

NEW UNIONICOLIDAE (ACARI, HYDRACHNELLAE) FROM AUSTRALIA

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Summary

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Seven new species of the water mite genus *Unionicola*, subgenus *Pentatax* (Acari, Hydrachnellae), are described from Australian freshwater mussels: *Unionicola* (*Pentatax*) *walkeri* n.sp., *U.* (*P.*) *procursa* n.sp., *U.* (*P.*) *aximilis* n.sp., *U.* (*P.*) *conjunctella* n.sp., *U.* (*P.*) *ligulifera* n.sp., *U.* (*P.*) *clipeata* n.sp. and *U.* (*P.*) *scutata* n.sp. A further new species is placed in *Unionicolopsis optimipalpis* n.g., n.sp.

Introduction

The Hydrachnellae are prostigmatid Acari. Within the family Unionicolidae Oudemans, 1909 there are five subfamilies: Eucetrachninae Viets, 1935 (20 spp. from Africa, Australia, southern Asia), Najadicolinae Viets, 1935 (one sp., North America), Pionatacinae Viets, 1916 (many spp., world-wide), Pollicipalpinae Viets, 1914 (two spp., Africa) and Unionicolinae Oudemans, 1909. The Unionicolinae include four genera: *Unionicola* Haldeman, 1842 (many spp., world-wide), *Vietsatax* Uchida & Imamura, 1938 (one sp., Japan), *Heteratax* Lundblad, 1941 (one sp., Africa) and *Atacella* Lundblad, 1937 (six spp., South America).

The taxonomy of *Unionicola* and its associated subgenera still is somewhat unsatisfactory, but is based on the numbers of genital acetabulae, the appearance of the genital field, and the sexual differentiation of the legs of males. The diagnoses of systematic groups above subgenera were last summarized by Cook (1974). Species of the subgenus *Unionicola* s.s. possess six pairs of genital acetabulae; two species are known from Australia. Species of the subgenus *Pentatax* Thor, 1922 have five pairs of acetabulae; three Australian species are known.

Some species of *Unionicola* are free-living, others parasitic for part or all of their life cycle (e.g. in molluscs; Viets & Plate 1954; Mitchell 1955; Hevers 1978a, 1978b). The life histories of most species, however, are unknown. In Australia, one *Unionicola* species only has been reported in association with a freshwater mussel, namely *U.* (*U.*) *clirrosa* Koenike 1914, in the mussel *Unio nepeanensis* (syn. *Hyridella australis* (Lamarck)). Although the precise locality in Australia is

unknown, the host mussel is likely to have come from a coastal stream in the southeast of the continent (cf. McMichael & Hiscock 1958).

Recently I obtained collections of water mites from various Australian freshwater mussels (Hyriidae) through Dr K. F. Walker of the University of Adelaide; I am grateful to him and the other collectors. Dr Walker also adapted this manuscript from the original German. From the material seven new species of *Unionicola*, subgenus *Pentatax* are described, and *Unionicolopsis* n.g. is erected for an additional new species.

General Remarks

The types and paratypes described herein are catalogued in the Viets Collection (Wilhelmshaven), and ultimately will go to the Senckenberg-Museum, Frankfurt.

The legs of water mites are 6-segmented: 1 trochanter, 2 basifemur, 3 telofemur, 4 genu, 5 tibia, 6 tarsus. The legs and their segments usually are symbolized as, for example, first leg tarsus: I.L.6 and fourth leg tibia: IV.L.5 (see Cook 1974: Fig. 5). The palps are 5-segmented: 1 trochanter, 2 femur, 3 genu, 4 tibia, 5 tarsus. These are denoted P I-V (Cook 1974: Fig. 6).

All measurements herein are μ m.

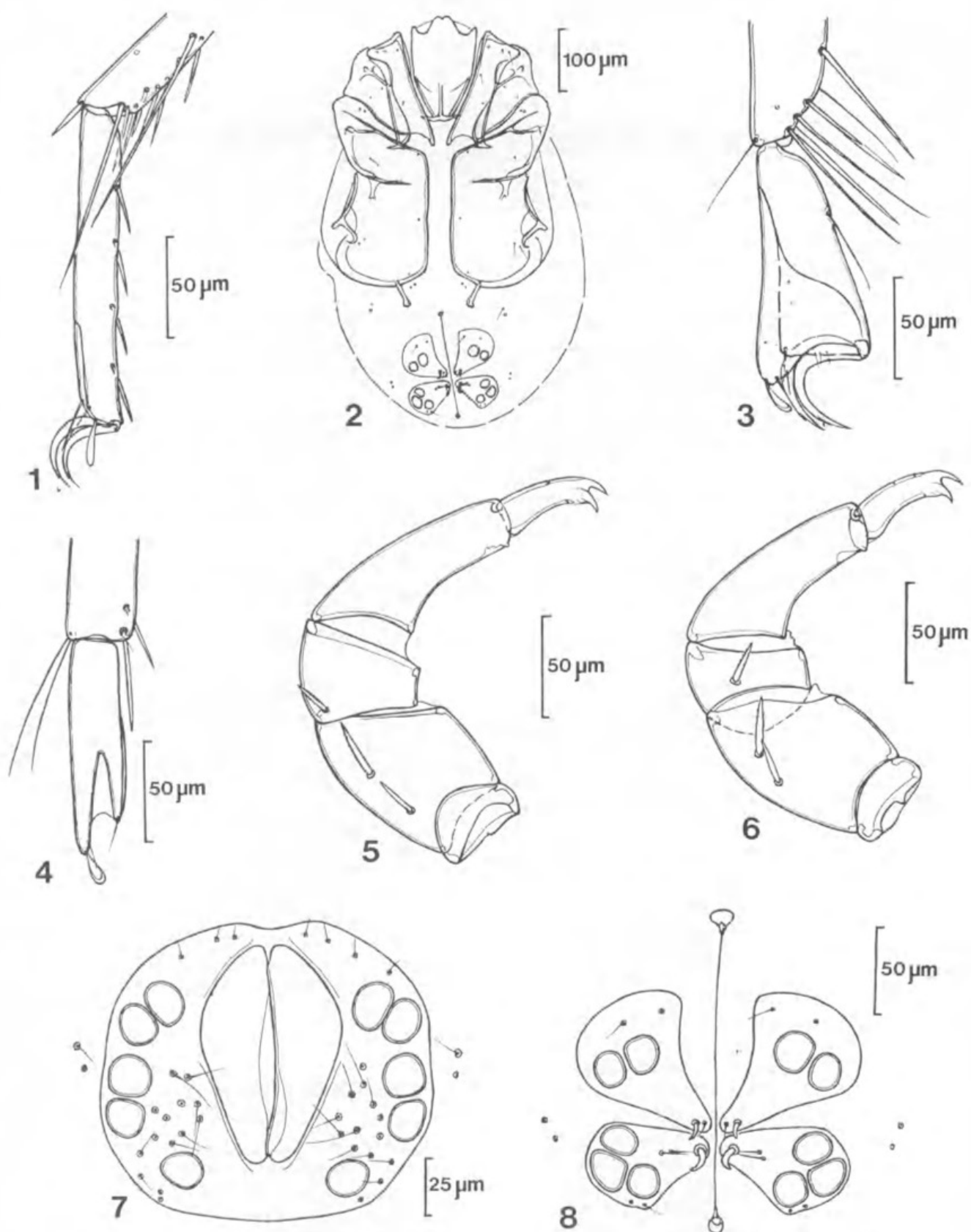
Unionicola (*Pentatax*) *walkeri* n.sp.

FIGS 1-8

Holotype ♀ prep. 6638: With soft integument. In dorsal integument lie two pairs of delicate, oblong plates (muscle attachment sites), anterior pair nearer one another than the posterior pair; length 38-50.

Coxal area (Fig. 2) 415 long. Third coxae considerably shorter in mid-line than fourth coxae; suture between coxal pairs does not

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Figs 1-8. *Unionicola (Pentatax) walkeri* n.sp. 1. ♀ holotype prep. 6638, IV.L.5-6, right; 2. ♀ holotype, ventral side; 3. ♀ holotype, I.L.5-6, left; 4. ♂ prep. 6675, I.L.5-6, right, dorsal aspect; 5. ♀ holotype 6638, right palp; 6. ♂ allotype prep. 6642, left palp; 7. ♂ allotype prep. 6642, genital field; 8. ♀ holotype prep. 6638, genital field.

reach medial margin. Posterior margins of fourth coxae rounded, and each with posteriorly-directed process. Medial margin of third and fourth coxae 198 long.

