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WATER MITES FROM FIJI (ACARI: HYDRACHNIDIA)

BY H. SMIT

(Accepted January 2002)

SUMMARY: One new genus, viz. Fijilimnesia and six new species, viz. Fijilimnesia fluviatilis, F. vitilevuensis, Neumania curvitarsis, N. montana, Koenikea fijica and K. cooki are described from Viti Levu, Fiji. Despite examining a lot of material, it has not been possible to separate females of the two new Fijilimnesia-species. These are the first records of water mites from Fiji. The water mite fauna of Viti Levu is rather poor, with only ten species recorded.

Résumé : Un nouveau genre, Fijilimnesia et six nouvelles espèces, viz. Fijilimnesia fluviatilis, F. vitilevuensis, Neumania curvitarsis, N. montana, Koenikea fijica et K. cooki sont décrits de Viti Levu, Fidji. Malgré le matériel abondant examiné, il n’a pas été possible de séparer les femelles des deux nouveaux Fijilimnesia. De cette première étude sur les hydracariens des Fidji, on peut noter la pauvreté de la faune avec seulement 10 espèces collectées.

Data on water mites from islands in the Pacific east of New Guinea and Australia/New Zealand are scarce. Water mites have been reported from the Bismarck Archipelago (PERSIG, 1903), New Caledonia (WALTER, 1915; VIETS, 1969; SMIT, 2002), Yap (COOK, 1957), the Palau Islands (UCHIDA, 1935, 1939; COOK & BRIGHT, 1983) and the Chatham Islands (SMIT, 1996). VIETS (1939) mentioned several records of damselflies with water mite larva from Hawaii, but until this time no species have been identified. IMAMURA (1981) however, was not able to collect water mites on the Hawaii Islands, and was therefore of the opinion that water mites have not invaded the Hawaii Islands. In the eastern part of the Pacific, GERECKE et al. (1995) were not able to collect water mites on the Galapagos Archipelago. Another example of isolated islands where water mites could not be found is the Falklands Islands in the southern Atlantic Ocean (own observation). It is likely that on isolated islands water mites are usually absent.

On the Fiji islands no water mites have been described before. During a trip to Viti Levu, one of the main islands of Fiji, the author has been able to collect water mites in streams, and to a lesser extent in ponds. Moreover, some material collected by D.R. COOK in 1982 is included in this paper. One new genus and six new species are described. Members of the genus Arrenurus collected on this trip will be treated in a separate paper.

MATERIAL AND METHODS

Unless stated otherwise, all material has been collected by the author. All type-material has been deposited in the Zoological Museum of the University of Amsterdam (ZMAN).

The following abbreviations have been used: PI-PV palp segments 1-5; IV-leg-4-6 fourth-sixth segments of fourth leg. All measurements are in μm, measure-

1. Zoological Museum, University of Amsterdam, Plantage Middenlaan 1018, DH Amsterdam, The Netherlands.

ments of leg and palp segments are of the dorsal margins. Measurements of paratypes in the description of new species are given in brackets.

SYSTEMATICS

Family Limnesiidae

Subfamily Limnesiinae

Fijilimnesia, new genus

Diagnosis: Gonopore bulging downwards.

Description: Characters of the subfamily Limnesiinae. Body soft. First coxal plates separated, apodemes of first coxal plates reaching halfway third coxal plates. Glandula Limnesiae located near suture line of third and fourth coxal plates. Genital field with two pairs of three acetabula, bulging downwards; gonopore half the length of genital field. Peg-like seta of PII inserted on a short tubercle. III-leg-4 slightly to strongly modified. Genital field with two pairs of three acetabula. Third and fourth legs with many swimming setae. Claws with clawlets. IV-leg-6 without claws but with a terminal seta. Females without generic characters.

Type species: Fijilimnesia fluviatilis, new species

Remarks: Within the subfamily Limnesiinae, modification of the legs has been used to describe a number of genera. The Australian genus Physosolimnesia Halik has an expanded III-leg-6, the African genus Xenolimnesia Smit has an expanded II-leg-4 and the American genus Centrolimnesia Lundblad has an expanded III-leg-5 and to a lesser extent III-leg-6. The South-American genus Acantholimnesia Viets shows some modification in the fourth leg, but without expanded segments. Fijilimnesia shows in the type species a modified III-leg-4, which is not found in any other member of the subfamily. However, within the new genus Fijilimnesia, which is characterised by the unusual shape of the male genital field, there is one species with a strongly modified III-leg-4 and one species almost without modification of this leg segment. Therefore, one can question the importance of leg modification in the systematics of the subfamily Limnesiinae.

