Acarologia is proudly non-profit, with no page charges and free open access

Please help us maintain this system by encouraging your institutes to subscribe to the print version of the journal and by sending us your high quality research on the Acari.

Subscriptions: Year 2021 (Volume 61): 450 €
http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php
Previous volumes (2010-2020): 250 € / year (4 issues)
Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France
ISSN 0044-586X (print), ISSN 2107-7207 (electronic)

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under the reference ID 1500-024 through the « Investissements d’avenir » programme (Labex Agro: ANR-10-LABX-0001-01)

Acarologia is under free license and distributed under the terms of the Creative Commons-BY-NC-ND which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited.
RHEOPHILIC WATERMITES (ACARI: HYDRACHNIDIA)
FROM MAINLAND MALAYSIA

BY Roy WILES *

WATERMITES MALAYSIA

ABSTRACT: Collections of rheophilic watermites from Peninsular Malaysia increase
the number of species reported in the region from 14 species to 30 species. Of the
18 species described herein, 13 species and one genus, Barbaxonopsalbia, are new to
Science.

INTRODUCTION

Fourteen species of watermites have previously
been reported from peninsular Malaysia (VIETS,
1927, VIETS, 1929; HALIK, 1930; WILES, 1986). A
further eight species are recorded for Singapore
(VIETS, K. O., 1959). Of these, five are from streams
in Perak (Halik, 1930b) and two (Arrenurus fibera­
tus WALTER, 1929 and Arrenurus rouxi (WALTER,
1915) are from streams in Singapore. The 18 species
presented in this paper were collected during 1984
and 1985; thirteen species and one genus are new
to science.

The complete list of the thirty species from
Malaysia is :

Hydrodroma monticola (PIERSIG, 1906); WILES, 1986
Bandakia wendyae new species
T. (Torrenticola) dentifera new species
T. (T.) semisuta HALIK, 1930
T. (Monatractides) neoapratima new species
T. (M.) circuloides HALIK, 1930
T. (M.) minor new species
T. (Heteratractides) orientalis new species
T. (Allotorrenticola) abnormipalpis (LUNDBLAD 1941)
T. (A.) bahillii new species
T. (A.) malayensis new species
Limnesia volzi PIERSIG, 1906; VIETS, 1927, 1929
Hygrobates (Hygrobates) limi new species

* Department of Biological Sciences, University of Buckingham, Hunter Street, Buckingham. MK18 1EG England.

Atractides conjunctus (Viets, 1935)  
A. putihi new species  
A. spatiosus (Viets, 1935)  
Neumania nodosa (Daday, 1898); Viets, 1927, 1929  
N. supina Viets, 1927, 1929  
Javalbia (Javalbia) sunyi new species  
Barbaxonopsalbia pilosa new genus, new species  
Axonopsis baumi Halik, 1930  
Axonopsis hornseyi new species  
Axonopsis baumi Halik, 1930  
Barbaxonopsalbia pilosa new genus, new species  
Axonopsis hornseyi new species  
Arrenurus (M.) rostratus Daday, 1898; Viets, 1927, 1929  
A. (M.) rostratus Daday, 1898; Viets, 1927, 1929  
Arrenurus (Megalura) bicornicodulus Piersig, 1906; Viets, 1927, 1929  
A. (M.) rostratus Daday, 1898; Viets, 1927, 1929  
A. (M.) rostratus Daday, 1898; Viets, 1927, 1929  
A. (Rhinophoracarus) luxatus Viets, 1927, 1929  

A number of species from lakes and ponds were also collected and will be presented at a later date.

In the following descriptions the terms epimera and infracapitulum sensu van der Hammen (1980) are used for coxae and capitulum sensu Cook (1974). All the terminology follows that of Cook (1974). Type specimens are deposited in the British Museum of Natural History in London.

The sampling localities

Most specimens were collected from the upper reaches of a small stream flowing into the S. Gombak upstream of the University of Malaya Field Station at Ulu Gombak in Selangor, Malaysia during November 1985. An early rainy season prevented sampling of the main river in which, numerically, watermites are a constant and significant faunal component. A comprehensive study on the S. Gombak is given by Bishop, 1973 (for appearance of main river in spate see plate 7 therein). Previous sample from the Gombak area and other localities in 1984 were carried out with inadequate sampling equipment and many further species are to be collected from these sites. A description of the sample sites referred to in the text is given below:

Site 1: Selangor: November 1985. Upper reaches of low order adventitious stream [2° by Horton's Classification] (Horton, 1945) leading into the Sungai Gombak, 3°20' N, 101°45' W (Bishop, 1973). Depth of water variable; 1 cm-15 cm in riffles over coarse quartz sand and tree roots, and up to 50 cm, in shallow pools and backwaters. Flowing down through undisturbed rainforest. Lower reaches affected by silt from new Gombak Highway.

