest, C. Howard & party, 14 Feb. 1977, female; KS24864, 42°41'S 145°52'E,

scrub rainforest, C. Howard & party, 14 Feb. 1977, female; KS24865, 42°41'S 145°53'E, wet scrub, C. Howard & party, 14 Feb. 1977, female; KS24866, Strathgordon, 42°46'S 146°03'E, moss on log, J.L. Hickman, 16 May 1978, female; TMAG, J3030, same data, male, female; KS24867, Strathgordon, moss, *Nothofagus* - *Eucalyptus* forest, J.L. Hickman, 25 Apr. 1978, male; KS24868, 42°41'S 145°53'E, moss, scrub rainforest, C. Howard & party, 14 Feb. 1977, female; KS24869, same data, female; KS24870, 42°51'S 145°50'E, moss, closed forest, C. Howard & party, 18 Feb. 1976, male; KS24871, 42°35'S 145°43'E, closed forest, C. Howard & party, 28 Jan. 1976, female.

Diagnosis. Body yellow brown; tarsus I and II of male with 2 articles, penis with 3 setae, most ventral one short.

Description. MALE. Similar to *L. exigua* except: body smaller, SL 1.15-1.23 (1.20, 5), CW 0.75-0.77 (0.76); colour yellow with dark brown pigmentation as figured; eyemound rising about 0.5 IOD, posterior

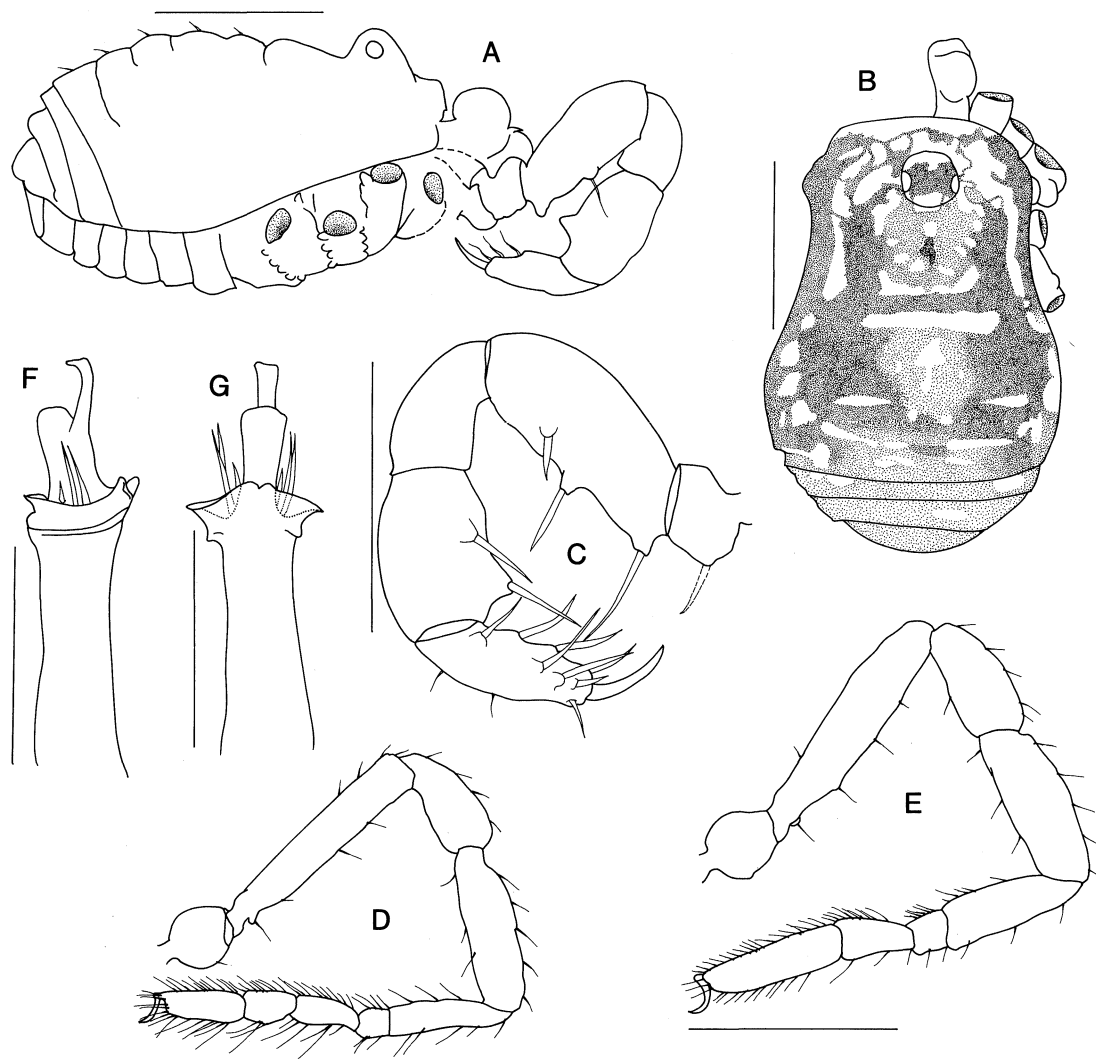


Fig.22. *Lomanella quasiparva* n.sp. A-C,E-G = male KS20035; D = female. A = body and pedipalp, lateral; B = dorsum with pigmentation pattern; C = pedipalp, prolateral; D,E = right leg I, retrolateral; F,G = penis, lateral and ventral. Scale bars: A-E = 0.5 mm; F,G = 0.1 mm.

slope steeper than anterior; process in anteriolateral corners of carapace lacking; tergal areas and free tergites granulate, TA1-5 each with row of tiny setose granules; PFL 0.42-0.46 (0.44); pedipalp with fv2 lacking, fv4 strong, trv3 very strong; FIV 0.61-0.66 (0.65); claw of tarsus IV slightly less complex with about 8 lateral branches on each side of the central prong; leg femora without ventral tubercles, TF 2(1),2(1),4,4; truncus of penis not swollen distally, terminating in dorsolateral plate which forms virtually continuous rim around penis (Fig.8D) and lies at level of the setae, sensillar region not elongate proximal to setae; distal extension of sensillar region blunt in lateral view, most ventral seta on each side very short, about 0.5 length of the 2 setae lying more dorsally.

