

Unusual new water mites (Acari: Hydracarina) from Australia, Part 1

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Abstract – The following new water mites are described from Australia: *Austrolimnochares* gen. nov. (Limnocharidae: Rhyncholimnocharinae), with the type and only included species *Paralimnochares womersleyi* Lundblad from southeastern Australia; *Pontarachna otto* sp. nov. (Pontarachnidae) from northeastern Australia; *Thryptaturus* gen. nov. (Aturidae: Notoaturinae) for *T. boultoni* sp. nov. (type species) from northeastern New South Wales and *T. abnormis* sp. nov. from southwestern Australia; *Austromonomia* gen. nov. for *A. grownsae* sp. nov. (Momoniidae: Momoniinae) from northeastern New South Wales; *Hesperomonomia* gen. nov. (Momoniidae: Momoniinae) for *H. humphreysi* sp. nov. from Western Australia; and *Tiramideopsis lictus* sp. nov. (Mideopsidae: Mideopsellinae) from northwestern Australia. Most of the described taxa represent groups with Gondwanan origins and most were collected from rheophilic or hyporheic habitats.

INTRODUCTION

The water mite fauna of Australia is quite well known at the familial and generic levels, thanks largely to the work of Cook (1986) who named numerous taxa and established a benchmark in our knowledge of the hydracarine fauna of the continent. Although additional genera have since been added, most specimens submitted to me for identification are readily attributable to a described genus. However, some recently collected specimens cannot be so easily placed, and either belong to demonstrably new genera or to genera that have not yet been recorded from Australia. The purpose of this paper is to provide names for several genera and species recently discovered in collections. These names are required to facilitate the completion of a key to Australian water mite families and genera currently being produced by the author.

Specimens are lodged in the Western Australian Museum, Perth (WAM), the Museum of Tropical Queensland, Townsville (MTQ) and the Australian Museum, Sydney (AM) and have been mounted on slides in Hoyers fluid. Most nomenclature follows Cook (1974), with the exception of the pedipalp and leg segments which follows Harvey (1996).

SYSTEMATICS

Family Limnocharidae Grube

Subfamily Rhyncholimnocharinae Lundblad

Remarks

The limnocharid subfamily Rhyncholimno-

charinae has a largely Gondwanan distribution with apparently subsequent incursions into the Nearctic region, with 12 species in the New World (K.O. Viets 1987) ranging from North America south to Argentina, and a sole species in southeastern Australia. Although originally placed in two separate genera, *Rhyncholimnochares* Lundblad and *Paralimnochares* Lundblad, Cook (1974) regarded the latter as a subgenus of the former, differing solely in the morphology of the pedipalp: in *R. (Paralimnochares)* the terminal segment (tarsus) is of moderate size and terminally situated, and in *R. (Rhyncholimnochares)* the terminal segment is greatly reduced and subterminally situated. For this reason, the sole Australian rhyncholimnocharine, *R. womersleyi* (Lundblad) has been placed in *Paralimnochares* as it bears the relatively unmodified condition of a terminal, moderately sized tarsus. However as noted by Cook (1980, 1986), the Australian species differs from the other two species of *Paralimnochares* in a number of ways. In particular, in *R. womersleyi* the pedipalpal femur-patella is curved dorsally and is either completely separate from the tibia (Cook 1986, fig. 15; Harvey 1990a, fig. 20) or occasionally partially fused with the tibia (Cook 1986, fig. 13), but it is straight or curved ventrally and is always fused with the tibia in the American species of *Rhyncholimnochares*. In addition, the pedipalpal tarsus of *R. womersleyi* is much longer than wide, whereas it is globular or only slightly longer than wide in the other *Rhyncholimnochares*. For these reasons, it is clear that *R. womersleyi* cannot be included within *Rhyncholimnochares* and a new genus is proposed here.

With the removal of the Australian species from *Rhyncholimnochares*, there seems to be little support for the retention of the subgenus *Paralimnochares* which now contains two species, *R. sursumhians* Lundblad 1937 [redescribed by Lundblad (1941)] from Brazil and *R. mexicana* Cook 1980 from Mexico. As noted above, *Paralimnochares* differs from the nominate subgenus only by the size and position of the pedipalpal tarsus which is slightly longer than broad and situated somewhat distally on the tibia. These features appear to be plesiomorphic when compared with *Rhyncholimnochares* in which the tarsus is reduced even further in size, often to a small nubbin bearing one or more terminal setae. The latter, apomorphic condition appears to render *Paralimnochares* paraphyletic and there seems to be little to recommend the retention of two separate subgenera within the genus. However, synonymy of *Paralimnochares* should be undertaken in conjunction with a broader review of the American rhyncholimnocharines, which is beyond the scope of the present study.

Genus *Austrolimnochares* gen. nov.

Type Species

Paralimnochares womersleyi Lundblad 1952.

Diagnosis

Adult

Idiosoma with long, tubular extension bearing the capitulum; without dorsal platelets. Pedipalp: femur-patella curved dorsally, sometimes partially fused with tibia; tarsus several times longer than broad. Mouth opening dorsally, surrounded by ring of setae. Ocular plate with 4 pairs of setae, 2 pairs on anterior protuberance, and 2 pairs just behind posterior eyes. Excretory pore not surrounded by sclerotised ring. Legs without swimming setae; claws simple.

Remarks

The two genera of Rhyncholimnocharinae can be distinguished by the following key:

1. Pedipalpal femur-patella curved dorsally, sometimes partially fused with tibia; pedipalpal tarsus several times longer than broad *Austrolimnochares* gen. nov.
Pedipalpal femur-patella straight; tibia and tarsus apparently fused; pedipalpal tarsus much reduced, only slightly longer than broad *Rhyncholimnochares* Lundblad

Etymology

The generic name is derived from the Latin stem

for south, and the generic name *Limnochares*. Gender: feminine.

Austrolimnochares womersleyi (Lundblad), comb. nov.

Paralimnochares womersleyi Lundblad 1952: 23, figs 1, 2a-e; K. Viets 1956: 46.

Rhyncholimnochares (*Paralimnochares*) *womersleyi* (Lundblad): Cook 1986: 10, figs 13, 15-17; K.O. Viets 1987: 680.

Rhyncholimnochares womersleyi (Lundblad): Harvey 1990a: 490-492, figs 9, 18-25.

Material Examined

In addition to those specimens examined by Lundblad (1952), Cook (1986) and Harvey (1990a), the following can be added:

Australia: Tasmania: 1 adult, Baldy Creek, headwater region, Buckland Military Training Area [GR 656993], 15 April 1991, P. Horwitz (WAM).

Remarks

Austrolimnochares womersleyi inhabits streams and rivers in southeastern Australia including Tasmania, and has been collected as far north as southern Queensland (Harvey 1990a, figure 9). This species has been described and illustrated by Lundblad (1952), Cook (1986) and Harvey (1990a).

Family Pontarachnidae Koenike

Genus *Pontarachna* Philippi

Pontarachna Philippi, 1840: 191.

Type Species

Pontarachna punctulum Philippi, 1840, by monotypy.

Pontarachna ottoi sp. nov.

Figures 1-8

Material Examined

Holotype

♂, Magnetic Island, Queensland, Australia, 19°08'S, 146°50'E, 2 March 1997, coral sand, J.C. Otto (MTQ).