Site 2: Selangor: November 1984. Lower reaches of 3° stream passing through disturbed forest into the S. Gombak, Station I of Bishop, 1973 (see plate 4 therein). Substrate of small boulders, with stones, gravel and much coarse sand between.

Site 3: Pasir Puteh Waterfalls near Kota Bharu, Tregganau: October 1984. Specimens from coarse sand in shallow pool (< 15 cm deep) between tree roots at base of cascading waterfalls.

Site 4: S. Batung Padang, Cameron Highlands, Perak: October 1984. 4° stream flowing down steep slope between massive boulders beside road. Substrate of coarse sand and small boulders with few accumulations of allochthonous detritus. Mean width approximately 3-4 m.

Method

Watermites were collected (in a fine meshed (0.3 mm) dip net) by removal of bottom sediments. Often this can be better achieved by building channels with boulders to divert water through the net. Stones and boulders are subjected to scrubbing with a nylon brush to remove clinging mites. The materials collected are sieved through 2 large diameter Endecott sieves, 5 mm mesh and 0.3 mm mesh, using bucketfuls of water. The sieved material is then picked live for specimens from white trays. A lightweight stand for plastic trays was constructed from greenhouse staging (PennPax Products Ltd., West End Road, High Wycombe, Bucks, HP1 2QB England). The eight tubes can be quickly dismantled, are lightweight and easily carried. This affords some degree of comfort when picking samples for long periods.
FAMILY ANISITSIELLIDAE KOENIKE, 1910

SUBFAMILY ANISITSIELLINAE KOENIKE, 1910

Bandakia wendyae new species
(Figs 1, 2)

Large conspicuous species, lemon yellow with scarlet eyes; characters of the family Anisitsiellidae Koenike, 1910 and subfamily Anisitsiellinae Koenike, 1910 (COOK, 1974); well developed dorsal and ventral shields present; anterior eye bearing sclerites fused together medially above the infracapitular bay; dorsal shield bearing postoculilla, five pairs of glandularia and post frontal setae; one pair of glandularia free in dorsal furrow; glands on third epimera absent but suture line extending between anterior and posterior sutures of third epimera present; fourth epimera and insertions of the fourth leg level with the posterior limit of the genital field; genital flaps covering three pairs of acetabula; fourth legs with claws.

Male: length 991 µm, breadth 722 µm; length of genital plate 273 µm, breadth 170 µm; infracapitulum 226 µm long with chelicerae bearing stylet-like claws; length PI 26 µm, PII 92 µm, PIII 50 µm, PIV 50 µm, PV 36 µm.

Female: larger than the male, body length 1322 µm-1330 µm, breadth 983 µm-1000 µm; length genital plate 222-235 µm, breadth 165 µm-174 µm; infracapitulum length 257 µm-260 µm; length PI 22 µm-28 µm, PII 97 µm-98 µm, PIII 52 µm-55 µm, PIV 63 µm-71 µm, PV 30 µm-36 µm.

Type series: Holotype M518 male. Paratype 1 M156 female, Paratype 2 M157 female.

Type locality: Site 1. Amongst tree roots.

Remarks: this species differs from the genus description in that the glands of the third epimera are absent and the fourth epimera are more closely associated with the genital field. The position of the fourth epimera relative to the genital field is intermediate between that of the genus Bandakia and that of Utxatax Habeeb, 1964 in which the fourth epimera extend beyond the posterior end of the genital plates. The two genera both possess a conspicuous suture line across the third epimera and claws on the fourth legs which separate them from the other genera in the subfamily Anisitsiellinae. They differ primarily on the relative position of fourth leg bases, those of Utxatax being anterior to the anterior edge of the genital field.