FEMALE. Similar to male except: pedipalp less robust, genital operculum wider at base, TF 3(2),3(2),4,4. Key measurements: SL 1.22, CW 0.75, PFL 0.40, FIV 0.62.

Comments. *Lomanella quasiparva* shares with *L. parva* only two articles in tarsus I and II of the male. This condition resembles the last instar of other species where there is subdivision of the tarsus into pro- and distitarsus but not subdivision of the distitarsus into two or more articles. Hence the condition in the male may be an example of neoteny where a juvenile character is retained in the adult.

We considered whether this synapomorphy indicated that *L. quasiparva* and *L. parva* are conspecific. We believe, however, that the difference in size and number of penile setae warrants separate species status. The form of the penis also appears to differ though this may be an artifact due to mounting or to variation in the state of penis expansion.

Etymology. The specific epithet means simulating *parva*.

Distribution. South-west Tasmania.

***Lomanella thereseae* n.sp.**

Figs 6,7,23,24

Type material. South-east Tasmania, King George V Cave, Hastings, 43°23'S 146°51'E: HOLOTYPE male: KS23267, underside of charcoal wood debris, A. Clarke, 21 Oct. 1988. PARATYPES: KS23240, A Goede, 30 June 1974, male; KS23242, A. Goede & J. Richardson, 30 June 1974, 2 males; KS23244, T. Goede, 21 Oct. 1971, female; KS17251, T. Goede, 17 July 1971, female; KS23245, T. Goede, 2 Nov. 1975, 2 females; A. Goede & G.S. Hunt, Oct. 1982, 3 males, 4 females; KS23266, underside of charcoal wood debris, A. Clarke, 21 Oct. 1988, male.

Other material examined. Tasmania: Ida Bay caves, 43°30'S 146°50'E: KS21468, Mystery Creek Cave, T. Goede,

4 Feb. 1976, male, female; KS21470, Mystery Creek Cave, T. Goede, 15 Nov. 1975, female; KS23268, Cave IB91, S. Eberhard, male; KS23269, Cave IB14, S. Eberhard, 1990, male; KS23241 Cave IB4, S. Eberhard, 1990, male. Weld River Arch Cave, 42°50'S 146°25'E: KS23260, threshold zone, S. Eberhard, 11 May 1986.

Diagnosis. Often cavernicolous, body orange-yellow with little or no pigmentation, pedipalp tibia with 4 setose tubercles, namely trv2, trv3, tpm1 and tpm2.

Description. MALE. Similar to *L. exigua* except: SL 1.58-1.63 (2), CW 0.97-0.99; body with only traces of pigmentation, overall colour orange-yellow; eyemound lower in profile, eyes reduced in size, process in anteriolateral corners lacking, tergal areas and free tergites granulate, TA1-5 defined by prominent grooves, each TA carrying a row of setose granules; pedipalp relatively longer, PFL 0.72-0.7; fv2 larger, fv4 smaller (almost lacking in Ida Bay Caves populations); tibia with 4 setose tubercles, trv2, trv3, tpm1, tpm2; trv3 relatively much larger than fv1; legs relatively much more elongate, FIV 1.27-1.31; claw of tarsus IV much less complex with only about 4 lateral branches on each side of the central prong (Fig.7D); TF 3(2),5(3),4,4; truncus of penis not swollen distally, dorsolateral plate well defined and lying immediately proximal to setae, sensillar region not elongate proximal to setae; distance between dorsolateral plate and more proximal flange much greater; distal extension of sensillar region larger and blunter in lateral view, stylus less sickle-shaped.

FEMALE. Differs from male as in *L. exigua*. Key measurements SL 1.68, CW 0.97, PFL 0.73, FIV 1.25.

Variation. There is some variation in eyemound size, one specimen from Ida Bay caves having a very low eyemound (Fig.6J). Ida Bay specimens essentially lack fv4 which is indicative of genetic isolation from the Hastings Cave population as electrophoretic studies seemed to show for the respective populations of *Hickmanoxyomma cavaticum* (Hunt, 1990). Mean measurements for three Ida Bay cave males are: SL 1.50, CW 0.91, PFL 0.67, FIV 1.16, PFL: CW 0.74, FIV: CW 1.27. Measurements for Weld River Arch male: SL 1.58, CW 0.93, PFL 0.74, FIV 1.40, PFL: CW 0.80, FIV: CW 1.51. A male specimen from the surface at Arve Valley is SL 1.57, CW 0.96, PFL 0.67, FIV 1.30, PFL: CW 0.72, FIV: CW 1.35.

Comments. Contrary to earlier views, for example in Eberhard (1990), the species as recognised here is not a strict troglobite. Specimens from the surface in the Arve Valley, an area without caves, have depigmentation and relative appendage length comparable to the cave specimens. *Lomanella thereseae* is much less troglomorphic than the other cavernicolous member of the species group, namely *L. troglodytes*, which is completely blind and has relatively much longer legs. Nevertheless, it is possible that one or more of the cave populations may be troglotic - no surface specimens

have been found at Ida Bay and Hastings despite repeated collecting, and variation between these populations (noted above) suggests restricted gene flow. Electrophoresis might demonstrate that *L. thereseae* consists of two or more cryptic species.