Fijilimnesia fluviatilis, new species

(Figs. 1-5)


Description: Male: Body 640 (640-721) long and 502 (510-579) wide. Body soft, dorsum without platelets. Capitulum with slender apodemes, chelicere 300 long. First coxal plates separated, apodemes of first coxal plates reaching halfway third coxal plates. Glandula Limnesiae located near suture line of third and fourth coxal plates. Genital field with two pairs of three acetabula, bulging downwards; gonopore half the length of genital field (Fig. 2). Genital field 124 long and 182 wide. Lengths of P1-PV: 26, 94, 68, 133, 38. Peg-like seta of PII inserted on a short tubercle (Fig. 3). PIV ventrally with a short setal tubercle. Dorsal lengths of I-leg-4-6: 110, 130, 122. Dorsal lengths of III-leg-3-6: 137, 171, 180, 186. III-leg-4 expanded, ventral margin and medial side with numerous swimming setae (Fig. 4); III-leg-5 and III-leg-3 also with swimming setae. Lengths of IV-leg-4-6: 196, 208, 198; IV-leg-5 and -6 with numerous swimming setae (Fig. 5). IV-leg-6 with a 76 long seta.

Female: See below.

Fijilimnesia vitilevuensis, new species

(Figs. 6-9)

Types: Holotype ♂, tributary of Singatoka River, northeast of Keiyasi, Viti Levu, Fiji, 11 October 2000 (ZMAN). Paratypes: 3 ♂, same data as holotype; 3 ♀, Muli Mulo River, east of Nadi, 10 October 2000. Other material: 2 ♂, Garrick River at Garrick Reserve, Viti Levu, 6 October 2000; 12 ♀, Wanivothe Yandono Creek, south of Korovou, Viti Levu,
9 October 2000; 24♂♂, stream 2.4 km north of Kuvu, Singatoka Valley, Viti Levu, 11 October 2000.

Description: Male: Body 640 (591-664) long and 530 (478-510) wide. Body soft, dorsum without platelets. Capitulum with slender apodemes, chelicere 283 long. First coxal plates indistinctly separated medially. Apodemes of first coxal plates reaching onto third coxal plates. Glandula Limnesiae located near suture line of third and fourth coxal plates. Third and fourth coxal plates medially well separated (Fig. 6). Genital field with two pairs of three acetabula, genital field bulging downwards (Fig. 7). Genital field 118 long and 128 wide. Gonopore half the length of genital field. Dorsal length of PI-PV: 20, 90, 71, 134, 36. Peg-like seta of PII inserted on a short tubercle. PIV ventrally with a short setal tubercle (Fig. 8). Dorsal lengths of I-leg-4-6: 106, 132, 116. Dorsal lengths of III-leg-4-6: 160 (158), 170 (172), 146 (156); third leg slightly modified (Fig. 9). Dorsal lengths of IV-leg-4-6: 168 (182), 164 (180), 162 (180). IV-leg-6 with a 68 long seta.

Female: See below.
FIGS. 6-10: *Fijilimnesia vitilevuensis*, new species. 6 — ventral view, male. 7 — genital field, male. 8 — palp, male. 9 — III-leg-4-6, male. 
*Fijilimnesia* spec. 10 — ventral view, female. Scale bars: 50 μm = 7, 8, 9; 6, 10 = 200 μm.

Remarks: The new species differs from *F. fluviatilis* in the shape of the third leg of the male. In *F. vitilevuensis* the third leg is only slightly modified, while it is strongly modified in *F. fluviatilis*. Moreover, the fourth coxal plates of the male are much larger in *F. fluviatilis*, and are lying much closer medially. The genital fields are very similar, although *F. fluviatilis* has a wider genital field, while the gonopore extends less posteriorly in ventral view. The palps of the two species and the fourth leg are very similar.

**Fijilimnesia** spec.  
(Fig. 10)

River, east of Nadi, 10 October 2000; 24 Q Q, stream 2.4 km north of Kuvu, Singatoka Valley, 11 October 2000; 15 Q Q, tributary of Singatoka River, northeast of Keiyasi, 11 October 2000; 11 Q Q, small stream Singatoka Valley, 16 km north of Singatoka, 11 October 2000.

Description. Female: Body 729 long and 632 wide. Body soft, dorsum without platelets. First coxal plates separated, apodemes of first coxal plates reaching halfway third coxal plates (Fig. 10). Medial distance of third and fourth coxal plates variable, from close to well separated. Medial margin of third and fourth coxal plates with or without secondary sclerotization. Chelicere 300 long. Glandula Limnesiae located near suture line of third and fourth coxal plates. Genital field with two pairs of three acetabula. Genital field 145 long and 130 wide, pregenital sclerite 54 wide. Dorsal lengths of PI-PV: 26, 104, 80, 141, 40; palp as in male. Dorsal lengths of I-leg-4-6: 114, 134, 130. Dorsal lengths of IV-leg-4-6: 196, 206, 196; IV-leg-6 without claws, but with a 98 long terminal seta. Third and fourth legs with numerous swimming setae.