Torretticola (Torretticola) dentifera new species
(Fig. 3)

Male: Body oval, length of dorsal shield 386 µm-410 µm, breadth 219 µm-240 µm; anterior pairs of platelets separate from plate; length of ventral shield 483 µm-521 µm, breadth 250 µm-271 µm; genital field 89 µm-97 µm long, 69 µm-73 µm wide; glands absent from third epimera; infracapitulum with no postdorsal projections; rostrum when viewed dorsally much narrower than the remainder of the infracapitulum, length of infracapitulum 209 µm-210 µm, length of chelicera 240 µm, palp much larger than the infracapitulum; PI small, serrated ventral projections on PII and PIII, PII with denticles on the ventral surface, PIV with large blunt spine at dorsal distal extremity and two small ventral projections present, dorsal lengths PI 19 µm-20 µm, PII 56 µm, PIII 44 µm, PIV 63 µm-69 µm, PV 14 µm-15 µm.

Female: unknown.

Type series: Holotype M145 male. Paratype 1 M146 male.

Type locality: Site 1. Amongst tree roots.

Torretticola (Torretticola) semisuta (Halik, 1930)
(Fig. 4)

**FIG. 1-4:** 1 (A-F). — *Bandakia wendyae* new species, venter (A) and dorsal shield (B) of female; venter (C) and dorsal shield (D) of male; genital field of female (E) and male (F); (scale line = 200 µm for A-D, 80 µm for E, F). 2 (A-C). — *Idem*, palp of female (A) and male (B); infracapitulum of female (C); (scale line = 20 µm for A, B, 80 µm for C). 3 (A-E). — *Torrenticola denifera* new species, male; dorsum (A), venter (B), infracapitulum (C), and palps (D, E); (scale line = 80 µm for A, B; 50 µm for C; 20 µm for D, E). 4 (A-D). — *Torrenticola semisuta* (Halik, 1930), female dorsum (A), venter (B), palp (C), and infracapitulum (D); (scale line 80 µm for A, B; 20 µm for C; 50 µm for D).


**Female**: Length of dorsal shield 421 µm-565 µm, breadth 323 µm-419 µm; two anterior pairs of platelets separate from dorsal plate; length of ventral shield 522 µm-706 µm, breadth 351 µm-487 µm; genital field 125 µm-153 µm long, 140 µm-143 µm wide; glands absent from third epimera; infracapitulum with short postdorsal projections; rostrum when viewed dorsally much narrower than the remainder of the infracapitulum, length of infracapitulum 264 µm-316 µm; length chelicera 322 µm-374 µm; palp with small PI and long PIV, PII and PIII with ventral projections bearing setae, projection of PII projecting distally, PIV ventral surface with two small centrally placed projections with three short and one long setae; length PI
33 µm-39 µm, PII 96 µm-117 µm, PIII 46 µm-56 µm, PIV 96 µm-115 µm, PV 15 µm-17 µm.

**Locality**: Site 1. Two females.

**Remarks**: Similar species include *T. tetraporella* Cook, 1967 and *T. maharashtris* Cook, 1967 from India; *T. bjorkegreni* Lundblad, 1967 from Indochina (Burma) and *T. tetraporus* Viets, 1935 from Java and Bali. The present species differs from these in having a long rostrum, a deep infracapitulum and narrow anterior dorsal platelets. The PII seta on the ventral extension is much reduced on the specimens from Gombak but they otherwise agree well with the description of HALIK for two male specimens from Tapah, Perak, Malaysia.

**Torrenticola (Monatractides) neoapratima** new species (Fig. 5)

**Male**: length of dorsal shield 469 µm, breadth 306 µm-320 µm; length of ventral shield 574 µm-577 µm, breadth 343 µm-350 µm; infracapitular bay squared at proximal end; genital field length 108 µm-111 µm, breadth 70 µm-78 µm; straight stout seta on ventral PII and PIII; length of palpal segments PI 21 µm-23 µm, PII 57 µm-58 µm, PIII 29 µm-31 µm, PIV 43 µm-45 µm, PV 17 µm-19 µm.

**Female**: length of dorsal shield 490 µm, breadth 317 µm; length ventral shield 591 µm, breadth 350 µm; genital plate length 104 µm, breadth 80 µm; length of palp segments PI 23 µm, PII 58 µm, PIII 34 µm, PIV 41 µm, PV 20 µm.

**Type series**: Holotype M213 male. Paratype M215, 1 female.

**Locality**: Site 3. One male M165.

**Remarks**: this species agrees well with the description given by HALIK, for *T. circuloides* and by LUNDBLAD, 1969 for the same female specimen from the S. Batung Padang, Cameron Highlands, Perak, Malaysia. No male has yet been described.

