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New data on pionid water mites from Australia, with the description of two new species (Acari: Hydrachnidia: Pionidae)

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Original research

ABSTRACT

New records are given of Australian pionids, and two species are described new for science, i.e. *Piona harveyi* **n. sp**. and *P. mutawintji* **n. sp**.

Keywords systematics; new records; new species; *Acercella*; *Piona*
Zoobank http://zoobank.org/4A44AD00-1867-4615-97E2-CD484365BC5C

Introduction

The water mite family Pionidae consists worldwide of seven subfamilies with 22 genera (Smit 2020). Within Australia, the Pionidae is represented by four genera, i.e. *Acercella* Lundblad, 1941, *Australotiphys* Cook, 1986, *Larri* Harvey, 1996 and *Piona* Koch, 1842. Apart from the genus *Piona*, all genera are endemic to Australia.

In this study the results are given of collecting trips in 1994, 1997, 2000, 2001, 2005, 2008 and 2024. Records of *Australotiphys* from the Northern Territory have been published by Smit (2023), those from Western Australia by Smit (2021).

Material and methods

All material was collected by the senior author. Holotypes are deposited in the Australian Museum, Sydney (AMS), non-type material and some of the paratypes in Naturalis Biodiversity Center, Leiden (RMNH). Lengths of palp and leg segments are dorsal lengths.

All measurements are given in µm. Numbers are given as males/females/nymphs. The photographs of ejaculatory complex were made using a camera on Samsung Galaxy smartphone. The following abbreviations are used: asl – above sea level; Cx-I-IV – coxae I-IV; I-leg-4 – fourth segment of first leg; III-leg– third leg; IV-leg – fourth leg; NP – National Park; P-1-5 – palp segments 1-5; vgl-5 – ventroglandularia 5. Coordinates were measured with a GPS. Coordinates given as degrees, minutes and seconds were taken from Google Earth and are by approximation.

Systematics

Family Pionidae Thor, 1900

Data on distribution are from Harvey (1996), unless stated otherwise.

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Genus *Acercella* Lundblad, 1941

Acercella is a small endemic Australian genus, with two species known.

Acercella falcipes Lundblad, 1941

Material examined — **Victoria**. 2/13/0, Glenelg River at crossing with Siphon Road, Grampians NP, 29 Sept. 1997; 0/4/0, Glenisla River at crossing with Red Rock Road, Grampians NP, 29 Sept. 1997; 1/1/0, Victoria Lagoon, SW of Grampians NP, 30 Sept. 1997. **New South Wales**. 0/1/1, artificial pool, Rockholes Loop, Mutawintji NP, Australia, 31 Oct. 2001; 6/15/5, pools in Homestead Creek, Mutawintji NP, 31 Oct. 2001; 12/33/2, rockpools, Mootwingee Gorge, Mutawintji NP, 31 Oct. 2001. **South Australia**. 0/16/0, temporary pond W of Mark Point, Coorong NP, 9 Oct. 2001. **Western Australia**. 0/2/0, ditch pastoral land, Peaceful Bay, SW of Denmark, 30 Aug. 1994.

Distribution — Victoria, Western Australia. Reported here for the first time for New South Wales and South Australia.

Genus *Piona* Koch, 1842

Piona has a worldwide distribution and occurs on every continent except Antarctica. Numerous species have been described, but from Australia only six species are known (Harvey 1996, Smit 2021).

Piona australica K.O. Viets, 1980

Material examined — **Queensland**. 2/0/0, Lake Emma, Lakefield NP, 15°17′47.43″ S, 144°38′48.05″ E, 3 Sept. 2000; 15/32/1, temporary pond along Wyseby Road (= road to Carnarvon NP), 24°59.185′ S 148°24.416′ E, 305 m asl, 30 Oct. 2005; 16/13/4, small lake Hawkwood Road, 13 km S of Mundaburra, 25°39.910′ S 151°13.941′ E, 130 m asl, 31 Oct. 2005.

Distribution — New South Wales, Western Australia. Reported here for the first time for Queensland.

