

THE WATER MITES (ACARI: HYDRACHNIDIA) OF BORNEO AND ADDITIONAL NEW SPECIES FROM THAILAND AND SULAWESI

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ABSTRACT. - Thirty seven water mite species (Acari: Hydrachnidia) are recorded from Borneo; 1 new genus and 11 new species are described below. Two new species of *Mideopsis* from Thailand and Sulawesi are also described and new records for S.E. Asia listed. *Torrenticola (Monatractides) pilosa* Wiles, 1989 from Peninsula Malaysia is synonymised with *Monatractides plumosa* (Wiles, 1989) from Sulawesi.

KEY WORDS. - Acari, Hydrachnidia, Water mites, Brunei, Thailand, Sulawesi, biogeography.

INTRODUCTION

Borneo is the largest island in S. E. Asia after New Guinea and the largest tropical island (830 miles long by 600 miles wide). It is divided politically into Sabah and Sarawak, Malaysia; the small state of Brunei Darussalam and the large province of Kalimantan, Indonesia. The island lies across the equator and was typically covered in tropical rainforests that extended through hilly lowlands 200-1000 m above sea level to the central highlands above 1000m in altitude. The land drained through a maze of tropical streams, rivers and extensive swamps. Only two species of water mites (Acari : Hydrachnidia), *Unionicola (Polyatax) neokoenikei* Viets, 1957 and *Unionicola (Parasitatax) thienemanni* Viets, 1957, have previously been reported from Borneo (Viets, 1957).

In 1992, Raleigh International organized a multinational scientific expedition to Brunei Darussalem and collections of water mites were made from the catchments of the Rivers Temburong and Belalong in North Brunei. The mite, *Acucapito naso* Wiles, 1996 was the first to be described from these collections (Wiles, 1996) and new records of *Torrenticola* from Brunei were reported in Wiles (1997). In this paper I describe the remaining new species in the collections and include descriptions of 2 species from Thailand and Sulawesi. The collections here described increase the known water mite fauna to 40 species that represents

approximately 10% of S. E. Asian species. Clearly, many species remain to be described.

MATERIALS AND METHODS

Collection and histological techniques of Wiles (1997a) were used. Holotypes, paratypes and syntypes will be deposited in the Natural History Museums in Brunei Darussalem and London, England. Slides not yet deposited are temporarily held at Buckingham University.

Abbreviations and gland homology used are those of Wiles (1997b) and Jin & Wiles (1996); A = antennal glandularia, D = dorsoglandularia, L = lateroglandularia, R = ocularia, V = ventroglandularia, I-IV-Leg-3-6 = first to fourth leg, segments 3 to 6 (patella to tarsus), P = pedipalp; PI-PV = pedipalp trochanter to tarsus. Leg and pedipalp nomenclature follows Harvey (1996). Anus = excretory pore sensu Cook (1974).

All measurements are in μm and segment lengths of leg and pedipalp are dorsal lengths.

CHECKLIST OF SPECIES FOUND ON BORNEO

[Synonymy prior to 1987 see Viets K. O. (1987). Descriptions of species listed in Lundblad (1941) can be found in Lundblad (1969) and (1971)]

FAMILY HYDRYPHANTIDAE

Eupatrella bijani, new species

FAMILY HYDRODROMIDAE

Hydrodroma sp.

FAMILY SPERCHONTIDAE

Sperchonopsis verrucosa (Protz, 1869)

FAMILY ACUCAPITIDAE

Acucapito naso Wiles, 1996

FAMILY OXIDAE

Frontipoda lewisi, new species

Frontipoda pilosa, new species

FAMILY TORRENTICOLIDAE [for synonymy, excluding *Monatractides*, see Wiles, 1997]

Monatractides circularis (Viets, 1935)

Monatractides macrognatha (Viets, 1935)

Monatractides parviventris (Viets, 1935)

Monatractides plumosa (Wiles, 1989)

Torrenticola indica Cook, 1967

Torrenticola longipalpis Wiles, 1997

Torrenticola minuta (Lundblad, 1941)

Torrenticola rhampha (Lundblad, 1941)

Torrenticola tjwalensis (Viets, 1935)

Neoatractides (Allotorrenticola) abnormipalpis (Lundblad, 1941)

Neoatractides (Allotorrenticola) farmerae, new species

Pseudotorrenticola sharpei Wiles, 1997

FAMILY LIMNESIIDAE

Limnesia wallshi, new species

FAMILY HYGROBATIDAE

Hygrobates hamatus (Viets, 1935)

Atractides spatirosus (Viets, 1935)

Asiabates longirostris, new genus and new species

FAMILY UNIONICOLIDAE

Unionicola (Pentatax) newsumi, new species

Unionicola (Polyatax) neokoениkei Viets, 1957

Unionicola (Parasitatax) thienemanni Viets, 1957

Neumania navina Cook, 1967

Neumania hirsuta, new species

FAMILY ATURIDAE

Axonopsis (Axonopsis) gracilipalpis Viets, 1935

Axonopsis (Brachypodopsis) baumi Halik, 1930

Axonopsis (Kalobrachypoda) rhopalopoda (Viets, 1929)

Albia (Albiella) saloi, new species

Albia (Spinalbia) kurusi, new species

FAMILY MOMONIIDAE

Momonides trabecularis Lundblad, 1941

FAMILY MIDEOPSIDAE

Mideopsis goldbergi, new species

FAMILY HARPAGOPALPIDAE

Harpagopalpis indicus Cook, 1967

FAMILY ARRENURIDAE

Arrenurus (Megaluracarus) laticodulus Piersig, 1898

Arrenurus (Megaluracarus) ceylonicus Daday, 1898

TAXONOMY

***Eupatrella bijani*, new species**
(Fig. 1)

Material examined. - Holotype female slide M495, S. Bersih, tributary of S. Belalong, 2 Sep. 1992.

Description. - Female: Colour scarlet. Length of body 460, width 300. Integument papillose. Dorsum covered in 5 rows of large, adjacent, porose platelets with glandularia located between them. The dorsal platelet distribution from anterior to posterior = 3, 4, 4, 4, 2. Eyes on platelets located at anterior margin of idiosoma lateral to A1 and R1. Venter with epimera in four blocks, EpI/EpII and EpII/EpIV. Genital field and E4 between triangular EpIV. Two pairs of genital plates with many fine setae along the inner margins. Many small acetabula free in integument around the genital opening; genital aperture 200 long. Ventral platelets distributed as in Fig. 1. Infracapitulum with small dorsal apodemes, length 141; chelicerae with long stylet - like chelae. Pedipalp slender, PII with one serrulate distolateral seta and one serrulate seta located centrally; length PI-PV 46, 65, 54, 130, 30. Legs without swimming

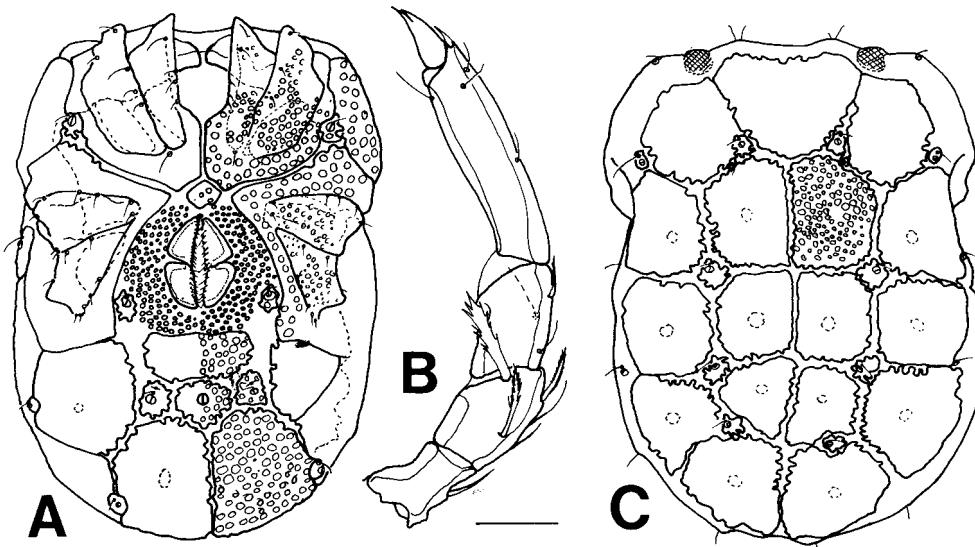


Fig. 1. *Eupatrella bijani*, new species. A. venter female, B. dorsum female, C. pedipalp female. Scale line AB 74; C 45.

setae. Short thick setae shine bright in polarized light. Length I-Leg-3-6 78, 130, 95, 147; II-Leg-3-6 113, 191, 191, 191; III-Leg-3-6 70, 130, 174, 165; IV-Leg-3-6 78, 260, 217, 183.

Etymology. - Named after Bijan Nabavi who organized the 1992 Raleigh International expedition to Brunei.

Remarks. - *Eupatrella reticulata* Walter, 1935, is the only other species in the genus. A nymph from Sindou, Ivory Coast was described by Walter (1935) and two adult females described by K.O. Viets & Böttger (1974) from Zaire. *E. reticulata* differs from the new Asian species in that the dorsal platelets are small and widely spaced and the pedipalps are shorter. I was unable to identify all glandularia on the specimen. It apparently has one pair of glandularia, possibly V1, missing.

***Frontipoda pilosa*, new species**
(Fig. 2)

Material examined. - Holotype male slide M520, paratype 1 M520 female, paratype 2 M521 female, paratype 3 M517 male, paratype 4 M473 female, paratype 5 M463 female, S. Belalong confluence with S. Temburong, Sep. 1992.

Description. - Male: Body brown with bluish green tinges. Total body length 730, height 532, width 400. Ventral shield; pilose with scale-like surface patterns; extending dorsally to the midline, anteriorly beyond the leg sockets and posteriorly to the back of the genital plates. E4 with long membranes located apically on Ep1, E2 located below L2 at anterior end of the dorsal shield and V1 and V3 located posteriorly. V3, in some specimens, lightly fused to the edge of the ventral shield. A1, A2, R1, R2, L1, L3, L4, D1-D4, V2, V4, lyrifissures and anus lie in dorsal furrow, R2 posteriorly on narrow platelets between D1 anterior to a long narrow dorsal plate which extends posteriorly to the anus and V2 on the anal plate lateral to the anus. Genital plates pilose, located posteriorly, length 153, 3 pairs of acetabula.

Infracapitulum sub-rectangular in dorsal view with two long dorsal apodemes and one long ventral apodeme strongly curved dorsally; length 170, width 48. Pedipalp typical, length PI-V 38, 45, 46, 73, 19. Legs with swimming setae II-Leg-5 17, III-Leg-5 18, IV-Leg-5 12. Length IV-Leg-6 terminal seta 59. Length I-Leg-3-6 57, 73, 95, 92; II-Leg-3-6 62, 121, 142, 118; III-Leg-3-6 86, 129, 157, 132; IV-Leg-3-6 107, 139, 181, 177. No sexual dimorphism.