**Torrenticola (Monatractides) minor** new species (Fig. 8)

**Female**: length of large dorsal plate 393 µm, breadth 306 µm; posterior platelets with swollen anterior margins; length of genital field 122-132 µm, breadth 108 µm-122 µm; depth of infracapitular bay 125 µm-132 µm, width 35 µm-45 µm; length PI 20 µm-22 µm, PII 39 µm-41 µm, PIII 25 µm-29 µm, PIV 31 µm-36 µm, PV 17 µm-18 µm.
FIG. 5-8:  5 (A-F). — *Torrenticola neogratina* new species, venter (A) and dorsum (B) of male; venter (C) and dorsum (D) of female; infracapitulum (E) and palp (F) of male; (scale line = 80 µm for A-D, = 50 µm for E; = 20 µm for F). 6. — *Torrenticola circuloides* (Halik, 1930), dorsum and venter of female; (scale line = 80 µm). 7. — Idem, palp and infracapitulum of female; (scale line = 50 µm for infracapitulum, = 20 µm for palp). 8 (A-D). — *Torrenticola minor* new species, female venter (A), dorsum (B), palp (C), and infracapitulum (D); (scale line 80 µm for A, B; = 20 µm for C; = 50 µm for D).
Type series: Holotype M147 female; paratype females M148(1), M149(1) and M150(1).

Locality: Site 1. Four females, M147, M148, M149 and M150.

Remarks: this species is superficially like specimens included in the _T. macropora_ (Viets, 1935) species complex. LUNDBLAD, 1971 regards _T. macrognatha_ (Viets, 1935) and _T. macrognatha major_ (Viets, 1935) as belonging to _T. macropora_. However, _T. macrognatha major_ has four dorsoglandularia on the dorsal plate, whereas _T. macrognatha_ and _T. macropora_ only have two. I suggest that _T. macrognatha major_ (Viets, 1935) be raised to a full species called _Torrenticola major_ (Viets, 1935). Thus, _T. major_ (Viets, 1945), new status [= _Atractides macrognathus major_, Viets, 1935].

_T. minor_ n. sp. closely resembles _T. major_ but differs considerably in size, the large dorsal plate being 393 µm long compared with 602 µm in _T. major_. The anterior dorsoglandularia on the dorsal plate lie nearer the anterior end of the medial muscle scar in _T. minor_ compared with _T. major_ and the anterior margins of the posterior platelets are more swollen. The palp PIV length is also somewhat shorter in _T. minor_; _T. minor_ PIV/PIII = 1.4 compared to = 1.2 in _T. major_.

It may well be that _T. minor_ is a variety of _T. major_ and that intermediate specimens may be found.

**Torrenticola (Heteraractides) orientalis** new species (Fig. 9)

*Female*: length of dorsal shield 546 µm, breadth 407 µm, two anterior platelets free, two posterior platelets fused completely with the dorsal plate; ventral shield 635 µm-657 µm, breadth 435 µm-470 µm; infracapitulum bay shallow; medial margin of fused second and third epimera reduced to median angle; glands absent from third epimera; genital field length 146 µm-150 µm, breadth 137 µm-139 µm; infracapitulum without long postdorsal projections; rostrum as wide as the remainder of the infracapitulum when viewed dorsally, rostrum somewhat flattened; length of infracapitulum 260 µm-275 µm; length of chelicera 306 µm-316 µm; palp with shortened distal segments, dorsal lengths PI 35 µm-36 µm, PII 78 µm-80 µm, PIII 45 µm-48 µm, PIV 31 µm-35 µm, PV 9 µm-13 µm.

*Male*: unknown.

Type series: Holotype, M140 female. Paratype 1, M141 female.

**Type Locality**: Site 1. 2 females.

Remarks: this species most resembles the type from Colombia, _T. serratirostris_ Lundblad, 1941. They both have broadened and somewhat flattened rostrum, no glands on the fourth epimera, and short distal segments to the palp. The anterior platelets of _T. orientalis_ are not fused with the dorsal plate and the shape of the palp and infracapitulum differs from _T. serratirostris_.