Piona cumberlandensis (Rainbow, 1906)

Material examined — **Tasmania**. 1/0/0, Little Waterhouse Lake, Waterhouse Protected Area, 21 Oct. 1997; 16/6/24, Big Waterhouse Lake, Waterhouse Protected Area, 21 Oct. 1997; 2/0/0, Platypus Tarn, Mt Field NP, 42°40.443′ S 146°35.146′ E, 955 m asl, 27 Mar. 2008. **New South Wales**. 1/1/0, ditch around Mother of Ducks Lagoon Nature Reserve, 30°13.424′ S 151°40.048′ E, 1348 m asl, 21 Nov. 2003; 0/7/1, pool near Betts Creek, Kosciuszko NP, 36°25.518′ S 148°22.618′ E, 1751 m asl, 5 Dec. 2003; 0/37/2, Spencer Creek, Kosciuszko NP, 36°25.758′ S 148°21.574′ E, 1739 m asl, 5 Dec. 2003; 3/17/2, small lake near Betts Creek, Kosciuszko NP, 36°25.543′ S 148°22.633′ E, 1747 m asl, 8 Feb. 2024. **Victoria**. 1/2/5, Darby River, Wilsons Promontory NP, 27 Oct. 1997; 0/6/1, pond Boar Gully Camping Area, Brisbane Ranges NP, 28 Sept. 1997; 2/1/12, swamp at junction of Victoria Valley Road and Bundol Road, SW of Grampians NP, 37°35′14.50″ S, 142°18′58.36″ E, 30 Sept. 1997; 7/6/13, pond 3 km N of Chiltern, 9 Oct. 1997; 7/9/5, pond 3 km W of Traralgon, along Princess Highway, 22 Oct. 1997; 0/1/0, unnamed creek 4.5 km E of Shipwreck Creek, Croajingolong NP, 23 Oct. 1997; 0/1/0, pool near Lake Catani, Mt Buffalo NP, 36°44.060′ S 146°48.698′ E, 1300 m asl, 10 Mar. 2008. **South Australia**. 3/7/0, temporary pool W of Mark Point, Coorong NP, 9 Oct. 2001; 0/1/0, Mosquito Creek, 15 km S of Naracoorte, 12 Oct. 2001; 1/0/0, Hacks Lagoon (behind reed bed), Bool Lagoon Game Reserve, 13 Oct. 2001; 0/2/0, Bolla Bollana Spring, Arkaroola, 25 Oct. 2001; 1/0/0, Nooldoo Nooldoona Waterhole, Arkaroola, 25 Oct. 2001; 3/3/0, Big Swamp, 20 km W of Port Lincoln, 27 Oct. 2001. **Queensland**. 1/2/19, Hasties Swamp, Hasties Swamp NP, 17°17′55.35″ S, 145°28′32.24″ E, 16 Sept. 2000; 1/0/0, rockpools Auburn River, Auburn

River NP, 25°42.848′ S 151°03.156′ E, 31 Oct. 2005. **Northern Territory**. 2/2/0, ponds Ormiston Gorge, Ormiston Gorge NP, 6 Aug. 1994.

Distribution — Widespread in Australia, and known from Tasmania, Victoria, South Australia, New South Wales, Northern Territory and Western Australia. Reported here for the first time for Queensland.

Piona puripalpis K.O. Viets, 1984

Material examined — **Queensland**. 1/1/0, Low Lake, Lakefield NP, 14°40′57.19″ S, 144°12′7.96″ E, 5 Sept. 2000; 1/0/0/, billabong W of Wenlock River, near crossing with road to Iron Range NP, 10 Sept. 2000. **Northern Territory**. 4/2/0, Lake Jabiru, Jabiru, 12°40.264′ S 132°50.436′ E, 20 Jul. 1994; 0/1/0, Lake Jabiru, 12°40.264′ S 132°50.436′ E, 43 m asl, 27 Sept. 2005; 0/1/0, Caranbirini Waterhole, 16°16.279′ S 136°04.837′ E, 6 Oct. 2005.

Distribution – Northern Territory, Western Australia, New South Wales (K.O. Viets 1984). Reported here for the first time for Queensland.

Piona harveyi n. sp.

Zoobank: E060A5E4-DF46-4304-9464-FC872817157C

Figures 1-2

Material examined — Holotype male, New South Wales, Water Gardens, Batemans Bay, 35°42.733′ S 150°10.688′ E, 16 Dec. 2003, leg. H. Smit, dissected and slide mounted (AMS). Paratypes: 7/12/0, same data as the holotype, one female dissected and slide mounted (AMS), 7/11/0 (in fluid, RMNH).

Diagnosis — Male. Cx-IV partially fused medially, genital plates fused to Cx-IV, excretory pore fused to genital plate; anterior claw (*sensu* Harvey 1996) of male III-leg with ventral clawlet; in both sexes P2 ventral margin convex, P4 slender, ventrally with two short setal tubercles and a subdistal peg-like seta. Genital field with 18-20 pairs of acetabula in male and 23—24 pairs of acetabula in female.