The single male specimen from Weld River Caves had a deep ventral concavity in the penis (Fig.24F). As

the concavity is regular in shape, we have assumed that it is neither an artifact nor a deformity. However, the specimen appears identical in other respects to the Hastings Cave population except in having longer appendages, so we have conservatively placed it in *L. thereseae* pending further material. Spination of the pedipalp tibia is the most plesiomorphic for *Lomanella*,

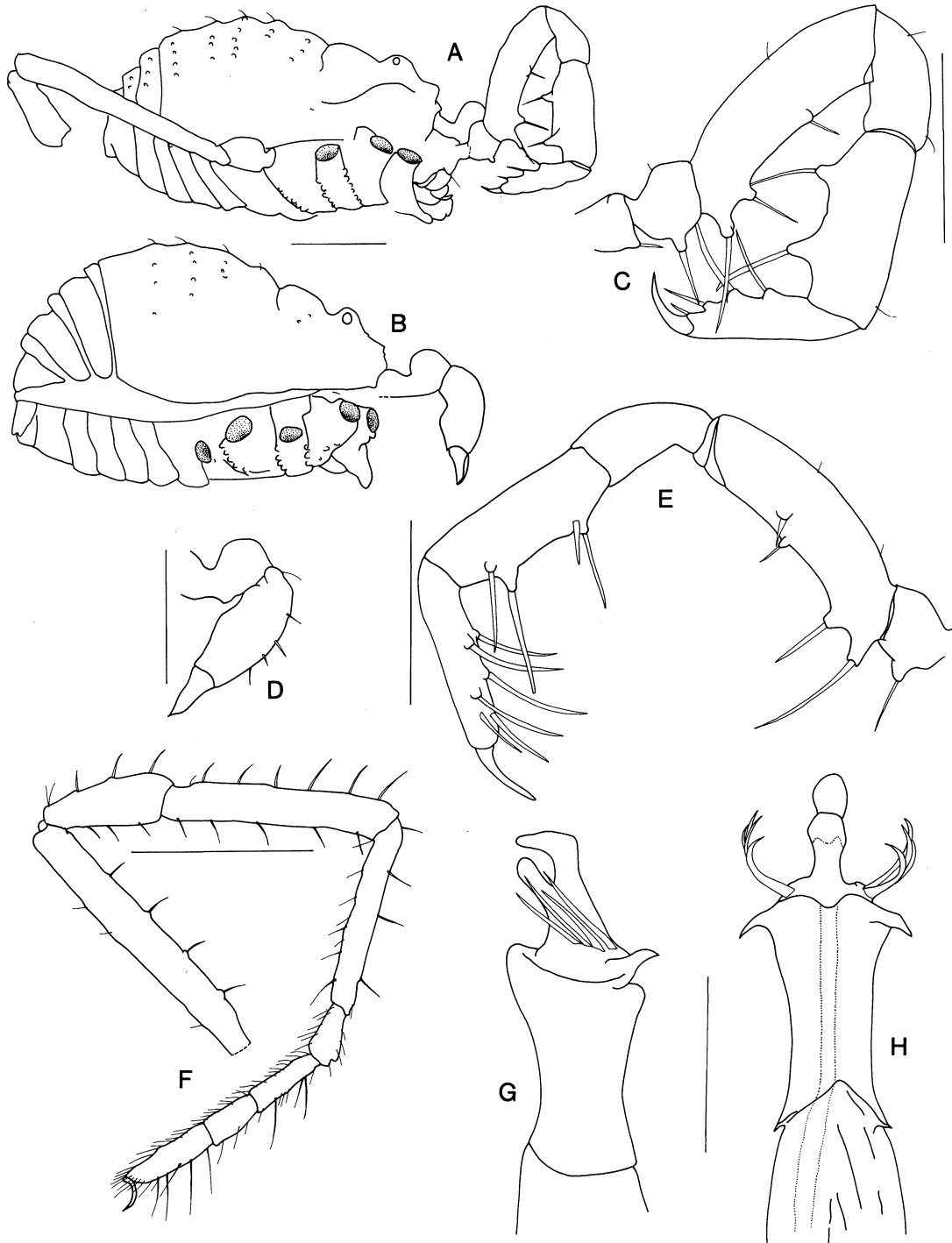


Fig.23. *Lomanella thereseae* n.sp. A,C,D,F-H = male KS23240; B,E = female KS23244. A,B = body and pedipalp, lateral (B distended showing intersclerite membranes); C,E = pedipalp, retro- and pro-lateral; D = chelicera, lateral; F = right leg I, retrolateral; G,H = penis, lateral and ventral. Scale bars: A-F = 0.5 mm; G,H = 0.1 mm.

approaching the disposition of spines typical of most Australian Triaenonychidae (Fig.1).

Etymology. The specific epithet is in recognition of the extensive biospeleological and surface sampling work of Therese March (formerly Goede) of Fern Tree, Hobart.

Distribution. South-east Tasmania: cave areas, specifically Hastings, Ida Bay and Weld River Arch Caves; surface habitat in Arve Valley near Geevestown.

Lomanella troglodytes n.sp.

Figs 6,7,25

Type material. Southern Tasmania, Precipitous Bluff, 43°30'S 146°35'E: HOLOTYPE male: KS21462, Damper Cave PB-1, A. Clarke, 22 Dec. 1988. PARATYPES: KS21463, Bauhaus Cave, PB-6, S. Eberhard, 24 Dec. 1988, male; KS21465, Cueva Blanca, PB-4, S. Eberhard, 18 Dec. 1988, male; KS23263, Bauhaus Cave, A. Clarke & S. Eberhard, 22 Dec. 1988, male; KS23264, Cave PB-17, A. Clarke & S. Eberhard, 22 Dec. 1988, male.

