

## Revision of the harvestman genus *Miobunus* from Tasmania (Arachnida: Opiliones: Triaenonychidae)

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**Abstract** – The genus *Miobunus* Roewer and its type species, *M. thoracicus*, are redescribed. *Tasmanobunus* Hickman is placed in synonymy and its type species, *T. constans*, is regarded as a junior synonym of *M. thoracicus*. Three new species are described: *M. forficula*, *M. mainae*, and *M. johnhickmani*. The nominal species *Miobunus levis* Hickman and *Tasmanobunus parvus* Hickman are regarded as *incertae sedis*. A key to species is given. Penis morphology suggests that the tribe Triaenobunini is a diphyletic taxon.

### INTRODUCTION

*Miobunus* Roewer is a group of small-bodied harvestmen known only from Tasmania. They are typically found in leaf litter, moss or decaying logs.

In undertaking his first major work on the Triaenonychidae, Roewer (1915) established three subfamilies on the basis of sternal morphology, namely the Triaenonychinae, Triaenobuninae and Adaeinae. He placed *Miobunus* in the Triaenobuninae as it had a broad posterior salience to the sternum, a placement tentatively followed by V.V. Hickman (1958) in his monograph on Tasmanian Triaenonychidae. Forster (1954), however, argued that these subfamilies were not monophyletic groups, a view which has gained acceptance, though he still retained the Triaenobunini as a tribe. Difficulties in establishing a 'natural' subfamily classification for the Triaenonychidae were reviewed by Hunt and J.L. Hickman (1993).

Hunt and Maury (1993) illustrated the male genitalia of several triaenobunine genera and pointed out that they fell into two basic morphologies: those possessing a dorsolateral plate and those lacking this plate. A survey of penis morphologies demonstrates that genera possessing a dorsolateral plate include *Miobunus*, *Chrestobunus* Roewer and *Thelbunus* Hickman; those lacking the plate include *Triaenobunus* Soerensen, *Glyptobunus* Roewer, *Rhynchobunus* Hickman and *Tasmanonuncia* Hickman (Hickman (1958) placed this last genus in the Triaenonychinae on the basis of sternal shape). The two penis morphologies suggest that the Triaenobuninae (or Triaenobunini) is at least a diphyletic taxon.

This paper is the first in a series revising the 'triaenobunine' genera.

### MATERIALS AND METHODS

The following abbreviations are used to indicate the present location of material: AM = Australian Museum, Sydney (usually denoted by the registration number prefix KS); FIS = Forschungsinstitut Senckenberg, Frankfurt am Main; QM = Queensland Museum, Brisbane. The extensive Hickman Collection of Tasmanian harvestmen is housed in the Australian Museum. Terminologies for pedipalp spination and penis morphology follow Hunt and Hickman (1993) and Hunt and Maury (1993), respectively. SEMs were done with a Cambridge Stereoscan 120 employing a Robinson Detector.

### SYSTEMATICS

#### Genus *Miobunus* Roewer

*Miobunus* Roewer, 1915: 163; 1923: 629; Hickman, 1958: 107.

*Tasmanobunus* Hickman, 1958: 108–109, **new synonymy**.

#### Type species

of *Miobunus*: *Miobunus thoracicus* Roewer, 1915, by monotypy.

of *Tasmanobunus*: *Tasmanobunus constans* Hickman, 1958, by original designation.

#### Diagnosis

Small harvestmen with broad posterior expansion to sternum ('triaenobunine' condition); 3 segments in tarsus I in both sexes, usually 5 segments in tarsus II (*M. johnhickmani* has 6), length of tubercles on ventral surface of femur I much less than femur diameter but larger than granules on



**Figure 1** *Miobunus thoracicus* Roewer, male: A, body, dorsal with pigmentation pattern; B, eyemound, lateral; C, pedipalp tibia and tarsus, ventral; D, pedipalp, prolateral; E-H, male genitalia, lateral, dorsal, ventral, entire ventral. Scale bars: 0.5 mm (Figs 1A-D), 0.1 mm (Figs 1E-H).

dorsal surface; simple proximoventral spine on pedipalp femur, usually a single distal spine on prolateral surface of pedipalp femur (second spine, if present, tiny); eyemound rising steeply from or just behind anterior margin; penis with dorsolateral plates, stylus length subequal to truncus diameter, superior setae unmodified, ventral plate lacking mesal notch but not attenuated.