Description — Colour yellowish. Dorsum with one pair of relatively large, sickle-shaped platelets. Apodemes of Cx-I relatively short. Palp slender, P2 ventral margin convex, P4 slender, ventrally with two small setal tubercles, close to each other, flanked by some small setae, distal peg-like seta separated from setal tubercles (Figure 1D). Legs long and slender.

Male. Cx-IV separated by a narrow cleft, fused posteriorly. Genital plates fused with each other, and, for about half of the anterior margin, to Cx-IV, with 18–20 pairs of acetabula. Gonopore short; excretory pore fused to genital plates (Figure 1A-B).

III-L-6 about the half of length of III-L-5, slightly curved (Figure 2D), setose, anterior claw (*sensu* Harvey 1996) strongly curved with ventral clawlet, posterior claw long and nearly straight (Figure 2C, inset). IV-L-4 modified with posterior concavity lined with several proximal and three distal peg-like setae (Figure 2E).

Female Genital plates bowed, with 23-24 pairs of acetabula, two or three of these free in the membranous integument, and three of these on an anterior platelet (Figure 1F). Palp as in male, but setal tubercles smaller (Figure 2A).

Measurements. Male (holotype, in parentheses some measurements of paratypes). Idiosoma dorsally 813 (844—888, n=2) long and 600 (630–656, n=2) wide; dorsal platelet 64 long. Coxal field 619 long (measured from Cx-I tip to end of posterior extension of Cx-IV), Cx-III width 569. Genital field 291 wide between outer margins of acetabula; gonopore 53 long. Ejaculatory complex 155 long.

Palp: dorsal length/height: P1, 37/68; P2, 216/117; P3, 94/78; P4, 208/56; P5, 55/29. Gnathosoma ventrally 154 long, 203 with apodemes. Chelicera 254 long. Dorsal lengths of I-leg-1-6: 81, 118, 172, 227, 250, 246; dorsal lengths of II-leg-1-6: 85, 140, 191, 250, 266, 256; dorsal lengths of III-leg-1-6: 95, 141, 166, 234, 287, 138; dorsal lengths of IV-leg-1-6: 169, 41, 181, 258, 309, 253; swimming setae numbers are as follows: I-leg-4, 1; I-leg-5, 3; II-leg-4, 5; II-leg-5, 7; III-leg-4, 6; III-leg-5, 1; IV-leg-4, 3; IV-leg-4, 5.