**Torrenticola (Allotorrenticola) abnormipalpis** (Lundblad, 1941)

(Fig. 10)


*Male*: length of dorsal shield 400 µm-430 µm, breadth 344 µm-371 µm; anterior platelets free; length of ventral shield 514 µm-530 µm; cuticle thickened with conspicuous glandularia on the third epimera; length genital field 114 µm-118 µm, breadth 83 µm-87 µm; infracapitulum long 246 µm-268 µm and heavily sculptured; palp with PI partially fused with PII on the ventral surface, PIV and especially PV much reduced, PII and PIII heavily sculptured on the dorsal surface; length PI 27 µm-37 µm, PII 40 µm, PIII 45 µm-49 µm, PIV 19 µm, PV 9 µm.

*Female*: similar to male, differs in that the interior proximal margin of the first epimera almost reach the genital plate in females whereas in males they end well before the genital plate; length dorsal shield 431 µm-445 µm, breadth 403 µm; length ventral shield 567-570 µm, breadth 441 µm; length genital plate 146 µm-153 µm, breadth 83 µm-87 µm; length infracapitulum 310 µm-316 µm; palp similar
Fig. 9-12: 9 (A-F). — *Torrenticola orientalis* new species, female, venter (A), dorsum (B), palp (C, D), and dorsal (E) and lateral (F) views of infracapitulum; (scale line = 80 µm for A, B; = 20 µm for C, D; = 50 µm for E, F). 10 (A-F). — *Torrenticola abnormipalpis* Lundblad, 1941; venter (A) and dorsum (B) of female; dorsum (C) and venter (D) of male; infracapitulum (E) and palp (F) of female; (scale line = 80 µm for A-D; = 50 µm for E; = 20 µm for F). 11 (A-D). — *Torrenticola bahtilli* new species, male, dorsum (A), venter (B), palp (C) and infracapitulum (D); (scale line = 80 µm for A, B; = 20 µm for C; 50 µm for D). 12 (A-F). — *Torrenticola malayensis* new species; dorsum of female (A); venter (B) and dorsum (C) of male; venter of female (D); palp (E) and infracapitulum (F) of male; (scale line = 80 µm for A-D; = 20 µm for E; = 50 µm for F).
to male, length PI 40 µm-42 µm, PII 45 µm-49 µm, PIII 49 µm-51 µm, PIV 19 µm, PV 8 µm-9 µm.

 Locality : Site 1. Nine females and four males.

 Remarks : these specimens agree with the description of *T. abnormipalpis* Lundblad 1941 from the Dawna Hills near Kawareik in South Burma.

Torrenticola (Allotorrenticola) bahtilli new species (Fig. 11)

**Male** : length of dorsal shield 442 µm-452 µm, breadth 362 µm-407 µm ; two anterior pairs of platelets separate from dorsal plate ; length of ventral shield 542-577 µm, breadth 396 µm-424 µm ; infracapitulum bay very shallow ; genital field 115 µm-125 µm long, 89 µm-97 µm wide ; glands generally present on third epimera ; infracapitulum with short postdorsal projections ; rostrum when viewed dorsally much narrower than the remainder of the infracapitulum ; length of chelicera 383 µm-431 µm, with strongly sculptured proximal segments and with shortened distal segments ; PI with ventral projection bearing a short setae, PII and PIII with much reduced ventral projection ; dorsal lengths PI 37 µm-43 µm, PII 91 µm-96 µm, PIII 48 µm-50 µm. PIV 35 µm-39 µm, PV 13 µm-15 µm.

**Female** : unknown.

Type series : Holotype M143 male. Paratype 1 M142 male, Paratype 2 M144 male, Paratype 3 M176 male.

Type locality : Site 1.

Remarks : the species included in the subgenus *Allotorrenticola* include *T. abnormipalpis* Lundblad, 1967 from Burma ; *T. suvarna* Cook, 1967 from India and *T. malayensis* new species. The present species can be separated from these by the presence of characteristic large projections on PII and PIII.

Torrenticola (Allotorrenticola) malayensis new species (Fig. 12)

**Male** : length of dorsal shield 417 µm-438 µm, breadth 355 µm-362 µm ; two anterior pairs of platelets separate from dorsal plate ; length of ventral shield 539 µm-560 µm, breadth 396 µm-400 µm ; glandularia present on third epimera ; length of genital field 115 µm, breadth 90 µm-94 µm, slightly narrower than that of the female ; infracapitulum bay very shallow ; infracapitulum long with short postdorsal projections ; rostrum when viewed dorsally much narrower than the remainder of the infracapitulum ; length of chelicera 390 µm-393 µm, with strongly sculptured proximal segments and with shortened distal segments ; PII with ventral projection bearing a short setae, PIII 43 µm-52 µm, PIV 26 µm-28 µm, PV 12 µm.