#### Redescription

Small harvestmen, claws of legs III and IV 3-

pronged, median prong much longer and stronger than laterals; posterior margin of sternum broad, dorsolateral plate of penis well developed or somewhat reduced; eyemound directed somewhat forward, usually rising more or less vertically directly from or just behind anterior margin, terminating conically or with a spine; anterior margin on each side usually with a single denticle (sometimes with 1-2 additional granules, or lacking); proximoventral spine on pedipalp femur (fv1) simple (no accessory branches), prodorsal surface of femur usually with a single distal spine;

ventral plate of penis usually with 7 pairs of setae, 4 of which appear to be inferior (most lateral one usually inserted on margin) and 3 superior (except for *M. johnhickmani* which appears to have 3 and 2 pairs respectively); setae all normal in form; stylus length subequal to truncus diameter; dorsal plate usually subequal to or longer than stylus, with widely spaced lateral terminations which tend to follow outline of stylus and may overlap mesally; stylus very broad and complex terminally and usually with a pair of spinous processes flanking a median structure; Tarsal formula 3(2),5-6(2-3),4,4.

### Remarks

This genus was erected for a single species, *Miobunus thoracicus* Roewer, which was represented by a female specimen, not a male as stated by Roewer (1915). The type locality was given as "Tasmania". Hickman (1958), in erecting *Tasmanobunus*, stated that it differed from *Miobunus* in having 5 rather than 4 segments in the tarsus of leg II. However, examination of the type of *M. thoracicus* shows it also has 5 segments, not 4 as described by Roewer. Study of the type species of *Tasmanobunus*, *T. constans* Hickman, represented by both males and females from Mt Wellington, reveals no female characters warranting separate generic status from *Miobunus*. Indeed, the type of *M. thoracicus* shows close identity to smaller females among a large collection of *T. constans* from Mt Wellington and hence *T. constans* is regarded as a junior synonym of this species. Accordingly,

*Tasmanobunus* is placed in synonymy with *Miobunus* and the genus redefined incorporating male characters.

*Tasmanobunus parvus* Hickman, however, does not belong in *Miobunus*. Its male genitalia have been re-illustrated by Hunt and Maury (1993) and indicate this species is allied to *Glyptobunus* and *Rhynchobunus* in lacking dorsolateral plates and in possessing a dorsodistal barb on the stylus. Similarly, *Miobunus levis* Hickman is allied to these genera and does not belong in *Miobunus* (Hunt, in prep.).

*Miobunus* appears close to *Chrestobunus* in general body and appendage form, in the form of the eyemound and in lacking a mesal notch separating the fused ventral plates. However, this latter genus can be distinguished by tending to have 6 rather than 5 segments in tarsus of leg II, in having a stylus length about twice diameter of truncus (rather than subequal to truncus), at least one large, strap-like superior seta (ss, Fig. 3F), an attenuated (tongue-like) ventral plate (vp, Fig. 3F), and a much more complex stylus. The *Chrestobunus* penis shows more similarities with that of *Thelbunus* Hickman (Hunt, in prep.).

### Key of males of *Miobunus* Roewer

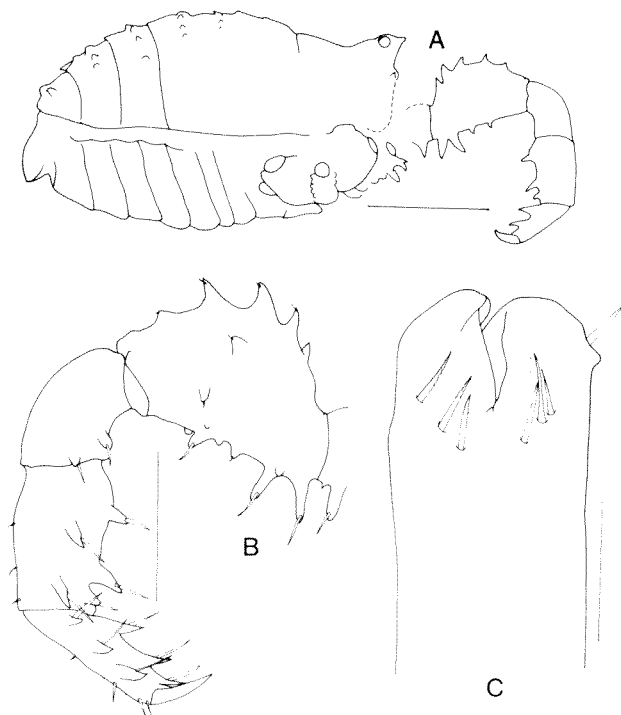
1. Dorsal surface of pedipalp femur only with 1 spine (Fig. 6C), eyemound rounded apically (Fig. 6A), at most with small apical granule .  
..... *M. johnhickmani* sp. nov.  
Dorsal surface of pedipalp femur with more than 1 dorsal spine, termination of eyemound conical or spinous ..... 2
2. Distal prominence on dorsal surface of pedipalp femur a strong spine (Fig. 5D), genital operculum somewhat pointed anteriorly (Fig. 5C) ..... *M. mainae* sp. nov.  
Distal prominence on dorsal surface of pedipalp femur a small denticle, genital operculum rounded in front ..... 3
3. Ventral plate of penis 3-lobed (Fig. 4G), distal spinous projections of dorsal plate overlap anterior to stylus (Fig. 4G) .....  
..... *M. forficula* sp. nov.  
Ventral plate of penis not 3-lobed (Fig. 1G), distal spinous projections of dorsal plate do not overlap anterior to stylus (Fig. 1G) .....  
..... *M. thoracicus* Roewer

