Acarologia

A quarterly journal of acarology, since 1959
Publishing on all aspects of the Acari

All information:
http://www1.montpellier.inra.fr/CBGP/acarologia/
acarologia-contact@supagro.fr

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 2020 (Volume 60): 450 €
http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php
Previous volumes (2010-2018): 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.
ELEVEN NEW SPECIES FROM SHIKOKU ISLAND IN NIPPON (ACARI, ORIBATIDA)

by T. FUJIKAWA

(Accepted August 2007)

SUMMARY: Eleven new species of oribatid mites were collected from 21 temples at Shikoku Island, Nippon: Eobrachychthonius sanukiensis n. sp., Perlohmannia (Apolohmannia) heterosa n. sp., Epilohmannia foveolata n. sp., Epilohmannia serrata n. sp., Epilohmannia vicina n. sp., Epilohmannoides setoensis n. sp., Mixacarus hexagonus n. sp., Papillacarus conicus n. sp., Ceratoppia rarus n. sp., Gustavia aominensis n. sp., Disparagalumna rostrata n. sp.

The old pilgrimage called “Shikoku Henro,” has taken place for more than a thousand years, and brought people to the 88 temples located between 32°43′34″ & 34°21′30″ N and 132°33′49″ & 134°30′10″ E on Shikoku Island (MIYATA, 1996) (FIG. 1). Four oribatid species had been recorded from one of the temples (AOKI, 1988; ENAMI & AOKI, 1988). After that oribatid fauna was newly investigated at all the temples during the last few years from November 2001 to January 2005. Seven oribatid species were already recorded from some temples in the previous papers (FUJIKAWA, 2004a; 2004b; 2005). In the present work, specimens were collected from soil materials of the gardens, graveyards, and forests associated with 21 temples (TABLE I; FIG. 2). All types were mounted on slide. The holotype and paratypes with number are deposited in National Science Museum, Tokyo.

The notations of descriptions and figures in the work are according to BALOGH & MAHUNKA (1983) as follows: ro, le, in, ex, exa, exp: rostral, lamellar, interlamellar and exobothridial setae; ss: sensillus; ta, te, ti, ms, c1-3, cp, d1-2, e1-2, f1-2, h1-3, p1-3, r1-3: dorsal setae; ia, ih, im, ip, ian, iad: lyrifissures; cha, chb: chericeral setae; 1a-c, 2a, 3a-c; 4a-d: epimeral setae; g1-8, ag, an1-3, ad1-3: genital, aggenital, anal and analanal setae; a, m1-3, h: anterior, medial and posterior subcapitular setae; a′′, d, ft′′, p, pv′′, v′: Setae of legs; e: famulus on tarsus of leg I; o1-3, φ1-2, g1-3: solenidia on tarsi, tibiae and genua of legs.


Fig. 1. — Maps showing the position of the temples in Shikoku Island. Numbers of temples investigated in the present work correspond to that in Table 1.

Fig. 2. — The sampling site of Ryōzenji Temple (No. 1).
EoBrachycthonius sanukiensis n. sp.
[Nipponese name: Sanuki-oodarumahiwadani]  
(Figs. 3 & 4)

Material examined: Holotype (NSMT-Ac 11962) from soil materials of Yashimaji Temple (No. 84), 23 Feb., 2003, T. Fujikawa & Y. Nakamura; one paratype (NSMT-Ac 11963) from soil material of Kanwonji Temple (No. 69), 8 Feb., 2004, T. Fujikawa & Y. Nakamura.

Etymology. After the locality.


Dorsal side. Rostrum rounded without tooth. Weak line observable around insertions of setae le, ex, ss and in. Prodorsum with observable oval spots; five behind rostral setae, seven pairs at the lateral sides, and one pair between interlamellar setae. Setae ro, le, in and ex ensiform, almost equal in length, except for setae ro. Setae ex bacilliform; other setae setiform (Figs. 3A & B). Prodorsal and dorsal setae except for sensilli almost equal in form and length, shorter than distance between their mutual distance of setae in. Distances (le-in) > (in-ro) > (es-in) > (le-le) > (ro-le) > (ro-ro). Sensilli broad bearing thick spines closely. Notogaster with two transverse sutures, rounded posterior margin, sixteen pairs of ensiform dorsal setae, and light spots. Two pairs of spots posterior to e2, one pair between d1 and d3, one pair between e1 and e2, four pairs touching each other behind f1, and two pairs anterior to h1. Supraneural plates Sp-la, sp-lp, Sp-II, Sp-III and Pl-I present; Sp-la with c3 (Fig. 4A). Distances (d1-d2) > (e1-e2) > (e3-e1) > (h2-h3) > (h3-h2) > (f1-f2) > (ps-1) > (ps-2) > (h1-h2).