Diagnosis

Adult male

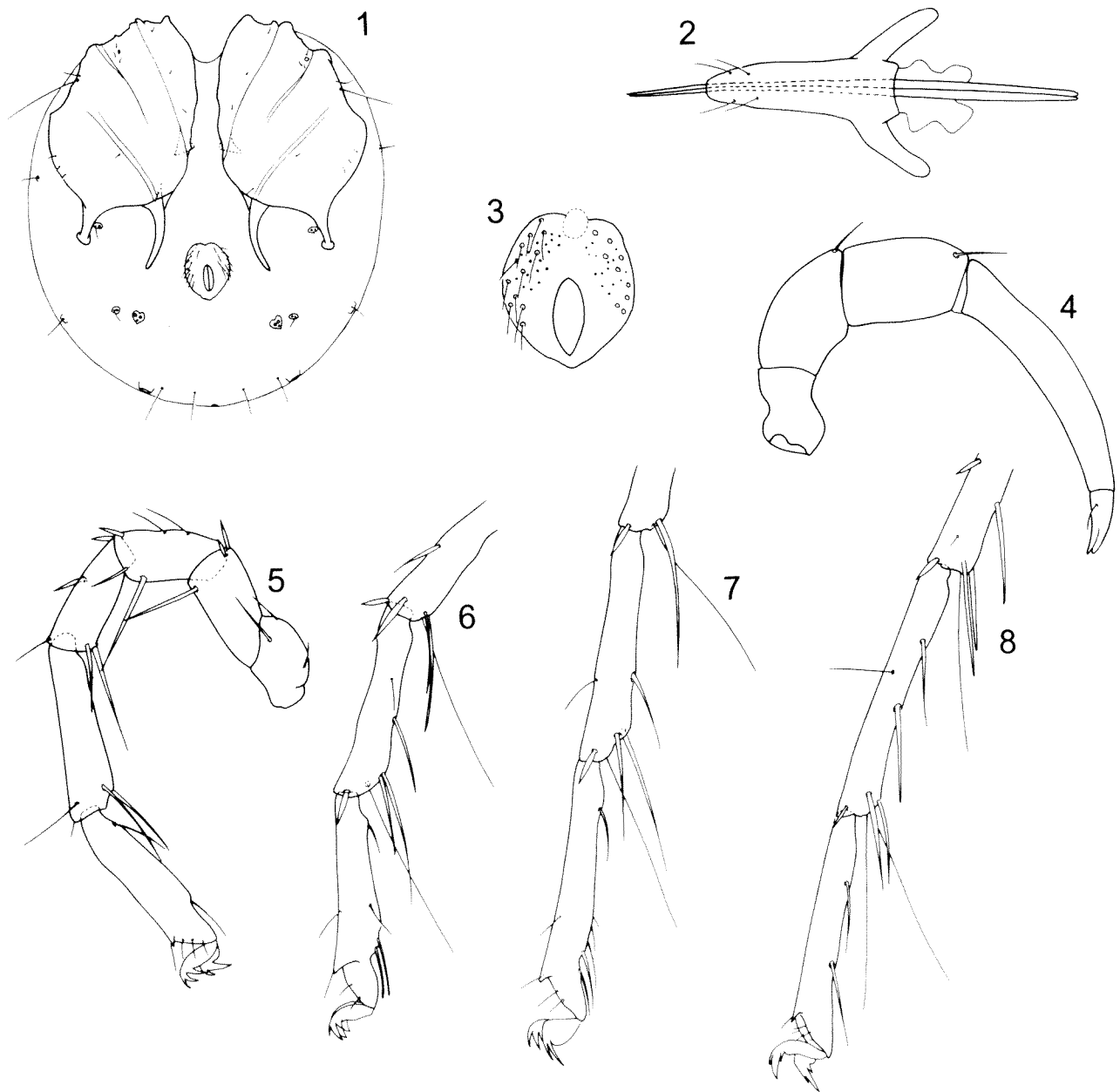
Genital field with fully sclerotised ring bearing 21 setae mostly in anterior half; gonopore situated sub-posteriorly; pedipalpal tibia elongate, 6.8 times longer than deep.

Description

Adult male

Integument soft, dorsalia, dorsal shield and ventral shields lacking; venter with several pairs of glandularia, as well as a pair of 'acetabula' (*sensu* Cook 1996) set in heart-shaped platelets situated posterolaterally to genital field; excretory pore situated terminally and without associated sclerotisation. Coxae (Figure 1) finely pitted; coxae fused on their respective sides, but completely separated medially; medial margin of coxa I slightly rounded and irregularly crenulate; suture line between coxae I and II not extending to posterior margin of coxae; suture lines between

coxa II and III not reaching medial margin of coxae; coxa line between coxa III and IV extending onto narrow curved apodemes; coxa IV with lateral apodeme extending posteriorly from posterolateral corner of coxa IV, terminating in small 'club'; ventroglandularium I situated on posterior margin of coxa II. Genital field (Figure 3): with fully sclerotised ring bearing 21 setae mostly situated in anterior half; gonopore situated sub-posteriorly; 'acetabula' (*sensu* Cook 1996) apparently absent. Capitulum (Figure 2): chelicera styliform. Pedipalp (Figure 4): femur and patella each with single, acuminate disto-dorsal setae; tibia gently curved and elongate, 6.8 times longer than deep and 2.11 times longer than patella. Legs (Figures 5-8):



Figures 1-8 *Pontarachna ottoi* sp. nov., holotype ♂: 1, ventral; 2, capitulum and chelicerae; 3, genital field; 4, right pedipalp; 5, right leg I; 6, distal segments of right leg II; 7, distal segments of right leg III; 8, distal segments of right leg IV.

ventral setae of tibiae and metatarsi I long; all tarsi with dorso-distal pointed process and with concave ventral margins; swimming hairs present on legs III and IV, distributed as follows: tibia III, 1; metatarsus III 2; tibia IV 1; metatarsus IV 2; claws of all legs of similar size, and with ventral clawlets.

Dimensions (μm): Idiosoma ca. 320/280. Genital field 42/38. Chelicera: 134. Pedipalp: trochanter 22, femur 38, patella 36, tibia 76, tarsus 16. Leg I: trochanter 38, femur 49, patella 48, tibia 50, metatarsus 74, tarsus 76. Leg IV: trochanter 67, femur 64, patella 60, tibia 70, metatarsus 97, tarsus 108.

Remarks

Pontarachna otto most closely resembles *P. capensis* Lohmann which was described from Simonstown, Cape Province, South Africa (Lohmann 1909), especially in the morphology of the male genital field (see Walter 1925: fig. 16) and the elongate pedipalpal tibia (see Walter 1925: fig. 14). In both species the male genital field bears approximately 20 setae situated on a sclerotised ring and the gonopore is usually situated close to the posterior edge of the genital field. In all other *Pontarachna* species the male genital field bears more than 25 setae and the gonopore is either central or anteriorly situated. Both *P. capensis* and *P. otto* possess an elongate pedipalpal tibia which is more than two times longer than the patella and is more than six times longer than deep.

Pontarachna otto differs primarily from *P. capensis* in the morphology of the pedipalpal tibia, which is 6.8 times longer than deep in the Australian species and 6.0 times longer than deep in the South African species.

Etymology

The specific epithet honors Jürgen Otto, collector of the holotype.

Family Aturidae Thor

Subfamily Notoaturinae Besch

Genus *Thryptaturus* gen. nov.

Type Species

Thryptaturus boultoni sp. nov.

Diagnosis

Adult

Dorsal shield divided into 12 platelets, with paired antero-medial platelet (bearing postocularia), posterior platelet (bearing 3 pairs of glandularia), a small central platelet, and 4 pairs of lateral platelets (3 of these bearing glandularia).

Pedipalpal femur with or without ventral projections; tibia somewhat expanded, with paired ventral setae placed medially. Posterior margin of coxa IV transverse.

Description

Adult

Colour generally pale. Lateral and median eyes present as subcuticular black spots, but reduced in size. Dorsal and ventral shields present. Dorsal shield divided into 12 platelets, with paired antero-medial platelet (bearing postocularia), posterior platelet (bearing 3 pairs of glandularia), a small central platelet, and 4 pairs of lateral platelets (3 of these bearing glandularia). Ventral shield entire; coxae without parallel, longitudinal ridges; posterior margin of coxa IV transverse. Genital field bearing several pairs of acetabula, these borne on lateral margin of ventral shield in male and medially in female; male genital field cleft medially and somewhat setose. Pedipalps: femur with or without ventral projections; tibia somewhat expanded, with paired ventral setae placed medially.

Remarks

Thryptaturus differs from all previously described members of the Notoaturinae by the division of the dorsal shield into 12 platelets (Figures 9, 16), which has been largely achieved by the division of the antero-lateral platelet into three smaller platelets, and the addition of a small central platelet which lacks glandularia. The only other notoaturine with one or more central platelets is *Notoaturus* Besch from South America (Cook 1988) which differs from *Thryptaturus* in the possession of a pair of glandularia on this platelet. Despite the possession of 12 platelets in the dorsal shield, the genus still conforms to the general pattern found in most of the Australian Notoaturinae, as outlined by Cook (1986).

It further differs from other notoaturines in the morphology of the male genital field which is cleft medially, with the acetabula situated on the lateral margins of the genital field (Figure 11).

Etymology

The generic name alludes to the dorsal shield which is divided into numerous platelets (*thrypto*, Greek, break) and is combined with the stem genus *Aturus*. Gender: masculine.