### *Miobunus thoracicus* Roewer

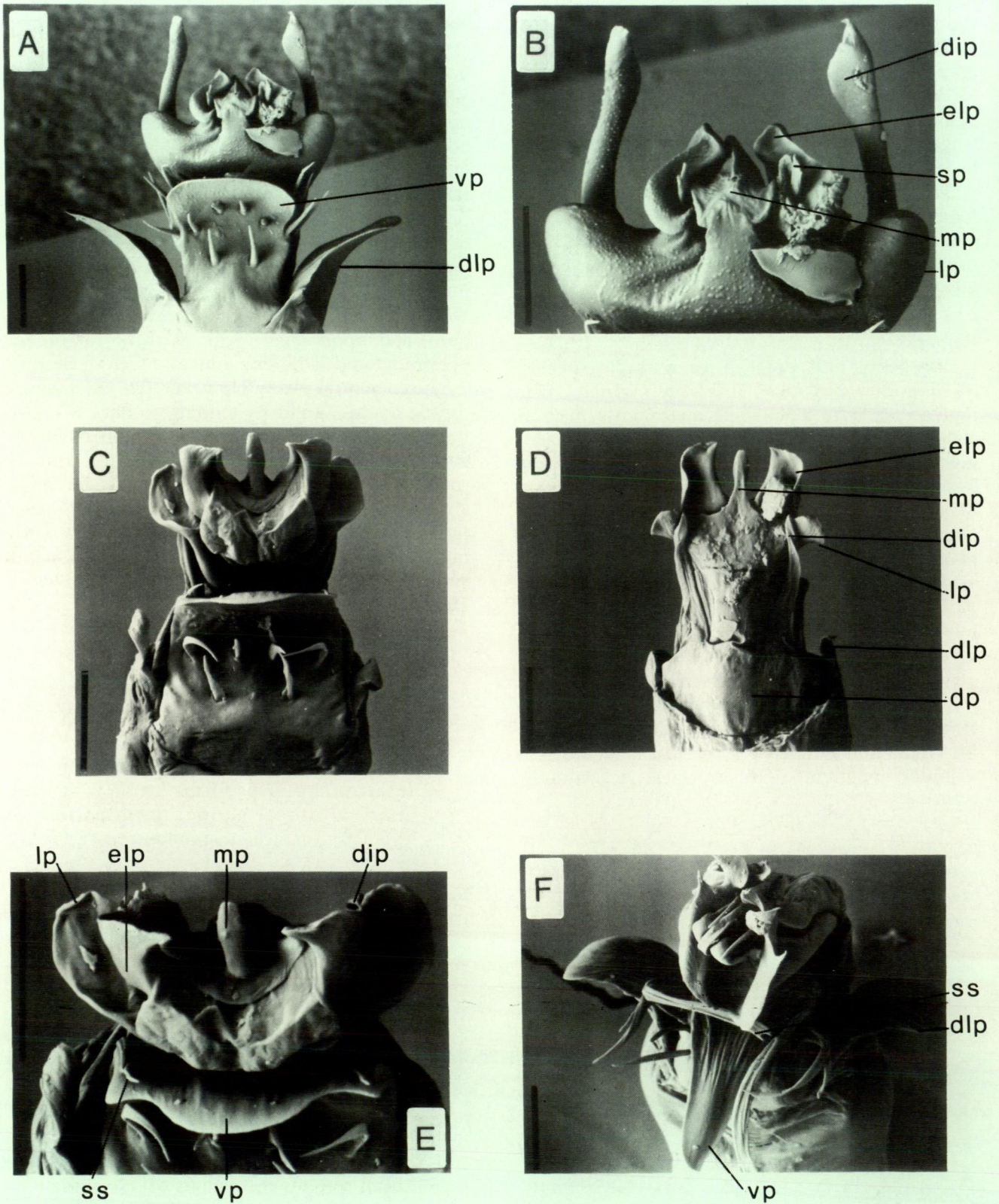
Figures 1-3

*Miobunus thoracicus* Roewer, 1915: 163; 1923: 629.