Genital field (Fig. 8) entirely at posterior end of body. It consists of two pairs of medially-constricted plates; anterior pair each with two genital acetabulae, and posterior pair each with three acetabulae. On strongly-tapered medial edge of each anterior plate short, stout seta ("stylet"), and near it smaller, slender seta. On medial edge of each posterior plate large, thick, curved seta, and alongside two (in some cases three) slender setae. Gonopore (about 182 long) surrounded by pre- and post-genital sclerites.

Capitulum (Fig. 2) 162 long, c. 104 wide. Chelicerae similar to those of other *Unionicola* species. Dorsal palp segment lengths (left P I-V): 10, 105, 53, 109, 54, P II on each side with two setae, and P III one seta. P IV has no ventral process, apart from a minute, often indistinct, peg-like seta at its distal end. P V ends in two strong claws.

Legs I-IV with number of ventrally-attached setae. On segment 5 of all legs, and on segment 4 of legs III and IV, are 3 long, slender swimming-setae (cf. Cook 1974: Fig. 5), located distally. Last segment of leg I (Figs 3-4), seen from side, strongly expanded distally (i.e. dorso-ventrally expanded) to form large claw fossa. On dorsal side, at distal end of segment, slender-based, spoon-shaped, chitinous structure. In Fig. 4 tarsal claws omitted. Club-shaped structure situated on distal end of IV.L6 (Fig. 1). Small, spoon-shaped seta attached near tarsal claws on II.L6 and III.L6. Tarsal claws simple in form, having no carpus, but with slender, terminal spine. Dorsal segment lengths of legs I and IV: I.L.3-6: 74, 115, 97, 118; IV.L.3-6: 94, 155, 180, 165.

Allotype ♂ prep. 6642: Coxal area (length 410) and dorsal side correspond closely with ♀. Genital field located terminally as an enclosed plate 127 long and 145 wide. For arrangement of genital acetabulae and hair-pores, see Fig. 7.

Capitulum 149 long and c. 100 wide. Palps (Fig. 6) similar to ♀, left P I-V, measured dorsally, as follows: 11, 97, 54, 105, 53. Legs similar to ♀; dorsal segment-lengths: I.L.3-6: 70, 111, 99, 114; IV.L.3-6: 92, 146, 170, 152.

Variation: coxal area, length 415-453 ♀(7), 350-433 ♂(9); gonopore, length incl. sclerites

169-188, genital field ♂, length, 114-127; genital field ♂, width, 124-165; capitulum, length 162-177, 143-159; capitulum, width 103-114, 91-101; chelicera, length (152), (135-152); palp, dorsal segment length P I 8-13, 7-11, P II 99-113, 82-105; P III 46-62, 47-59; P IV 109-120, 100-114; P V 53-58, 44-57; legs, segment length I.L.3 74-84, 69-76; I.L.4 114-124, 103-119; I.L.5 95-107, 89-105; I.L.6 110-122, 104-121; IV.L.3 94-104, 83-99; IV.L.4 155-170, 135-158; IV.L.5 177-198, 157-182; IV.L.6 165-175, 146-159; egg, long axis 135-143.

Hosts and localities (all S. Aust.): *Alathyria jacksoni* Iredale, Lock 3, River Murray, K. F. Walker, 19.xi.1977 (1 ♂, 1 ♀, holotype); Lock 3, R. Murray, K. F. Walker, 5.xi.1977 (1 ♂, allotype); *Velesunio ambiguus* (Phillipi), Lock 3, R. Murray, K. F. Walker, 19.xi.1977 (8 ♂, 7 ♀); Point Sturt, Lake Alexandrina (R. Murray) K. F. Walker, 30.x.1977 (4 ♀); L. Alexandrina nr Milang, M. C. Geddes, 20.xi.1977 (3 ♂, 2 ♀); Point Sturt, L. Alexandrina K. F. Walker, 3.xii.1977 (3 ♂, 2 ♀).

Unionicola (*Pentatax*) *procursa* n.sp.

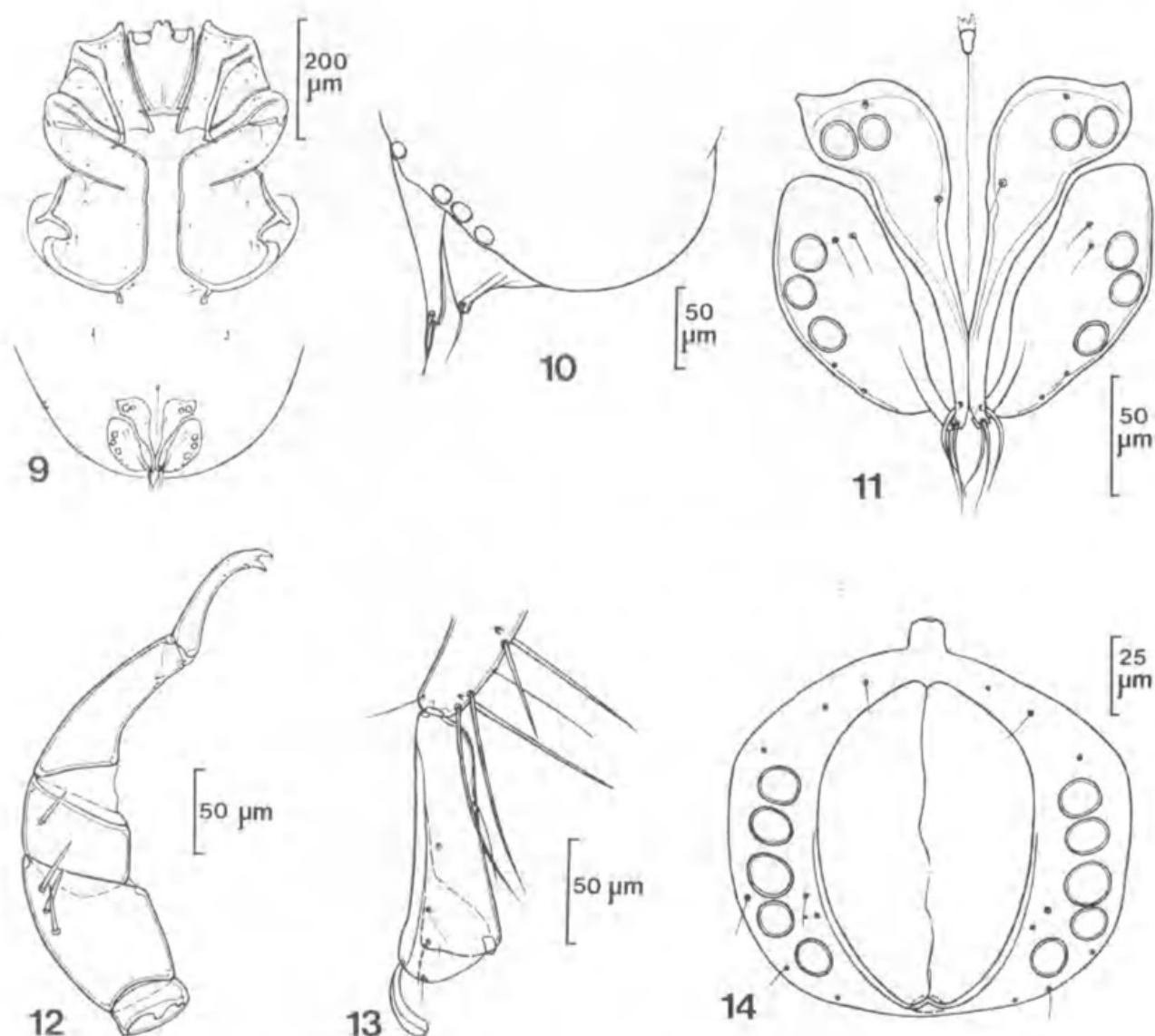
FIGS 9-14

Holotype ♀ prep. 6671: Dorsal integument and coxal area (Fig. 9) very similar to *U. (P.) walkeri* n.sp., although posterior process of fourth coxa somewhat shorter. Coxal area 446 long.