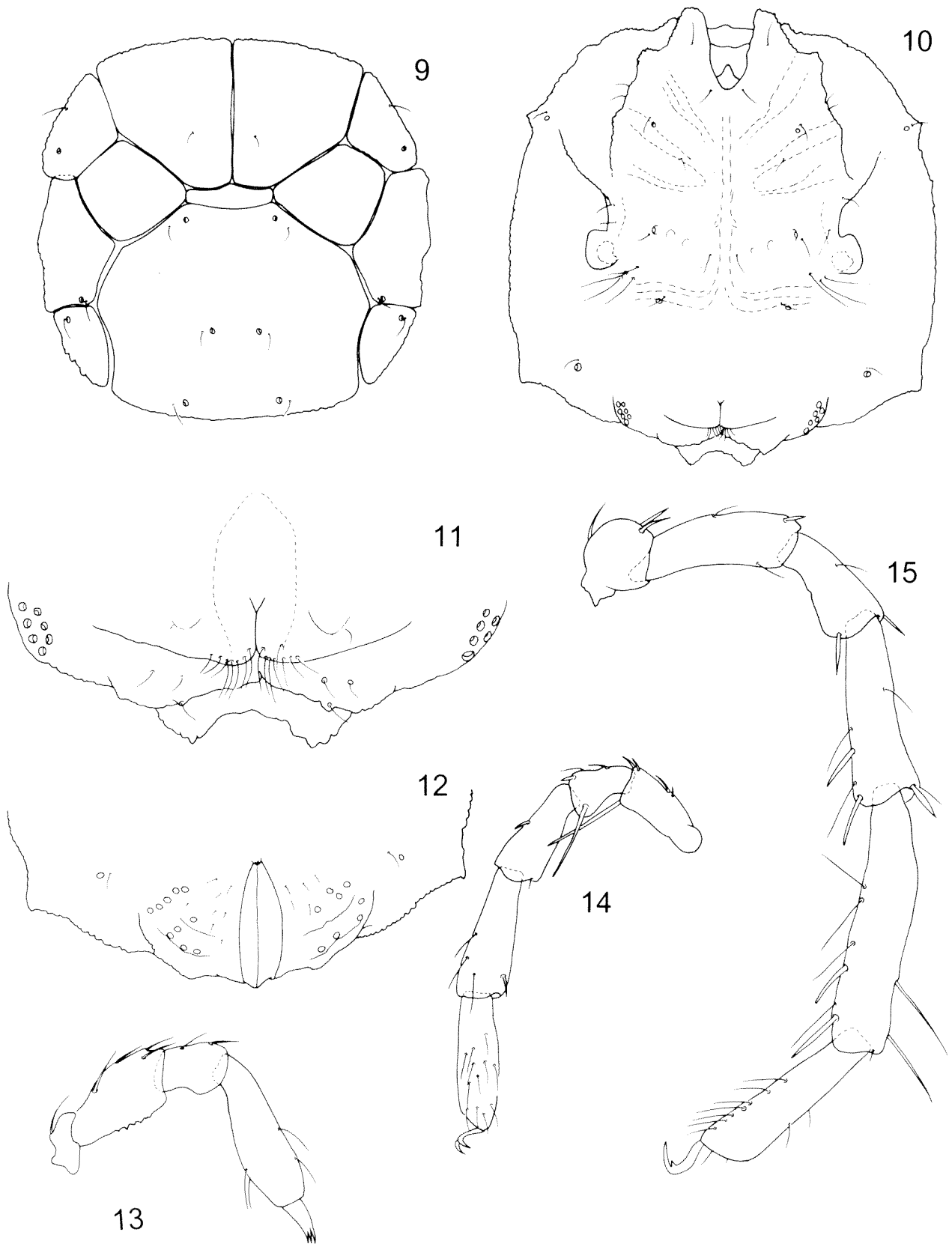
Thryptaturus boultoni sp. nov.

Figures 9–15

Material Examined

Holotype

♂, Never Never River, Tallowood Road turnoff,



Figures 9–15 *Thryptaturus boultoni* sp. nov., holotype ♂, unless state otherwise: 9, dorsal shield; 10, ventral shield; 11, genital field; 12, genital field, paratype ♀; 13, pedipalp; 14, left leg I, without trochanter; 15, left leg IV.

New South Wales, Australia, 30°21'41"S, 152°54'14"E, 30 cm deep well, 21 November 1997, J. Foster, P. Lisle, A. Boulton (AM).

Paratype

Australia: New South Wales: 1 ♀, same data as holotype except hyporheos #4, 4 October 1997, A. Boulton, J. Grouns (AM).

Diagnosis

Adult

Thryptaturus boultoni differs from *T. abnormis* in its larger size (dorsal shield of *T. boultoni* 400 µm (♂), 415 µm (♀), vs. ♀ *T. abnormis* 358 µm), the very narrow median platelet, possession of lateral conical protuberances on the ventral shield, and the slightly different positions of the dorsoglandularia.

Description

Adult

Dorsal shield (Figure 9) divided into 12 platelets, with paired antero-medial platelet (bearing postocularia), antero-lateral platelet divided into a postero-lateral platelet, a postero-medial platelet and a small central platelet. Dorsal shield with 6 pairs of glandularia distributed as follows: 1 pair on antero-lateral platelet, 1 pair on lateral platelet, 1 pair on postero-lateral platelet, and 3 pairs on postero-medial platelet. Lateral and median eyes present as subcuticular black spots, but greatly reduced in size. Ventral shield (Figure 10): glandularium vg1 situated near posterior margin of coxa II; coxae without parallel, longitudinal ridges; posterior margin of coxa IV transverse; openings of leg IV covered by small ventral lobes; posterior margin with several projections; lateral conical protuberances present. Genital field of male (Figure 11) terminally situated and cleft medially; bearing several pairs of acetabula situated on lateral margin of ventral shield; several pairs of setae situated medially. Genital field of female (Figure 12) subterminal; bearing 8–10 pairs of acetabula situated medially on ventral shield. Capitulum not unusual; chelicera 2 segmented. Pedipalp (Figure 13): femur with several small ventral projections; patella without small rounded ventral projection; tibia somewhat expanded, with paired ventral setae placed medially. Legs (Figs 13–14): without swimming setae; claws with small ventral clawlets.

Dimensions (mm), holotype ♂ (paratype ♀): Dorsal shield 400/416 (415/435). Ventral shield 460/226 (493/440). Pedipalp: trochanter 29 (29), femur 58 (58), patella 32 (35), tibia 75 (73), tarsus 23 (22). Leg I: trochanter ? (?), femur 65 (?), patella 45

(?), tibia 64 (?), metatarsus 84 (?), tarsus 77 (?). Leg IV: trochanter 54 (61), femur 107 (92), patella 77 (61), tibia 119 (96), metatarsus 160 (118), tarsus 119 (93).

Remarks

Thryptaturus boultoni has been collected from a single stream in northeastern New South Wales.

Etymology

The specific epithet is in honor of Andrew Boulton for his endeavors in understanding hyporheic ecosystems.

Thryptaturus abnormis sp. nov.

Figures 16–19

Material Examined

Holotype

♀, Carey Brook, Western Australia, Australia, 34°22'03"S, 115°56'00"E, July 1993, K. Trayler (WAM 97/3151).

Diagnosis

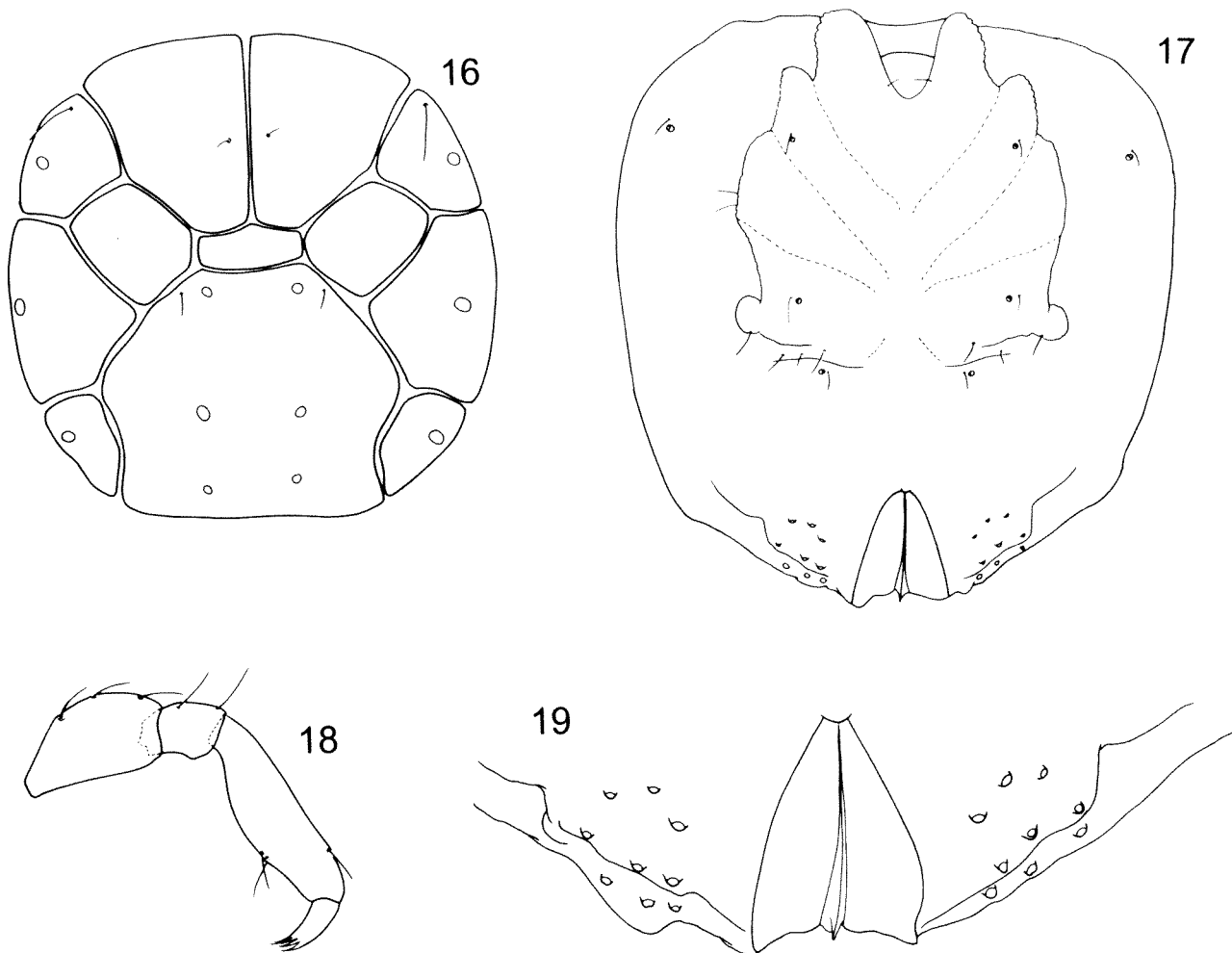
Adult female

Thryptaturus abnormis differs from *T. boultoni* in its smaller size (dorsal shield of ♀ *T. abnormis* 358 µm, vs. ♂ *T. boultoni* 400 µm), the shape of the median platelet, lack of lateral conical protuberances on the ventral shield, and the slightly different positions of the dorsoglandularia.