Diagnosis. Troglotic, totally blind and

depigmented.

Description. MALE. Differs from *L. exigua* in being: cavernicolous, SL 0.96-1.32 (1.10, 5), CW 0.62-0.84 (0.71); body depigmented, overall colour white-straw yellow; blind with no remnant of lens or retina visible, eyemound reduced to slightly raised area which is less prominent than median swelling closer to anterior margin (Fig.6K); body low in profile; process in anteriolateral corners lacking, scute and free tergites sparsely granulate throughout; scutal groove deep, each TA with some small setae arising from tiny granules; pedipalp very long and gracile, PFL 0.57-0.74 (0.66); fv4 very large, trv3 placed at about 0.5 tibia length, its base very prominent; legs extremely attenuated, FIV 1.38-1.66, calcaneus of leg 1 relatively long, femora ventrally without tubercles, claw of tarsus IV much less complex with about 4 lateral branches on each side of the central prong; TF 3(2),5(3),4,4; truncus of penis not swollen distally, sensillar region not elongate proximal to setae; stylus and distal extension to sensillar region more elongate but of similar form; 3 setae visible on each side in lateral view.

FEMALE. Unknown.

Variation. The figures above demonstrate considerable variation in body size and the relative length of appendages. The FIV: CW ratios were 1.64,

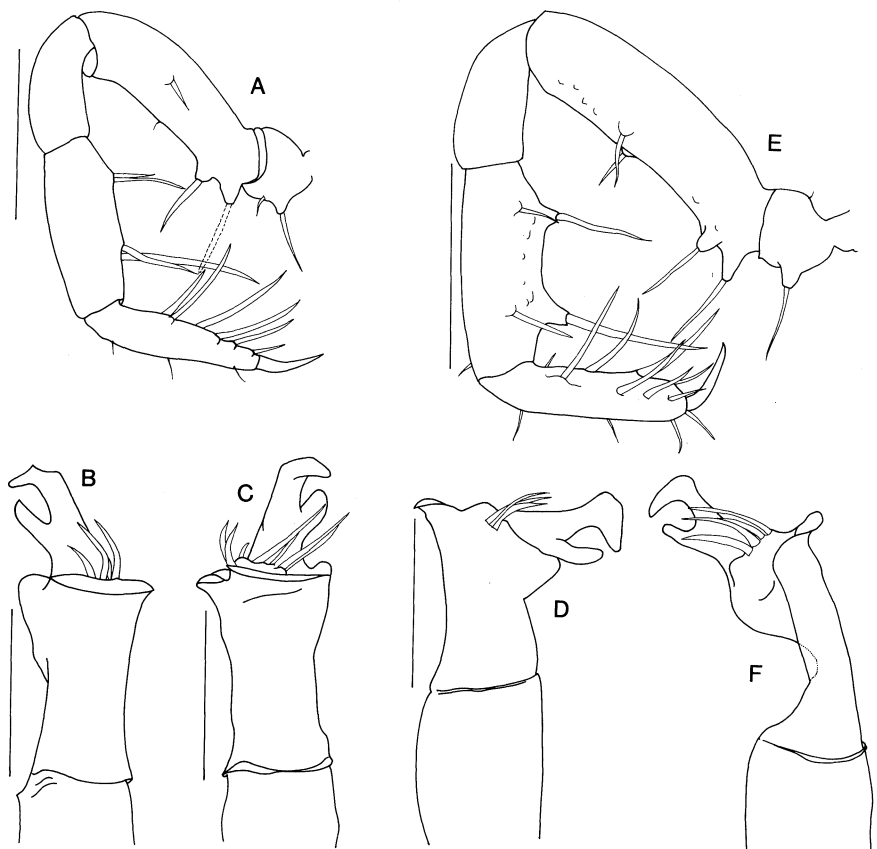


Fig.24. *Lomanella thereseae* n.sp. A-D = ex Ida Bay Caves, A = male KS24241; E,F = male KS23260 ex Weld River Arch Cave. A,E = pedipalp, prolatateral; B,C = penis, lateral and dorsolateral; D = everted penis, expanded (lateral); F = penis, lateral. Scale bars: A,E = 0.5 mm; B,C,D,F = 0.1 mm.

1.97, 2.32, 2.37, 2.44. It is possible these indicate there is polymorphism with regard to 'cave adaptedness' but a larger series is needed to verify this.

Comments. *Lomanella troglodytes* is the most troglomorphic harvestman species in Australia and shows complete eye and pigment loss and great elongation of legs (mean FIV: CW 2.14). It is similar in general habitus to the blind Argentinian triaenonychid *Picunchenops spelaeus* described by Maury (1988). The legs of this latter species are even more attenuated (FIV: CW 3.5) though its eyemound is less reduced in height. *Lomanella troglodytes* appears most closely related to the surface species *L. parva* and *L. quasiparva*. The claw of tarsus IV resembles that of *L. thereseae*.

Of the four species of harvestmen collected in the caves at Precipitous Bluff, three are the most troglomorphic of their respective genera, namely *Hickmanoxyomma cristatum* Hunt, *Lomanella troglodytes* n.sp. and a new species of *Mestonia*. The caves provide a home for several other troglobites (Eberhard, personal communication). Hume (1990) provides access to the speleological literature and cave descriptions.

Etymology. The specific epithet refers to its cave dwelling ecology.

Distribution. Caves at Precipitous Bluff, southern Tasmania.

Lomanella blacki n.sp.

Figs 7,26

Type material. Victoria: HOLOTYPE female: Toolangi State Forest, 4 km south-east of Toolangi, 37°35'S 145°40'E, sieved litter, eucalypt forest, D. Black, 4 Mar. 1990. PARATYPE female: 7 km south on Archeron Way, 15 km east-north-east of Healesville, 37°34'S 145°40'E, sieved tree fern litter, D. Black, 4 Mar. 1990.