Genital field (Fig. 10, lat. view) at end of body. In dorsal aspect (Fig. 11) abdominal integument at anterior margin of field indented (although this is not clear from Fig. 10). Anterior plates of genital field, each with two acetabulae, directed posteriorly. Each anterior plate with two stout setae at hindmost extremity. Posterior plates broader, and bear one seta at the ends of their respective posterior processes.

Capitulum 150 long and 104 wide anteriorly. Chelicerae like those of congeners. Long, slender P V (Fig. 12), and, as with related species, two distinct terminal claws. P III with two setae on outer border, and three inner setae. Dorsal segment lengths (left P I-V): 15, 110, 60, 116, 73.

I.L.6 similar to that of *U. (P.) walkeri* n.sp. (Fig. 13; tarsal claws omitted for clarity). It is, however, smaller and the distal border of the expanded part of the large claw fossa is convexly rounded, not strongly indented as in other species. Large, spoon-shaped appendage



Figs 9-14. *Unionicola (Pentatax) procursa* n. sp. 9. ♀ holotype, prep. 6671, ventral side; 10. ♀ paratype, prep. 6673, genital field, lateral view; 11. ♀ holotype, genital field; 12. ♀ holotype, left palp; 13. ♀ holotype, I.L.5-6, left; 14. ♂ allotype, prep. 6676, genital field.

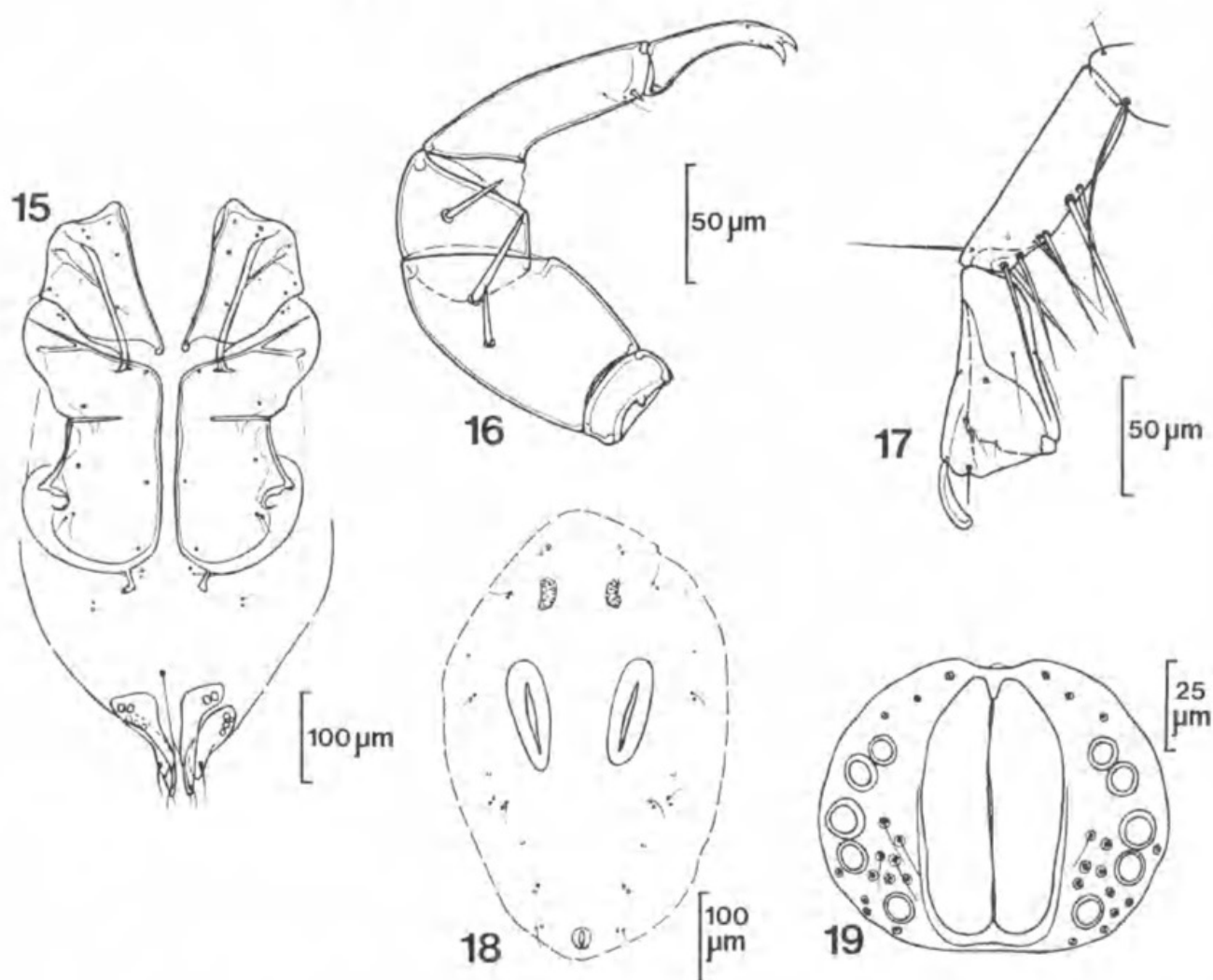
on I.L.6 like that of *U. (P.) walkeri* n.sp. Stout seta on dorsal side of II and III.L.6, proximal to each claw; tends to a spoon-shape on leg II, but simple on leg III. No club-shaped chitinous structure on end of IV.L.6, as in related species. Otherwise leg setation shows no significant differences. Dorsal segment lengths: I.L.3-6: 95 . 163 . 117 . 129; IV.L.3-6: 104 . 168 . 183 . 167.

Allotype ♂ prep. 6676: ♂ and ♀ very similar. Coxal area 365 long. Genital field (Fig. 14) differs from other species in form and especially number of hair-pores. A small anterior projection, 114 and 126 wide dorsally.

Capitulum dimensions 122 : 85. Chelicerae 126 in length. Palps as in ♀; dorsal segment

lengths (left P I-V): 14 . 94 . 50 . 100 . 64. Legs as in ♀. Dorsal segment lengths: I.L.3-6: 78 . 124 . 92 . 109; IV.L.3-6: 82 . 130 . 139 . 144.

Variation: coxal area, length 365-393 ♂♂ (4), 405-446 ♀♀ (5); capitulum, length 122-133, 135-150; capitulum, width 83-90, 94-104; palp, dorsal segment length P I 12-14, 13-16; P II 90-100, 98-110; P III 44-51, 51-64; P IV 101-105, 112-119; P V 59-67, 64-73; genital field (♂), length 114-120, ...; genital field (♂), width 126-137, ...; legs, segment length I.L.3 75-80, 88-97; I.L.4 121-128, 144-164; I.L.5 92-99, 105-117; I.L.6 105-109, 115-129; IV.L.3 79-85, 92-108; IV.L.4 129-139, 149-169; IV.L.5 139-151, 164-183;



Figs 15–19. *Unionicola (Pentatax) assimilis* n.sp. 15. ♀ holotype, prep. 6625, ventral side; 16. ♀ holotype, left palp; 17. ♀ holotype, I.L.5–6, left; 18. ♂ paratype, prep. 6635, dorsum; 19. ♂ allotype, prep. 6633, genital field.

IV.L.6 137–146, 161–168; egg, long axis , 160–163.

Host and localities (all S. Aust.): *Velesunio ambiguus*, R. Murray nr Mannum, K. F. Walker, 19.xi.1977 (1 ♂); Point Sturt, L. Alexandrina (R. Murray), K. F. Walker, 30.x.1977, (5 ♂); L. Alexandrina nr Milang, M. C. Geddes, 20.xi.1977 (7♂, 1 ♀, incl. holotype and allotype); Point Sturt, L. Alexandrina (R. Murray), K. F. Walker, 3.xii.1977 (5 ♀).

Unionicola (Pentatax) assimilis n.sp.

FIGS 15–19

Holotype ♀ prep. 6625: Ridged posterior plates of dorsal integument (Fig. 18, ♂) about 130 long. Coxal area (Fig. 15) length 406. As in the other species, suture between the third and fourth coxae does not reach medial margin, and is directed transversely. Genital field, capi-

tulum and chelicerae similar to *U. (P.) procursa* n.sp. P II (Fig. 16) bears two setae on inner and outer sides. P V ends in two claws; length in same proportion to P IV as in other species. Dorsal lengths of P II and P IV nearly identical, whereas in *U. (P.) procursa* n.sp. P IV is slightly longer than P II. Dorsal segment lengths (left P I–V): 11 . 105 . 50 . 103 . 61.