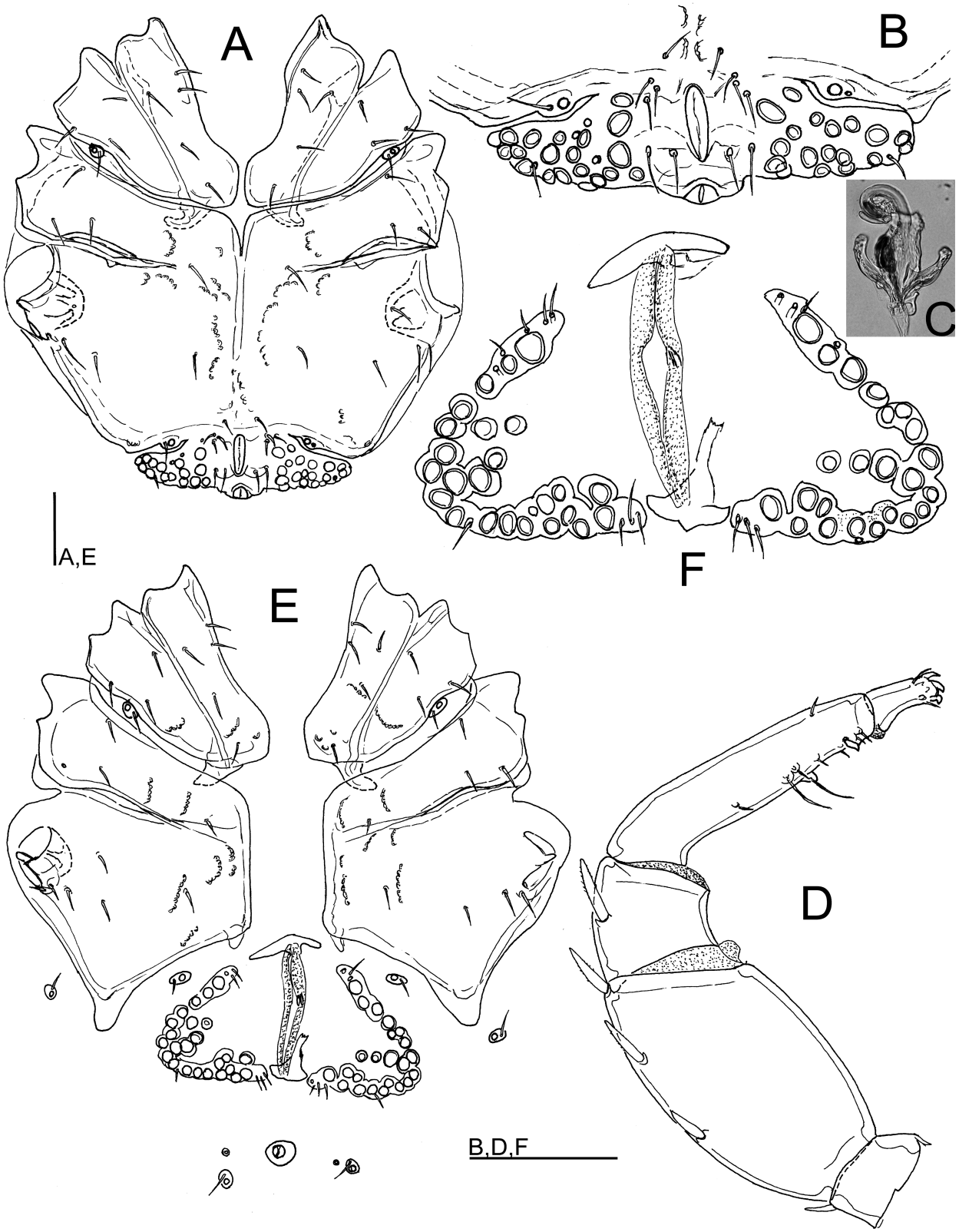

Figure 1 . *Piona harveyi* **n. sp**. (A-D male holotype, E-F female paratype), mounted, A, E – coxal and genital field; B, F – genital field; C – photograph of ejaculatory complex; D – palp. Scale bars = 100 µm.