*Tasmanobunus constans* Hickman, 1958: 109-110,  
**new synonymy.**



**Figure 2** *Miobunus thoracicus* Roewer, holotype female: A, body, lateral; B, pedipalp, prolateral; C, ovipositor, distal. Scale bars: 1 mm (Fig. 1A), 0.1 mm (Figs 2B, C).



**Figure 3** *Miobunus* spp. male genitalia: A, B, *M. thoracicus* Roewer, ventral, ventral detail; C–E, *M. johnhickmani* sp. nov., ventral, dorsal, distoventral; F, *Chrestobunus spinularus* Roewer, distoventral (cf. E). Abbreviations: dip, distal process of dorsal plate; dlp, dorsolateral plate; dp, dorsal plate; elp, "ear-like" process; lp, lateral process; mp, mesial process; sp, spinous process; ss, superior seta. Scale bars: 100 $\mu$ m (Figs 3A, C, D, F), 50 $\mu$ m (Figs 3B, E).

**Material Examined***Holotype* of *M. thoracicus*

♀, Tasmania, Australia, no other data, Roewer collection no. 1186 (FIS).

*Holotype* of *T. constans*

♂, Mt Wellington, Tasmania, Australia, J.L. Hickman, 15 May 1956 (AM KS6969).

*Allotype* of *T. constans*

♀, same data as holotype (AM KS17752).

*Other Material*

**Australia: Tasmania:** Mt Wellington (Hickman collection at AM, KS24123–8, KS24131–3).

**Rediagnosis**

Body orange-brown, eyemound conical; tergal areas well defined by intertergal grooves and row of tubercles, lateral extensions of dorsal plate extend distal to stylus but do not overlap mesally, ventral plate not divided into lobes.

**Redescription***Male*

The following supplements Hickman's description of *T. constans*. Body. Pigmentation pattern as figured. Eyemound rising subvertically at or just behind anterior margin, with conical termination anterior to eyes, and sloping more gradually posteriorly. Anterior margin with 1–2 denticles on each side. *Pedipalp*. Femur spination includes single prodistal spine; size order fv1,2,3=4. Tarsal formula 3(2),5(3),4,4. *Penis*. Stylus complex distally with median part closely flanked by ear-like and spinous processes and with a large rounded lobe extending laterally beyond dorsal plate; ventral plate large with 4 inferior setae (most lateral inserted on margin) and 3 superior setae on each side; dorsolateral plates well developed; lateral extensions to dorsal plate extend distal to stylus, do not overlap mesally. Corpus with waist located at 0.25 corpus length.

*Female*

Similar to male except pedipalp less robust. Ovipositor as illustrated (Fig.).

**Remarks**

The species *T. constans*, as recognised by Hickman (1958), is widely distributed along eastern Tasmania. However, more than one cryptic species may be contained in Hickman's original material now housed in AM.

This species is known from eastern Tasmania.

*Miobunus forficula* sp. nov.

Figure 4

**Material Examined***Holotype*

♂, Hastings, Tasmania, Australia, 43°23'S, 146°51'E, leaf litter, closed forest outside King George V Cave, 31 October 1988. G.S. Hunt (AM KS19857).

**Diagnosis**

Eyemound rises abruptly from and somewhat overhangs anterior margin, equipped with short spine; pedipalp femur with row of 4–5 dorsal spines/denticles, most distal weak, spine ppl1 very strong, lateral extensions of dorsal plate of penis terminate beyond level of stylus, ventral plate 3-lobed.