I.L.6 (Fig. 17) expanded distally, and 52.6–62.7% of segment length; it is also shorter in proportion to I.L.5 (90.5–101.2%) than is the case for *U. (P.) procursa* n.sp. (106.5–118.5%). I.L.6 bears a spoon-shaped distal projection like the other species. On II.L.6 and III.L.6, however, only one stout seta at distal end of dorsal edge, and this is not spoon-shaped. Dorsal segment lengths: I.L.3–6: 84 . 136 . 95 . 90; IV.L.3–6: 90 . 144 . 172 . 149.

Allotype ♂ prep. 6633: Dorsal integument, coxal area, palps and legs similar to ♀. Posterior dorsal plates about 115 long, with strong chitinous ridge (Fig. 18). Coxal area length 355. Genital field (Fig. 19) about 80 long and 97 wide, weakly indented at anterior border.

Capitulum dimensions 132 : 79. Dorsal palp segment lengths (left P I-V): —, —, 42, 85, 54. Dorsal leg segment lengths: I.L.3-6: 74, 110, 85, 81; IV.L.3-6: 75, 123, 150, 134.

Variation: coxal area, length 344-380 ♂♂ (6), 400-442 ♀♀ (6); posterior dorsal plate, length 105-137, 125-140; capitulum, length 124-138, 143-157; capitulum, width 76-85, 94-100; chelicerae, length (102), (125-132); palp, dorsal segment length P I 10-12, 10-13; P II 85-97, 102-112; P III 42-48, 50-62; P IV 82-89, 99-110; P V 50-54, 56-67; genital field (♂), length (77-85), —; genital field (♀), width 89-108, —; leg, segment length I.L.3 65-83, 84-98; I.L.4 104-119, 136-145; I.L.5 77-89, 95-105; I.L.6 75-85, 89-97; IV.L.3 71-84, 89-97; IV.L.4 115-132, 144-155; IV.L.5 142-160, 172-186; IV.L.6 130-139, 147-165; egg, long axis —, (133-138);

Host and locality: *Westralunia carteri* Tredale, Murray River S of Dwellingup, W. Aust., N. M. Morrissey, 15.xii.1977 (8♂, 13♀, 11 nymphs, incl. holotype and allotype).

Remarks: Allied to *U. (P.) procursa* n.sp. Significant differences between the two species are summarized in Table 1.

Unionicola (Pentatax) conjunctella n.sp.

FIGS 20-25

Holotype ♀ prep. 6669: Dorsal side (Fig. 23, ♂) like that of *U. (P.) assimilis* n.sp. Ridged plates (c. 135 long) very thin, outline not always evident, in contrast to ridge itself.

Coxal area (Fig. 20) 360 long. Suture between third and fourth coxae runs obliquely, approximately parallel to anterior margin of third coxae, and fused with medial edge of posterior plates. Genital field (see Fig. 20) similar to other species.

Capitulum 142 long and 87 wide, and, like the chelicerae, with no distinctive characteristics. Palp (Fig. 21) segment P II bears two setae on each of its inner and outer sides. Dorsal lengths of segments (left P I-V): 12, 89, 42, 91, —.

I.L.6 (Fig. 22) similar to that of *U. (P.) assimilis* n.sp. Terminal segments of legs II and III each with expanded spoon-shaped seta dorsally, at distal end, in front of tarsal claws. Dorsal segment lengths: I.L.3-6: 64, 93, 72, 76; IV.L.3-6: 77, 115, 140, 125.

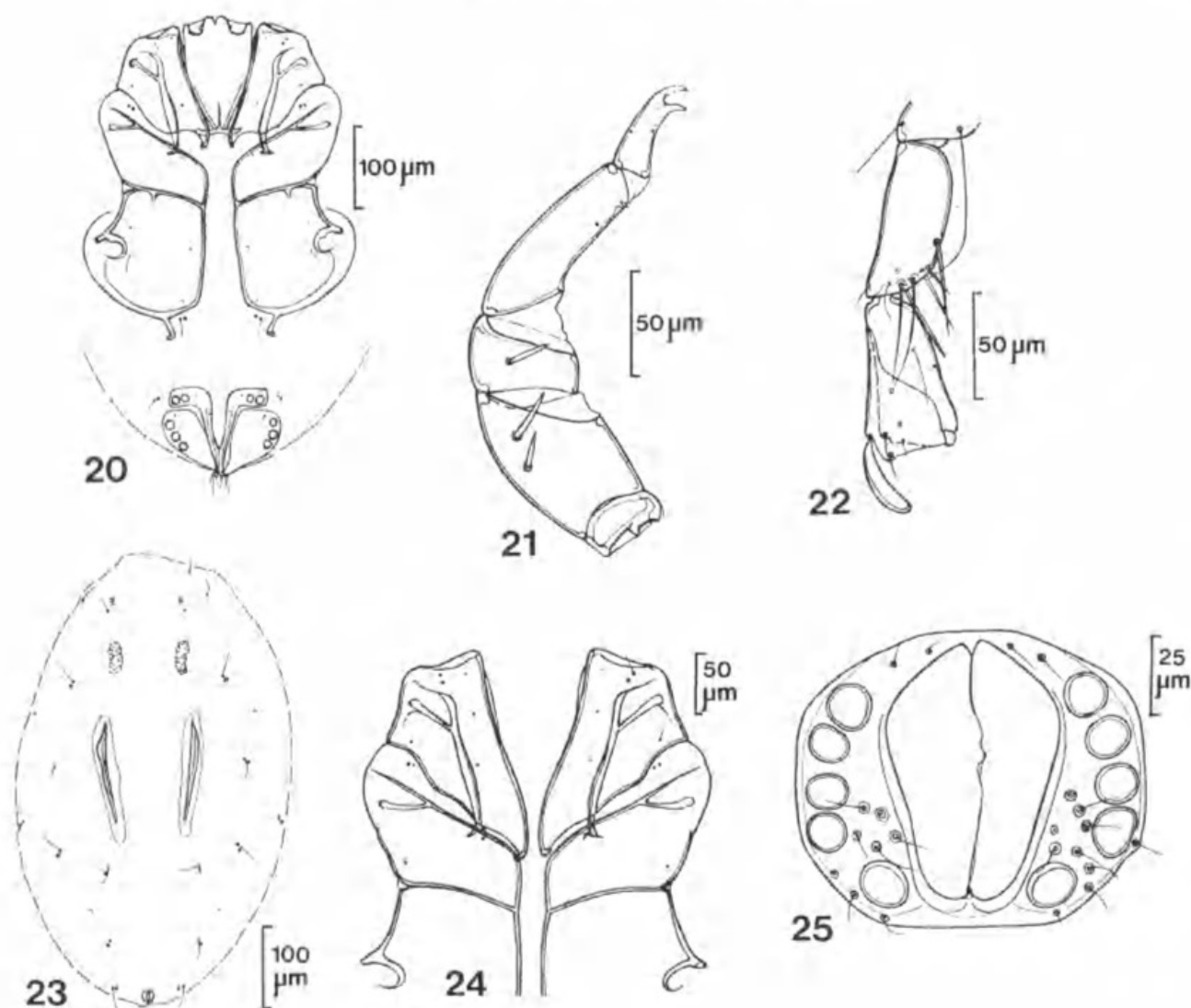
Allotype ♂ prep. 6663: Dorsal side (Fig. 23) similar to ♀. Length of posterior plates 158. Coxal area 386 long. Unlike ♀, first coxae (Fig. 24) extend posteriorly beyond ends of outer apodemes. Genital field 94 long and 110 wide, (Fig. 25) like *U. (P.) assimilis* n.sp.

Capitulum 140 long and 87 wide. Palps similar to ♀; dorsal segment lengths (left P I-V): 10, 93, 45, 93, 47. Legs also similar to ♀. Dorsal segment lengths: I.L. 3-6: 66, 99, 76, 80; IV.L.3-6: 77, 119, 147, 132.