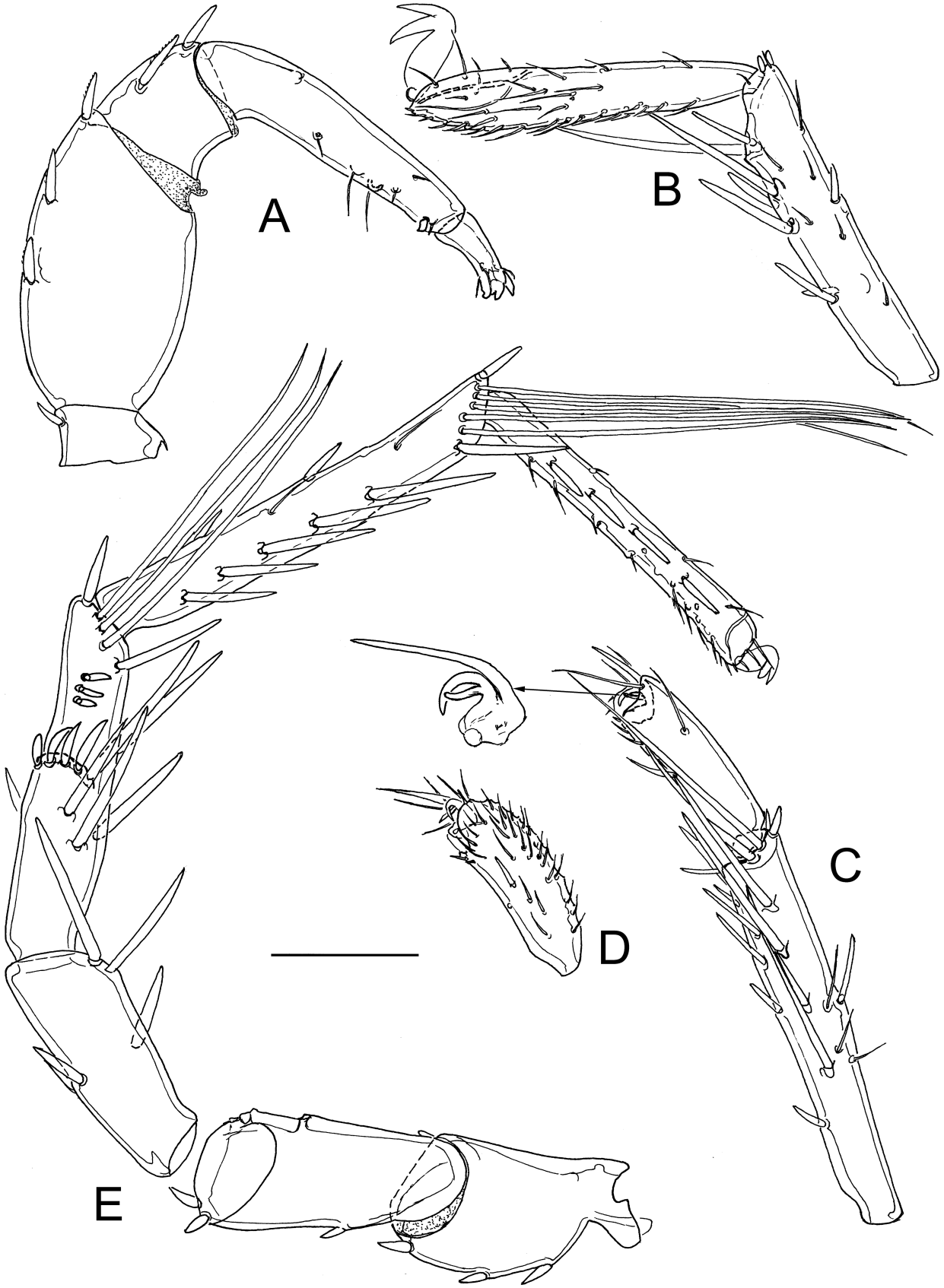

Figure 2 . *Piona harveyi* **n. sp**. (B-E male holotype, A female paratype), A – palp, mounted; B – I-leg-5 and 6, mounted; C – III-leg-5 and 6 (inset: claw enlarged 2x), unmounted; D – III-leg-6, mounted; E – IV-leg, mounted. Scale bar = 100 µm.

Female. Idiosoma dorsally 1088 long and 825 wide. Coxal field 650 long, Cx-III width 666, medial length Cx-III+IV 188. Genital field 359 wide between outer margins of genital plates; gonopore 188 long, pregenital sclerite 100 wide. Egg (n=2) maximum diameter 152–156.

Palp: dorsal length/height: P1, 39/68; P2, 211/116; P3, 94/78; P4, 216/58; P5, 63/28. Gnathosoma ventrally 183 long. Chelicera basal segment 203 long, claw 75 long. Dorsal lengths of I-leg-1-6: 93, 119, 178, 241, 263, 263; dorsal lengths of II-leg-1-6: 88, 138, 208, 273, 284, 276; dorsal lengths of III-leg-1-6: 97, 144, 192, 263, 278, 256; dorsal lengths of IV-leg-1-6: 159, 153, 200, 281, 312, 241; swimming setae numbers are as follows: I-leg-4, 3; I-leg-5, 6; II-leg-4, 7; II-leg-5, 9; III-leg-4, 8; III-leg-5, 9; IV-leg-4, 6; IV-leg-4, 5.

Etymology — Named after Mark Harvey (Western Australian Museum) for his excellent contribution to the Australian Pionidae.

Remarks — Due to the similar structure of the genital field (genital plates fused for about half of the anterior margin to Cx-IV, excretory pore fused to genital plates) and anterior claw of III-leg with ventral clawlet, the male of the new species resembles *Piona puripalpis* K.O. Viets, 1984, a species known from northern and eastern Australia (Harvey 1996). The latter species differs in having slenderer and more elongated palpal segments (especially P2 and P4, see figures 99-100 in Harvey 1996). Two other Australian *Piona* species, i.e. *P. australica*, *P. marchanti* Harvey, 1996 and *P. murleyi* Harvey, 1996 have a more or less morphologically similar genital field, but differ in having much less acetabula (5-8 in *australica* and *marchanti*, 9-14 in *murleyi*), and in the males of these species Cx-IV is separated medially.

Distribution — New South Wales.

Piona mutawintji n. sp.

Zoobank: CBFFE474-C7A7-4EB4-BA1E-62BCE7BE5164

Figures 3-4

Material examined — Holotype male, New South Wales, pools in Homestead Creek, Mutawintji NP, 31 Oct. 2001, leg. H. Smit, dissected and slide mounted (AMS). Paratypes: 3/3/0, same data as the holotype, one female dissected and slide mounted (AMS), 3/2/0 (in fluid, RMNH). Other material. **New South Wales**. 1/1/0, rockpools, Mootwingee Gorge, Mutawintji NP, 31-x-2001; 1/0/0, artificial pool, Rockholes Loop, Mutawintji NP, 31 Oct. 2001. **South Australia**. 1/1/0, Round Swamp, Bool Lagoon Game Reserve, 12 Oct. 2001.