**Description***Male*

*Body*. Pigmentation brown relieved by orange-yellow patches especially anteriorly; brown pigmentation of tergal areas largely unrelieved by pale patches though mesially tends to be lighter; pattern as figured. Sternites each with prominent band of dark brown pigmentation, lighter mesially. Eyemound rising from and slightly overhanging anterior margin, with small apical spine anterior to eyes, sloping more gradually posteriorly; eyes placed almost directly above anterior margin. Anterior margin with 3 denticles on each side, that above each pedipalp strongest. Scutal groove shallow; TA1–5 defined mesially by grooves, between TA4 and 5 extending more laterally and with reduced pigmentation; each TA mesially with setose granules; dorsum otherwise finely shagreened. Genital operculum rounded, without anterior projection, only extending anteriorly to level of coxa III and IV articulation; sternum narrow between coxae III, broad posteriorly. Prodistant tubercles on coxa I united into terminally bifurcate compound tubercle; bridging granules on posterior margin of coxa IV partially obscure spiracle. *Chelicerae*. Dorsal surface of basal article with small prodistal spine; distal article with 3–4 small prodorsal tubercles. *Pedipalps*. Dorsal surface of femur with 3–4 largeish spines curved forward at tip; spine fv1 simple, size order fv1,2,4,3=5; fpl1 moderately large, fpl2 reduced to tiny denticle; ppl1 and 2 small; tibia with 3 conspicuous retrolateral spines, spine trv2 strongest, trv3 smallest; tpv1 and 2 large, tpv3 reduced to small setose granule; tarsus with 3 large pro- and 3 retrolateral spines. *Legs*. Femur I slightly tuberculate ventrally in proximal half; claw IV with lateral prongs shorter than median prong; tarsal



**Figure 4** *Miobunus forficula* sp. nov., male: A, B, body, lateral, dorsal with pigmentation pattern; C, sternum and genital operculum; D, chelicera, retrolateral; E, femur and patella of pedipalp, prolateral; F, tibia and tarsus of pedipalp, ventral; G, H, male genitalia, ventral, lateral. Scale bars: 0.5 mm (Figs 4A, B), 0.2 mm (Figs 4C, D), 0.1 mm (Figs 4E–H).

formula 3(2),4(2),4,4. *Penis*. Stylus complex distally with median part and flanking processes; ventral plate with mediolateral lamina carrying pair of central inferior setae and a distolateral lamina on each side carrying 3 setae (probably superior setae homologues), total of 7 setae on each side, median notch lacking, dorsolateral plates small; dorsal plate with long spine-like extensions which overlap

distally resembling an earwig's forceps. Corpus largely lost in dissection.

*Female*

Unknown.

**Distribution**

Hastings Caves area, Tasmania.

**Etymology**

The specific epithet refers to the shape of the dorsal plate which resembles an earwig's forceps.

***Miobunus mainae* sp. nov.**

Figure 5

**Material Examined***Holotype*

♂, Olga Camp, Gordon River, Tasmania, Australia, 19 February 1976, J.L. Hickman and P.J. Suiter (AM KS28187).

*Paratypes*

**Australia: Tasmania:** 3♂, 3♀, Gordon River, 11 February 1976, J.L. Hickman and P.J. Suiter (AM KS24370).

**Diagnosis**

Eyemound rises vertically from anterior margin and with short spine; pedipalp femur with about 4–5 dorsal spines; most distal strong, spine pp11 very strong, lateral extensions of dorsal plate of penis overlap distally but terminate well short of stylus, ventral plate not divided into lobes.

**Description***Male*

*Body.* Overall colour orange yellow, darker individuals with brown pigmentation as figured, lighter than in *T. constans*. Eyemound rising from and slightly overhanging anterior margin, with small apical spine anterior to eyes, sloping more gradually posteriorly; eyes placed slightly posterior to anterior margin. Anterior margin with 2–3 denticles on each side. Scutal groove shallow; TA1–5 defined mesially by grooves, that between TA4 and 5 extending more laterally and with reduced pigmentation; each TA mesially with setose granules; dorsum otherwise finely shagreened. Genital operculum very thick posteriorly with heavily sclerotised granular rim; with short anterior projection reaching to level of coxa III and IV articulation; sternum narrow between coxae III, broad posteriorly; genital operculum somewhat pointed anteriorly. Prodistal tubercles on coxa I united into terminally bifurcate compound tubercle; bridging granules on posterior margin of coxa IV partially obscure spiracle. *Chelicerae.* Dorsal surface of basal article with small prodistal spine; distal article with 3–4 small prodorsal tubercles. *Pedipalps.* Dorsal surface of femur with 4 large spines, most distal large; spine fv1 simple, size order fv1=2,4,3=5, small additional spine usually between fv1 and 2; fpl1 moderately large, fpl2