**Female** : similar to the male, but with medial proximal end of first epimera nearer to the genital field and with a wider genital field ; dorsal shield 435 µm-473 µm, breadth 358 µm-382 µm ; length of the ventral shield 560 µm-591 µm, breadth 413 µm-428 µm ; infracapitulum bay very shallow ; genital field 139 µm-146 µm long, 129 µm-132 µm wide, glands generally present on third epimera ; length of infracapitulum 289 µm-310 µm ; length of chelicera 379 µm-417 µm ; dorsal lengths of palp segments PI 35 µm-43 µm, PII 82 µm-85 µm, PIII 50 µm-54 µm. PIV 24 µm-28 µm, PV 10 µm-14 µm.


Type locality : Site 1. 2 males, 4 females.

Remarks : two species have previously been included in the subgenus *Allotorrenticola*, *T. abnormipalpis* Lundblad, 1941 from Burma and *T. suvarna* Cook, 1967 from India. This species can easily be recognized by its characteristic palp shape.

It should be noted that the glands of the third
epimera are not always present and of the six specimens collected two were without glands, two had a gland present on only one side of the body and two specimens had both glands present.

**Family Hygrobatidae Koch, 1842**

**Subfamily Hygrobatinae Koch, 1842**

*Hygrobatis (Hygrobatis)* limi new species (Fig. 13)

**Male** : length of body 379 μm-410 μm; glandularia on dorsum free in integument; apodemes between epimera III and epimera IV not extending to median margin, median margin of epimera III and epimera IV indistinct; genital field 80 μm-87 μm long; genital plate with three acetabula; palp with triangular denticles on the ventral surface of PIII, PII with long ventral projection bearing denticles; length PI 22 μm-24 μm, PII 68 μm-78 μm, PIII 61 μm-63 μm, PIV 101 μm, PV 35 μm-37 μm; no swimming hairs on legs.

**Female** : length of body 513 μm-542 μm; genital plate length 87 μm-96 μm; length genital field 137 μm; length of genital plate 97 μm; length of infracapitulum 149 μm; length of palp segments PI 25 μm, PII 56 μm, PIII 76 μm, PIV 71 μm, PV 30 μm; length I leg 5 109 μm, I leg 6 178 μm.

**Locality** : Site 1. Female M179.

**Remarks** : this species has a palp similar to *H. orientalis* Lundblad, 1969 from Burma, but it can be separated in that the ventral surface of PIII is concave in *H. orientalis* and convex in *H. limi* and that denticles are not confined to ventral distal portion of PIII in *H. limi*. *H. grimshawi* Cook, 1967 from India is similar but has a tuft of thin pointed denticles on PIII and more medially located glandularia between epimera III and epimera IV.


**Female** : length of body 546 μm; length of genital field 137 μm; length of genital plate 97 μm; length of infracapitulum 149 μm; length of palp segments PI 25 μm, PII 56 μm, PIII 76 μm, PIV 71 μm, PV 30 μm; length I leg 5 109 μm, I leg 6 178 μm.

**Locality** : Site 1. Female M179.

**Remarks** : this mite fits the description of *A. conjunctus* (VIETS) from Java, but it is a larger animal and until more specimens and males are found this will only be a tentative assignment.

*Hygrobatis (Hygrobatis)* putihi new species (Fig. 15)

**Female** : length of body 428 μm; dorsum without plates; glandularia free on integument somewhat thickened; epimera well sclerotized; genital plate with three acetabula, genital plate in posterior half of genital field, length of genital plate 49 μm-52 μm, length of genital field 108 μm; infracapitulum 87 μm long; rostrum very short; length of chelicera 135 μm; palp with ventral proximal peg-like seta on PIV; length PI 22 μm, PII 56 μm, PIII 36 μm, PIV 72 μm, PV 31 μm; length of I-leg-6 shorter than I-leg-5, I leg 6 only slightly bent; large blade-like setae of similar length and placed closely together at ventral distal margin; IV-leg-5 with two solenidium-like setae at distal and nearly as long as IV-leg-6 length I-leg-5 83 μm, I-leg-6 52 μm.