Variation: coxal area, length 340-406 ♂♂ (7), 320-380 ♀♀ (4); posterior dorsal plates, length 130-158, 130-135; capitulum, length 125-145, 124-142; capitulum, width 76-90, 80-87; chelicera, length (110-125), (115); palp, dorsal segment length P I 10-13, (12); P II 79-97, 83-89; P III 37-47, 40-45; P IV 84-98, 84-93; P V 43-48, 42-47; genital field (♂), length (81-94), —; genital field (♀), width 107-129, —; legs, segments length I.L.3 57-71, 58-64; I.L.4 85-105, 85-94; I.L.5

TABLE 1. Comparison of *U. (P.) assimilis* and *U. (P.) procursa*

	<i>U. (P.) assimilis</i> n.sp.	<i>U. (P.) procursa</i> n.sp.
dorsal integument	1 pair small ant. muscle attachment sites; 1 pair post. plates with strong ridge	1 pair small ant. muscle attachment sites; 1 pair post. plates without strong ridge
suture between coxae 3 and 4	transverse	oblique, ± parallel to ant. border of 3rd coxa
genital field (♂)	without medial process; post. 1/2 with many hair-pores	with medial process; post. 1/2 with few hair-pores
P II inner side	2 setae	3 setae
I.L.6	± broad	± slender
max. width as % segment length	♂♂: 54.3-63.7% ♀♀: 52.6-60.0%	♂♂: 40.2-41.3% ♀♀: 36.8-40.0%



Figs 20-25. *Unionicola (Pentatax) conjunctella* n.sp. 20. ♀ holotype, prep. 6669, ventral side; 21. ♀ holotype, left palp; 22. ♀ holotype, I.L.5-6; 23. ♂ allotype, prep. 6663, dorsum; 24. ♂ paratype, prep. 6662, coxal area; 25. ♂ allotype, genital field.

66-83, 66-76; I.L.6 71-88, 72-77; IV.L.3 69-87, 70-77; IV.L.4 105-129, 108-121; IV.L.5 131-155, 136-148; IV.L.6 120-143, 117-131; I.L.6, maximum width 43-50, 44-47; egg, long axis ..., (165).

Hosts and localities: *Alathyria jacksoni*, Lock 3, R. Murray, S. Aust., K. F. Walker, 19.xi.1977 (1 ♂); *Velesunio ambiguus*, R. Murray nr Mannum, S. Aust., K. F. Walker, 19.xi.1977 (2 ♂, 1 ♀); Lock 3, R. Murray S. Aust., K. F. Walker, 19.ix.1977 (3♂, incl. allotype, 1 ♀); Rocklands Reservoir, Vict., P. J. Suter, 20.xi.1977 (1 ♂); Point Sturt, L. Alexandrina (R. Murray), S. Aust., K. F. Walker, 30.x.1977 (1 ♂ holotype).

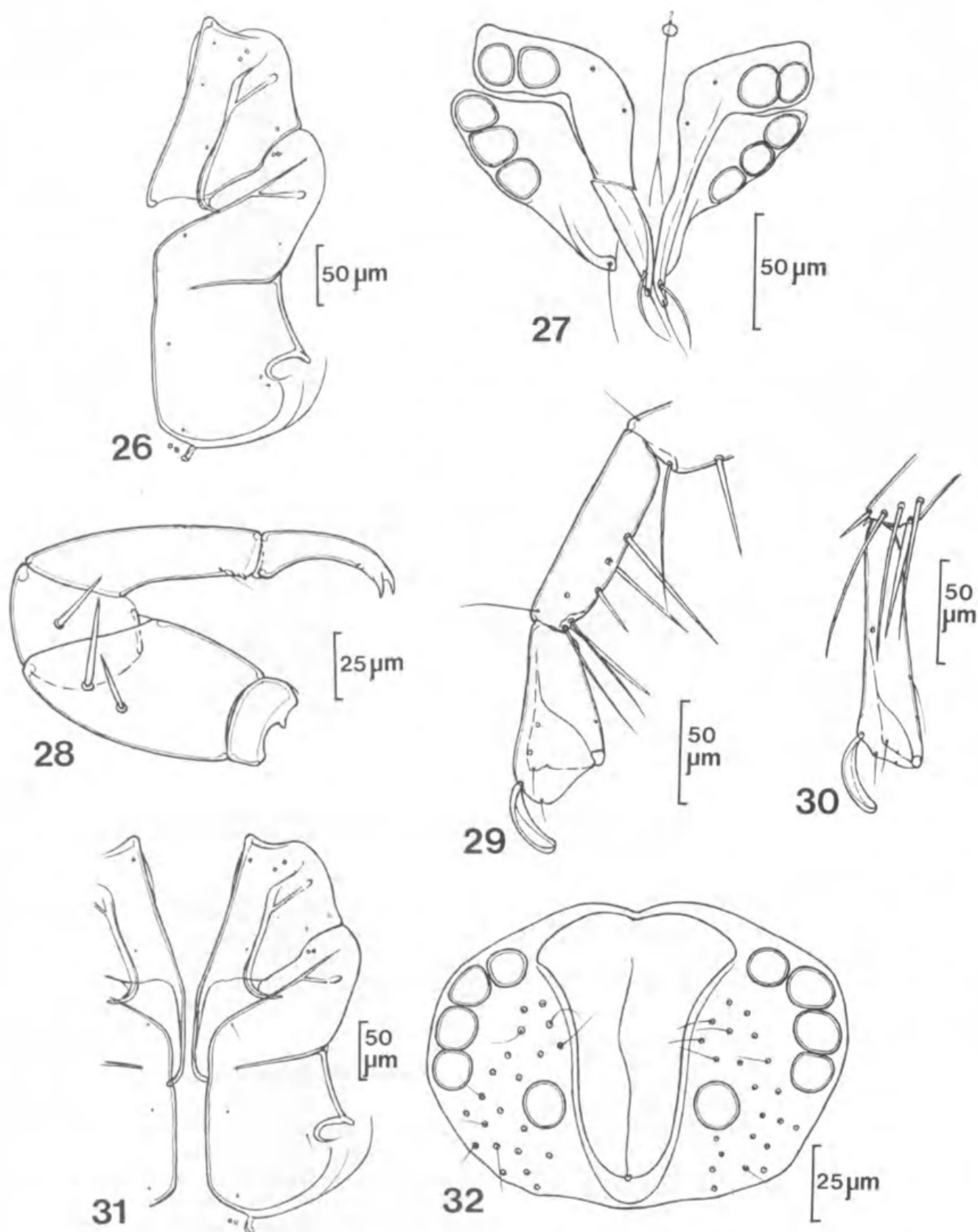
Remarks: Distinguished from *U. (P.) procursa* n.sp. and *U. (P.) assimilis* n.sp. in that suture between third and fourth coxae extends to medial margin of posterior plates.

P V is considerably shorter than in other species, as seen in comparisons of P V length as % P IV length (♂ + ♀): *U. (P.) conjunctella* n.sp. 46.2-53.6%; *U. (P.) procursa* n.sp. 57.1-65.7%; *U. (P.) assimilis* n.sp. 56.0-64.3%.

***Unionicola (Pentatax) ligulifera* n.sp**

FIGS 26-32

Holotype ♀ prep. 6664: As with *U. (P.) conjunctella* n.sp., dorsally two separate, thin plates with prominent chitinous ridges. Coxal area (Fig. 26) 373 long. First coxae do not extend beyond posterior ends of apodemes. Suture between third and fourth coxae short and does not reach medial margin. Genital field (Fig. 27) like that of other species except *U. (P.) walkeri* n.sp.



Figs 26-32. *Unionicola (Pentatax) ligulifera* n.sp. 26. ♀ holotype, prep. 6664, coxal area, left; 27. ♀ holotype, genital field; 28. ♀ holotype, left palp; 29. ♀ holotype, I.L.5-6, left; 30. ♀ holotype, III.L.5-6, left; 31. ♂ allotype, prep. 6666, coxal area; 32. ♂ allotype, genital field.

Capitulum dimensions 120 : 81. P II (Fig. 28) bears two setae on inner and outer sides. P V long, 57-58% of P IV length. Dorsal segment length (left P I-V): 12 : 85 : 44 : 91 : 52.