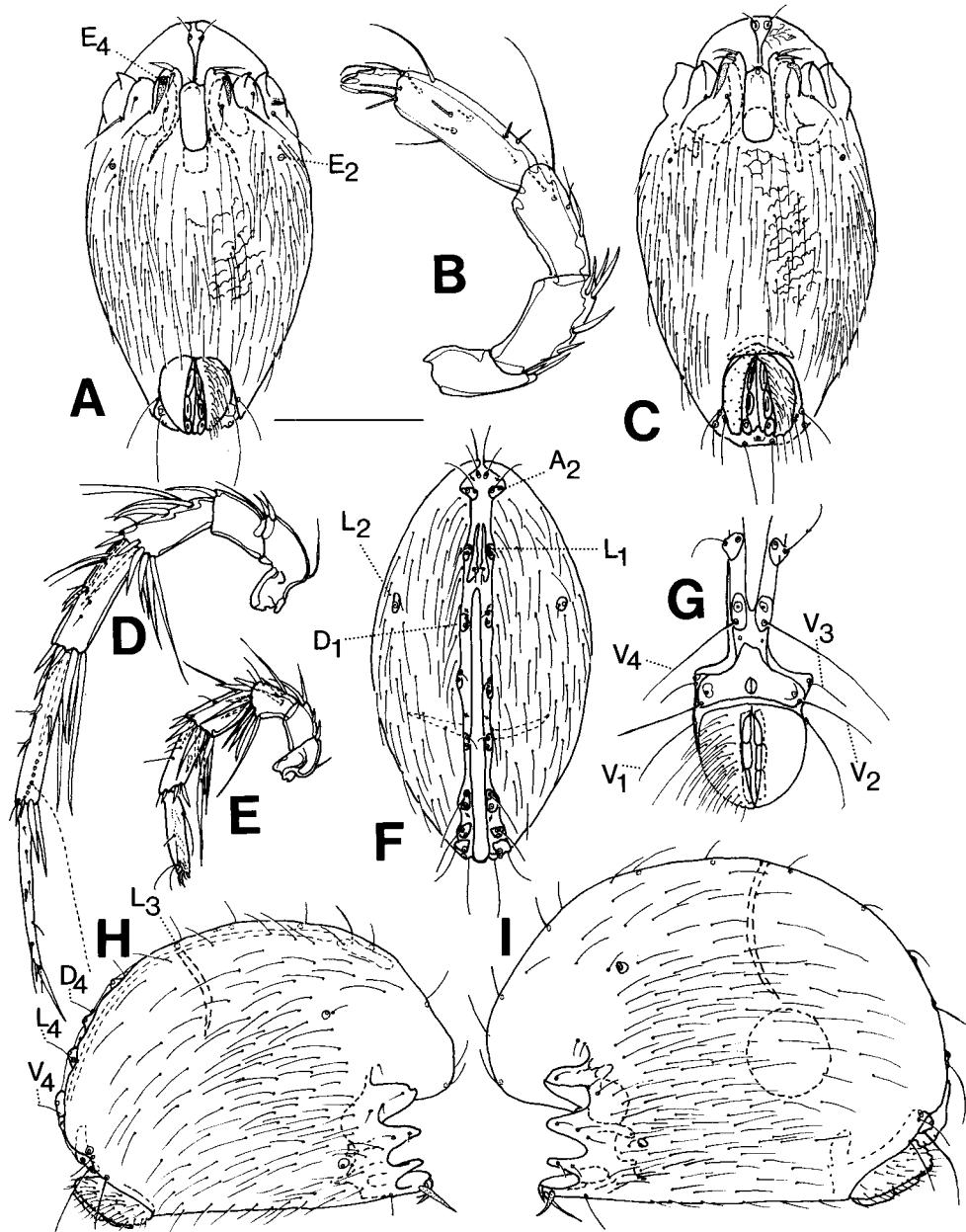


Fig. 2. *Frontipoda pilosa*, new species. A. venter male, B. pedipalp female, C. venter female, D. IV-Leg female, E. I-Leg male, F. dorsum male, G. anal plate male, H. lateral view male, I. lateral view female. Scale line ACFHI 270, G 190, DE 160, B 70.

Female: Similar to male. Body length 852, height 633, width 440. Genital plate less hirsute than male, length 165. Infracapitulum length 172, width 50. Pedipalp typical, length PI-V 45, 52, 56, 74, 29. Legs with swimming setae II-Leg-5 15, III-Leg-5 11, IV-Leg-5 10-16. Length IV-Leg-6 terminal seta 54. Length I-Leg-3-6 56, 77, 94, 97; II-Leg-3-6 73, 118, 143, 122; III-Leg-3-6 73, 118, 143, 118; IV-Leg-3-6 87, 132, 153, 160. Egg diameter 160.

Etymology. - From *pilosa* meaning hairy.

Remarks. - Similar to *F. spinosa* K.O. Viets, 1977 from Australia but V3 is at the edge of the ventral shield and not more dorsomedially located, the dorsal platelet is single and not separated into two platelets, there are fewer swimming setae on IV-Leg-5, more swimming setae on II-Leg-5 and the distal seta of IV-Leg-6 is longer. These two species, on either side of Wallacea, are clearly closely related. At present I cannot determine whether they are Australian or Asian in origin.

***Frontipoda lewisi*, new species**

(Fig. 3)

Material examined. - Holotype male slide M514, paratype 1 M514 female, S. Temburong, 15 Sep. 1992; paratype 2 M464 female, S. Temburong, 19 Sep. 1992; paratype 3 M516 male, S. Belalong confluence, 20 Sep. 1992.

Description. - (Lengths in parentheses are for the small specimen M516 male. Male: Body brown with bluish green tinges. Total body length 768 (619), height 501 (462) width 362. Ventral shield; porose and sculptured with sub-hexagonal and pentagonal patterns; extending dorsally to the midline, anteriorly beyond the leg sockets and posteriorly beyond the rear of the genital plates. E4 with long membranes located apically on Ep1, E2 located below L2 at anterior end of dorsal shield. All glandularia and setae located along the distal part of the dorsal shield with L2, L3 and V3 more ventrally (medially) located. Lyrifissures 2, 3 and 4 and the anus lie in dorsal furrow with two narrow dorsal platelets of similar proportions. Genital plates located posteroventrally, length 153 (136). Infracapitulum with apodemes of typical length; length infracapitulum (124). Pedipalp typical, with surface patterns, PV slender and PIV short, length PI-V 36, 41, 52, 53, 24. Legs with swimming setae II-Leg-5 12, III-Leg-5 15, IV-Leg-5 10. Terminal seta long, equal in length to IV-Leg-6, length IV-Leg-6 terminal seta 104. Length I-Leg-3-6 56, 66, 63, 78; II-Leg-3-6 69, 87, 115, 104; III-Leg-3-6 76, 100, 130, 122; IV-Leg-3-6 77, 90, 108, 109. No sexual dimorphism.

Female: Similar to male. Body length 827, height 504, width 389. Genital plate length 174. Infracapitulum similar to male, length 229. Pedipalp typical, length PI-V 55, 66, 73, 87, 42. Legs with swimming setae II-Leg-5 12-13, III-Leg-5 13, IV-Leg-5 7-10. Length IV-Leg-6 terminal seta 54. Length I-Leg-3-6 63, 70, 76, 63; II-Leg-3-6 77, 101, 128, 111; III-Leg-3-6 87, 115, 146, 136; IV-Leg-4-6 89, 111, 122, 122. Egg diameter 149 (111 for M464).

Etymology. - Named after David Lewis for his help in collecting water mites on expeditions in Indonesia.

Remarks. - Similar to *F. biscutata* Cook, 1966 from Africa (Liberia) but the pedipalp is much less slender and PIV is shorter.

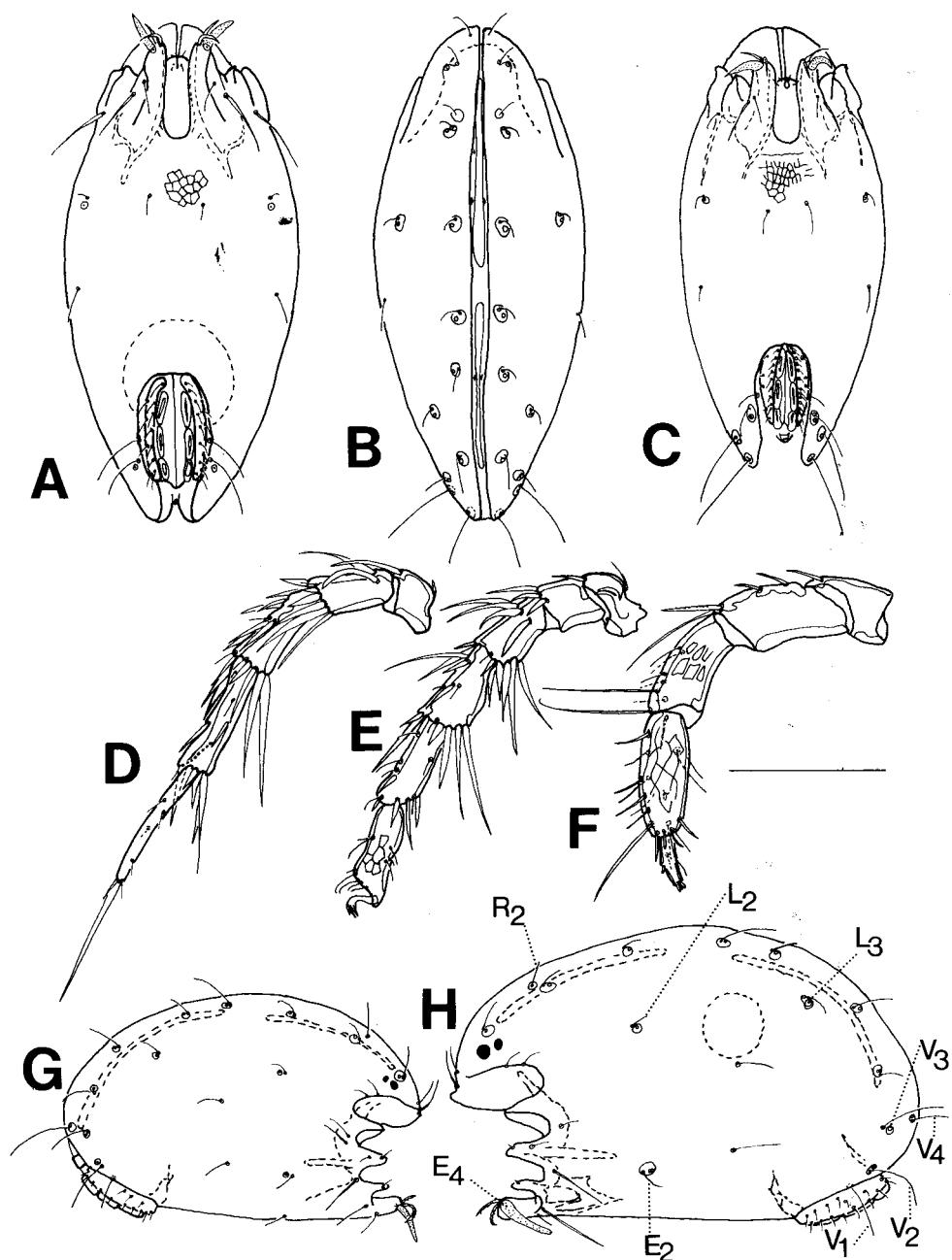


Fig. 3. *Frontipoda lewisi*, new species. A. venter female, B. dorsum female, C. venter male, D. IV-Leg-2-6 male, E. I-Leg male, F. palp male, G. lateral view male, H. lateral view female. Scale line ABCGH 270, DE 140, F 70.

Neoatractides (Allotorrenticola) farmerae, new species
(Fig. 4)

Material examined. - Holotype slide M552 male, paratype 1 M555 male, S. Temburong, 14 Sep. 1992. Other material examined: M476 male in lateral view.

Description. - Male: Characters of *Allotorrenticola* (sensu Wiles 1997). Colour brown. Dorsal plates 4+1, dorsal shield length 431, width 361. Ventral shield, 560 long 424 wide: IbG