Description

Adult female

Dorsal shield (Figure 16) divided into 12 platelets, with paired antero-medial platelet (bearing postocularia), antero-lateral platelet divided into a postero-lateral platelet, a postero-medial platelet and a small central platelet. Dorsal shield with 6 pairs of glandularia distributed as follows: 1 pair on antero-lateral platelet, 1 pair on lateral platelet, 1 pair on postero-lateral platelet, and 3 pairs on postero-medial platelet. Lateral and median eyes present as subcuticular black spots, but reduced in size. Ventral shield (Figure 17): glandularium vg1 situated near posterior margin of coxa II; coxae without parallel, longitudinal ridges; posterior margin of coxa IV transverse; openings of leg IV covered by small ventral lobes. Genital field (Figure 19) subterminal; bearing 9 pairs of acetabula situated on ventral shield. Capitulum not unusual; chelicera 2 segmented. Pedipalp (Figure 18): femur without ventral projections; patella with small rounded ventral projection; tibia somewhat



Figures 16–19 *Thryptaturus abnormis* sp. nov., holotype ♀: 16, dorsal shield; 17, ventral shield; 18, right pedipalp, without trochanter; 19, genital field.

expanded, with paired ventral setae placed medially. Legs: without swimming setae; claws with ventral clawlets.

Dimensions (μm): Dorsal shield 358/349. Ventral shield 428/407. Pedipalp: trochanter 21, femur 61, patella 34, tibia 79, tarsus 26. Leg I: trochanter 58, femur 58, patella 35, tibia 48, metatarsus 70, tarsus 74. Leg IV: trochanter 61, femur 80, patella 58, tibia 86, metatarsus 106, tarsus 83.

Remarks

Thryptaturus abnormis has been collected from a stream in southwestern Australia, and is currently known from only a single specimen. This specimen is very pale, and the absence of setae associated with the dorsoglandularia could not easily be explained. Further specimens are required to determine the position of these setae.

Etymology

The specific epithet refers to the unusual dorsal shield (*abnormalis*, Latin, departing from the rule).

Family Momoniidae K. Viets

Subfamily Momoniinae K. Viets

Genus *Hesperomomon* gen. nov.

Type Species

Hesperomomon humphreysi sp. nov.

Diagnosis

Adult

Dorsal shield divided into equal-sized anterior and posterior platelets (Figures 20, 22). Dorsoglandularia lacking the gland bearing portion of the glandularia (Figures 20, 22). Ventral shield of males and females undivided (Figures 21, 23). Genital field bearing 3 pairs of acetabula, these borne in gonopore of male (Figure 26), and borne on small plates on either side of gonopore of female (Figure 27).

Description

Adult

Colour generally pale. Eye-spots present but

greatly reduced. Dorsal and ventral shields present. Dorsal shield divided into anterior and posterior platelets of approximately equal size; anterior platelet of dorsal shield bearing postocularia and 2 pairs of setae (lg2, dg3); posterior platelet bearing 3 pairs of setae (dg4, dg5, lg5); dorsal shield flanked by 4 pairs of lateral platelets, and 3 pairs of small platelets bearing glandularia (dg2, lg3, lg4), as well as 1 (δ) or 3 (♀) platelets which lack glandularia. Ventral shield entire in both sexes, with no evidence of suture lines; clear patch of integument present lateral to coxae IV. Coxal plates completely fused, with median suture lines obliterated. Glandularium vg1 situated on posterior margin of coxa II; vg2 situated posterior to coxa IV lateral to genital field. Genital field bearing 3 pairs of acetabula, these borne in gonopore of male, and borne on small plates on either side of gonopore of female. Pedipalps: tibia with 1 prominent ventral seta borne on prominent tubercle; tarsus with thick, claw-like terminal seta. Leg I with elongate metatarsus, and highly modified tarsus I typical of the family.

Remarks

Cook (1974) recognised three subfamilies of Momoniidae, Momoniinae, Stygomomoniinae and Momonidinae, and a further two subfamilies, Cladomomoniinae and Cyclomomoniinae, were added by Orghidan and Gruia (1980, 1983) and Smith (1989a), respectively. Smith (1989a) and Harvey (1990b) noted that the sole species of Cladomomoniinae, *Cladomomoniamirifica* Orghidan and Gruia from Cuba, lacks the synapomorphic character states of the Momoniidae and was effectively excluded from the family.

Of the four subfamilies currently recognised, three include only a single genus and the fourth, the Momoniinae, contains five genera: *Momoniam* Halbert from the Holarctic region, *Neomomoniam* Cook and *Partidomomoniam* Cook from Australia and New Zealand, *Notomomoniam* Cook from Chile, and the widespread *Momoniella* K. Viets (west Africa, Indonesia, Australia, New Zealand and Chile). However, the monophyly of this widespread and disjunct subfamily has been questioned by Smith (1989b) who noted that it was diagnosed primarily upon a single plesiomorphic character state (males with three pairs of genital acetabula situated within the genital field) and was clearly paraphyletic.

Hesperomomoniam humphreysi shares at least two significant plesiomorphic character states with other genera currently attributed to the Momoniinae:

- males with three pairs of genital acetabula situated within the genital field (plesiomorphy shared with *Momoniella*, *Partidomomoniam*,

Momoniam, *Neomomoniam*, *Austromomoniam* and *Notomomoniam*); and

- ventral shield entire in both sexes, especially the female (plesiomorphy shared with *Momoniella* and *Partidomomoniam*).

These data seem to indicate that *Hesperomomoniam* cannot be included in a clade which includes those momoniids with a female ventral shield which bears a separate platelet posterior to the genital field (*Austromomoniam*, *Cyclomomoniam* Smith, *Momoniam*, *Neomomoniam*, *Notomomoniam*, *Stygomomoniam* Szalay and *Xenomomoniam* Orghidan *et al.*). Therefore, like *Momoniella* and *Partidomomoniam*, *Hesperomomoniam* appears to belong to a plesiomorphic clade of Momoniidae. Although a direct relationship with *Momoniella* is not apparent, it appears that *Hesperomomoniam* and *Partidomomoniam* share at least one apomorphy, the loss of the gland-bearing portion of some of the glandularia on the dorsal shield (see descriptions of *Partidomomoniam* species in Cook 1983, 1986, 1992 and Harvey 1990b), and the two genera can be confidently placed as sister taxa. Indeed, the only feature which separates the two genera is the division of the dorsal shield into several platelets in *Partidomomoniam*. Unfortunately, this leaves *Hesperomomoniam* without any identifiable apomorphies but the cladistic analysis of the Momoniidae proposed by Smith (1989a, 1989b) may provide a suitable framework within which the status and position of the new genus can be adequately assessed.

Etymology

The generic name refers to the occurrence of the type species in Western Australia (*hesperus*, Latin, west) and is combined with the stem genus *Momoniam*. Gender: feminine.

Hesperomomoniam humphreysi sp. nov.