I.L.6 (Fig. 29) shorter than I.L.5 and typical of other species in the *Pentatax* group. II and III.L.6 (Fig. 30), like I.L.6, each with a large spoon-shaped chitinous structure distally. Species in related groups have, on these segments, minute setae only slightly expanded distally. Dorsal segment lengths: I.L.3-6: 72 : 118 : 100 : 89; IV.L.3-6: 85 : 133 : 152 : 139. Allotype ♂ prep. 6666 (+ paratype ♂, *in toto*): Dorsal integument similar to ♀. Coxal area (Fig. 31) 332(326) long (paratype dimensions in parentheses). First coxae slender in mid-posterior region and wide and elongate at extremity. Genital field (Fig. 32) 134 wide. Foremost four acetabulae on either side arranged in rows.

Capitulum 103(102) long and 70(69) wide. Palps as in ♀; dorsal segment lengths (left P I-V): 10(12) : 71(71) : 34(37) : 77(77) : 45(45). Legs similar to ♀. Dorsal segment lengths: I.L.3-6: 59 : 97 : 87 : 78; IV.L.3-6: 73 : 116 : 132 : 117.

Hosts and localities: *Alathyria jacksoni*, Lock 3, R. Murray, S. Aust., K. F. Walker, 19.xi.1977 (1 ♂); *Velesunio ambiguus*, Lock 3, R. Murray, S. Aust., K. F. Walker, 19.xi.1977 (1 ♀, 2 ♂, incl. holotype and allotype).

Remarks: Distinctive in that II and III.L.6 each bear, on their distal-dorsal margins, a large, spoon-shaped chitinous structure similar to that borne on I.L.6. Although in the ♀ the first coxae do not extend beyond the posterior apodemes, they are very long in the ♂, markedly longer than in the ♂ of *U. (P.) conjunctella* n.sp. The projection extends to the suture between the third and fourth coxae. The suture does not reach the medial margin of the posterior plates.

Unionicola (Pentatax) clipeata n.sp.

FIGS 33-38

Holotype ♀ prep. 6647 (*paratype* ♀ prep. 6649): (Measurements of paratype in parentheses). Weakly chitinized, undivided dorsal shield has dimensions: 202(188) 180(171). Coxal area (Fig. 33) 302(271) long. First coxae do not extend beyond posterior end of apodemes. Suture between third and fourth coxae curved over entire length, and meets medial margin of posterior plates. Fourth

coxae have almost right-angled medial-posterior margin. Genital field (see Fig. 33) similar to preceding species.

Capitulum dimensions 112(95), 67(60), chelicerae 87 long. P II (Fig. 34) has two setae on inner and outer sides. Relative length of P V between that of *U. (P.) conjunctella* n.sp. and *U. (P.) procursus* n.sp. Dorsal segment lengths (left P I-V): 11(8) : 60(55) : 36(29) : 66(63) : 38(33).

I.L.6 (Fig. 35) relatively short and wide (61.3-67.2% of segment length), and with convex distal margin. Distal-dorsal setae on legs II and III only slightly expanded. Dorsal leg segment lengths: I.L.3-6: 51(48) : 70(68) : 53(52) : 61(59); IV.L.3-6: 59(55) : 89(86) : 107(106) : 94(96).

Allotype ♂ prep. 6648 (+ paratype ♂ prep. 6650): Dimensions of dorsal shield (Fig. 36) 208 : 178. Coxal area 288(280) long, similar to ♀. Genital field (Fig. 37) with many hair pores, indented anteriorly and 127(132) wide.

Capitulum 99 long and 63 wide. Palp dorsal segment lengths (left P I-V): —(8) : 58(59) : 32(30) : 62(61) : 36(33); Legs similar to ♀. Dorsal segment lengths: I.L.3-6: 50(51) : 69(70) : 53(54) : 62(61); IV.L.3-6: 56(58) : 82(86) : 105(103) : 95(96).

Host and locality: *Velesunio ambiguus*, R. Murray nr Mannum, S. Aust., K. F. Walker, 19.xi.1977 (2 ♂, 2 ♀, incl. holotype and allotype).

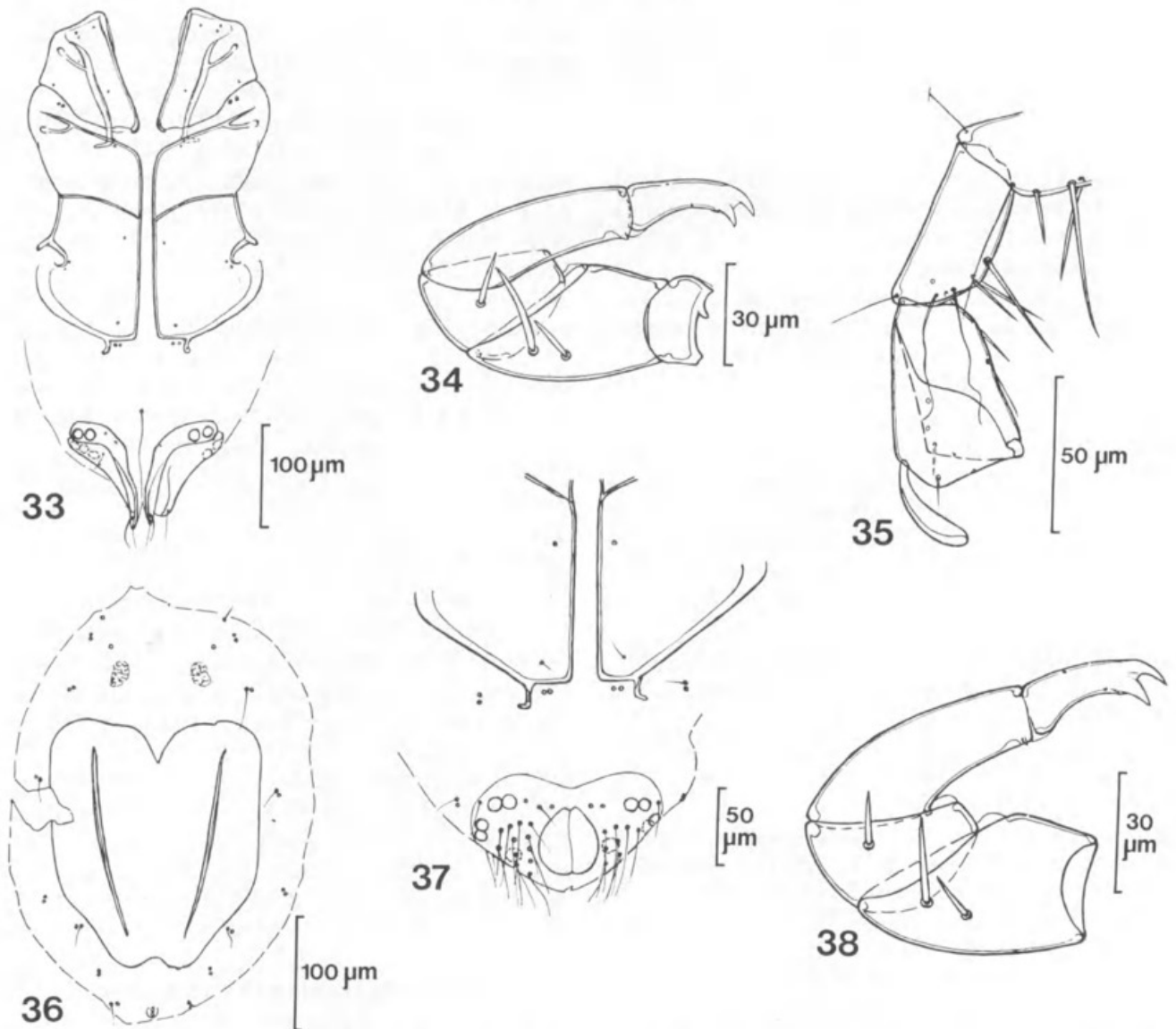
Unionicola (Pentatax) scutata n.sp.

FIGS 39-45

Holotype ♀ prep. 6679: Dorsal shield (Fig. 39) about 280 long and finely pored. On each side small, weakly chitinized shield, with hair-pore, in front of anterior muscle attachment sites. Coxal area (Fig. 40) 366 long. Suture between third and fourth coxae extends to medial margin of posterior plates. First coxa does not extend beyond end of posterior apodemes. Genital field (see Fig. 40) similar to other species.