Diagnosis — In both sexes a part of the acetabula is incorporated into a genital plate (male) or into a platelet (female). Palp with strong sexual dimorphism in P4 (in male P4 stocky, ventrally expanded, in female P4 slender, ventrally not expanded), in both sexes P-4 distal peg-like seta separated from distal segment margin. Genital field with 13-15 pairs of acetabula in both sexes.

Description — Colour yellowish. Dorsum with one pair of sickle-shaped platelets. Apodemes of Cx-I relatively short, posterior extensions of Cx-IV large. Palp with strong sexual dimorphism in P4, distal peg-like seta of P4 separated from distal segment margin. Legs long and slender.

Male — Cx-IV medially separated. Genital plates fused with Cx-IV, not extending beyond posterior extension of Cx-IV, with 13–14 pairs of acetabula, most of acetabula lying free in the idiosoma, not on plates (Figure 3A-B), gonopore short. 5-6 pairs of acetabula lying on a platelet fused with the gonopore. Excretory pore with a sclerotized ring, not fused with the genital plates, anteriorly to flanking glandularia. (vgl-5) P4 stocky, ventral tubercles large, the distal one with a peg-like seta (Figure 3D). III-L-6 about the half of length of III-L-5, anterior claw (sensu Harvey 1996) strongly curved with ventral clawlet, posterior claw long and nearly straight (Figure 4D, inset). IV-L-4 modified with posterior concavity lined with several proximal and two distal peg-like setae (Figure 4E).

Female — Cx-III/-IV widely separated medially (Figure 3E). Genital field with two pairs of plates: small anterior platelets bearing one acetabulum and surrounded by several setae, posterior plates sickle-shaped, with 12-13 pairs of acetabula, two or three of them free in