Figures 20–27

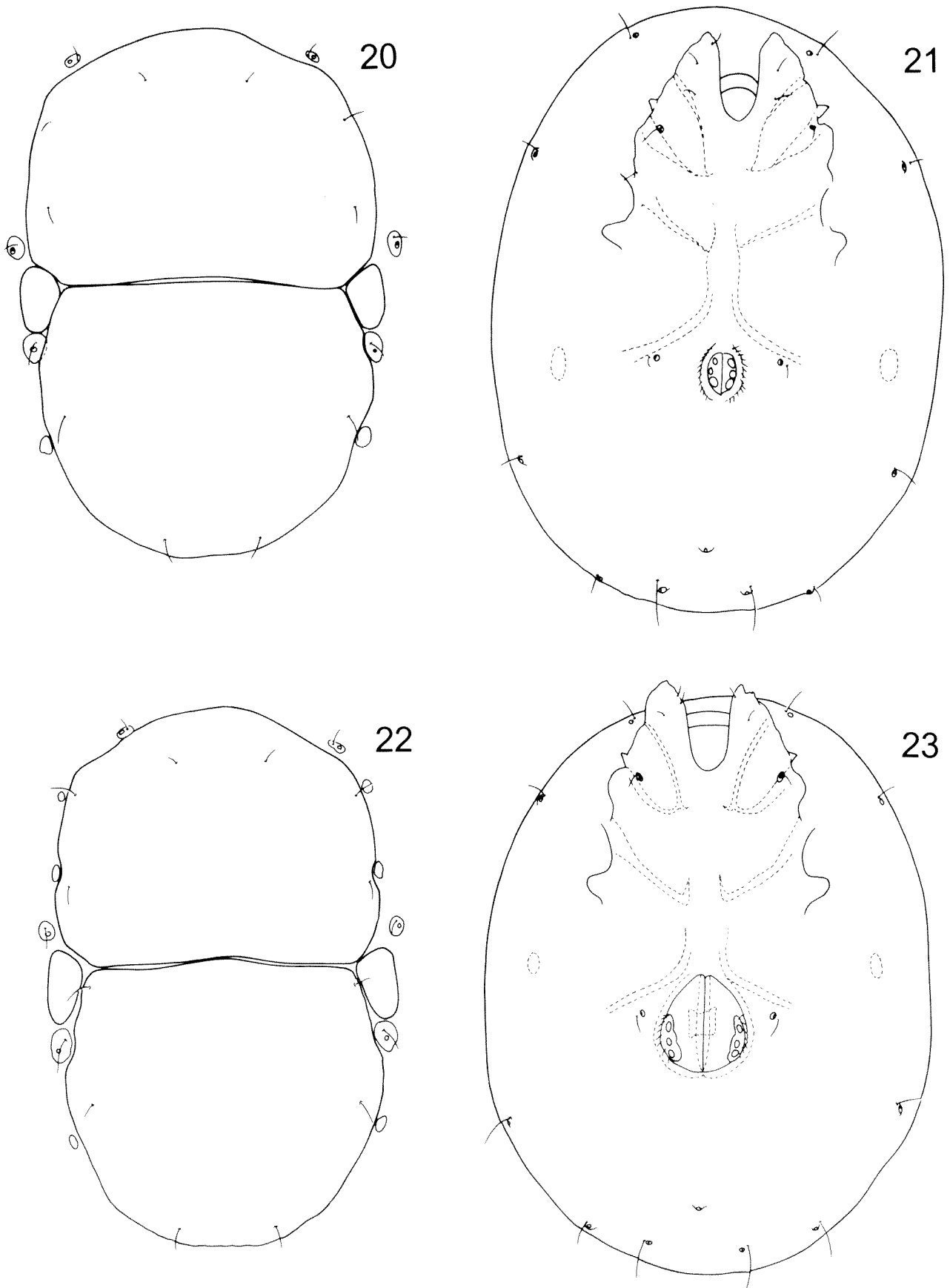
Material Examined

Holotype

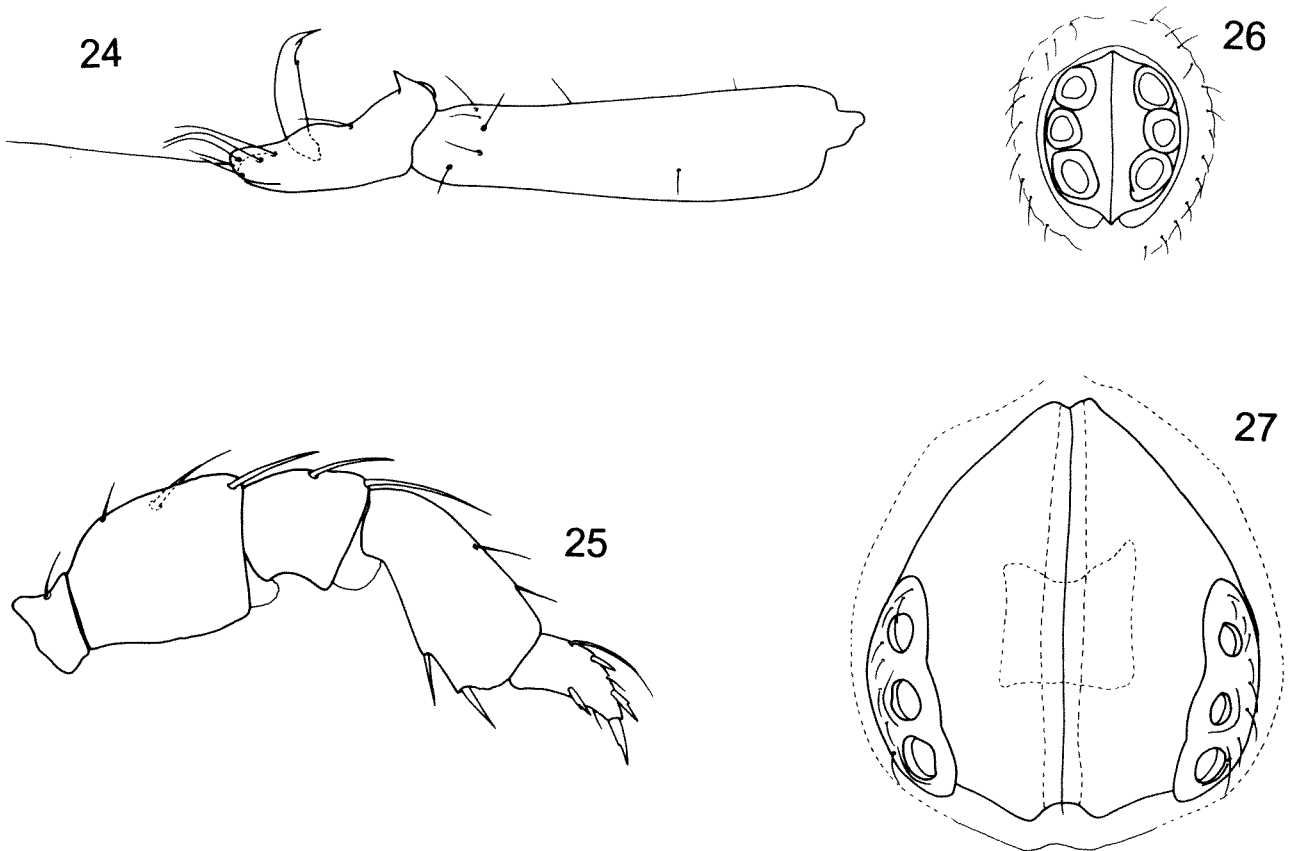
δ , large (>1 km) pool in Fortesque River, at Fortesque River road bridge, Western Australia, Australia, 21°17'52"S, 116°08'23"E, Bou-Rouche pump, medium sample, 3 m, sample 4, 5 August 1997, W.F. Humphreys and S.M. Eberhard, BES 4982 (WAM 97/3149).

Paratype

Australia: Western Australia: 1 ♀ , large (>1 km) pool in Fortesque River, at Fortesque River road bridge, 21°17'52"S, 116°08'23"E, Bou-Rouche pump, shallow sample, water edge, sample 5, 5 August 1997, W.F. Humphreys and S.M. Eberhard, BES 4962 (WAM 97/3150).



Figures 20–23 *Hesperomonomia humphreysi* sp. nov.: 20–21, holotype ♂: 20, dorsal shield; 21, ventral shield; 22–23, paratype ♀: 22, dorsal shield; 23, ventral shield.



Figures 24–27 *Hesperomomonía humphreysi* sp. nov.: 24, metatarsus and tarsus I, holotype ♂; 25, right pedipalp, holotype ♂; 26, genital field, holotype ♂; 27, genital field, paratype ♀.

Diagnosis

Adult

As for genus.

Description

Adult

Dorsal and ventral shields present. Lateral eyes present, but extremely small. Dorsal shield (Figures 20, 22) widest sub-anteriorly; divided into anterior and posterior platelets of approximately equal size; anterior platelet bearing postocularia and 2 pairs of setae (lg2, dg3); posterior platelet bearing 3 pairs of setae (dg4, dg5, lg5); dorsal shield flanked by 4 pairs of lateral platelets, and 3 pairs of small platelets bearing glandularia (dg2, lg3, lg4), as well as 1 (♂) or 3 (♀) platelets which lack glandularia. Ventral shield (Figures 21, 23) entire; capitular bay deep and basally rounded; vg1 situated near posterior margin of coxa II; medial suture line obliterated but all coxal suture lines visible; medial margin of coxa IV broad; openings of leg IV covered by small ventral lobes; clear patch of integument present lateral to coxae IV; excretory pore situated closer to posterior margin of ventral shield than to genital field. Genital field (Figures 26, 27) bearing 3 pairs of acetabula, these borne in

gonopore of male, and borne on small plates on either side of gonopore of female. Capitulum not unusual; chelicera 2 segmented. Pedipalp (Figure 25): all setae acuminate; tibia expanded ventrally, with 1 prominent ventral seta borne on prominent tubercle; tarsus with thick, claw-like terminal seta. Legs (Figure 24): metatarsus I tubular and much longer than all other segments of leg I; tarsus I highly modified with proximally directed claw; without swimming setae; all setae acuminate, except for some distal setae on leg IV, distributed as follows: patella (1), tibia (2), metatarsus (2); claws with ventral clawlets.