Capitulum 114 long and 76 wide. P II (Fig. 41) with 2 setae on inner and outer sides. Dorsal segment lengths (left P I-V): 13 : 68 : 35 : 81 : 40.

I.L.6 (Fig. 42) similar to other species; as with *U. (P.) clipeata* n.sp., slightly longer than penultimate segment. Distal-dorsal setae on II and III.L.6 only slightly broadened (cf. spoon-shaped). IV.L.6 (Fig. 43) has, in the middle of its distal extremity, club-shaped chitinous structure comparable to *U. (P.) walkeri* n.sp.



Figs 33–38. *Unionicola (Pentatax) clipeata* n.sp. 33. ♀ holotype, prep. 6647, ventral side; 34. ♀ holotype, left palp; 35. ♀ holotype, I.L.5–6, left; 36. ♂ allotype, prep. 6648, dorsum; 37. ♂ allotype, ventral side, posterior; 38. ♂ allotype, left palp.

Dorsal leg segment lengths: I.L.3–6: 55 . 88 . 65 . 64; IV.L.3–6: 66 . 110 . 138 . 123.

Allotype ♂ prep. 6680 (+ paratype ♂ prep. 6681): (Dimension of paratype given in parentheses). Dorsal side similar to ♀. Coxal area (Fig. 44) 333(375) long. First coxae extend beyond end of posterior apodemes (in these characters the ♂ is similar to the ♂ of *U. (P.) conjunctella* n.sp.). Genital field (see Fig. 44) 138(158) wide, and posterior margin (Fig. 45) indented; large numbers of hairpores in posterior area.

Capitulum 109(118) long and 70(75) wide. Palps are similar to ♀; dorsal segment lengths (left P I–V): 8(9) . 60(70) . 30(33) . 72(77) . —(41). Dorsal leg segment lengths: I.L.3–6: 55(58) . 85(89) . 64(67) . 67(68);

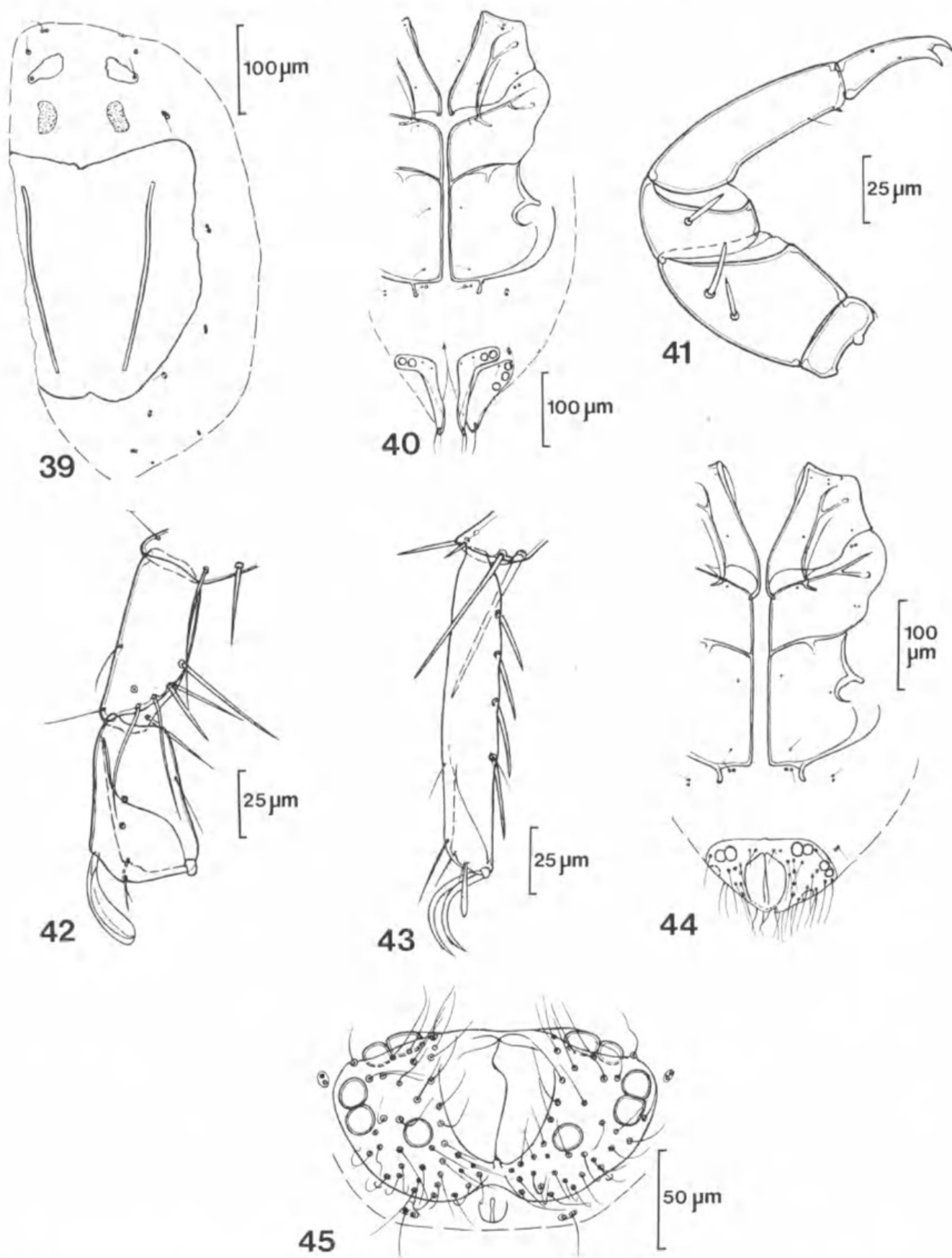
IV.L.3–6: 62(67) . 102(110) . 128(136) . 116(121).

Host and locality: *Velesunio angasi* (Sowerby), Ja-Ja Billabong, Magela Creek, Arnhem Land, N.T., W. D. Williams, xi.1977 (2 ♂, 1 ♀, incl. holotype and allotype).

Remarks: Like *U. (P.) clipeata* n.sp., this species has an undivided dorsal shield in which borders have become fused. Essential differences between the two species are in Table 2.

Genus *Unionicolopsis* n.g.

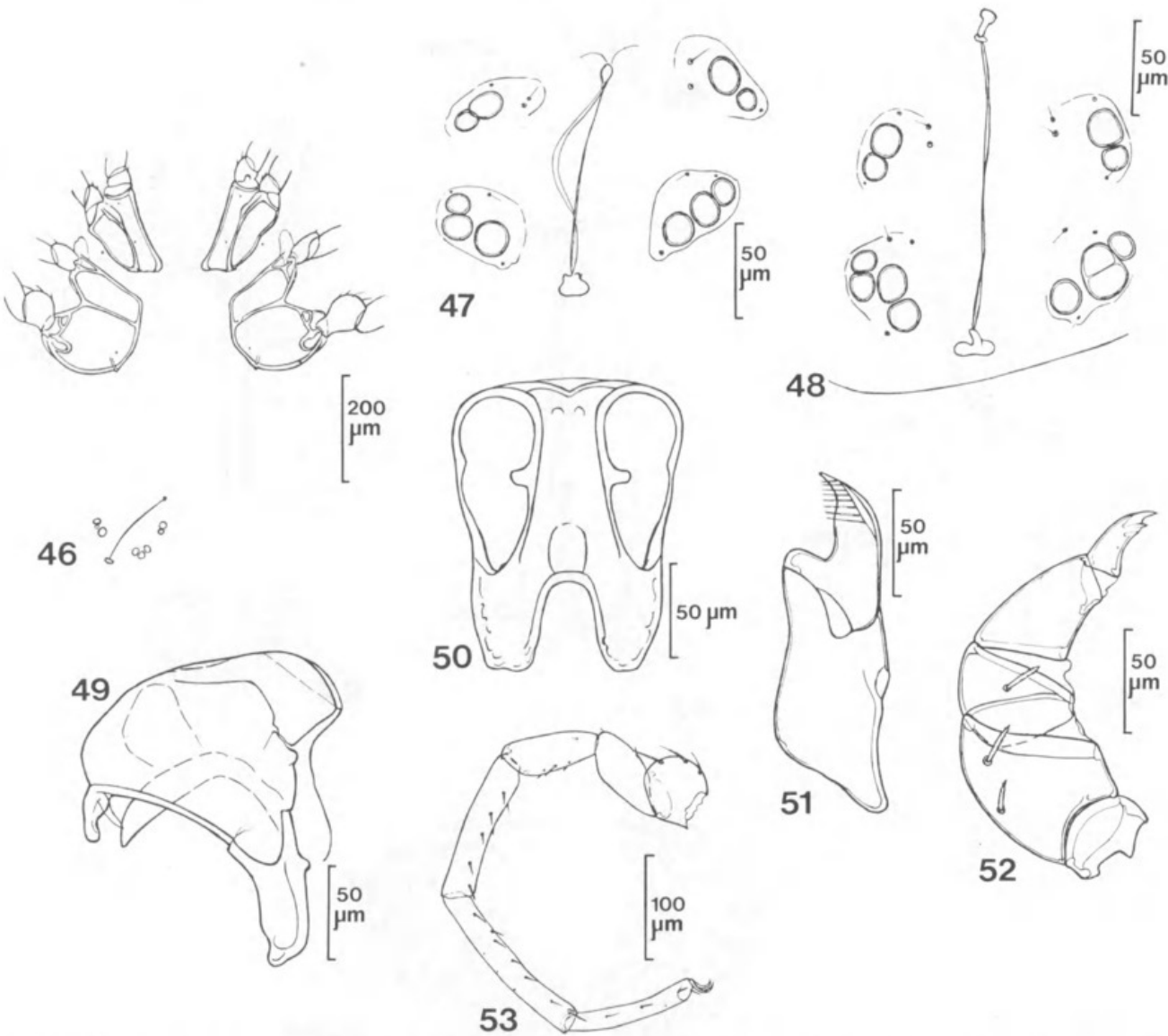
Diagnosis (based on ♀ only): With soft integument. Coxae in four groups, the posterior group especially widely separated; anterior coxal group without posterior apodemes. Genital field with delicate, weakly chitinized plates,