Diagnosis. SL less than 1.30 mm, eyemound with short apical tubercle, anteriolateral corners with small tubercles, TF 3(2),4(3),4,4, claw IV with 2 pairs of lateral branches adpressed to median prong.

Description. FEMALE. Similar to *L. exigua* except: body smaller, SL 1.14-1.20 (2), CW 0.65-0.68; dorsum

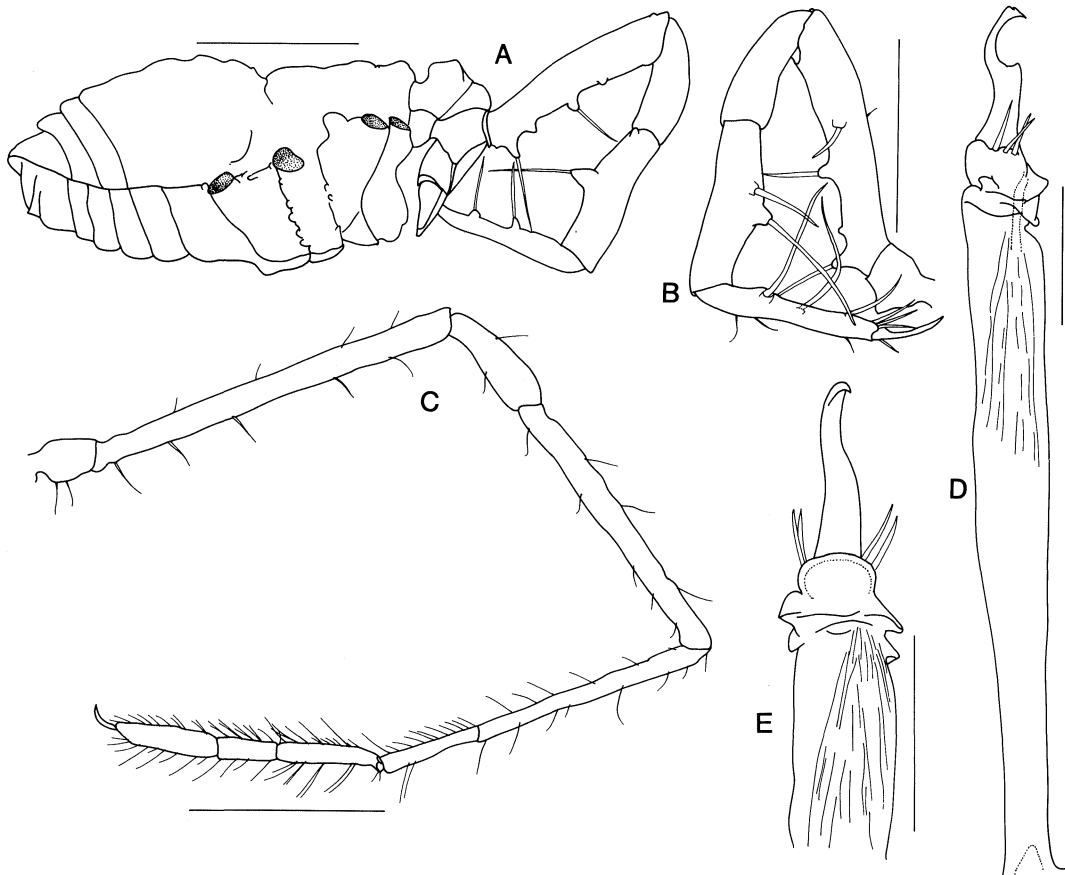


Fig.25. *Lomanella troglodytes* n.sp. A-E = male. A = body and pedipalp, lateral; B = pedipalp, prolateral; C = right leg I, retrolateral; D,E = penis, entire (lateral) and ventral. Scale bars: A-C = 0.5 mm; D,E = 0.1 mm.

predominantly brown interrupted by yellow patches, pigmentation pattern as figured; eyemound rising steeply about 0.8 IOD behind anterior margin, terminating in a small spine and then rounded posterior to eyes; scutal groove deep, extending almost to lateral margins; TA1-5 delineated by prominent grooves; PFL 0.35-0.37, setose tubercles of pedipalp much stronger, tov1, fv1, fv4 and trv3 particularly strong, seta of tarv2 relatively much larger than tarv1; FIV 0.63-0.65, femur I essentially lacking tubercle development; 2 pairs of lateral prongs on claw IV, larger pair about 0.8 length of median prong, adpressed to and lying in concavity along median prong; smaller pair 0.5 length of larger pair, adpressed to and lying in concavity along larger pair (Fig.7C); TF 3(2),4(3),4,4.

MALE. Unknown.

Comments. This is among the smallest bodied species in the genus. Its affinities will remain uncertain until the male is studied. The profile of the eyemound is not unlike females of much larger-bodied species in Victoria, for example *L. kallista* belonging to the *L. raniceps* species group. The structure of the claw of tarsus IV, however, suggests it is transitional between the simple claw of the *L. raniceps* group and the complex peltonychium of the *L. exigua* and *L. peltonychium*

species groups. In having claws with two pairs of lateral branches the species resembles the *L. insolentia* species group but in having branches adpressed to the central prong, the species resembles the *L. exigua* and *L. peltonychium* species groups. We predict that the form of the penis will resemble the *L. exigua* group because of pedipalp tibial spination, less than 5 articles in tarsus II and geographical proximity. Discovery of the male of *L. blacki* should greatly assist in understanding the phylogeny of the genus.

Etymology. The specific epithet acknowledges the help of myriapodologist Dennis Black, La Trobe University, Melbourne, collector of the two known specimens of this species.