Ventral side. Epimera fused medially (Fig. 2B). Epimeral setae 3-1-3-4; setae smooth, thin. Genito-anal setae 7-1-2-3. One pair of peranal setae (pa) present (Fig. 2C). Setae g, ag, an and pa thin, smooth. Adanal setae thick, smooth, various in length and the thickness; ad1 the largest and ad2 the smallest.

Lyrifissures iad and ia aligned almost longitudinally. Gnathosoma anarthri. Subcapitular setae 1-1-1; setae thin, smooth. Pedipalpal setae 0-2-1-3-9(1).

<table>
<thead>
<tr>
<th>Number of temple</th>
<th>Name of temple</th>
<th>Locality</th>
<th>Latitude (N.L.)</th>
<th>Longitude (E.L.)</th>
<th>Altitude (m)</th>
<th>Sampling date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ryōzenji</td>
<td>Naruto City, Tokushima Pref.</td>
<td>34°09'36</td>
<td>134°30'10</td>
<td>20</td>
<td>30-nov-01</td>
</tr>
<tr>
<td>3</td>
<td>Konsenji</td>
<td>34°08'50</td>
<td>134°28'05</td>
<td>7</td>
<td>30-nov-01</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dainichiji</td>
<td>34°09'04</td>
<td>134°25'50</td>
<td>35</td>
<td>30-nov-01</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Anrakuji</td>
<td>34°07'07</td>
<td>134°23'18</td>
<td>9</td>
<td>01-déc-01</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Kongō-fukuji</td>
<td>Tosa-shimizu City, Kōchi Pref.</td>
<td>32°43'34</td>
<td>133°31'06</td>
<td>60</td>
<td>03-janv-04</td>
</tr>
<tr>
<td>40</td>
<td>Kanjizaiji</td>
<td>Ainan-chō, Ehime Pref.</td>
<td>32°57'58</td>
<td>133°35'49</td>
<td>20</td>
<td>17-déc-03</td>
</tr>
<tr>
<td>47</td>
<td>Yassakai</td>
<td>Matsuyama City, Ehime Pref.</td>
<td>33°45'27</td>
<td>132°48'47</td>
<td>60</td>
<td>12-janv-03</td>
</tr>
<tr>
<td>48</td>
<td>Sairinji</td>
<td>33°47'37</td>
<td>132°48'50</td>
<td>40</td>
<td>12-janv-03</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>Ishiteji</td>
<td>33°50'54</td>
<td>132°47'51</td>
<td>20</td>
<td>12-janv-03</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Taisanji</td>
<td>33°53'06</td>
<td>132°42'53</td>
<td>60</td>
<td>12-janv-03</td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>Eifukuji</td>
<td>Imabari City, Ehime Pref.</td>
<td>34°01'45</td>
<td>132°58'42</td>
<td>50</td>
<td>05-janv-02</td>
</tr>
<tr>
<td>59</td>
<td>Kokubunji</td>
<td>34°01'34</td>
<td>133°01'20</td>
<td>10</td>
<td>05-janv-02</td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>Maegami-jii</td>
<td>Saijō City, Ehime Pref.</td>
<td>33°53'25</td>
<td>133°09'37</td>
<td>20</td>
<td>31-oct-03</td>
</tr>
<tr>
<td>65</td>
<td>Sankakuji</td>
<td>Shikokuchū City, Ehime Pref.</td>
<td>33°58'02</td>
<td>133°35'11</td>
<td>320</td>
<td>08-févr-04</td>
</tr>
<tr>
<td>67</td>
<td>Dakiōji</td>
<td>Mitoyo chō, Kagawa Pref.</td>
<td>34°06'09</td>
<td>133°43'08</td>
<td>60</td>
<td>08-févr-04</td>
</tr>
<tr>
<td>71</td>
<td>Iyadanji</td>
<td>34°13'48</td>
<td>133°43'27</td>
<td>210</td>
<td>08-févr-04</td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>Kanwonji</td>
<td>Kanwonji City, Kagawa Pref.</td>
<td>34°08'03</td>
<td>133°38'50</td>
<td>45</td>
<td>08-févr-04</td>
</tr>
<tr>
<td>72</td>
<td>Mandaraji</td>
<td>Zentsūji City, Kagawa Pref.</td>
<td>34°13'79</td>
<td>133°45'02</td>
<td>15</td>
<td>07-févr-04</td>
</tr>
<tr>
<td>80</td>
<td>Kokubunji</td>
<td>Kokubunji chō, Kagawa Pref.</td>
<td>34°18'11</td>
<td>133°56'39</td>
<td>30</td>
<td>22-févr-03</td>
</tr>
<tr>
<td>82</td>
<td>Negoroji</td>
<td>Takamatsu City, Kagawa Pref.</td>
<td>34°20'39</td>
<td>133°57'38</td>
<td>360</td>
<td>22-févr-03</td>
</tr>
<tr>
<td>84</td>
<td>Yashimaji</td>
<td>34°21'30</td>
<td>134°06'04</td>
<td>280</td>
<td>23-févr-03</td>
<td></td>
</tr>
</tbody>
</table>
Fig. 3. — *Eobrachythionius sanukiensis* n. sp., adult ♀; A. — dorsal view; B, rostral region; C. — solenidial region on right leg I.
Legs. All legs monodactyl. Leg chaetotaxy including famulus: I(1-3-3-4-17); II(1-4-2-3-14); III(2-3-2-3-14); IV(1-2-2-3-12). Femora I and II bearing carina. Solenidiotaxy: I(1-2-2); II(1-1-1); III(1-1-0); IV(1-0-0). On tarsus I, famulus setiform, situated at the lateral side of solenidia, about 0.8 times longer than solenidion ω₁ (Fig. 3C).