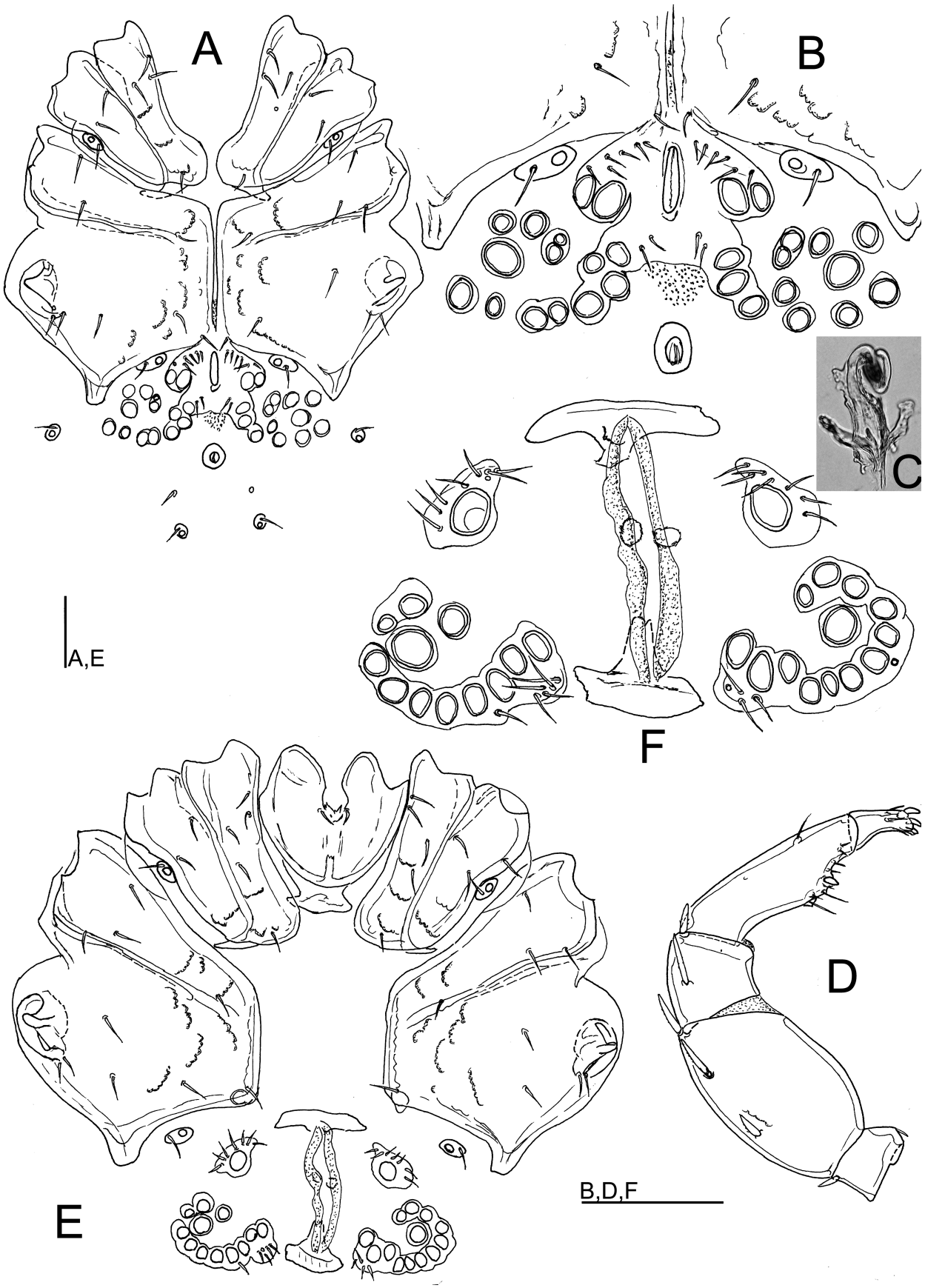

Figure 3 . *Piona mutawintji* **n. sp**. (A-D male holotype, E-F female paratype), mounted, A, E – coxal and genital field; B, F – genital field; C – photograph of ejaculatory complex; D – palp. Scale bars = 100 µm.