Distribution. Victoria: Dandenong Range area.

Lomanella peltonychium species group

Western Australia; claw of tarsi II and IV a peltonychium; tarsus II with 5 articles, in lateral view sensillar region of penis reflexed and not extending distal to setae.

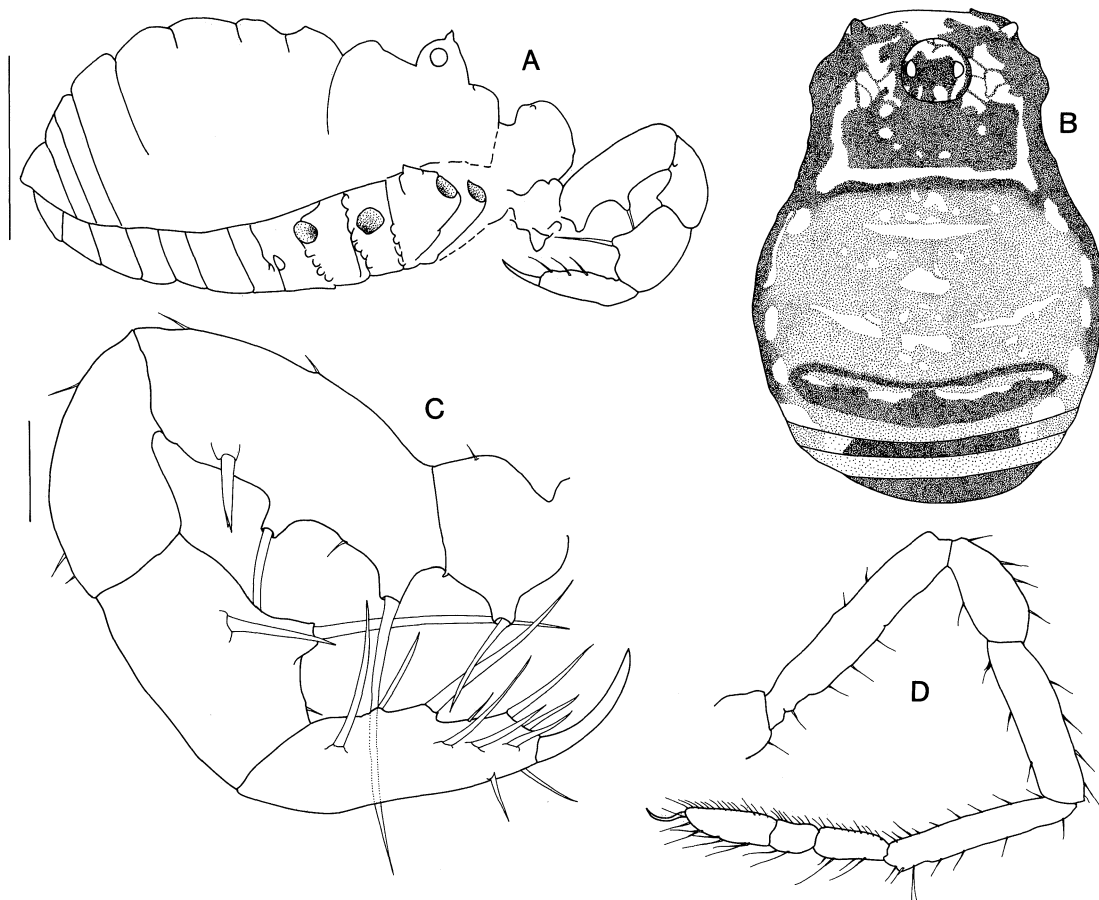


Fig.26. *Lomanella blacki* n.sp. A-D = female; A = body and pedipalp, lateral; B = dorsum with pigmentation pattern; C = pedipalp, prolateral; D = right leg I, retrolateral. Scale bars: A,B,D = 0.5 mm; C = 0.1 mm.

Lomanella peltonychium n.sp.

Figs 3,6,7,27

Type material. Western Australia: HOLOTYPE male: ANIC, Nornalup National Park, Walpole, 34°59'S 116°45'E, I.D. Neumann & J.C. Cardale, ANIC berlesate no. 744, 6 Oct. 1981. PARATYPES: ANIC, same data, 20 males, 24 females; KS23270, 11 km north of Walpole, about 180 m, Karri forest, ANIC berlesate no.146,

leafmould, R.W. Taylor, 23 Oct. 1969, 5 males, 4 females; ANIC, same data, 2 males, 1 female; WAM 91/1359-62, same data, ANIC berlesate 145, male, 3 females; WAM 90/1703, Walpole Nornalup National Park, Hilltop Road, 4 km south-east of Walpole, J.M. Waldock, 13 June 1987, female.

Other material examined. Western Australia: ANIC, 11 km north of Walpole, about 180 m, Karri forest, ANIC berlesate no.146, leafmould, R.W. Taylor, 23 Oct. 1969, 5