Dimensions (µm) ♂ (♀): dorsal shield 816/564 (830/545), ventral shield 920/696 (880/706). Genital field 64/49 (145/133). Pedipalp: trochanter 19 (21), femur 70 (68), patella 42 (47), tibia 77 (75), tarsus, excluding distal claw 41 (39). Leg I: trochanter 66 (61), femur 111 (96), patella 147 (150), tibia 148 (151), metatarsus 302 (309), tarsus 145 (142). Leg IV: trochanter 108 (103), femur 136 (134), patella 126 (127), tibia 173 (180), metatarsus 218 (222), tarsus 208 (211).

Remarks

Hesperomomonía humphreysi was collected with the aid of a Bou-Rouch pump driven between large

cobbles from the edge of a large pool, some 1 km in diameter, in the Fortesque River. The mites came from relatively shallow or medium pump samples, and were not found in deeper samples collected at the same time (W.F. Humphreys, personal communication).

Etymology

The specific epithet honors Dr W.F. (Bill) Humphreys who collected the only known specimens.

Genus *Austromonomia* gen. nov.

Type Species

Austromonomia growsnsae sp. nov.

Diagnosis

Adult female

Dorsal shield present and divided into anterior and posterior platelets, with the anterior platelet significantly smaller than the posterior platelet; anterior platelet bearing postocularia; posterior platelet bearing glandularia dg3, dg4, dg5 and lg5; lg2 situated on separate triangular, antero-lateral platelet; lg4 situated in dorsal furrow. Ventral shield divided, with glandularia vg4 and vg5 situated on a separate posterior platelet, and vg3 situated on a separate postero-lateral platelet; lg1 and lg3 situated on lateral margins of ventral shield. Genital field bearing 3 pairs of acetabula borne on small platelets on either side of gonopore. Tarsus I with thickened proximal seta.

Description

Adult female

Colour extremely pale. Eye-spots present. Dorsal and ventral shields present. Dorsal shield divided into anterior and posterior platelets, with the anterior platelet significantly smaller than the posterior platelet; anterior platelet bearing postocularia; posterior platelet bearing glandularia dg3, dg4, dg5 and lg5; lg2 situated on separate triangular, antero-lateral platelet; lg4 situated in dorsal furrow. Ventral shield divided, with glandularia vg4 and vg5 situated on a separate posterior platelet, and vg3 situated on a separate postero-lateral platelet; lg1 and lg3 situated on lateral margins of ventral shield; clear patch of integument not present lateral to coxae IV; several short, curved setae present on coxa IV. Coxal plates with suture lines visible. Glandularium vg1 situated on posterior margin of coxa II; glandularium vg2 situated posterior to coxa IV anterior to genital field. Genital field

bearing 3 pairs of acetabula, these borne on small plates on either side of gonopore. Pedipalps: tibiae with 2 prominent ventral setae borne on prominent tubercle; tarsi with 2 thick, claw-like terminal setae. Leg I with greatly expanded and stout metatarsus, and highly modified tarsus I typical of the family; tarsus I with thickened proximal seta.

Remarks

The generic placement of the Australian species described here is somewhat problematic due to the lack of males which often provide important phylogenetic data in the nature of the genital field. However, it is clear that the species shares many similarities with *Neomonomia* Cook from New Zealand, currently known from five species (Cook 1983, 1992; Schwoerbel 1984). These similarities include:

- dorsal shield divided into two platelets, with the anterior portion somewhat smaller than the posterior portion. The division represents an apomorphic character state shared with many other momoniid genera, including *Cyclomonomia*, *Hesperomonomia*, *Monomia*, *Partidomonomia*, *Notomonomia* and *Xenomonomia*. The small anterior platelet is elsewhere restricted to species of *Monomia*.
- glandularium lg2 situated on antero-lateral platelets. This is a plesiomorphy shared with *Monomiella*, *Partidomonomia* and *Cyclomonomia*.
- Small female acetabular platelets. This is an apomorphy restricted to *Neomonomia* and *Austromonomia*.
- tarsus I with thickened proximal seta. This appears to be an apomorphy restricted to *Neomonomia* and *Austromonomia*, but a similar seta may occur in *Notomonomia* (Cook 1988).

Despite these similarities, the two genera possess a number of differences:

- *Austromonomia*: glandularium lg3 situated on ventral shield (probably a plesiomorphy shared with *Stygomonomia*). *Neomonomia*: glandularium lg3 situated in dorsal furrow (probably an apomorphy shared with most other genera).
- *Austromonomia*: glandularium vg3 situated on separate postero-lateral platelet (autapomorphy). *Neomonomia*: glandularium vg3 situated on ventral shield (plesiomorphy shared with most other momoniid genera).
- *Austromonomia*: glandularium lg5 situated in dorsal shield (probably a plesiomorphy shared with at least *Cyclomonomia*, *Hesperomonomia*, *Partidomonomia*, *Notomonomia*, *Stygomonomia* and *Xenomonomia*). *Neomonomia*: glandularium lg5 situated in dorsal furrow (probably an autapomorphy).

Austromonomia further differs from *Neomonomia* in the lack of a clear patch of integument on the

lateral margins of coxa IV. Although this may be considered sufficient grounds for the separation of separate genera, a precedent occurs in another momoniid genus, *Stygomomonium*, where a group of long setae may be present in some species but reduced to two pairs of short setae in others (Smith 1989b, 1989c). However, there is no doubt that considerable morphological differences separate *Austromomonium* and *Neomomonium*.

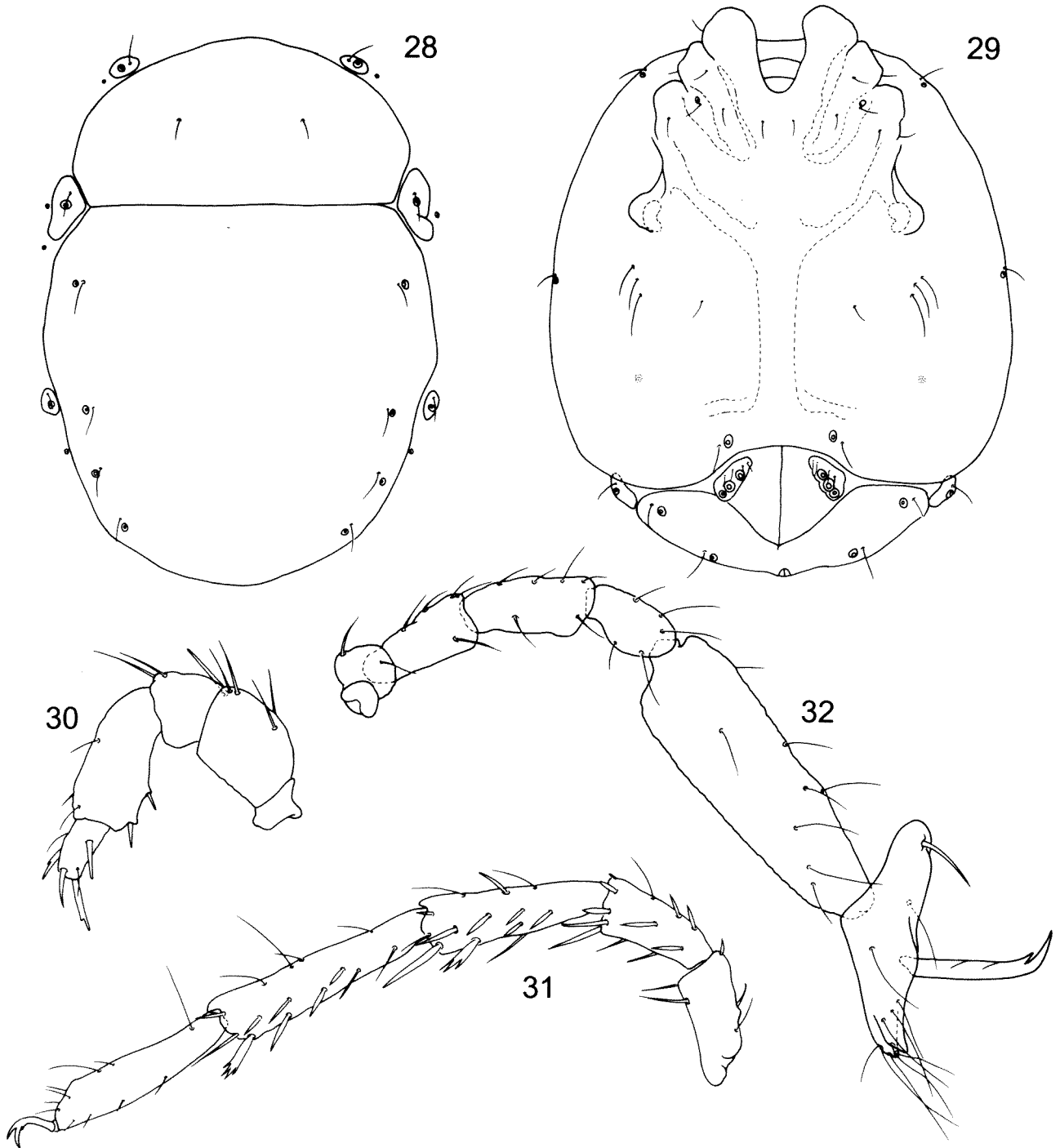
Austromomonium grownsae sp. nov.