reduced to tiny denticle; pp11 very large, 2 very small; tibia with 3 retrolateral spines, spine trv2 strongest, trv3 smallest; tpv1 and 2 large, tpv3 reduced to small setose granule; tarsus with 3 large pro- and 3 retrolateral spines. *Legs.* Femur I tuberculate ventrally in proximal half; tibia I robust and strongly granulate dorsally and ventrally; claw IV with lateral prongs shorter than median prong; tarsal formula 3(2),5(3),4,4. *Penis.* Stylus complex distally with median part and 3 pairs of flanking processes, more ventral pair larger, middle pair spine-like; ventral plate with lamina carrying pair of central inferior setae and 6 other setae on each side (it is difficult to distinguish superior and inferior setae but there are probably 3 and 4 pairs respectively), median notch lacking, dorsolateral plates small; lateral extensions to dorsal plate overlap distally as in *T. forficula* but relatively much shorter and stouter. Corpus waist at 0.12 its length.

*Female*

Similar to male except pedipalps less robust. Tarsal formula 3(2),4–5(2–3),4,4.

**Distribution**

South-west Tasmania.

**Etymology**

The specific epithet acknowledges the enthusiasm with which Dr Barbara York Main has promoted the study of arachnology in Australia. She encouraged my interest in harvestmen when, as a keen but naive undergraduate, I visited her home in Perth some 30 years ago.