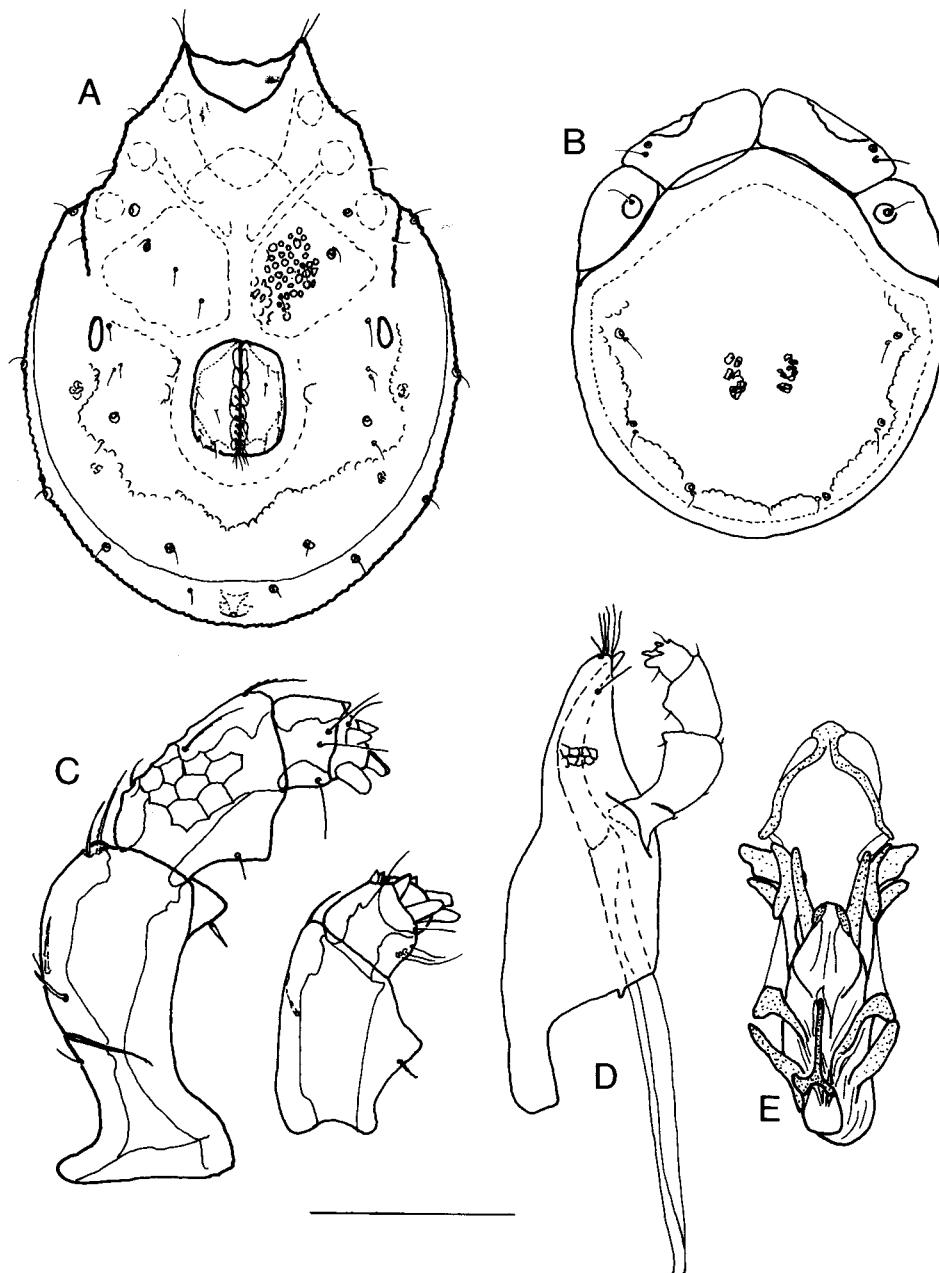


Fig. 4. *Neoatractides (Allotorrenticola) farmerae*, new species. male A. venter, B. dorsum, C. pedipalp, D. infracapitulum, E. ejaculatory complex. Scale line ABD 195; C 48, E 70.

222. E4 posterior to E2 located on EpIII; E2-E4 38. Genital flap, length 107, width 45. Infracapitulum length 280, rostrum long, length 93; height of posterior infracapitulum 96. Pedipalp short, PI partially fused to PII, short seta located on broad flange on distoventral margin of PII and PIII; length PI-PV 37, 46, 52, 18, 17.

Etymology. - Named after Francis Farmer who made the slides.

Remarks. - *N. farmerae* is similar to *N. abnormipalpis* Lundblad, 1941 which is the only other species to have partial fusion of PI and PII. The main difference is the presence of flanges ventrally on PII and PIII on male *N. farmerae*. The only females of *Neoatractides* that were collected from Brunei were identified as *N. abnormipalpis* (see below). However, they may be females of *N. farmerae*. Further specimens are required to solve this problem.

***Limnesia wallshi*, new species.**
(Fig. 5)

Material examined. - Syntypes male female slide M512, S. Temburong, 14 Sep. 1992; male female slide M606 female, M607 female, S. Belalong, 22 Sep. 1992.

Description. - Male: Length 678, width 462. Dorsum with one small oval posterior platelet between D4; all glandularia free in epidermis. Venter typical with no signs of secondary sclerotization. E4 located at median edge of suture line EpIII/IV near EpIII/EpiV median margin and posterolateral to EpIII median seta. Genital plates curved, broader posteriorly and separate; together; distance across genital plates 146; length 129, width of single plate 49, with 3 pairs of acetabula. V3 located just posterior to the genital plate posterolateral to

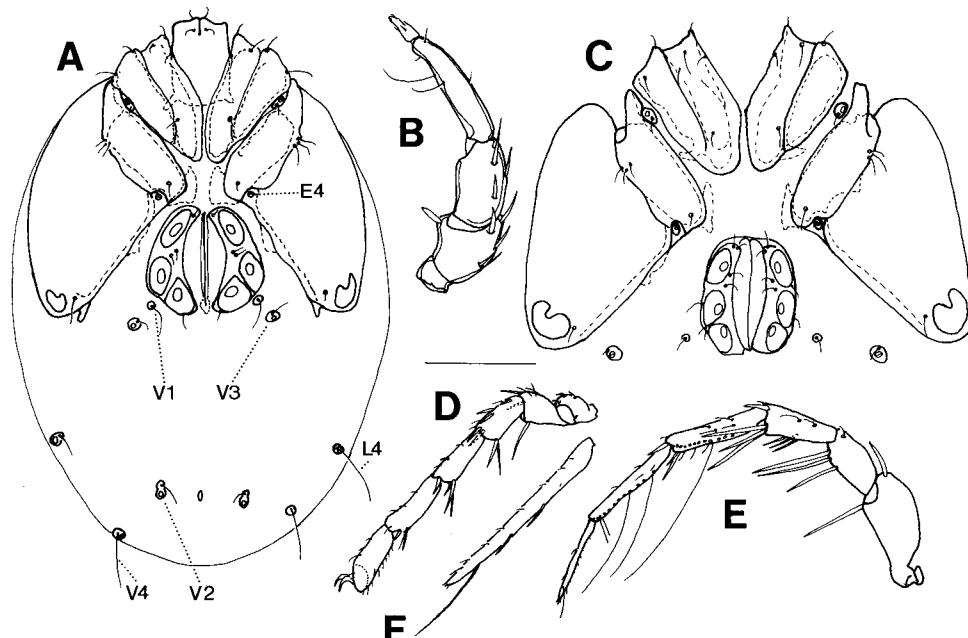


Fig. 5. *Limnesia wallshi*, new species. A. venter male, B. pedipalp female, C. venter female, D. I-Leg male, E. IV-Leg male, F. IV-Leg-6 male. Scale line = AC 132, B 90, DE 140, F 60.

V1. Anus between V2 near posterior of body. Pedipalp PIV cylindrical and not strongly tapering distally; PII ventrodistal seta stout, not located on a protuberance and not pointing posteriorly; length PI-V 9, 65, 70, 98, 28. IV-Leg-6 with no apparent long distal spine at tip of segment but with a long sub-apical seta located dorsally, length 64; I-III-Leg claws with a broad ventral clawlet and no proximal blade; length I-Leg-2-6 45, 70, 80, 83, 87; II-Leg-2-6 56, 83, 104, 107, 132; III-Leg-2-6 34, 72, 107, 132, 104; IV-Leg-2-6 76, 94, 132, 139, 111. Swimming setae III-Leg-4-5 11-12, 16; IV-Leg-4-5 12, 13.

Female: Similar to male. Body length 626, width 486. Genital field almost oval; distance across genital plates equal to their length; length 149, width 118, width of single plate 42, with 3 pairs of oval acetabula. V3 located just posterior to the genital plate posterolateral to V1. Anus between V2 near end of body. Pedipalp PIV cylindrical and not strongly tapering distally; PII ventrodistal seta stout, as in male; length PI-V 13, 83, 70, 113, 33. IV-Leg-6 as in male, sub apical seta length 64; length I-Leg-2-6 66, 94, 122, 129, 129; II-Leg-2-6 52, 73, 94, 101, 115; III-Leg-2-6 62, 80, 122, 136, 122; IV-Leg-2-6 87, 115, 146, 156, 160. Swimming setae III-Leg-4-5 11-12, 16; IV-Leg-4-5 11, 13.

Etymology. - Named after Mr. Ian Wallsh who collected this species on the 1992 Raleigh International expedition to Brunei.

Remarks. - Similar species in Asia are *Limnesia patens* Viets, 1935, *Limnesia lembangensis* Viets, 1935, *Limnesia isensis* Imamura, 1965 and *Limnesia koenikei* var. *asiatica* Marshall, 1928. *Limnesia patens* has PIV tapering distally and a backwardly pointing spine on PII; *L. lembangensis* has EpI/EpII fused at the midline in both sexes and the ventral seta of PII is located on a projection. The remaining species are very similar and may be representative of one variable species. *Limnesia isensis* from Japan has E4 level with EpIII seta, legs with fewer swimming setae, long ventral setae on IV-Leg-6, small acetabula and, in females, slender genital plates. *Limnesia koenikei* var. *asiatica* from China is most similar to *L. wallshi* but in the female, V1 are located at the anterior end of the genital field and V3 are beside EpIII/EpIV suture not the IV-Leg sockets. *Limnesia koenikei* var. *asiatica* from Japan (Imamura, 1953) has a similar distribution of glandularia to *L. wallshi* but IV-Leg has fewer swimming setae and E4 glandularia are level with EpIII seta. Further material will need to be collected to sort out this taxonomic problem.

***Asiabates*, new genus**
(Fig. 6)

Material examined. - Holotype female slide M458 femal, S. Temburong, 19 Sep. 1992; paratype 1 M485 female, S. Temburong, 14 Sep. 1992. Other material examined.- M484 nymph, S. Temburong, 14 Sep. 1992.

Description. - Female: Characters of the family Hygrobatidae Koch, 1842 (sensu Cook 1974 p180) and subfamily Hygrobatinae Koch (sensu Cook 1974 p190). Idiosoma lacks secondary sclerotization, dorsal plates absent. EpI not fused at midline and not fused to infracapitulum. EpI/EpII partly fused to EpIII/EpIV. E4 located on EpIV far from suture line EpIII/IV. EpIV posterior apodemes small and inconspicuous and without associated muscle scars. Infracapitulum with long rostrum and long broad posterior projection extending beyond EpI/EpII. Cheliceral claw long and slender. Pedipalp without denticles or ventral projections and without thick setae on PII or PIV. Genital plates each with 4 acetabula. I-Leg-6 straight and

distal I-Leg-5 without thickened setae ventrally. Legs with numerous swimming setae. Nymph similar to adult but genital plates each with 2 acetabula and genital aperture absent

Type species. - *Asiabates longirostris*, new species

Etymology. - Hygrobates-like water mite from Asia.

Remarks. - The gnathosoma of *Asiabates* is unique with a long rostrum, a broad posterior process to the infracapitulum which is not fused to EPI and smooth slender pedipalps without thick setae on PII or PIV. The legs have no large ventral setae on distal I-Leg-5 which are a common feature in the Hygrobatidae; there are no conspicuous apodemes or muscle scars on EPIV and 4 acetabula on each genital plate.

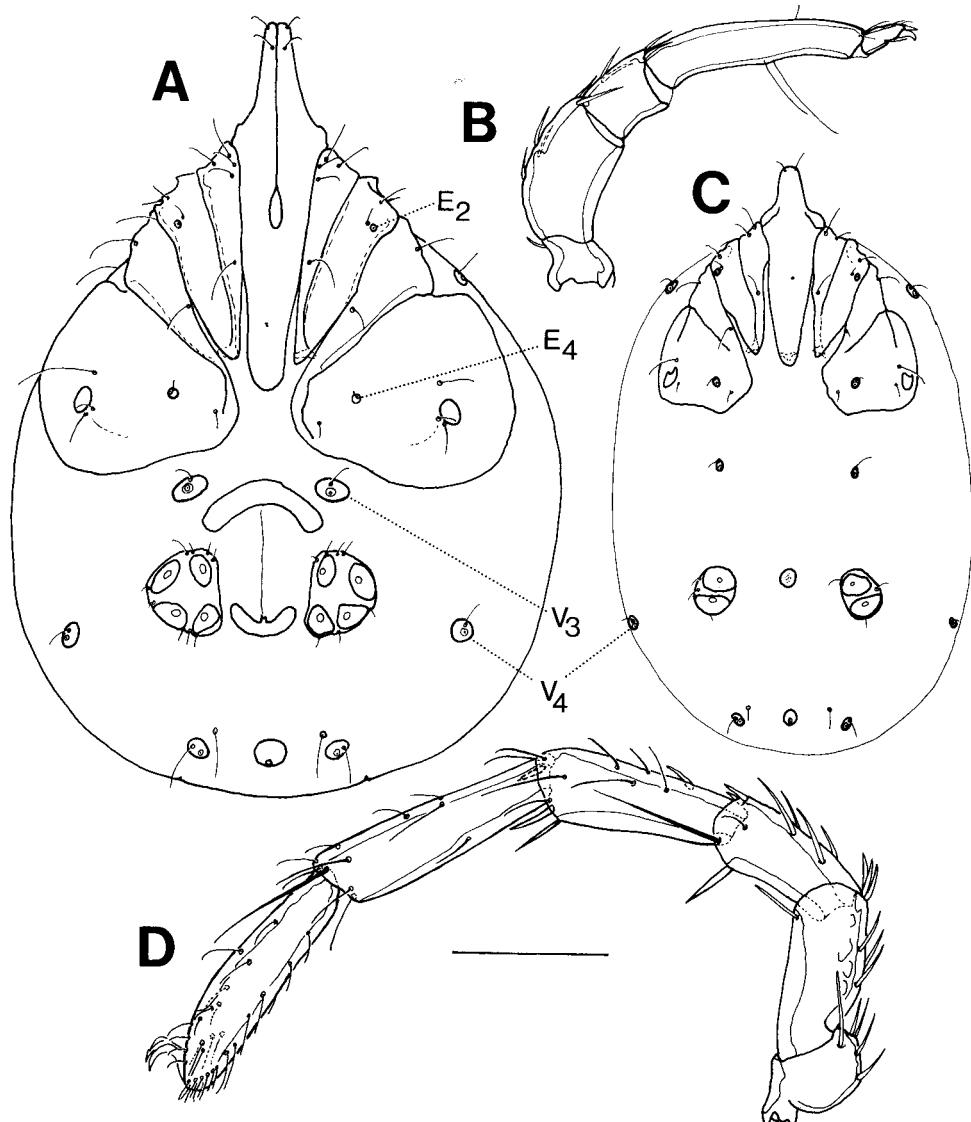


Fig. 6. *Asiabates longirostris*, new species. A. venter female, B. pedipalp male, C. venter nymph, D. I-Leg male. Scale line AC 200; B 120; D 90.