**Type series** : Holotype M186 female.

**Locality** : Site 3.

**Remarks** : the combination of a peg-like seta on PIV and three pairs of acetabula are diagnostic of this species. Two other species posses a peg-like seta, *A. diversus* Cook, 1967 and *A. minutus* Walter,
FIG. 13-16. 13 (A-F). _Hygrobatres limi_ new species; venter of female (A); venter of male (B); palp of female (C); palp of male (D); genital field of female (E) and male (F); (scale line = 80 μm for A, B; = 50 μm for C-F). 14 (A-C). _Atractides conjunctus_ (Viets, 1935), female, palp (A), segments 5-6 of leg I (B), and venter (C); (scale line = 20 μm for A; = 50 μm for B; = 80 μm for C). 15 (A-D). _Atractides putihi_ new species, female, venter (A), dorsum (B), palp (C), and segments 5-6 of leg I (D); (scale line = 80 μm for A, B, = 20 μm for C; = 50 μm for D). 16 (A-C). _Atractides spatiosus_ (Viets, 1935), female, palp (A), segments 5-6 of leg I (B), and venter (C); (scale line = 20 μm for A; = 50 μm for B; = 80 μm for C).
1928 both of which possess many acetabula. Several specimens of this species have been collected by the author in Sulawesi, including a male (Wiles, in prep.).

*Atractides* (*Atractides*) *spatiosus* (Viets, 1935)  
(Fig. 16)


Female: length of body 480 \( \mu m \)-652 \( \mu m \); length genital field 111 \( \mu m \); length genital plate 76 \( \mu m \)-87 \( \mu m \); length infracapitulum 98 \( \mu m \)-106 \( \mu m \); dorsal length of palp segments PI 22 \( \mu m \)-27 \( \mu m \), PII 50 \( \mu m \)-55 \( \mu m \), PIII 63 \( \mu m \)-82 \( \mu m \), PIV 74 \( \mu m \)-86 \( \mu m \), PV 28 \( \mu m \)-36 \( \mu m \); length I-leg-5 163 \( \mu m \)-196 \( \mu m \), I-leg-6 414 \( \mu m \)-170 \( \mu m \).

**Locality**: Site 1. Three females M178, M1823, M183.

**Remarks**: this species has previously been collected from Sumatra, Java and Burma.

**Family Aturidae Thor, 1900**

**Subfamily Axonopsinae Viets, 1929**

*Javalbia sunyi* new species  
(Fig. 17)

Male: body oval, length 459 \( \mu m \); dorsal shield oval with indentations at the anterior lateral edge in which lie glandularia on plates; lateral glandularia in dorsal furrow somewhat elongated; anterior portion of ventral shield separated by narrow strips of thin integument into an anterior platelet; ventral shield length 445 \( \mu m \); distance between infracapitular bay and gonopore 223 \( \mu m \), breadth 272 \( \mu m \); genital

---

**Fig. 17** (A-C) : *Javalbia sunyi* new species, male, venter (A), dorsum (B), palp (C); (scale line = 80 \( \mu m \) for A, B = ; = 20 \( \mu m \) for C).
field fused with ventral shield with no obvious suture line; three pairs of acetabula flanking genital pore, length genital pore 59 µm; a pair of glandularia located in indentations in posterior end of ventral shield; excretory pore located on small platelet posterior to gonopore; dorsal lengths of palp segments PI 20 µm, PII 36 µm, PIII 25 µm, PIV 48 µm, PV 26 µm; swimming setae absent from legs.

**Types series**: Holotype M169 male.

**Type locality**: Site 1.

**Remarks**: The present species differs from typical *Javalbia* in that there is, at the anterior ventral shield a platelet, separated by suture lines. It closely resembles *J. bella* Cook, 1974 from Spain and particularly *J. antama* Cook, 1967 from India.

Correct placement of this species requires further specimens.

**Barbaxonopsalbia** new genus

*Diagnosis*: species with pronounced sexual dimorphism of idiosoma but not of legs, with characters of the *Axonopsalbia*-like mites but lacking the glandularia associated with the fourth epimera; anterior end of ventral shield entire; dorsal plate large and flanked by three pairs of glandularia on platelets; posterior end of dorsal plate covered with many setae in the male; anal pore subterminal on dorsal plate; genital plates of males fused to the ventral shield, with conspicuous suture lines; epimeroglandularia IV and genital plate of female free behind ventral shield, each

![Fig. 18-19: Barbaxonopsalbia pilosa new genus, new species.](image-url)
genital plate with three acetabula, the medial acetabulum of males is somewhat reduced.

Type species: *Barbaxonopsalbia pilosa* n. sp.