Figures 28–32

Material Examined

Holotype

♀, Never Never River, Tallwood Road turnoff, New South Wales, Australia, 30°21'41"S, 152°54'14"E, 30 cm deep well, 21 November 1997, J. Foster, P. Lisle, A. Boulton (AM).



Figures 28–32 *Austromomonium grownsae* sp. nov., holotype ♀, unless stated otherwise: 28, dorsal shield; 29, ventral shield; 30, left pedipalp, paratype ♀; 31, left leg I; 32, left leg IV, without trochanter.

Paratype

Australia: New South Wales: 1 ♀, Never Never River, Tallowood Road turnoff [30°21'41"S, 152°54'14"E], 9 March 1996, P. Hancock (AM).

Diagnosis*Adult female*

As for genus.

Description*Adult female*

Colour extremely pale. Eye-spots present. Dorsal and ventral shields present. Dorsal shield (Figure 28) widest medially; divided into anterior and posterior platelets with the posterior platelet approximately twice the size of the anterior platelet; anterior platelet bearing postocularia only; posterior platelet bearing glandularia dg3, dg4, dg5 and lg5; dg2 situated on small anterior platelet in dorsal furrow; lg2 situated on separate triangular, antero-lateral platelet; lg4 situated on small lateral platelet in dorsal furrow. Ventral shield (Figure 29) divided; capitular bay deep and basally rounded; vg1 situated near posterior margin of coxa II; medial suture line obliterated but all coxal suture lines visible; medial margin of coxa IV broad; openings of leg IV covered by ventral lobes; clear patch of integument not present lateral to coxae IV; 3 pairs of long setae on coxae IV; excretory pore situated at posterior margin of ventral shield. Genital field (Figure 29) bearing 3 small pairs of acetabula, these borne on small plates on either side of gonopore of female. Capitulum not unusual; chelicera 2 segmented. Pedipalp (Figure 30): all setae acuminate; tibia expanded ventrally, with 2 prominent ventral setae borne on prominent tubercle; tarsus with 2 thick, claw-like terminal setae. Legs (Figures 31, 32): without swimming setae; metatarsus I greatly expanded and stout; tarsus I modified as typical for family; tarsus I with thickened proximal seta; claws II-IV with ventral clawlets.

Dimensions (µm), holotype ♀ (paratype ♀): dorsal shield 466/339 (445/320), ventral shield 467/392. Genital field 96/118. Pedipalp: trochanter 16 (13), femur 37 (35), patella 29 (28), tibia 51 (47), tarsus excluding distal claw 28 (21). Leg I: trochanter 42, femur 70, patella 73, tibia 64, metatarsus 185, tarsus 134. Leg IV: trochanter 68, femur 76, patella 73, tibia 106, metatarsus 138, tarsus 115.

Remarks

The holotype was bearing a single, somewhat ovoid, egg.

Etymology

The specific epithet honours Jane Grown, enthusiastic student of Hydracarina.

Family Mideopsidae Koenike**Subfamily Mideopsellinae Lundblad****Remarks**

Relationships within the Mideopsidae are poorly understood, and the generic and subfamilial classifications appear to be somewhat unreliable. Cook (1974, 1986) included five subfamilies within the family (Mideopsinae, Mideopsellinae, Guineaxonopsinae, Gretacarinae and Plaumanninae). A sixth subfamily, the Phreatomideopsinae, was proposed by Schwoerbel (1986) but was subsequently placed in the synonymy of the Mideopsellinae by Cook (1988).

Five genera are currently included in the Mideopsellinae: *Mideopsella* Lundblad and *Phreatomideopsis* Schwoerbel from South America, *Mideopsellides* K.O. Viets from South Africa, *Tiramideopsis* Cook from India and Australia (see below) and *Tillia* Harvey from Australia (Cook 1967, 1974; Schwoerbel 1986; Harvey 1990c). The subfamily appears to have Gondwanan origins as all genera are restricted to the southern continents.

Phreatomideopsis was placed in a separate subfamily by Schwoerbel (1986) for a single rheophilic species from southern Chile, *Phreatomideopsis arrenuripalpis* Schwoerbel. He noted several unusual features of the species including the presence of lateral sclerites in the female gonopore and an uncate pedipalp, which he regarded as so unusual as to question the familial position of *P. arrenuripalpis*. As noted by Cook (1988), these features clearly ally *Phreatomideopsis* to *Tiramideopsis* from India, described by Cook (1967) for four species taken from interstitial sediments in the states of Mysore and Maharashtra.

Genus *Tiramideopsis* Cook

Tiramideopsis Cook 1967: 190.

Type Species

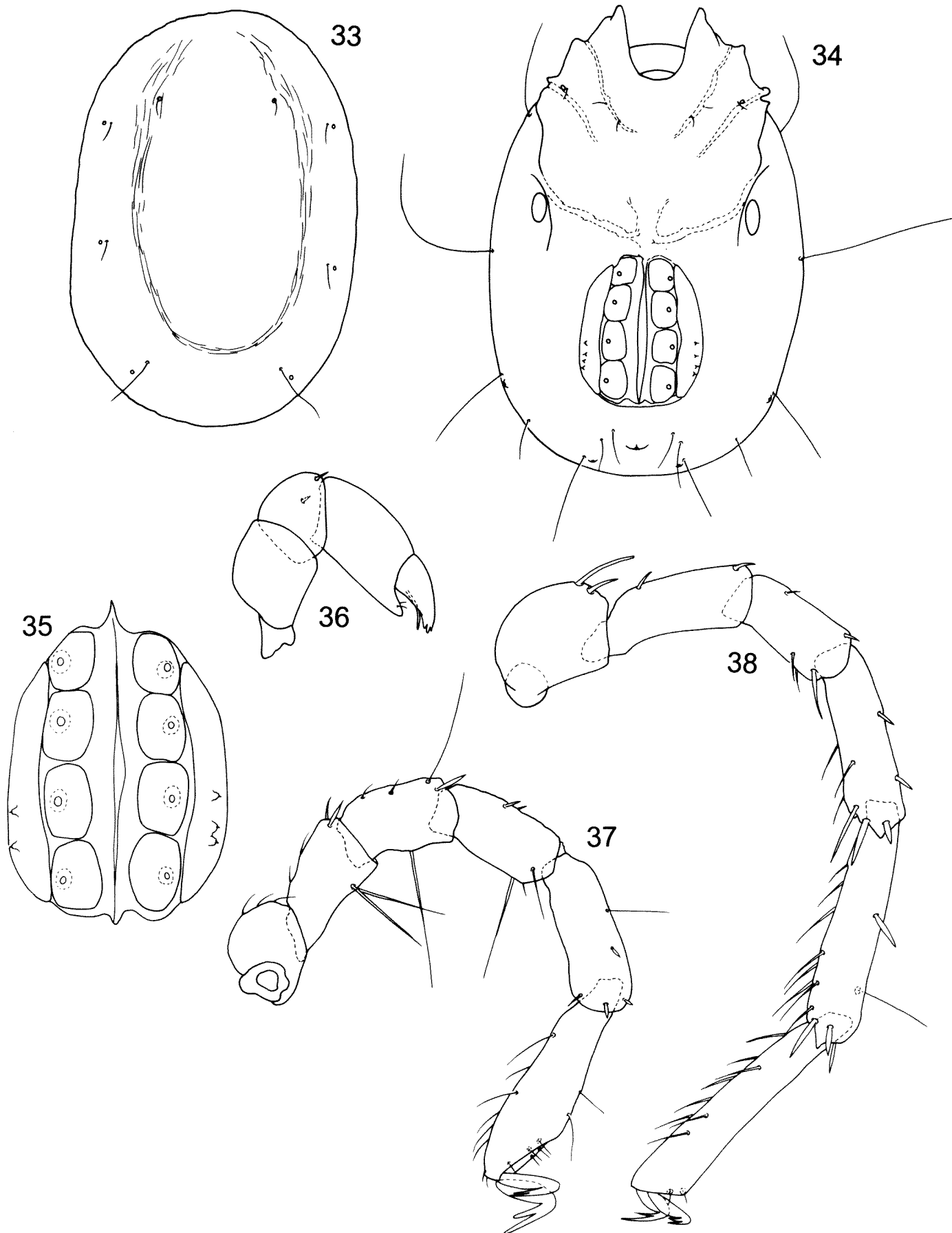
Tiramideopsis (Tiramideopsis) ovalis Cook 1967, by original designation.

Diagnosis*Adult*

Dorsal shield present, entire and ovoid; U-shaped ridge present; with three pairs of glandularia. Pedipalp uncate. Deep genital bay situated between coxae IV; four or seven pairs of acetabula situated within gonopore; separate lateral sclerites within the female gonopore.

Remarks

Tiramideopsis appears to represent the sister-group to *Phreatomideopsis* from Chile, as both



Figures 33–38 *Tiramideopsis lictus* sp. nov., holotype ♀, unless stated otherwise: 33, dorsal shield, paratype ♀; 34, ventral shield, paratype ♀; 35, genital field; 36, left pedipalp; 37, left leg I; 38, left leg IV.

possess separate lateral sclerites within the female gonopore (Figure 35), an apomorphic character state within the Arrenuroidea. *Tiramideopsis* differs from *Phreatomideopsis* by the deep genital bay situated between coxae IV (Figure 34).