Similar genera include *Coaustraliobates* Cook, 1987 which has a similar configuration of the posterior infracapitulum and epimera and *Tetrabates* Thor, 1922, which also has 4 pairs of acetabula and no epimeral muscle scars. However, the present taxon, known only from the female and nymph, is clearly distinct enough to warrant generic ranking.

***Asiabates longirostris*, new species**
(Fig. 6)

Material examined. - See under genus description above.

Description. - Female: Characters of *Asiabates*. Body brown in colour. Total length from tip of EpI to posterior margin of idiosoma 817 μ m, width 682 μ m. Dorsum without plates. Infracapitulum (length 463 μ m) with long, broadly tapering ventral posterior extension projecting beyond the posterior margin of EpI, not fused to EpI, rostrum long. EpI/EpII partly fused to EpIII/EpIV. EpI narrow, 5 times longer than broad, E4 lacking long, conspicuous, posterior apodemes and associated muscle scars. E2 and E4 located on EpII and EpIV respectively, V3 between genital field and EpIV and V1 and V2 either side of anus. Genital plates each with 4 acetabula. Genital aperture longer than genital plates. Pedipalp slender and smooth with no thick setae on PII or PIV; length PI-PV 41, 115, 65, 167, 43(m. I-Leg-6 straight and distal I-Leg-5 with no thickened setae ventrally. Swimming setae on I-Leg-5 1, II-Leg-4 6, II-Leg-5 6, III-Leg-4 7, III-Leg-5 7, IV-Leg-5 6. Length I-Leg-3-6 35, 118, 143, 150, II-Leg-3-6 101, 132, 163, 163, III-Leg-3-6 108, 146, 157, 74, IV-Leg-3-6 118, 143, 177, 167.

Nymph: similar to adult female but genital plates each with 2 acetabula and genital aperture absent.

Etymology. - Name refers to the long rostrum.

Remarks. - See discussion under genus.

***Unionicola newsumi*, new species**
(Fig. 7)

Material examined. - Syntypes male female, slides M511 male female female, S. Temburong, 14 September 1992; M467 female, S. Temburong, 19 Sep. 1992.

Description. - Male: D1 free in integument next to small platelet, D2 free in integument lateral to small platelet; a third platelet located ventral to L1 between II-Leg and III-Leg sockets. EpI separate, EpIII shorter than EpIV, length median EpIII + EpIV 163. Genital plates fused to form a ring around the genital aperture with 5 pairs of acetabula; width across genital plates 98, height 96. PIV with small tubercles ventrally and a long seta located on PIII; length, PI-V 13, 52, 20, 50, 26. I-Leg-5 with conspicuously tiny ventral setae and I-Leg-4 with small setae ventrally; length I-Leg-2-6 69, 94, 108, 125; II-Leg-2-6 66, 94, 104, 118; III-Leg-2-6 67, 80, 87, 115, 87; IV-Leg-2-6 80, 76, 90, 122, 129; 3 swimming setae at distal margin of III-Leg-5 and IV-Leg-4-5.

Female: Similar to male except in the genital field. Length dorsum 518, width 382; D1 free in integument or attached to small platelet, EpI separate, EpIII shorter than EpIV, length

median EpIII 69, length EpIV 149. Genital field with 2 pairs of acetabula on anterior plates and 3 pairs on the posterior plates; width across anterior genital plates 97. Pedipalp lengths, PI-V 15, 65, 28, 59, 33. Legs similar to male; length I-Leg-2-6 85, 115, 174, 150, 287; II-Leg-2-6 97, 111, 139, 157, 149; III-Leg-2-6 87, 115, 143, 170, 156; IV-Leg-2-6 115, 122, 139, 181, 191; 3 swimming setae at distal margin of III-Leg-5 and IV-Leg-4-5.

Etymology. - This species is named after Ernest Newsum who collected it on the 1992 Raleigh International expedition to Brunei.

Remarks. - This species is unique in having minute ventral setae on I-Leg-5 in both sexes. I have been unable to place this species in the subgenera created by Vidrine (1996).

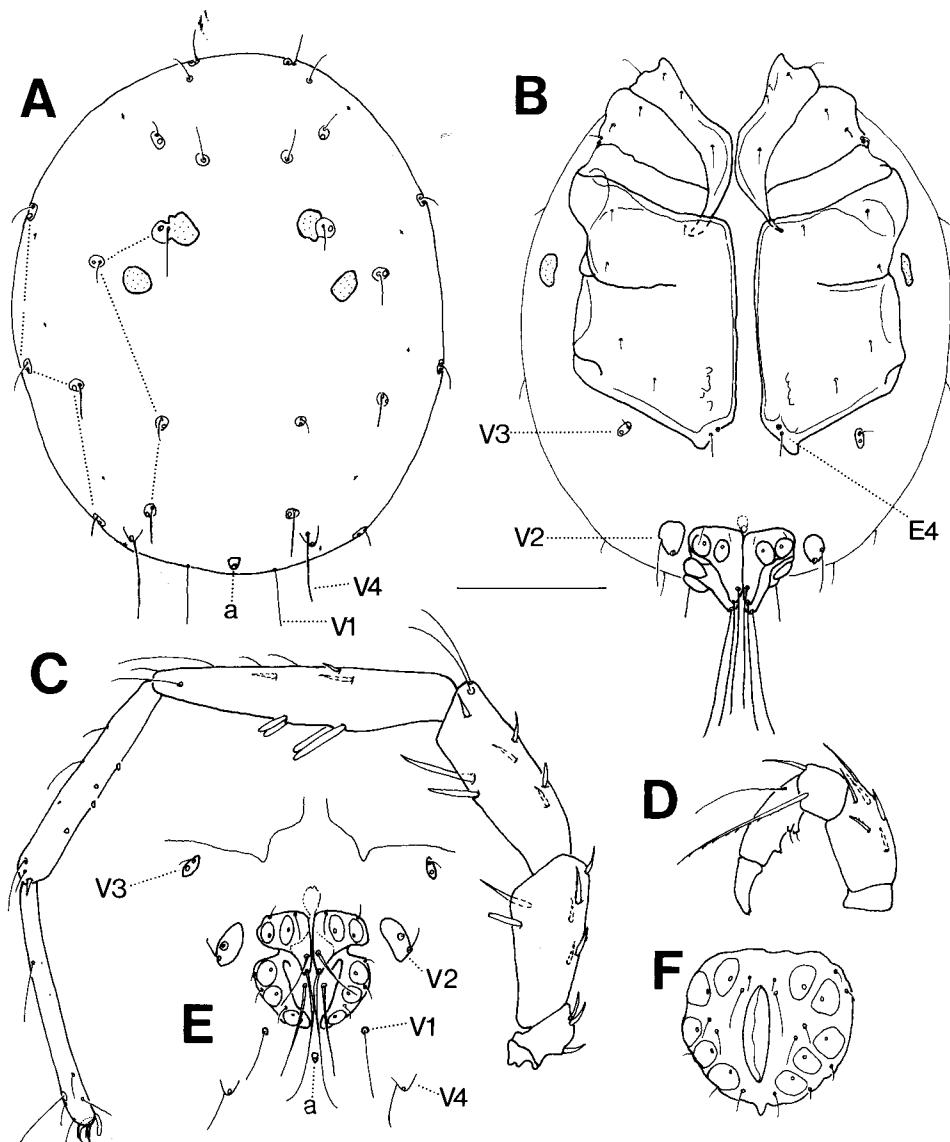


Fig. 7. *Unionicola newsumi*, new species. A. dorsum female, B. venter female, C. IV-Leg male, D. pedipalp male, E. posterior view female genital field, F. male genital plates. Scale line = ABE 132, CDF 90.

***Neumania hirsuta*, new species.**
(Fig. 8)

Material examined. - Syntype male female, slides M609 male female, Sungai Baki, tributary of S. Temburong, 14 Sep.1992; M600 female, Sungai Isu, tributary of S. Temburong, 5 Nov.1992; M504 female, Sungai Apan, tributary of S. Temburong, 6 Nov.1992.

Description. - Male: Length 417, width 355. Integument of idiosoma hirsute. Glandularia with their associated setae, and ocularia located on long finger-like tubercles. D1 free in integument next to small platelet. EpI separate with apodeme extending to posterior half of EpIV. Genital plates fused to form a ring around the genital aperture with 17 pairs of acetabula; width across genital plates 432, height 111, width genital aperture 35, length 66. Anus located on projection. PIV with small ventrodistal peg-like seta, length, PI-V 17, 60, 26, 46, 26. I-Leg-5 distal ventral blade-like seta long >2/3 length of other ventral setae. Length I-Leg-3-6 73, 108, 111, 143; II-Leg-3-6 70, 104, 115, 146; III-Leg-3-6 59, 104, 125, 139; IV-Leg-3-6 83, 129, 156, 153; swimming setae III-Leg-5 2, IV-Leg-5 2, III-Leg-4 3, IV-Leg-5 2+(3).

Female: Similar to male except in the genital field. Length variable 406-591, width 389-486. Size of papillae with glandularia variable. Genital plates of variable configuration, with 19-22 pairs of acetabula. PII variable, broader and more robust in some specimens than others; PIV with small ventrodistal peg-like seta, length, PI-V 19, 58, 24, 50, 25. I-Leg-5 distal ventral blade-like seta long >2/3 length of other ventral setae. Legs similar to male; length I-Leg-3-6 84, 104, 125, 153; II-Leg-3-6 94, 132, 129, 143; III-Leg-3-6 66, 111, 143, 143; IV-Leg-3-6 97, 157, 174, 174; swimming setae III-Leg-5 2, IV-Leg-5 2-3, III-Leg-4 3, IV-Leg-5 2-3+(3).

Etymology. - This species name is derived from the “hairy” nature of the idiosoma.

Remarks. - This species is unique in having a hairy idiosoma, large fingerlike tubercles on which glandularia and associated seta are located, and a long ventral distal seta on I-Leg-5. It is found in the same locality as *Neumania navina* Cook, 1967, which has a smooth idiosoma, short ventral distal seta on I-Leg-5, < 2/3 length of other ventral setae, only 5-7 pairs of acetabula in both sexes and the setae associated with glandularia located at the base of tubercles. (See discussion under *N. navina*).

***Wattleopsis* new subgenus**
(Fig. 9)

Material examined. - Syntypes: slides M571 male female, S. Temburong, 14 Sep.1992; M573 male female, M462 female, S. Temburong, 19 Sep.1992; M513 female, S. Temburong / S. Belalong confluence, Sep.1992. Other material examined.- M560 Nymph, S. Isu, tributary of S. Temburong, 5 Nov.1992.