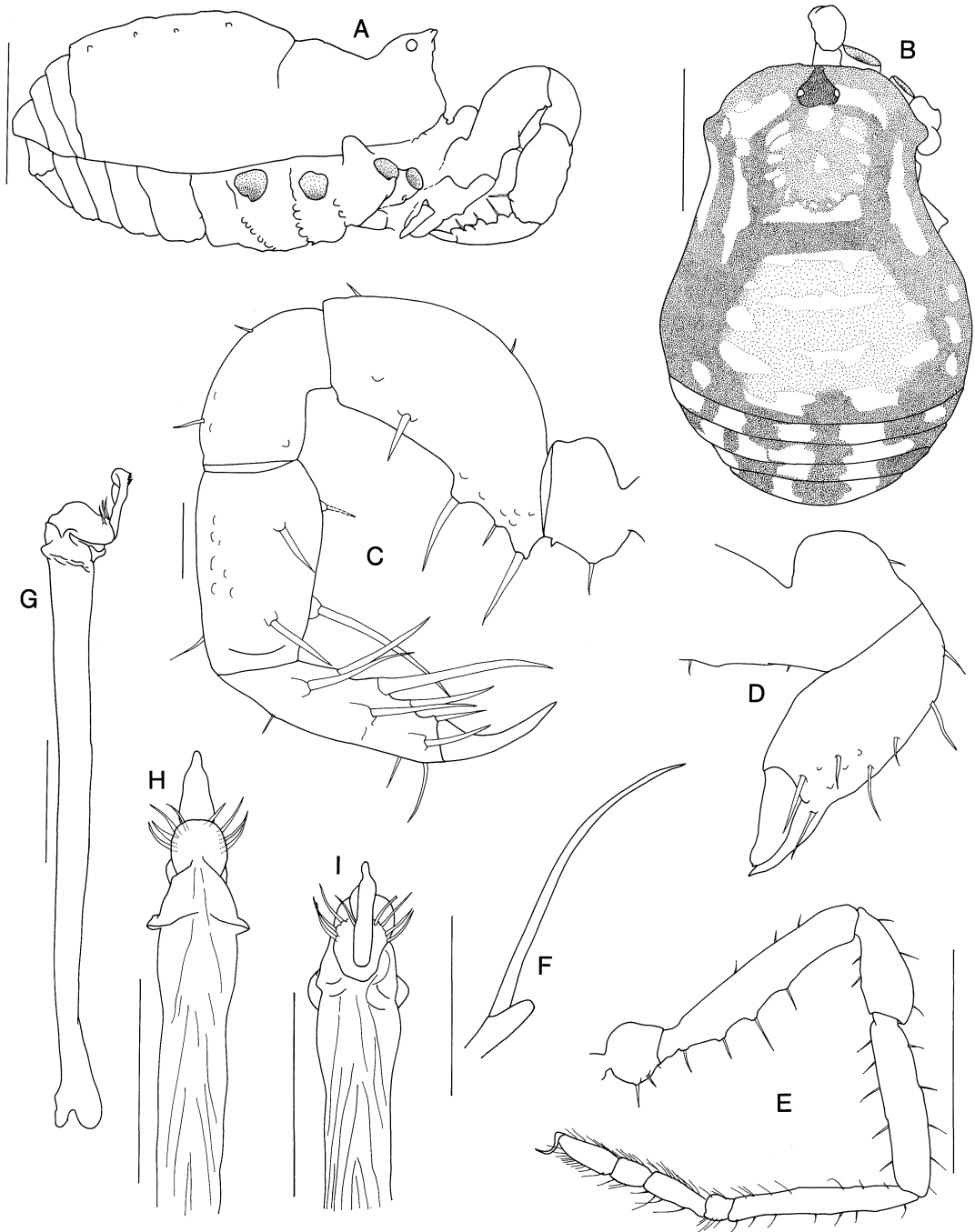


Fig.27. *Lomanella peltonychium* n.sp. A-E = male. A = body and pedipalp, lateral; B = dorsum with pigmentation pattern; C = pedipalp, prolateral; D = chelicera, lateral; E = right leg I, retrolateral; G-I = penis, entire (lateral), ventral and dorsal; F = ovipositor seta. Scale bars: A,B,E = 0.5 mm; C,D,F-I = 0.1 mm.

males, 7 females; ANIC, 19 km north of Walpole, about 250 m, Marri forest, ANIC berlesate no.148, leafmould, R.W. Taylor, 24 Oct. 1969, female; ANIC, 6 km west of Walpole, about 70 m, Karri forest, ANIC berlesate no.142, leafmould, R.W. Taylor, 22 Oct. 1969, 2 males.

Diagnosis. Eyemound conical, rising vertically from short distance behind anterior margin, anteriolateral corners without tubercles or projections, scutal groove extending to near lateral margins, TA1-5 weakly defined by grooves, claws III and IV a peltonychium, 5 articles in tarsus II, penis in lateral view strongly reflexed.

Description. MALE. *Body:* small, SL 1.26-1.33 (1.28, 5); CW 0.75-0.78 (0.76). Pigmentation pattern as figured, dorsum dark brown relieved by yellow-orange patches tending to reflect segmentation in tergal areas. Eyemound rising vertically about 0.5 IOD behind anterior margin, apex anterior to eyes, conical or with small tubercle, eyemound sloping more gradually posterior to apex (Fig.6E); anterior margin of carapace essentially smooth; scutal groove distinct and extending almost to lateral margins (Fig. 6E), TA1-5 not strongly delineated by grooves, groove between TA4 and 5 strongest, each TA and free tergite carrying a row of tiny setose granules, dorsum otherwise uniformly granulate; genital operculum triangular. *Pedipalps:* PFL 0.36-0.42 (0.38); yellowish with brown reticulations; fv1, fv4 and fp1 moderately developed, fv2 small, fv4 in proximal half; tpv1, tpv2, and strong trv3 present, suggestion of trv2 in some specimens; trv3 much larger than fv1, tarv2 much

stronger than tarv1, tarsus with 3 proventral and 4 retroventral setose tubercles. *Legs:* FIV 0.66-0.73 (0.70); ventral surface of femur I with setose tubercles; claws III and IV in form of a peltonychium (Fig.7G inset) with numerous scale-like accessory branches; TF 3(2),5(3),4,4. *Penis:* truncus extremely long; dorsolateral plate in form of a flap-like annulus extending around most of truncus except midventrally; sensillar region in lateral view reflexed with proximal convexity followed by insertion of 4 setae on each side; no extension of sensillar region distal to setae or expression of separate ventral plate; stylus clearly differentiated from sensillar region, distodorsally with a comb of teeth-like processes (Fig.3).