***Miobunus johnhickmani* sp. nov.**

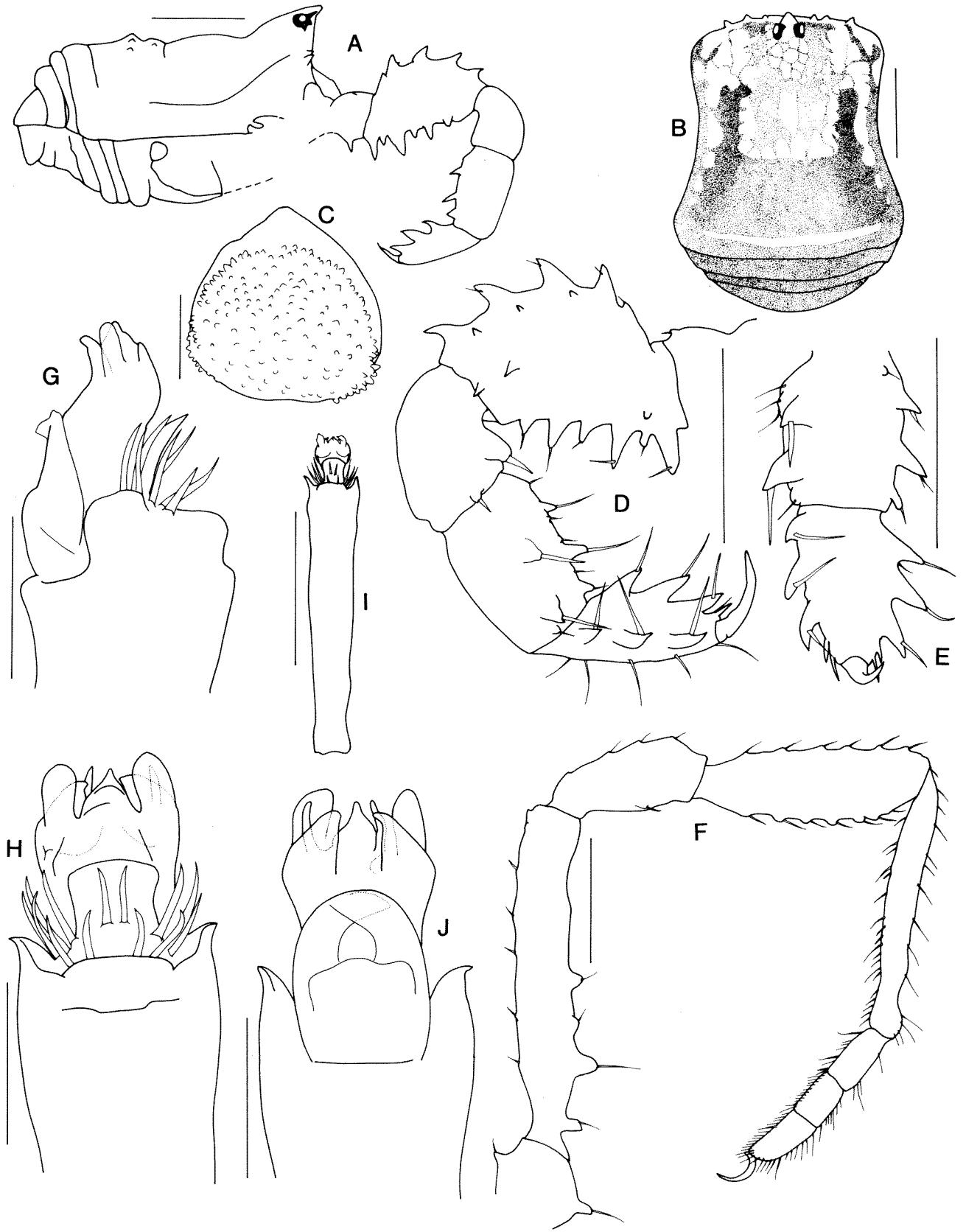
Figures 3, 6

**Material Examined***Holotype*

♂, Bubs Hill, about 30km SE Queenstown, Tasmania, Australia, 42°11'S, 145°57'E, ex litter outside Thylacine Den Cave, 1 November 1988, G.S. Hunt, (AM KS19882).