Diagnosis. - Characters of the genus *Mideopsis* (Cook, 1974); 3 pairs of acetabula; dorsal and ventral shields separate; anterior epimera not projecting beyond the edge of the body; ridges present on each side extending anterolaterally from area posterior to IV-Leg sockets and median ridges between infracapitular bay and genital field between epimera; E4 anterior to genital field; posterior idiosoma exhibiting sexual dimorphism, males have concave margin posteriorly and anus on bulbous projection; legs with swimming setae not exhibiting pronounced sexual dimorphism; PIV with ventral tubercle.

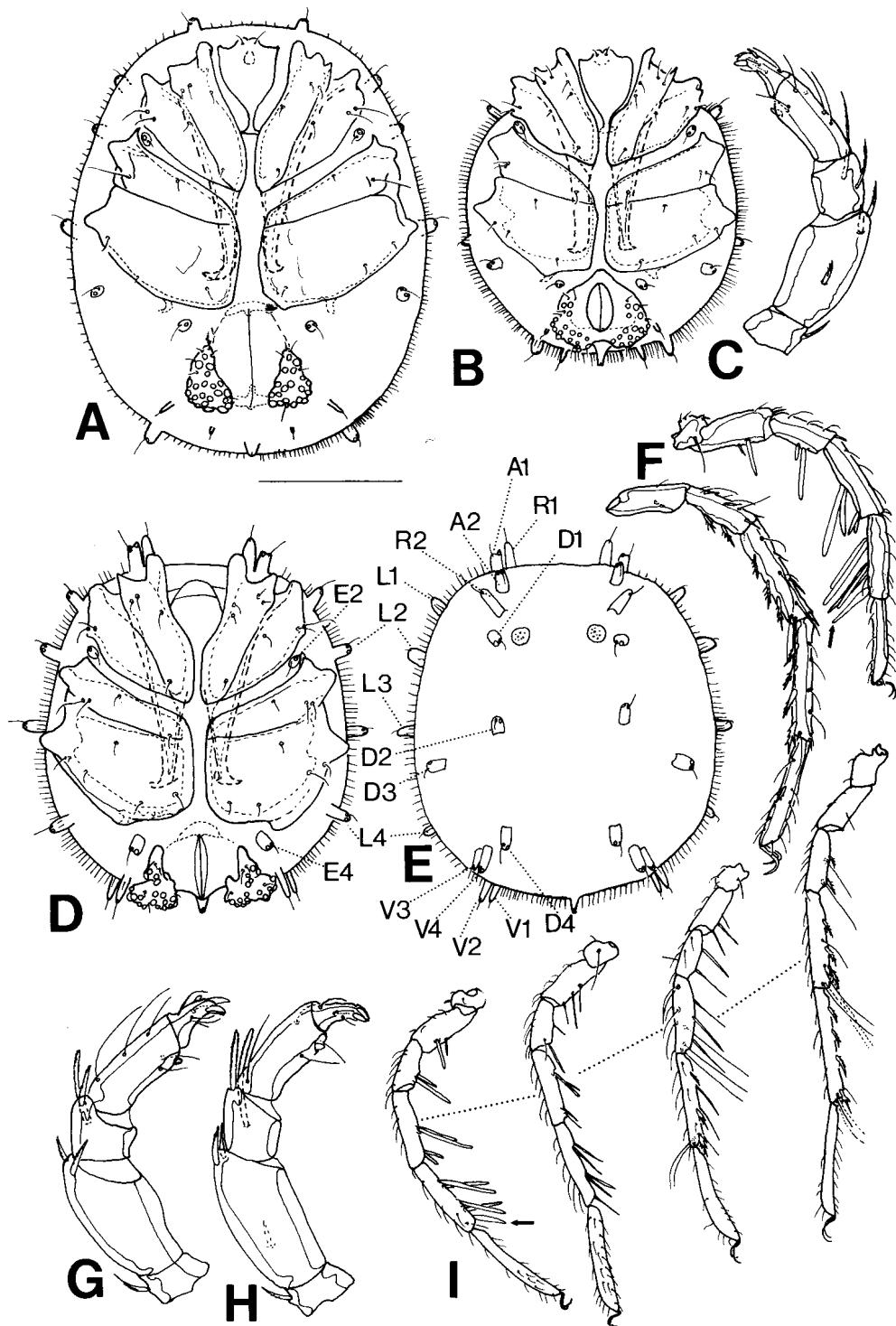


Fig. 8. *Neumania hirsuta*, new species. A. venter female, B. venter male, C. pedipalp female, D. venter female M600, E. dorsum female M600, F. I- and IV-Leg M600, G. pedipalp M600, H. pedipalp female, I. I-IV-Leg male. Scale line ABDE FI 190, CGH 70.

Type species. - *Mideopsis (Wattleopsis) goldbergi*, new species.

Etymology. - *Wattleopsis* refers to the wattle-like protuberance upon which the anus is located.

Remarks. - I hesitate to create yet another subgenus of *Mideopsis* for one species. However, the sexual dimorphism of the posterior idiosoma but not of the legs present a unique combination of characters. The neotropical subgenus *Neoxystonotus* Lundblad, 1927 is most similar but has strong sexual dimorphism of the fourth leg (Cook, 1974).

***Mideopsis (Wattleopsis) goldbergi*, new species**
(Fig. 9)

Material examined. - See under subgenus description above.

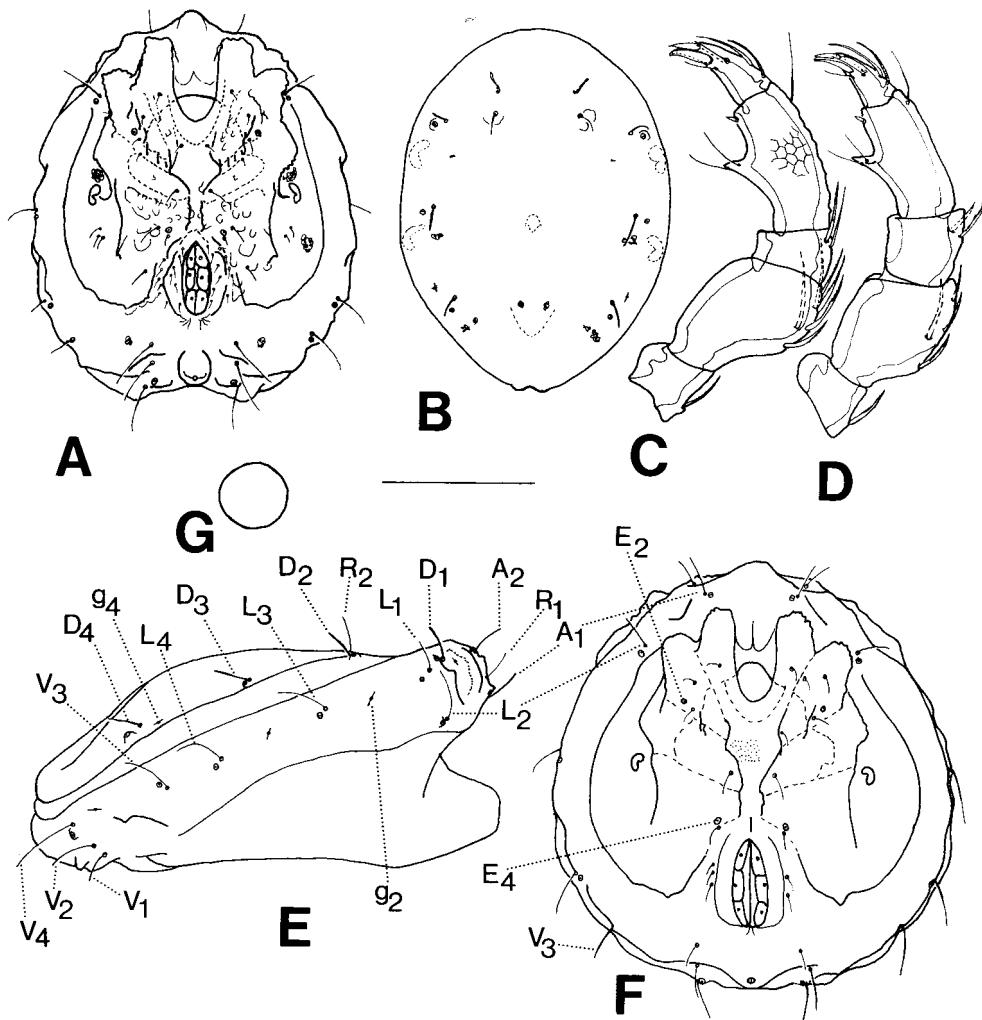


Fig. 9. *Mideopsis (Wattleopsis) goldbergi*, new subgenus, new species. A. venter male, B. dorsum male, C. pedipalp female, D. pedipalp male, E. lateral view female, F. venter female. Scale line ABEF 230, CD 80.

Description. - Male: Characters of subgenus. Colour brown / gold with hints of red along sutures. Body oval to round with slight anterior projection to ventral shield, indented at posterior margin and tapering dorsoventrally from eyes to anus; length 602, width 500, height 292. R2, D2-D4 and g4 located on large dorsal plate; length 553, width 417. Dorsal furrow complete. L2 located below L1. Ventral shield heavily sclerotized with indistinct epimeral suture lines. Genital field with >6 pairs of genital plate setae; genital opening oval; length 111, width 40. PIV heavily sculptured and with ventral projection; length PI-PV 30, 60, 26, 70, 46. Anus on small round projection between V1, V2 and V4. Legs with swimming setae II-Leg-4 3, II-Leg-5 4, III-Leg-4 4, III-Leg-5 6, IV-Leg-3 2+1, IV-Leg-4 3+5, IV-Leg-5 6. Length I-Leg-3-6 38, 45, 70, 94; II-Leg-3-6 45, 66, 78, 96; III-Leg-3-6 63, 87, 98, 101; IV-Leg-3-6 59, 87, 94, 101.

Female: Colour similar to male. Body broad posteriorly; length 654, width 616. Dorsal plate oval; length 612, width 490. Length PI-PV 28, 60, 38, 62, 38. Ventrally, epimeral suture lines indistinct. Genital field with <3 pairs of genital plate setae. Anus not on projection. Legs with swimming setae II-Leg-4 1, II-Leg-5 2, III-Leg-4 5, III-Leg-5 6, IV-Leg-3 1+2, IV-Leg-4 4+5(6), IV-Leg-5 5. Length I-Leg-3-6 35, 52, 80, 101; II-Leg-3-6 49, 56, 84, 118; III-Leg-3-6 49, 80, 101, 104; IV-Leg-3-6 66, 104, 108, 108. Egg diameter 94.

Nymph: Integument soft and papillate; body length 365, width 351. Dorsum without plates but glandularia heavily sclerotized. Eyes not on plates. Venter with anterior epimera fused to form a single plate. E2 fused to anterior margin of EpIII, E4 located between genital field and EpIV. Genital field trapezoid with two pairs of acetabula. V1 and V2 without glands, located lateral to anus; V3 posterolateral to EpIV and V4 terminal. Pedipalp similar to adult, length PI-PV 17, 43, 19, 48, 32. Legs with swimming setae II-Leg-4 1, II-Leg-5 1, III-Leg-4 2, III-Leg-5 2, IV-Leg-3 1, IV-Leg-4 2, IV-Leg-5 4. Length I-Leg-3-6 28, 41, 61, 85; II-Leg-3-6 35, 39, 52, 91; III-Leg-3-6 39, 52, 67, 80; IV-Leg-3-6 46, 70, 80, 85.

Etymology. - Named after Gordon Goldberg for his help with Latin names.

Remarks. - The anal protuberance is unique in the genus *Mideopsis* and will identify the male. Females can be separated from *M. orientalis* Wiles, 1988 from Sulawesi by the presence of the small anterior projection above the infracapitular bay and by the shape of the dorsal plate which is oval rather than round. Nymphs have not been described for other Asian species of *Mideopsis*. The species was common in material from the Rivers Belalong and Temburong and their tributaries. For a list of species from Sulawesi see Wiles (1990).

Albia (Albiella) saloi, new species
(Fig. 10)

Material examined. - Holotype male slide M449, S. Temburong, 19 Sep.1992; paratype 1 M518 female, S. Belalong, 20 Sep.1992; paratype 2 M519, S. Temburong / S. Belalong confluence, 20 Sep.1992; paratype 3 M451 female female male, S. Temburong, 19 Sep.1992; paratype 4 M487 male, S. Temburong, 13 Sep.1992; Other material examined.- M617 Nymph, Sungai Babi, tributary of S. Temburong, 13 Sep.1992.