**Barbaxonopsalbia pilosa** new species  
(Figs 18, 19)

*Male*: length of dorsal plate 382 µm, breadth 250 µm; central region of dorsal plate strongly punctate, posterior region with striate pattern which is absent terminally; length of ventral shield 400 µm; suture between epimera III and epimera IV indistinct and not terminating with a medially placed glandularium; genital plate lying in a vertical plane and fused to the ventral plate, with three pairs of genital acetabula, two large and lateral to the gonopore, one small and elongate lying alongside the gonopore; two glandularia and many setae associated with the genital plate; excretory pore subterminal on dorsal plate; infracapitulum rounded posteriorly, length 62 µm, breadth 34 µm; chelicerae bent outwards posteriorly; palps and legs showing no sexual dimorphism.

*Female*: length of dorsal plate 372 µm-386 µm, breadth 233 µm-243 µm; dorsal plate punctate bearing four pairs of glandularia, pre- and post-ocularia, the anal pore and terminally several pairs of setae; ventral shield 330 µm-341 µm; suture lines between epimera III and epimera IV terminating in a glandularium located medially between leg IV bases; each genital plate with three acetabula, nearly triangular and free on integument on either side of the gonopore; epimeroglandularia IV apparently free on the integument; infracapitulum length 90 µm; palp with no extensions to the ventral surfaces of PII and PIV, PIV longer and wider than other palp segments; length PI 28 µm, PII 37 µm, PIII 23 µm, PIV 48 µm, PV 22 µm, breadth of PIV 21 µm.

*Type series*: Holotype M184 female.  
*Locality*: Site 3.

Remarks: the subgenus cannot be assigned to this species until a male is collected.

**Bharatalbia (Japonalbia) darbyi** new species  
(Fig. 21)

*Male*: body oval, 497 µm long and 344 µm wide; colourless with tinges of red; ventral plate extension with one central and two lateral shallow V shaped clefts; eyes present 184 µm apart; dorsal plate round with depression in anterior margin (length 299 µm-306 µm, breadth 264 µm-274 µm) and bearing postocularia and one pair of glandularia; the dorsal plate with two ridges which tend to coalesce posteriorly; infracapitulum bay 156 µm.
deep; gonopore subterminal, 95 μm-97 μm long; excretory pore at posterior extremity of body; infracapitulum small; palps long and slender; length PI 28 μm, PII 83 μm-85 μm, PIII 102 μm, PIV 130 μm-134 μm, PV 26 μm-28 μm; ventral side of III-leg-5 not showing any sexual dimorphism; swimming hairs absent.

Female: very similar to males, differing in position of gonopore which is terminal and shape of dorsal plate which is slightly more rounded; body length 463 μm-483 μm, breadth 320 μm-348 μm; eye separation 160 μm; depth of infracapitular bay 152 μm-160 μm; length of dorsal plate 254 μm-281 μm, breadth 257 μm-268 μm; gonopore length 104 μm-111 μm; length PI 24 μm-28 μm, PII 87 μm-90 μm, PIII 96 μm-109 μm, PIV 128 μm-136 μm, PV 24 μm-26 μm.

Type series: Holotype M161, male; paratype 1 M160, female; paratype 2 M162, female; paratype 3 M159, male; paratype 4 M163 lateral mount, sex unknown.

Type locality: Site 1. Interstitial near tree roots.

Remarks: this species resembles Bharatalbia (Japonalbia) longipalpis Imamura, 1984, but has a rounder body and has a concave margin rather than a convex margin between the anterior ventral
plate extension of Epimera 1 above the infracapitulum. The palp is also unique, PIII being longer than PII. This species was named after Mr. Ron Darby, an amateur watermite enthusiast of the Postal Microscopical Society, who died recently.

ACKNOWLEDGEMENTS

Many people helped make the trips to Malaysia in 1984 and 1985 possible. In particular Tan Sri Haniff Omar, Mr. Tan Tiong Kai and Tan Sri Kishu, Dr. R. Lim, Dr. Sasekumar and the zoologists from the University of Malaya who gave advice, loaned equipment and provided transport. Mr. P. Gathercole and Dr. P. Ashie accompanied me on collecting trips in 1984 and 1985 respectively. Much of the work was financed by the University of Buckingham. Encouragement and advice were given by Mr. T. Gledhill of the FBA, Windermere, and the script was typed by Miss J. Cakebread.

REFERENCES