Figs 39–45. *Unionicola (Pentatax) scutata* n.sp. 39. ♀ holotype, prep. 6679, dorsum; 40. ♀ holotype, ventral side; 41. ♀ holotype, left palp; 42. ♀ holotype, I.L.5–6, left; 43. ♀ holotype, IV.L.5–6, right; 44. ♂ allotype, prep. 6680, ventral side; 45. ♂ paratype, prep. 6681, genital field.

TABLE 2. Comparison of *U. (P.) scutata* and *U. (P.) clipeata*

	<i>U. (P.) scutata</i> n.sp.	<i>U. (P.) clipeata</i> n.sp.
body size	large (330–380)	small (270–300)
dorsum	dorsal shield strongly chitinized; with a pair of small shields, each bearing hair-pore, in front of ant. muscle attachment sites	dorsal shield weakly chitinized; without shields in front of ant. muscle attachment sites
genital field	with many hair-pores	with few hair-pores
IV.L.6	with distal club-shaped structure	without distal club-shaped structure



Figs 46–53. *Unionicolopsis opimipalpis* n.sp. 46. ♀ holotype, prep. 6683, ventral side; 47. ♀ paratype, prep. 6684, genital field; 48. ♀ paratype, prep. 6682, genital field; 49. ♀ holotype, capitulum, lateral view; 50. ♀ paratype, pre. 6682, capitulum, dorsal view; 51. ♀ holotype, chelicera; 52. ♀ holotype, left palp; 53. ♀ paratype, prep. 6684, leg IV, left.

anterior plates each with two, posterior plates each with three, genital acetabulae. Medial margins of plates without special spines or setae. Capitulum with broad upper processes. Palp stout, without process on P IV.

Type species: Unionicolopsis opimipalpis n.sp.

Unionicolopsis opimipalpis n.sp.

FIGS 46-53

Holotype ♀ prep. 6683 (+ *paratype* ♀♀ preps. 6682, 6684): In soft dorsal integument is pair of long and pair of short muscle attachment sites; these are not significantly chitinized, and not formed as plates. Data for all three specimens are given (paratypes in parentheses).

Third and fourth coxae (Fig. 46) relatively widely separated in medial line; medial length about 148(145, 148). Posterior apodemes of first coxal group absent.

Genital plates (Figs 47-48) very weakly chitinized, and indistinct in outline; widely separated, on both sides of gonopore (c. 165(165, 175) long). As in *Pentatax*, each anterior plate with two genital acetabulae, and posterior plates with three acetabulae. Number of acetabulae may vary (Fig. 48).

Capitulum (Figs 49-50) stout, about 164(150, 163) long and —(119, 120) wide, and ends posteriorly in two wide-lobed, upper processes. Chelicerae 165 long (Fig. 51). Palps stout (Fig. 52), P II with two setae on inner and outer sides. No process on P IV, P V ends in two large, dissimilar claws.

Legs very simple in form. On I.L.3, in about middle of ventral side, is conspicuous, very long, strong seta, and beside it a short seta. On III.L.3 and 4 is distal seta and another proximally. Setae on segment 3 dissimilar in length, whereas those on segment 4 are about equal, and in general longer than those on segment 3. At distal extremity of III.L.5 pair of setae. IV.L.1 bears three distinct setae (Fig. 53); all other segments of leg IV with only very small spine-like setae. Segments 4-6 on leg IV elongate, and segment 6 slightly curved. All tarsal claws simple. Dorsal leg segment lengths: I.L. 3-6: 59(59, 62) . 75(67, 75) . 72(65, 72) . 75(75, 79); IV.L.3-6: 103(99, 105) . 169(158, 173) . 187(179, 193) . —(154, 164).

Host and locality: Velesunio ambiguus, R. Murray nr Albury, N.S.W., T. J. Hillman, xi, 1977 (3 ♀, incl. holotype).

Remarks: Only 3 ♀♀ of this new species are available and, because the ♂ remains unknown,

the systematic position of the material is uncertain. Whether the new species, for which the *Unionicolopsis* n.g. now is erected, should be placed as a subgenus in *Unionicola*, must remain in doubt pending discovery of the ♂. It appears unlikely to me.

List of mussels and associated mites

Alathyria jacksoni Iredale: *U.* (P.) *walkeri*, *conjunctella*, *ligulifera*.

Velesunio ambiguus (Phillipi): *U.* (P.) *walkeri*, *conjunctella*, *ligulifera*, *procursa*, *clipeata*; *Unionicolopsis opimipalpis*.

Velesunio angasi (Sowerby): *U.* (P.) *scutata*.

Westralunio carteri Iredale: *U.* (P.) *assimilis*.

Key to the species of the *Pentatax* group described herein

1. Dorsum with undivided shield, with pair of distinct chitinous ridges 2
Dorsum without complete shield 3
2. Shield strongly chitinized; IV.L.6 with distal club-shaped chitinous structure; first coxae of ♀ falling short of, those of ♂ extending beyond posterior apodemes *scutula*
Shield weakly chitinized; IV.L.6 without distal club-shaped chitinous structure; first coxae of ♂ and ♀ not extending beyond posterior apodemes *clipeata*
3. Dorsum with two weakly chitinized plates, each having distinct chitinous ridge 4
Dorsum without chitinized ridges, but with muscle attachment sites on weakly chitinized plates 6
4. Suture between third and fourth coxae reaching medial margin of posterior pair of plates; distal-dorsal edges of II. and III.L.6 with only slightly expanded (spoon-shaped) seta; first coxae of ♀ shorter than those of ♂, longer than posterior apodemes *conjunctella*
Suture between third and fourth coxae not reaching medial margin of posterior pair of plates 5
5. II. and III.L.6 with setae only on distal-dorsal margin; first coxae of ♂ and ♀ not extending beyond posterior apodemes *assimilis*
II. and III.L.6 with large spoon-shaped chitinous structure dorsally (as on I.L.6); first coxae of ♀ shorter than, and those of ♂ extending beyond posterior apodemes (reaching suture between third and fourth coxae) *ligulifera*
6. P V long (57.7-65.7% of P IV length); inner side of P II with 3 setae; IV.L.6 without club-like structure *procursa*
P V short (45.7-51.9% of P IV length); inner side of P II with 2 setae; IV.L.6 with club-like structure (♀ genital field distinct from that of other species, with 4 similar plates and short, thick spines) *walkeri*

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