Description. - Male: Colour, pale brown with variable distribution of pale red pigment on dorsal shield which may be absent. Dorsal shield length 678-869, width 461-609. Ventral shield length 723-862, width 521-643. Epimera without spinelike setae. Suture lines EpII/III and EpIII/IV generally complete. EpI/II median fusion point anterior to line joining E4-

E4. EpII/III fusing with the apex of EPIII/IV anterior to E4. EpIII/IV and EPI/II fusing at the midline at the same point or EpII/III fusing with EPI/II anterior to EPI/II median fusion point. E4 between or slightly anterior to IV-Leg sockets. E4-E4 156, E2-E2 209. L1 anterior and median to L2 and touching the anterolateral extension of EpIII/IV. Each genital plate with approximately 70 acetabula. Pedipalp typical. PIV ventrally with one long seta located medially, lengths PI-PV 43, 78, 67, 124, 41. I-Leg-6 with normal sized claw, length I-Leg-3-6 73, 83, 101, 115. II, III and IV-Legs-5 with 9, 11 and 9 swimming setae respectively.

Female: Similar in colour to males but proportionately larger and wider. Dorsal shield length 967, 783 wide, rounded anteriorly. E4-E4 219, E2-E2 271. PIV with ventral seta located anteriomedially, length PI-PV 48, 107, 83, 152, 52. Length I-Leg-3-6 83, 97, 122, 139. II, III and IV-Legs-5 with 7, 7 and 7 swimming setae respectively.

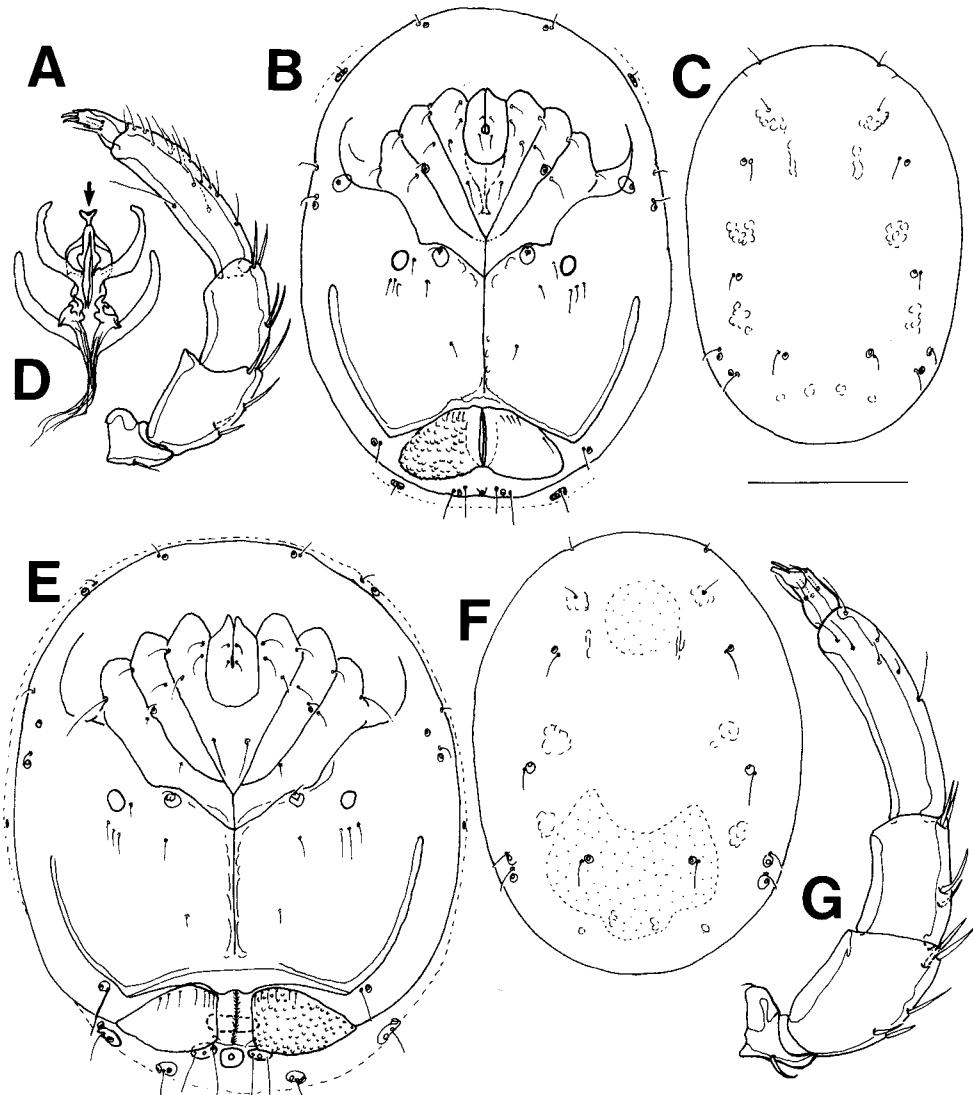


Fig. 10. *Albia (Albiella) saloi*, new species. A. pedipalp male, B. venter male, C. dorsal plate male, D. ejaculatory complex male, E. venter female, F. dorsal plate female, G. pedipalp female. Scale line BCEF 350, AG 100, D140.

Etymology. - This species is named after Ala Salo. It was found amongst the collections he made in Brunei.

Remarks. - *Albia saloi* most closely resembles the New Guinea species *Albia longipalpis* Wiles, 1991 in the location of E4 between IV Leg sockets and the fusion of EpII/III at or anterior to EpI/II median fusion point. However, the pedipalp is not as slender (especially PV), L1 is more medially located and touching the anterior extension of EpIII/IV and the genital plates are broader in *A. saloi*. *Albia suvarna* Cook, 1967 from India has a similar configuration of ventral shield suture lines and genital field but E4 are located posterior to the IV-Leg sockets. Similarly, *Albia australica* Cook, 1986 resembles *A. saloi* but the genital plates are smaller and E4 are more anteriorly located.

Two other specimens of *Albia* (*Albiella*) were found. M450 male is similar to *A. saloi* but has E4 posterior to IV leg sockets, L1 at the lateral margin of the idiosoma and L4 and V4 fused to the dorsal shield. It may represent a different species or a variant of *A. saloi*. M486 appears to be *Albia lundbladi* Cook, 1986. This would be an interesting discovery as the latter has only been reported from Australia on the southern side of Wallace's Line. Further collections are required to evaluate these two specimens and descriptions are not included here.

Albia (Spinalbia) kurusi, new species
(Fig. 11)

Material examined. - Syntypes slides M452 3 male, M475 female, River Temburong, 15 Sep.1992; M620 male, S. Temburong / R Belalong confluence, 20 Sep.1992; M494 female, Sungai Baki, tributary of S. Temburong, 4 Nov.1992; M618 male, S. Babi, tributary of S. Temburong, 6 Nov.1992; Other material examined.- M507 nymph, S. Baki, tributary of S. Temburong, 14 Sep.1992; M498 nymph, S. Apan tributary of S. Temburong, 6 Nov.1992; M619 nymph, tributary of S. Temburong, 15 Sep.1992; M488 male, S. Temburong, 12 Sep.1992; M499 male, S. Temburong, 11 Jul.1992.

Description. - Male: Colour, pale brown with occasional pale red pigment on the dorsal shield. Dorsal shield length 653, width 390. Ventral shield length 660, width 400. Epimera with large spinelike setae. Suture lines EpII/III and EpIII/IV incomplete. EpI/II median fusion point anterior to line joining E4-E4. EpII/III fusing with EpI/II posterior to EpI/II median fusion point. E4 nearer to IV-Leg sockets than genital field and anterior to posterior median epimeral setae. E4-E4 101, E2-E2 129. Each genital plate with approximately 26-30 acetabula. Pedipalp as in Fig. 11. PV ventrally with two long seta located anteriorly, lengths PI-PV 45, 83, 49, 146, 35. I-Leg-6 with normal sized claw, length I-Leg-3-6 66, 73, 83, 87 . II, III and IV-Legs-5 with 4, 6 and 5-6 swimming setae respectively.

Female: Similar in colour to males but proportionately larger and wider. Dorsal shield length 748, 740 wide, rounded anteriorly. E4-E4 125, E2-E2 146. P4 with ventral seta located anteriomedially, lengths PI-PV 36, 56, 33, 99, 27. I-Leg-6 with normal sized claw, length I-Leg-3-6 66, 73, 83, 87. II, III and IV-Legs-5 with 3-5, 3-5 and 5 swimming setae respectively. Egg diameter 86.

Etymology. - This species is named after Mr. Ramlee Kurus. It was found amongst the collections he made in Brunei.

Remarks. - Six species of *Albia* (*Spinalbia*) have been described from Asia. *Albia rectifrons* Viets, 1935 from China, India, Burma, Malaysia, Sumatra and Java, *Albia makinoi* Imamura, 1965 from Japan, *Albia tahani* Wiles, 1991a from the Malay peninsula, *Albia sulutensis* Wiles, 1991a from North Sulawesi and *Albia spinipes* Wiles, 1991a from New Guinea and now *Albia kurusi* from Borneo. The species excluding *A. rectifrons* are very closely related and may represent island forms of one species.

A. makinoi is most distinctive in having well developed epimeral suture lines and in the female, V1/V2 located on the anal plate. The position of E4 is an important diagnostic character for separating species. In *A. spinipes* E4 are located between IV-Leg sockets, in *A. tahani*, represented by one female, E4 are located posteriorly and posterior to the posteromedian epimeral setae; in *A. makinoi*, *A. sulutensis* and *A. kurusi* E4 are located

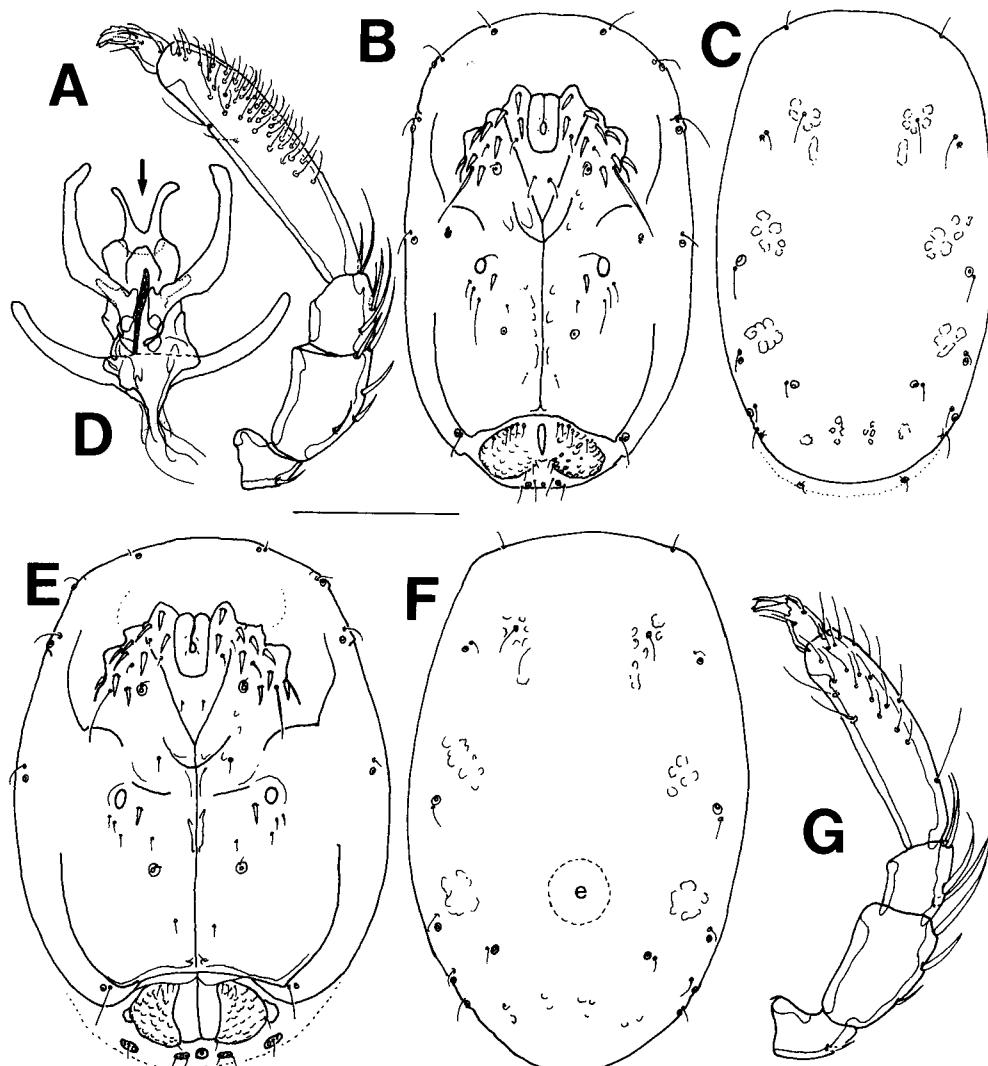


Fig. 11. *Albia* (*Spinalbia*) *kurusi*, new species. A. pedipalp male, B. venter male, C. dorsal plate male, D. ejaculatory complex male, E. venter female, F. dorsal plate female, G. pedipalp female. Scale line BCEF 230, AG 80, D70.

between IV-Leg sockets and the genital plate and anterior to the posteromedian epimeral setae. *Albia kurusi* can be separated from *A. sulutensis* by the long epimeral spines and absence of bright purple pigment. It is probable that *A. kurusi* is an island race of *A. sulutensis* but further collections from other river catchments on Borneo will be required to establish this.