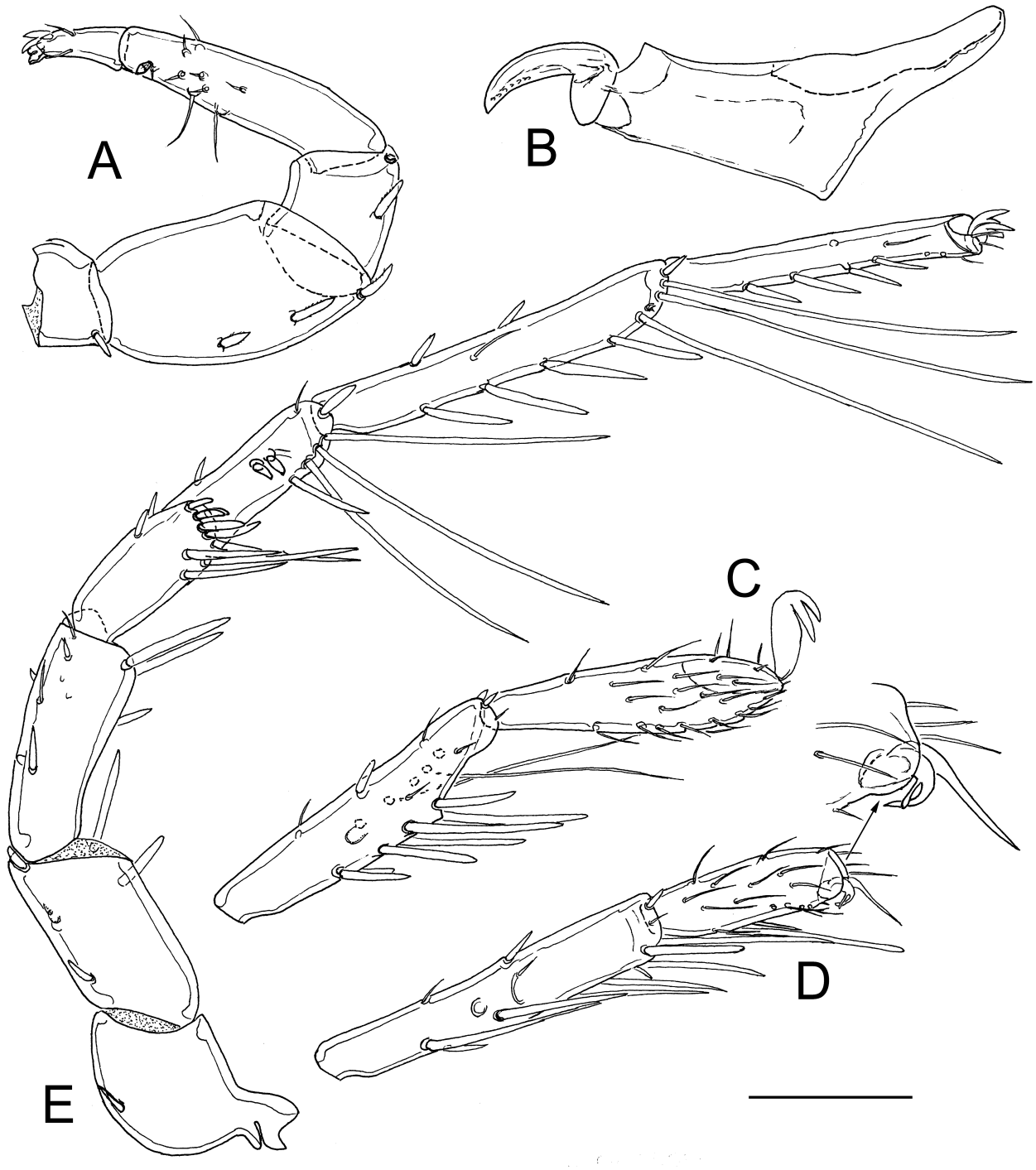

Figure 4 . *Piona mutawintji* **n. sp**. (C-E male holotype, A-B female paratype), A – palp, mounted; B – chelicera, mounted; C – I-leg-5 and 6, mounted; D – III-leg-5 and -6 (inset: claw enlarged 2x), unmounted; E – IV-leg, mounted. Scale bar = 100 µm.

idiosoma (Figure 3F). Palp as illustrated in Figure 4A, P4 slender, ventral tubercles short, flanked by some small setae, distal peg-like seta separated from distal segment margin.

Measurements — *Male* (holotype, in parentheses some measurements of paratype). Idiosoma dorsally 825 (838, n=1) long and 619 (625, n=1) wide; dorsal platelet 58 long. Coxal field 550 long (measured from Cx-I tip to pend of posterior extension of Cx-IV), Cx-III width 538. Genital field 323 wide between outer edges of genital acetabula; gonopore 47 long.

Ejaculatory complex 126 long.

Palp: dorsal length/height: P1, 34/58; P2, 150/88; P3, 72/61; P4, 147/47; P5, 53/28. Capitulum ventrally 147 long, 200 with apodemes. Chelicera 222 long, basal segment 172 long, claw 68 long. Dorsal lengths of I-leg-1-6: 66, 95, 135, 175, 206, 191; dorsal lengths of II-leg-1-6: 72, 108, 141, 200, 225, 203; dorsal lengths of III-leg-1-6: 88, 120, 155, 209, 228, 124; dorsal lengths of IV-leg-1-6: 131, 113, 150, 206, 238, 198; swimming setae numbers are as follows: I-leg-4, 3; I-leg-5, 5; II-leg-4, 4; II-leg-5, 6; III-leg-4, 1; III-leg-5, 6; IV-leg-4, 3; IV-leg-4, 4-5.

Female Idiosoma dorsally 1520 long and 1047 wide. Coxal field 606 long, Cx-III width 775, medial length Cx-III+IV 163. Genital field 397 wide between outer margins of genital plates; gonopore 194 long, pregenital sclerite 138 wide.

Palp: dorsal length/height: P1, 44/66; P2, 170/94; P3, 88/69; P4, 178/50; P5, 69/28 Gnathosoma ventrally 191 long, 225 with apodemes. Chelicera 331 long, basal segment 225 long, claw 88 long. Dorsal lengths of I-leg-4-6: 203, 247, 247; dorsal lengths of II-leg-2-6: 141, 184, 253, 271, 244; dorsal lengths of III-leg-2-6: 141, 191, 253, 281, 256; dorsal lengths of IV-leg-1-6: 150, 144, 222, 291, 313, 266; swimming setae numbers are as follows: I-leg-4, 4; I-leg-5, 6; II-leg-4, 5; II-leg-5, 7; III-leg-4, 8; III-leg-5, 9; IV-leg-4, 5-7; IV-leg-4, 6-7.

Etymology — Named after the Mutawintji National Park, the location of the type locality. The name is a noun in apposition.

Remarks — Due to the similar structure of the genital field (in both sexes only some acetabula incorporated into genital plate) and palp (P-4 distal peg-like seta separated from distal segment margin) the new species resembles *Piona murleyi* Harvey, 1996, a species known in both sexes from Western Australia (Harvey 1996). From the latter species, the new species from South New Wales can easily be separated by P4 stockier and ventrally expanded (compare figure 4D with figure 88 in Harvey 1996), and the number of acetabula is much lower in *P. murleyi*, especially those acetabula not lying on the platelet fused with the gonopore (3 in *murleyi*, 9 in the new species).

Distribution — New South Wales, South Australia.

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