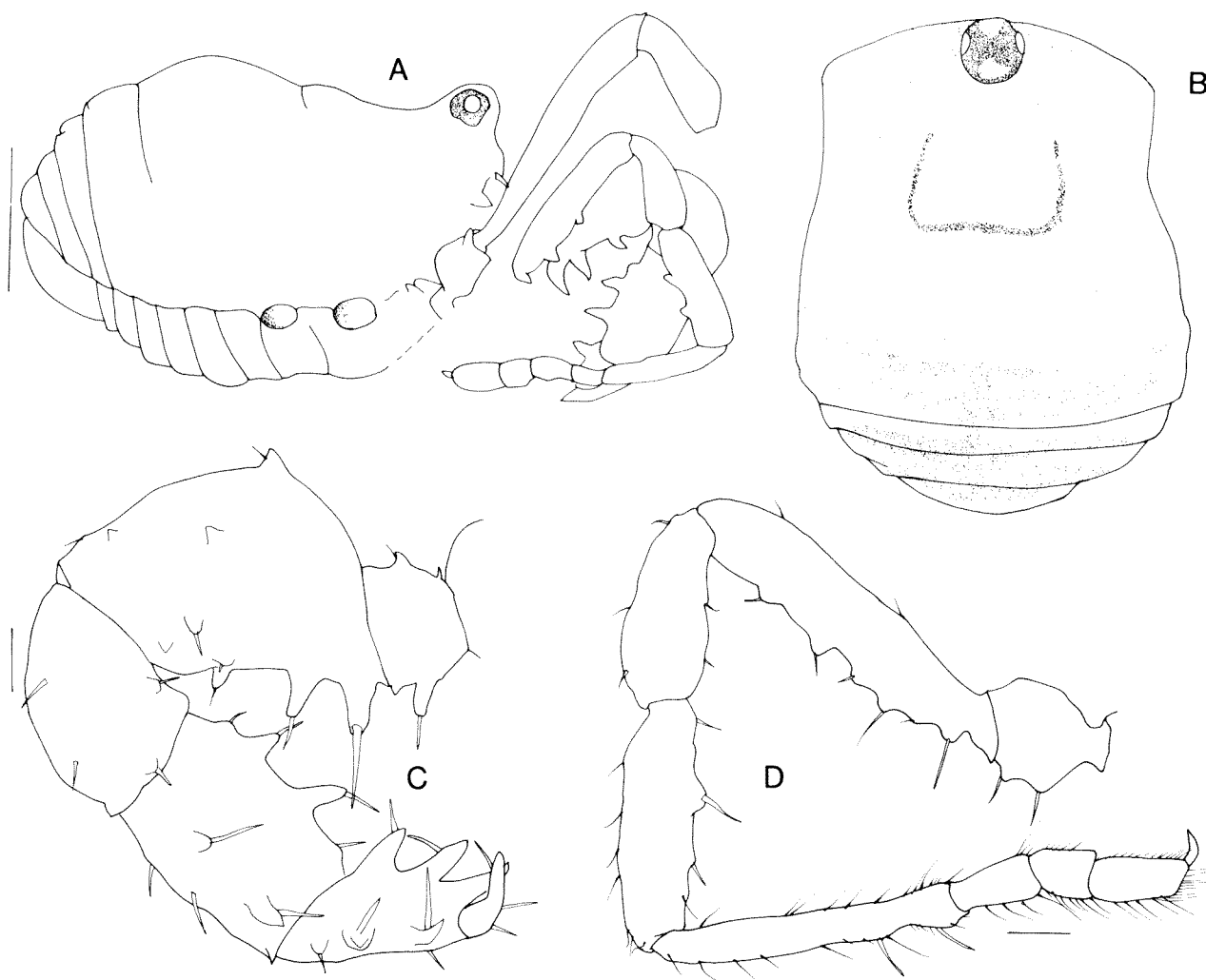
*Paratypes*

**Australia: Tasmania:** 3♂, same data as holotype (AM KS40651); 6♀, same data (AM KS40652); 2♂, Jacks Track, Strathgordon, 42°26'S, 146°03'E, rainforest, 28 April 1987, R. Raven and T. Churchill, (QM S21641); 7♀, same data (QM S1712); 1♀, SW Tasmania, 13 February 1976, C. Howard and party (AM KS28509); 1♂, 2♀, SW Tasmania, 28 January 1978, C. Howard (AM KS24380).



**Figure 5** *Miobunus mainae* sp. nov., male: A, B, body, lateral, dorsal with pigmentation pattern; C, genital operculum; D, pedipalp, prolateral; E, tibia and tarsus of pedipalp, ventral; F, leg I, retrolateral; G, J, male genitalia, lateral, ventral, entire ventral, dorsal. Scale bars: 0.5 mm (Figs 5A, B, D, F, I), 0.1 mm (Figs 5C, G, H, J).





**Figure 6** *Miobunus johnhickmani* sp. nov., male: A–B, body, lateral, dorsal with pigmentation pattern; C, pedipalp, prolateral; D, leg I. Scale bars: 1 mm (Figs 6A, B), 0.1 mm (Figs 6C, D).

### Diagnosis

Orange-brown, scute without conspicuous granules on anterior margin or free tergites; pedipalp femur with only 1 dorsal spine; 6 segmented tarsus II.

### Description

#### Male

**Body.** Overall colour of body orange with areas of brown pigmentation, carapace and flanks of tergites largely orange; pattern as figured. Sternites each with prominent band of dark brown pigmentation, darker mesially. Eyemound rising steeply from just behind anterior margin, rounded apically and sloping more gradually posteriorly. Anterior margin without denticles. Scutal groove shallow; TA1–5 faintly defined by colour pattern; groove between TA4 and 5 clearly visible as area of reduced pigmentation; each TA mesially without obvious setose granules; dorsum otherwise finely shagreened. Genital operculum rounded, without anterior projection, only extending anteriorly to level

of coxa III and IV articulation; sternum narrow between coxae III, broad posteriorly. Prodistal tubercles on coxa I united into terminally bifurcate compound tubercle; bridging granules on posterior margin of coxa IV partially obscuring spiracle. **Chelicerae.** Dorsal surface of basal article without prodistal spine. **Pedipalps.** Dorsal surface of femur with 1 spine; spine fv1 simple, size order fv1,2,3; fpl1 moderately large, fpl2 reduced to small denticle; ppl1 and 2 small; tibia with 2 conspicuous retrolateral spines, spine trv3 strongest, trv1 and 4 small; tpv2 and 3 conspicuous, tp1 and 4 not seen, tarsus with 3 large pro- and 3 retrolateral spines. **Legs.** Femur and tibia I tuberculate ventrally; claw IV with lateral prongs shorter than median prong; tarsal formula 3(2),6(3),4,4. **Penis.** Stylus very complex distally with median part finger-like and apparently without flanking spines; ventral plate with 3 inferior and apparently only 2 superior setae; dorsolateral plates weak and tongue-like; inferred homologies with penis of *M. thoracicus* as figured (cf. Figs 3B and E).

*Female*

Similar to male except pedipalps much less robust.

**Variation**

Some individuals have a small granule at apex of eyemound.

**Remarks**

This species is an unusual member of the genus in having 6 segments in tarsus II, 3 pairs of inferior and 2 pairs of superior setae on the ventral plates and apparent absence of terminal flanking spines on stylus. However, I consider that the general structure of the penis, structure of the eyemound, scute and pedipalp places it in *Miobunus*.

This species is known only from south-west Tasmania.

**Etymology**

The specific epithet acknowledges the work that Dr John Hickman, formerly of University of Tasmania, has done in the study and documentation of Tasmanian invertebrates. His fieldwork was invaluable to the taxonomic work on harvestmen of his father, Prof. V.V. Hickman, and some of the type material of this species was collected on a major survey of south-west Tasmania co-ordinated by him.

**ACKNOWLEDGEMENTS**

An Australian Biological Resources Study grant supported this research. Sue Lindsay provided the SEMs and Roger Springthorpe the inked figures and figure layouts.

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*Manuscript received 10 March 1994; accepted 27 June 1994.*