NEW RECORDS FOR BRUNEI DARUSSALEM

(Synonymy prior to 1987 see Viets, K. O., 1987. * = new record)

FAMILY HYDRODROMIDAE

***Hydrodroma* sp.**

Material examined. - Preserved material from S. Temburong and S. Belalang.

Remarks. - *Hydrodroma* species are difficult to identify. The genus is in need of revision. Specimens were regularly found in stream tributaries of the S. Temburong.

FAMILY SPERCHONTIDAE

***Sperchonopsis verrucosa* (Protz, 1869): [Holarctic].**

[Thailand *, Peninsular Malaysia *]

Material examined. - M477, North Brunei, S. Temburong, 15 Sep.1992; M385 males, Thailand, Mai Gland Waterfalls, Chaing Mai, 18 Aug.1988; M315 female, Peninsular Malaysia, tributary stream to Sungai Tahan, Taman Negara, 3 Sep.1988.

Remarks. - Common in the S. Temburong, S. Belalang and their tributaries in North Brunei. New records from Thailand, Peninsular Malaysia and Brunei Darussalem increase the known holarctic distribution of *S. verrucosa* to tropical S.E. Asia.

FAMILY TORRENTICOLIDAE

[for synonymy, except *Monattractides*, see Wiles, 1997]

***Monattractides circularis* (Viets, 1935): 32-33, Table 1 [Sumatra, Java].**

[Peninsular Malaysia *]

Material examined. - M303 female, P. Malaysia, tributary stream to Sungai Tahan, Taman Negara, 3 Sep.1988. Preserved material not made into slides: North Brunei, S. Temburong and S. Belalang.

Remarks. - Common in the S. Temburong, S. Belalang and their tributaries in Brunei and is widespread in S.E. Asia.

***Monatractides macrognatha* (Viets, 1935):** 32-33, Table 1 [Java, Sumatra, Bali].

Wiles, P. R., 1997. 191-236 [Peninsular Malaysia]

Material examined. - M551, S. Temburong, 19 Sep. 1992.

Remarks. - The taxonomy of this species is difficult. There are many similar species including *Monatractides lutea* (Viets, 1935), *M. transversalis* (Lundblad, 1941), *M. landbergi* (Lundblad, 1941), *M. parva* (Lundblad, 1941), *M. longiuscula* (Lundblad, 1941), *M. minor* (Wiles, 1991). The group is in need of revision. The above designation is for a specimen which best fits the species description of *Monatractides macrognatha* (Viets, 1935). There are other specimens that are not such a good fit and their status must await further investigation.

***Monatractides parviventris* (Viets, 1935):** 32-33, Table 1 [Sumatra, Java].

Wiles, P.R., 1990. 282 [Sulawesi]

Material examined. - M566, M567, M568, S. Isu, tributary of S. Belalong, 5 Nov. 1992.

Remarks. - This species is variable and the taxonomy needs further investigation. The specimens from Brunei indicate that the fusion between the median margins of anterior platelets might not be a species-specific character. Mixed populations of normal 4+1 and 1+2+1 platelet arrangements were found. Also the shape of the body is variable from round to oval.

***Monatractides plumosa* (Wiles, 1989):** 245-248 [Sulawesi, Peninsular Malaysia].

Synonymy: *Torrenticola (Monatractides) pilosa* Wiles, 1989. New Synonymy.

Material examined. - M471, S. Temburong, 19 Sep. 1992. M569 males, S. Isu, tributary of S. Belalong, 5 Nov. 1992.

Remarks. - The pedipalp of this species has an intermediate form between *M. pilosa* from Peninsular Malaysia and *M. plumosa* from North Sulawesi. It is clear that the species is variable and widely distributed. *M. plumosa* has page priority over *M. pilosa* and the latter species has therefore been synonymised under *M. plumosa*.

***Torrenticola indica* Cook, 1967:** 1-411 [India]

Material examined. - M554, S. Temburong, 19 Sep. 1992.; M537, M539, S. Belalong, 22 Sep. 1992; M565, S. Isu, tributary of S. Belalong, 5 Nov. 1992; M583, M584 male, M585, S. Baki, tributary of S. Temburong, 6 Nov. 1992.

Remarks. - *Torrenticola indica* is a species with a 2+1 configuration of dorsal plates (see Wiles 1997) and a flanged pedipalp. It closely resembles *T. flangia* Wiles, 1997 from Sulawesi but the flange is shorter and glandularia E2 are sub apical not adjacent to E4.

***Torrenticola longipalpis* Wiles, 1997: 191-236 [Sulawesi].**

Material examined. - M482, M589, M592, S. Temburong, 13 Sep.1992; M539, M541, S. Belalong, 22 Sep.1992; M558, S. Temburong, 19 Sep.1992; M564, S. Isu, tributary of S. Belalong, 5 Nov.1992; M579, M581, M582, M584 male, S. Baki, tributary of S. Temburong, 6 Nov.1992.

Remarks. - Specimens from Brunei are similar to those from Sulawesi but have E4 closer to, but still anterior to E2 and a slightly longer median suture (MS sensu Wiles 1997).

Note that there is an error in Wiles, 1997 p. 217: E2 are posterior to E4. Like the populations from Sulawesi there are forms with long and short rostrums.

***Torrenticola minuta* (Lundblad, 1941): 97-126, [Java]. Wiles P. R., 1997. 191-236 [Peninsular Malaysia].**

Material examined. - M547, M549, M556, S. Temburong, 19 Sep.1992; M579, S. Baki, tributary of S. Temburong, 6 Nov.1992.

Remarks. - E4 are closer to E2 in the specimens from Brunei than those from Peninsular Malaysia. Instead of being sub apical (i.e. located just posterior to the apex of EpI) they are more posteriorly located near I-Leg sockets. The MS is shorter than the similar species *T. roxanneae* Wiles, 1997 from Sulawesi.

***Torrenticola rhampha* (Lundblad, 1941): 97-126, [Burma]. Wiles P. R., 1997. 191-236 [Peninsular Malaysia]. [Thailand *]**

Material examined. - M510 male, S. Temburong, 19 Sep.1992; M595 female, Thailand, Wangtakrai River, (N. of Bangkok), 6 Jul.1996; M342 male, Bambun Kumbang, Taman Negara, Peninsular Malaysia, 4 Sep.1988.

Remarks. - The male specimen from Brunei is similar to the holotype from Burma and the female from Thailand. This species has now been found from Burma to Borneo.

***Torrenticola tjwalensis* (Viets, 1935): 32-33, Table 1, [Java]. Wiles P. R., 1997. 191-236 [Peninsula Malaysia]**

Material examined. - M579, S. Baki, tributary of S. Temburong, 6 Nov.1992; M557, S. Temburong, 19 Sep.1992.

Remarks. - Widespread species in Asian tropical stony streams and rivers.

***Neoactractides (Allotorrenticola) abnormipalpis* (Lundblad, 1941): 97-126, [Burma]. Wiles P. R., 1997. 191-236 [Peninsular Malaysia, Brunei].**

Material examined. - M476 females, S. Temburong, 15 Sep.1992 [male on this slide is *N. farmerae* n. sp.].

Remarks. - This species has a wide distribution in stony Asian streams and rivers. See discussion under *N. farmerae*.

***Pseudotorrenticola sharpeae* Wiles, 1997:** 191-236
[Peninsular Malaysia, Thailand, Brunei].

Material examined. - M386, Thailand; M336, Peninsular Malaysia; M300, M492, Brunei

Remarks. - Only four specimens have been found but they suggest this species is widespread in Asian rivers.

FAMILY HYGROBATIDAE

***Hygrobates hamatus* (Viets, 1935):** 32-33, Table 1 [Java, Sumatra]. Cook D. R., 1967. 1-411 [India]. Gledhill, T. & P.R. Wiles, 1997. 513-539 [Sri Lanka]. Wiles P. R., 1997a. 375-418 [Papua New Guinea]. Cook D. R., 1986. 1586 [Australia]. [Singapore *], Peninsular Malaysia *].

Material examined. - M468, M479, S. Temburong, Sep.1992; M500, M501, M502 S. Apan, tributary of S. Temburong, 6 Nov.1992. Preserved material from S. Belalong, S. Temburong and tributaries. M329, M330 small stream Taman Negara, Peninsular Malaysia, 3 Sep.1988; Preserved Material, Bukit Timah, Singapore, 9 Aug.1988.

Remarks. - This species has a very wide distribution and crosses Wallace's line. Generally found in slow flowing streams with dead leaves. For checklist of water mites from Sri Lanka see Gledhill & Wiles (1997).

***Atractides spatirosus* (Viets, 1935):** 32-33, Table 1 [Java]. Wiles, P.R., 1991. 4156 [Peninsular Malaysia]. Gledhill, T. & P.R. Wiles, 1997. 513-539 [Sri Lanka].

Material examined. - M469, M590, S. Temburong, Sep.1992. Preserved material from S. Belalong, S. Temburong and tributaries.

Remarks. - This species is common in stony rivers with leaf litter and detritus.

FAMILY UNIONICOLIDAE

***Neumania navina* Cook, 1967:** 1-411 [India]

Material examined. - M600 male female, M604 female, North Brunei, Sungai Isu, tributary of S. Temburong, 5 Nov.1992; M504 males, Sungai Apan, tributary of S. Temburong, 6 Nov.1992.

Remarks. - The specimens collected most closely fit the description of *Neumania navina* Cook, 1967 from India. They are small and have large glandularia tubercles. However, Cook's material was collected from ponds while Bruneian specimens were from shallow streams. *N. ambigua* Piersig, 1906 is a very similar species. It is variable in the number of acetabula: Thailand male 19 and female 12-13 (Imamura 1964), Philippines female 12-13 (Walter 1930),

Burma male 9 (Lundblad 1969), India male 6-8, female 10 (Cook 1967) and Sri Lanka male 8 (Walter 1928) and differs from *N. navina* in the smaller glandularia tubercles and larger total size. It is not clear whether *N. navina* is an extreme form of *N. ambigua*, which has been reported from Sumatra, Java, India, Sri Lanka, Burma, Thailand, Philippines.

FAMILY ATURIDAE

Axonopsis (Axonopsis) gracilipalpis Viets, 1935: 32-33, Table 1 [Sumatra]

Material examined. - M455, M457, S. Temburong, 19 Sep.1992.

Axonopsis (Brachypodopsis) baumi Halik, 1930: 135-139 [Peninsular Malaysia],
Viets, K. H., 1935. 32-33, Table 1 [Java]

Material examined. - M459, M460, M470, S. Temburong, 19 Sep.1992; M508, S. Baki, tributary of S. Temburong, 6 Nov.1992; M526, M527, S. Belalong, 22 Sep.1992.,

Remarks. - This species is common in the catchment of the S. Temburong.

Axonopsis (Kalobrachypoda) rhopalopoda (Viets, 1929): 49-56 [Sumatra].
Viets, K. H., 1935. 32-33, Table 1 [Java]

Material examined. - M525, S. Belalong, 22 Sep.1992.

FAMILY MOMONIIDAE

Momonides trabecularis Lundblad, 1941: 97-126 [Java].
Wiles, P.R., 1990. 282 [Sulawesi].

Material examined. - M575, S. Belalong confluence, 21 Sep.1992; S31, S. Toraut, Domoga Boné, Toraut, Sulawesi, 16 Oct.1985.

Remarks. - This species is a rare component of the water mite fauna.

FAMILY HARPAGOPALPIDAE

Harpagopalpus indicus Cook, 1967: 1-411 [India]

Material examined. - M474, S. Temburong, 15 Nov.1992; M483, S. Temburong, 13 Nov.1992; M493, S. Temburong, 19 Sep.1992.