FEMALE. Similar to male, body slightly larger, pedipalps slightly more slender, genital operculum wider at base. Ovipositor with long, unevenly bifid setae (Fig.27F) around vaginal opening (7 on each side in specimen examined). Key measurements: SL 1.33, CW 0.78, PFL 0.38, FIV 0.70.

Comments. The peltonychial claw structure suggests this species is closely allied to the *L. exigua* species group but differs in structure of the penis including the lack of an extension of the sensillar region distal to the setae.

Etymology. The specific epithet is a noun in apposition referring to tarsal claws III and IV which are in the form of a peltonychium.

Distribution. South-west Western Australia.

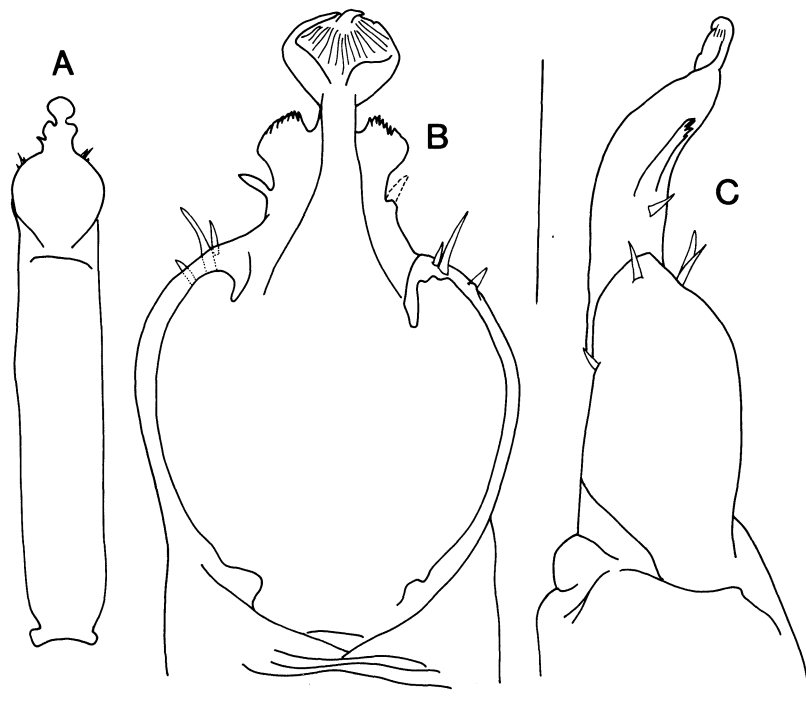


Fig.28. *Nucina silvestris* V.V. Hickman. Holotype. A-C = penis, entire (ventral), ventral and lateral. Scale bar: 0.1 mm.

Nucina silvestris V.V. Hickman

Fig.28

Nucina silvestris V.V. Hickman, 1958: 55-57.

Comments. V.V. Hickman (1958) illustrated the ventral aspect of the penis of this species and stated "The ventral plate is large, oval and concave. The margin is strongly chitinised. Unlike the ventral plate of most other species, it appears to be closely fused with the glans [i.e stylus] and not capable of separate movement. It is provided with three pairs of small inferior setae".

The form of the penis of *Nucina* is clearly convergent with that in certain *Lomanella* spp., particularly *L. raniceps*. The two genera are only distantly related, *Nucina* sharing none of the distinctive synapomorphies of *Lomanella*.

We illustrate the ventral and lateral views and add the following to Hickman's description: small superior seta on each dorsolateral flank of sensillar region, stylus ventrolaterally with a small non-socketed spine and more distally with flat, serrated wing-like process; dorsolateral and dorsal plates lacking.

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APPENDIX

Table 1. Present distribution among taxa of characters used to support family level classifications in the superfamily Travunoidea (Sources: Briggs, 1969, 1971a,b, 1974; Forster, 1954; Hunt, 1990; Martens, 1986; Maury, 1988; Suzuki, 1975a,b, 1976; this paper). X = presence in at least some members of the taxon. 1. Travuniidae; 2. Cladonychiidae; 3. Synthetonychidae; 4. Pentanychidae; 5. Triaenonychidae; 6. Triaenonychinae; 7. Soerensenellinae; 8. Paranonychinae; 9. Kaolinonychinae; 10. Nippononychinae; 11. *Picunchenops spelaeus*; 12. *Lomanella raniceps*; 13. *L. insolentia*; 14. *L. exigua*; 15. *L. peltonychium*.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Adult claws III & IV with 1 pair short lateral branches					X	X						X			
1 pair of laterals longer than centralprong					X		X								
2 pairs of laterals				X	X			X					X		
Laterals absent					X	X									
Claw single, then bifurcating		X													
Claw a peltonychium	X		X		X				X	X	X			X	X
Juvenile claw with 3 pairs of laterals	X	X		X	X	X	?	X				X	?		
Juvenile with 4 pairs of laterals					X				X					?	
Juvenile with 5 pairs of laterals					X					X					
Juvenile with no. of laterals dependent on nymphal instar					X										X
Juvenile claw with aroleum		X		X											
Eggs guarded by female							X								
Penis with muscle along length of truncus			X	X	X	X	X	X	X	X	X	X	X	X	X
Muscle at base of truncus	X	X													
Free ninth tergite				X	X*										
Free lateral sclerites	X			X	X	X									

* *Yuria* spp. from Japan, regarded by Suzuki (1975a) as Travuniidae. However, genitalia very similar to *Kainonychus* spp. which Suzuki (1975b) regards as Triaenonychidae. Martens (1986) also regards these as triaenonychids on the basis of penis structure.