Remarks. Despite a lot of material, I have not been able to separate females of the two new species of Fijilimnesia. Apart from sexual characters (genital field, legs), males of the two new Fijilimnesia-species differ only in the medial distance and shape of the fourth coxal. Within the females, no differences could be found in the shape of the fourth coxal plates. The medial distance of the fourth coxal plates is variable, but no disjunction could be found. Therefore, the description given here for the female of Fijilimnesia refers to both new species. The females are not included in the type material.

Family Unionicolidae
Subfamily Pionatacinae
Genus Neumania Lebert

Neumania (Lemienia) curvitarsis, new species (Figs. 11-15)

Material examined: Types: Holotype ♂, old river branch west of Sawani, north of Suva, Viti Levu, Fiji, 5 October 2000. Paratypes: 1 ♂, 5 ♀, same data as holotype; 1 ♀, pond near Lipanoni, ± 35 km east of Suva, Viti Levu, 6 October 2000.

Diagnosis. IV-leg-6 of male bowed, ventral margin with 4 + 2 slightly curved setae.

Etymology. Named for the curved tarsus of the fourth leg.

Description. Male: Body 672 (599) long and 559 (535) wide. Body soft, integument smooth, dorsum without platelets. First coxal plates separated. Apodemes of first coxal plates long, reaching onto fourth coxal plates. Suture line of third and fourth coxal plates incomplete (Fig. 11). Posterior apodemes of fourth coxal plates short. Coxal plates with a reticulate pattern. Genital field 235 wide; genital field with 19 acetabula on each side. Two lateral acetabula distinctly larger than other acetabula (Fig. 12). Posterior margin of genital field with four short, stiff setae on each side. Dorsal lengths of PI-PV: 31, 110, 62, 116, 38; PIV ventrally with a setal tubercle (Fig. 13). Dorsal lengths of I-leg-4-6: 267, 284, 227. Dorsal lengths of IV-leg-4-6: 263, 287, 182. IV-leg-6 bowed, ventral margin with 4 + 2 slightly curved setae (Fig. 14). Fourth legs without swimming setae, III-leg-5 with nine long, stiff setae and a pectinate seta. First and second legs with grooved setae.

Female: Body 697 (932-1012) long and 575 (810-850) wide. Body soft, integument smooth, dorsum without platelets. First coxal plates separated. Apodemes of first coxal plates long, reaching onto fourth coxal plates. Suture line of third and fourth coxal plates complete. Posterior apodemes of fourth coxal plates short. Coxal plates with a reticulate pattern. Genital plates with 23 acetabula on each side. Two lateral acetabula distinctly larger than other acetabula (Fig. 15). Posterior margin of genital field with three short, stiff setae on each side. Dorsal lengths of PI-PV: 36, 116, 63, 114, 38; palp as in male. Dorsal lengths of I-leg-4-6: 284, 292, 196. Dorsal length of IV-leg-4-6: 259, 308, 243. All tarsi of the legs slightly bowed. IV-leg-5 with three “swimming setae”, these setae long but rather stiff. Third leg with numerous long, stiff setae, first and second legs with grooved setae.

Remarks. The subgenus Lemienia is only defined by the bowed IV-leg-6 of the male. The new species has a more bowed IV-leg-6 compared to other species,
and the configuration of the setae on the ventral margin of this segment is also unique within the subgenus.

**Neumania (?) montana**, new species
(Figs. 16-20)

Material examined: Holotype nymph: unnamed creek 2 km south of Nandarivatu (at 900 m above sea level), Viti Levu, Fiji, 8 October 2000.

Diagnosis: Palp, especially PIV, very stocky.
Etymology: Named for its occurrence in the mountains.
Description
Nymph: Body soft, dorsum 502 long and 340 wide. Dorsum with a pair of larger platelets, 90 long, and a pair of smaller platelets, 34 long (Fig. 17). First coxal plates separated, apodemes of first coxal plates reaching onto fourth coxal plates. Coxoglandulariae 2 not visible. Suture line of third and fourth coxal plates incomplete (Fig. 16). Anteriorly and medially...
of third and fourth coxal plates a small strip of secondary sclerotization. Chelicere 110 long, cheliceral claw 38 long (Fig. 19). Provisional genital field with two pairs of nine acetabulae. Dorsal length of PI-PV: 19, 70, 35, 36, 16. Palp very stocky, especially PIV (Fig. 18). Dorsal length of I-leg-4-6: 85, 67, 111; I-leg-3-5 with a heavy, curved seta, which are probably provisional grooved setae (Fig. 20). Dorsal length of IV-leg-4-6: 116, 114, 120. IV-leg-3 with one swimming seta, IV-leg-4 with two swimming setae and one pectinate seta and IV-leg-5 with one swimming and one pectinate seta. Claws without clawlets. First and second legs without grooved setae, as is usual in nymphs of the genus.