Remarks. - This is the first record of the species outside of India. It was found in leaf litter accumulations and woody detritus.

FAMILY ARRENURIDAE

Arrenurus (Megaluracarus) laticodulus Piersig, 1898: 365-380 [Java].
Viets K. H., 1935. 32-33, Table 1 [Sumatra]. Cook D. R., 1967. 1-411 [India]. Wiles, P.R., 1988. 479-504 [Peninsular Malaysia]. Jin, & Wiles, 1996. 317-344 [China].

Material examined. - Preserved material, small pond East of BSB.

Remarks. - Widespread Asian species, common in ponds and lakes.

Arrenurus (Megaluracarus) ceylonicus Daday, 1898: 85-117 [Sri Lanka].
Walter, C., 1928. 57-108 [India]. Walter, C., 1929. 211-273 [Java].
Wiles, P.R., 1988. 479-504 [Peninsular Malaysia].

Material examined. - Preserved material, small pond East of BSB, Brunei Darussalem.

Remarks. - Widespread species common in ponds and lakes.

ADDITIONAL SPECIES FROM SULAWESI AND THAILAND

Mideopsis orientalis, new species
(Fig. 12)

Material examined. - Holotype male slide S311, paratype 1 S18 female, paratype 2 S26 female, North Sulawesi, Indonesia, 25 Sep. 1985; paratypes 3 male and paratype 8 female S312 male female, S. Elok near confluence with S. Tumpah, Domoga Bone National Park, 12 Oct. 1985; paratype 4 S9 female, paratype 5 S6 female, paratype 7 S3 female, S. Elok near confluence with S. Tumpah, Sep. 1985. Other material examined.- S319, S. Elok, 17 Oct. 1985.

Description. - Male: Colour brown with purple patches on the dorsal plate and hints of purple along sutures. Body round with no anterior projection to ventral shield or indentation at posterior margin; length 602, width 500. R2, D2-D4 and g4 located on large dorsal plate; length 407, width 351. Dorsal furrow complete. L2 located below L1. Ventral shield heavily sclerotised with indistinct epimeral suture lines. Genital field with >6 pairs of genital plate setae; genital opening oval, length 180, width 38. Infracapitulum length 106. Pedipalp PIV heavily sculptured and with ventral projection; lengths PI-PV 32, 63, 26, 69, 50. Anus on idiosoma between V2. V1 and V2 lacking glands. Legs with swimming setae II-Leg-4, 3; II-Leg-5, 1; III-Leg-4, 5; III-Leg-5, 5; IV-Leg-3, 2?+1; IV-Leg-4, 2+5; IV-Leg-5, 6. Length I-Leg-3-6 39, 39, 67, 89; II-Leg-3-6 39, 48, 69, 96; III-Leg-3-6 46, 56, 72, 87; IV-Leg-4-6 46, 72, 85, 87.

Female: Similar to male differing only in the size of the genital field and generally larger size, length 556, width 515. Dorsal plate round; length 500, width 455. Length PI-PV 28, 66, 31, 73, 45. Ventrally, epimeral suture lines indistinct. Genital field with >6 pairs of genital plate setae. Anus not on projection. Legs with swimming setae II-Leg-4, 1; II-Leg-5, 3; III-Leg-4, 6; III-Leg-5, 6; IV-Leg-3, 1+2; IV-Leg-4, 4+5(6); IV-Leg-5, 6. Length I-Leg-3-6 45, 52, 77, 104; II-Leg-3-6 45, 52, 80, 101; III-Leg-3-6 49, 63, 83, 90; IV-Leg-4-6 57, 70, 94, 87.

Etymology. - Name refers to Oriental distribution.

Remarks. - See discussion under *M. goldbergi*.

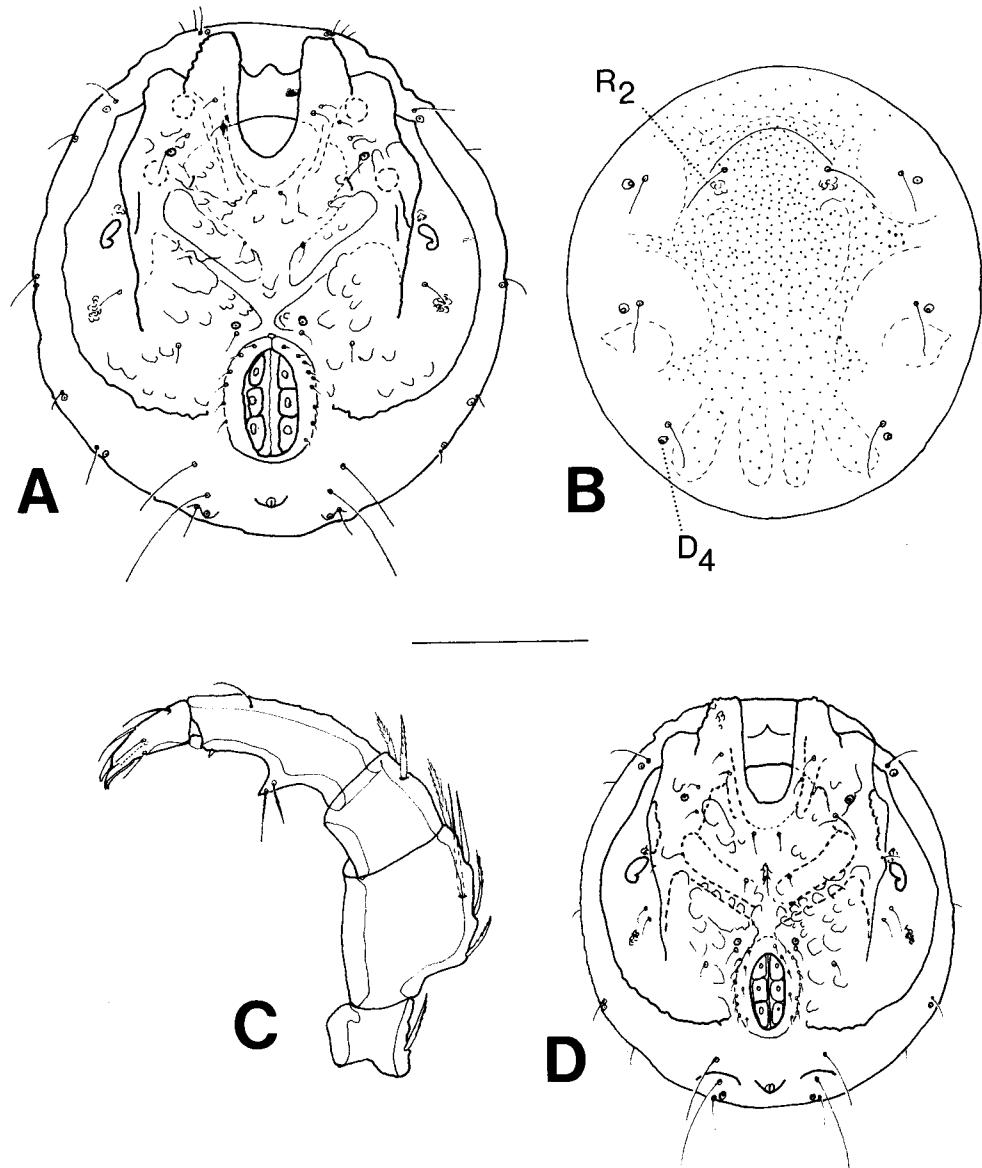


Fig. 12. *Mideopsis orientalis*, new species. A. venter female, B. dorsal plate female, C. pedipalp female, D. venter male. Scale line ABD 195, C 70.

***Mideopsis kanyae*, new species**
(Fig. 13)

Material examined. - Holotype male slide M603, Thailand, Mangrong waterfall 50 miles north of Bangkok, 6 Jul.1992.

Description. - Male: Colour brown. Body attenuating posteriorly, length 667, width 511. R2, D2-D4 and g4 located on large dorsal plate; length 567, width 442. Dorsal furrow complete. L2 located below L1. Ventral shield heavily sclerotized with indistinct epimeral suture lines. Genital opening oval, length 127, width 45. Length infracapitulum 101. Pedipalp PIV heavily sculptured and with double ventral projection which is variable in shape; length PI-PV 46 22, 60, 41. Anus located ventrally at the tip of a triangular extension posterior to V1, V2 and V4. V1 and V2 lacking glands. Legs with swimming setae II-Leg-4, 1; II-Leg-5, 1; III-Leg-4, 5; III-Leg-5, 5; IV-Leg-3, 2?+1; IV-Leg-4, 4+6; IV-Leg-5, 6. Length I-Leg-3-6 45, 49, 77, 100; II-Leg-3-6 49, 63, 80, 104; III-Leg-3-6 52, 73, 90, 94; IV-Leg-4-6 70, 87, 107, 111.

Etymology. - Named after Kanya Hirunwattanapong who collected water mites.

Remarks. - The posterior extension bearing the anus is characteristic of the species.

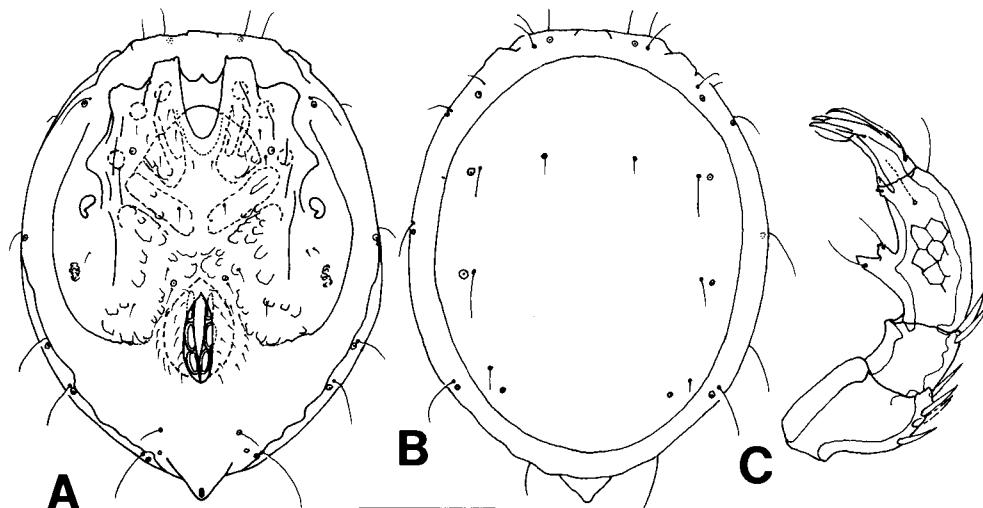


Fig. 13. *Mideopsis kanyae*, new species. A. venter male, B. dorsal plate male, C. pedipalp male. Scale line AB 195, C 60.

ADDITIONAL NEW RECORD FOR THAILAND

***Torrenticola tetrapora* (Viets, 1935):** 32-33, Table 1 [Sumatra, Java].
Wiles P. R., 1997. 191-236 [Peninsular Malaysia]

Material examined. - M596, Thailand, Wangtakrai River, 6 Jul.1996 (N. of Bangkok).

DISCUSSION

The island of Borneo emerged from the sea about 15 million years ago and is thus geologically young. Borneo escaped the major upheavals of the Pliocene and was little disturbed by the climatic swings of the Pleistocene, which saw the ice caps expand at least four times. During the periods when the ocean waters were held in the ice caps, Borneo with the Malay Peninsula, Sumatra and Java formed a single land mass called Sundaland. It is therefore not surprising to find that Brunei / Borneo has a similar water mite fauna to Sumatra, Java and mainland S. E. Asia.

All three *Axonopsis* species from Borneo have been recorded from other parts of "Sundaland" (Sumatra, Java and Peninsula Malaysia) but not from Sulawesi where two different species are commonly present in rivers (Wiles 1989, 1990). Similarly, all *Torrenticola*, *Pseudotorrenticola*, *Harpagopalpis* and *Neoatractides* species on Borneo have a widespread Sundaland distribution and all except *T. longipalpis* are absent from Sulawesi. Of the 16 rheophilic species only four (25%): *Momonides trabecularis*, *Monatractides circularis*, *M. plumosa* and *T. longipalpis* have been reported from both Sulawesi and "Sundaland". This reflects the isolation of Sulawesi, which was never directly connected to "Sundaland".

The limited collections indicate many species may have island forms. However, more data are required from many more localities before the variations between island populations can be established. Clearly these first collections represent a small fraction of the total water mite species from Borneo.

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