Cook (1967) divided the genus *Tiramideopsis* into two subgenera, *Tiramideopsis* (*Tiramideopsis*) and *Tiramideopsis* (*Navamideopsis*) based upon a number of apparently autapomorphic features found in the type species of the latter, *T. (N.) expansipes* Cook, including the presence of seven pairs of acetabula. The species described below can probably be assigned to *Tiramideopsis* (*Tiramideopsis*) but the lack of male specimens precludes a definitive placement.

***Tiramideopsis lictus* sp. nov.**

Figures 33–38

Material Examined

Holotype

♀, Palm Springs, Millstream aquifer, 21°34'44"S, 116°58'07"E, Western Australia, Australia, 30 July 1997, haul net in piezometer P4, W.F. Humphreys, S.M. Eberhard, BES 4876 (WAM 97/3223).

Paratype

Australia: Western Australia: 1 ♀, Millstream aquifer, 21°34'24"S, 116°57'59"E, 19 October 1996, haul net in piezometer P1, W.F. Humphreys, BES 4006 (WAM 97/3224).

Diagnosis

Adult female

Suture lines between coxae III and IV meeting at anterior margin of genital field. Four pairs of acetabula; each acetabulum large, but with extremely small cap; lateral genital sclerites with 2–4 pairs of small spines in posterior half.

Description

Adult female

Dorsal and ventral shields present. Lateral eye spots present; medial eye apparently absent. Dorsal shield (Figure 33) entire and ovoid, widest medially; bearing 3 pairs of sub-equidistant dorsoglandularia; dorsoglandularial setae situated close to glandularia; postocularia slightly anterior to anterior-most glandularia of dorsal shield. Ventral shield (Figure 34) entire; vg1 situated near posterior margin of coxa II; all coxal suture lines visible, those between III and IV meeting at anterior margin of genital field; posterior margin of coxa IV not visible; outer coxal margins with pointed tips; openings of leg IV not covered by small ventral lobes; capitular bay moderately deep

and basally rounded, not extending far forward of ventral shield; excretory pore incorporated into ventral shield, situated midway between genital field and posterior margin of ventral shield. Genital field (Figure 35) placed within deep genital bay situated between coxae IV; with 4 pairs of large acetabula situated within field; each acetabulum with extremely small cap; gonopore with separate lateral sclerites; lateral genital sclerites with 2–4 pairs of small spines in posterior half. Capitulum and chelicera not unusual. Pedipalp (Figure 36) unicate; without setae except for two acuminate setae situated on patella, 2 small distal tibial setae, and 1 large tarsal thick seta. Legs (Figures 37, 38): leg I with long stiff ventral setae on femur (2), patella (1) and tibia (1); patella I–III with long sub-distal seta; without swimming setae; with very few serrate setae; claws with large ventral clawlets.

Dimensions (µm), holotype ♀: dorsal shield 371/256, ventral shield 426/297. Pedipalp: trochanter 24, femur 54, patella 38, tibia 57, tarsus 38. Leg I: femur 77, patella 58, tibia 67, metatarsus 80, tarsus 115. Leg IV: trochanter 67, femur 92, patella 64, tibia 90, metatarsus 121, tarsus 132.

Remarks

In the possession of only four pairs of acetabula, *Tiramideopsis lictus* most closely resembles *T. (T.) ovalis* Cook, *T. (T.) tanasachiae* Cook and *T. (T.) pallida* Cook from India, but differs from all of them by the possession of 2–4 pairs of small spines on the lateral genital sclerites and by the extremely small acetabular caps.

Etymology

The specific epithet refers to the relictual nature of the Australian species, left behind in the southern hemisphere after the rafting of the Indian subcontinent during the early Tertiary (*lictus*, Latin, abandoned).

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REFERENCES

- Cook, D.R. (1967). Water mites from India. *Memoirs of the American Entomological Institute* 9: 1–411.
 Cook, D.R. (1974). Water mite genera and subgenera. *Memoirs of the American Entomological Institute* 21: 1–860.
 Cook, D.R. (1980). Studies on Neotropical water mites. *Memoirs of the American Entomological Institute* 31: 1–645.
 Cook, D.R. (1983). Rheophilic and hyporheic water mites

- of New Zealand. *Contributions of the American Entomological Institute* **21**(2): 1–224.
- Cook, D.R. (1986). Water mites from Australia. *Memoirs of the American Entomological Institute* **40**: 1–568.
- Cook, D.R. (1988). Water mites from Chile. *Memoirs of the American Entomological Institute* **42**: 1–356.
- Cook, D.R. (1992). Water mites (Hydracarina), mostly from driven wells in New Zealand: taxa other than the Notoaturinae Besch. *Stygologia* **7**: 43–62.
- Cook, D.R. (1996). A freshwater species of *Pontarachna*, (Acari, Pontarachnidae) from South Africa, with a discussion of genital acetabula in the family. *Anales del Instituto Biología, Universidad Nacional Autónoma de México, Serie Zoología* **67**: 259–264.
- Harvey, M.S. (1990a). A review of the water mite family Limnocharidae in Australia (Acarina). *Invertebrate Taxonomy* **3**: 483–493.
- Harvey, M.S. (1990b). Two new species of *Partidomonomia* Cook from south-eastern Australia (Acarina: Momoniidae). *Memoirs of the Museum of Victoria* **50**: 337–340.
- Harvey, M.S. (1990c). Two new water mite genera from south-western Australia (Acarina: Aturidae, Mideopsidae). *Memoirs of the Museum of Victoria* **50**: 341–346.
- Harvey, M.S. (1996). A review of the water mite family Pionidae in Australia (Acarina: Hygrobatoidae). *Records of the Western Australian Museum* **17**: 361–393.
- Lohmann, H. (1909). Marine Hydrachnidae und Halacaridae. In: W. Michaelsen and R. Hartmeyer (eds), *Die Fauna Südwest-Australiens*, vol. **2**: 151–154. Gustav Fischer: Jena.
- Lundblad, O. (1937). Vierte Mitteilung über neue Wassermilben aus Santa Catharina in Südbrasilien. *Zoologischer Anzeiger* **118**: 248–265.
- Lundblad, O. (1941). Die Hydracarin fauna Südbrasilien und Paraguays. Erster Teil. *Kungl. Svenska Vetenskapsakademiens Handlingar* (3) **19**(7): 1–183.
- Lundblad, O. (1952). Eine neue australische Wassermilbe. *Entomologisk Tidskrift* **73**: 23–26.
- Orghidan, T. and Gruia, M. (1980). Diagnose de trois hydrachnelles nouveaux de Cuba. *Travaux de l'Institute de Spéologie "Émile Racovitza"* **19**: 143–146.
- Orghidan, T. and Gruia, M. (1983). Sur trois espèces nouvelles d'Hydrachnellae de Cuba appartenant au genre *Cladomonomia* Orgh. & Gruia et au sous-genre *Crockongsbergia* Orgh. & Gruia. In: Orghidan, T., Núñez Jiménez, A., Decou, V., Negrea, St., and Viña Bayés, N. (eds), *Résultats des Expéditions Biospéologiques Cubano-Roumaines à Cuba*, vol. **4**: 167–179.
- Philippi, R.A. (1840). Zoologische Bemerkungen. *Archiv für Naturgeschichte* **6**: 181–195.
- Schwoerbel, J. (1984). Subterrane Wassermilben aus Fließgewässern Neuseelands (Acari, Actinedida). *Archiv für Hydrobiologie, Supplement* **66**: 293–308.
- Schwoerbel, J. (1986). Rheophile Wassermilben (Acari) aus Chile 1. Hyporheische Arten. *Archiv für Hydrobiologie* **106**: 71–78.
- Smith, I.M. (1989a). North American water mites of the family Momoniidae Viets (Acari: Arrenuroidea). I. Description of adults of *Cyclomonomia andrewi* gen. nov., sp. nov., and key to world genera and subgenera. *Canadian Entomologist* **121**: 543–549.
- Smith, I.M. (1989b). North American water mites of the family Momoniidae Viets (Acari: Arrenuroidea). II. Revision of species of *Momonium* Halbert, 1906. *Canadian Entomologist* **121**: 965–987.
- Smith, I.M. (1989c). North American water mites of the family Momoniidae Viets (Acari: Arrenuroidea). III. Revision of species of *Stygomonomia* Szalay, 1943, subgenus *Allomonomia* Cook, 1968. *Canadian Entomologist* **121**: 989–1025.
- Viets, K. (1956). *Die Milben des Süßwassers und des Meeres*, vols **2–3**. Gustav Fischer: Jena.
- Viets, K.O. (1987). *Die Milben des Süßwassers (Hydrachnellae und Halacaridae [part.], Acari)*. 2: *Katalog*. Paul Parey: Hamburg and Berlin.
- Walter, C. (1925). Marine Hygrobatidae. Revision der Wassermilben-Genera *Pontarachna* Philippi und *Nautarachna* Moniez. *Internationale Revue der gesamten Hydrobiologie und Hydrographie* **14**: 1–54.