Male and female: Unknown.

Remarks. Although I normally do not describe species based on nymphs, the description of the new species here is justified in my opinion. The very unusual stocky palp will make it easy to identify the adults.

Genus *Koenikea* Wolcott

The genus *Koenikea* is known from the New World, Australia and New Guinea. The findings on Fiji of two species described below is therefore surprising.

*Koenikea (Notomideopsis) fijica* new species
(Figs. 21-26)

Diagnosis: Posterior apodemes of anterior coxal plates extending halfway third coxal plates, dorsal shield lacking apophyses.

Etymology: Named after the Fiji Islands

Description

Male: Body 429 long and 445 wide. Dorsal shield lacking apophyses, 413 long and 360 wide. Dorsal shield with six pairs of glandularia, posterior pair on small tubercles (Fig. 22). First coxal plates not extending beyond anterior body margin. Posterior apodemes of anterior coxal plates extending halfway third coxal plates (Fig. 21). Excretory pore terminal. Genital field placed near posterior end, with 12-13 acetabula (Fig. 25). Lengths of PI-PV: 16, 68, 31, 69, 31. Tubercle of PIV inserted on segment and located near distal end. PV with a hooked dorso-distal seta (Figs. 24, 26). Lengths of I-leg-4-6: 126, 128, 134; grooved setae ("rillborsten") relatively long (Fig. 23). Second legs also with grooved setae. Lengths of IV-leg-4-6: 146, 164, 150; IV-leg-4 and -5 with three swimming setae. IV-leg-5 with a row of six short setae and a large pectinate dorso-distal seta.

Female: Unknown.
Remarks. The subgenus *Notomicleopsis* usually has much longer apodemes of the first coxal plates, reaching onto the fourth coxal plates. However, some Australian species have apodemes reaching until the suture lines of the third and fourth coxal plates.

**Koenikea (Notomideopsis) cooki** n. sp.  
(Figs. 27-31)


Diagnosis: Posterior apodemes of anterior coxal plates extending halfway third coxal plates, dorsal shield lacking apophyses, small tubercle of PIV located in middle of segment, grooved setae short.

Etymology: Named after the collector of the material, Dr D.R. Cook.

Description
Male: Unknown.
Female: Body 454 long and 437 wide. Dorsal shield lacking apophyses, 429 long and 365 wide. Dorsal shield with six pairs of glandularia (Fig. 28). First coxal plates not extending beyond anterior body margin. Posterior apodemes of anterior coxal plates
extending halfway third coxal plates (Fig. 27). Excretory pore terminal. Genital field placed near posterior end, with 15-16 acetabula, gonopore 96 long. Lengths of PI-PV: 16, 72, 32, 70, 34. Tubercle of ventral margin of PIV located near middle of segment (Fig. 29, 31). Lengths of I-leg-4-6: 84, 93, 90; grooved setae short (Fig. 30). Second legs also with short grooved setae. Lengths of IV-leg-4-6: 110, 134, 104. IV-leg-5 with a row of five short setae and a large pectinate dorsodistal seta. III-leg-4 and IV-leg-4 with two swimming setae, III-leg-5 and IV-leg-5 with three swimming setae.

Remarks
The dorsal shield of the two Fijian species are very similar. However, Koenikea cooki has much shorter leg segments, shorter grooved setae of the first two legs while the tubercle of PIV is located near the middle and not distally as in K. fijica. The two new species from Fiji differ from Australian species with a similar dorsal shield in the short apodemes of the first coxal plates.

DISCUSSION
The water mite fauna of Viti Levu is rather poor. In this paper six new species are described, two of these belonging to a new genus. Two other species of this paper belong to a cosmopolitan genus. Furthermore, on Viti Levu a number of specimens have been collected of the cosmopolitan genus Eylais, but these were all nymphs, and for these reason this species is not described here. Moreover, three species of the cosmopolitan genus Arrenurus have been collected (one of these only known from a female, and therefore left unidentified), making the total number of Fiji ten. The presence of cosmopolitan genera and of the new limnesiid genus with no affinities with other genera of the subfamily, give no indication of the relationship of the water mite fauna of Fiji. However, the finding of two Koenikea species points to affinities with the Australian fauna.

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