Remarks. Eobrachychthonius oudemansi Van der Hammen, 1952 has been recorded from Nippon (Fujikawa et al., 1993). The new species is similar to E. setus Sergienko, 1992. However, it differs from all congeners by having 1) light spots behind setae ro, and in front of setae h₁, 2) thick, smooth prodorsal and notogastral setae, and 3) elongate aggenital plates.
FIG. 5. — Perlohmia (Apoloohnanni) heterosa n. sp., adult ♂; A. — famulus region on left tarsus I; B. — prodorsum; C. — projections (arrows) on tarsus II; D. — solenidial region on left tibia I; E. — ventral view of left tarsus I; F. — projection (arrow) on left tarsus III; G. — solenidial region of left genu I.
Fig. 6. — *Perlohmnia (Apolohmannia) heterosa* n. sp., adult ♂; A. — dorsal view; B. — granules on body surface.
Fig. 7.—*Perlohmannia (Apolohmannia) heterosa* n. sp., adult $d$; A. — gnathosoma; B. — epimeral region; C. — genito-anal region; D. tarsus of right pedipalp; E. right medial subcapitular setae.
**PERLOHMANNIA (Apolohmannia) heterosa** n. sp.

[Nipponese name: Naruto-tonosamadani]

(Figs. 5-8)

**Material examined:** Holotype (NSMT-Ac 11965) from soil materials of Konsenji Temple (No. 3), 30 Nov., 2001, T. FUJIKAWA & Y. NAKAMURA.

**Etymology:** After the various lengths of the genital setae.

**Measurements and body aspect** (1 male): length, 1,443; width, 664. Dark reddish brown. Whole body surface finely granular. On rostral region granules forming longitudinal stripes.

**Dorsal side.** Rostrum triangular in shape (Fig. 5B). Prodorsal setae, ro, le, in and exa sparsely, minutely barbed; setae exp smooth (Fig. 8). Sensilli unilaterally bearing 9 or 10 long peristomations. Right rostral seta inserted slightly posterior to left one. Setae in > ss > le > ro > exa > exp. Distances (exp-exp) > (exa-exa) > (ss-ss) > (in-in) > (ro-ro) > (le-le) > (ro-ro). Setae ro, le and in, longer than their own mutual distance. Notogaster oval in shape bearing fifteen pairs of dorsal setae and one pair of vestigial setae f1. Notogastral setae except for ps3, long, setiform sparsely, minutely barbed, extending to insertions of the next setae (Fig. 6). Setae c2 the longest and f3 the shortest. Setae ps3 short, smooth (Fig. 7). Lyrifissures ia large, aligned somewhat horizontally, reaching the insertion of seta c1. Lyrifissures im horizontally aligned anterolaterally to setae cp; ip aligned obliquely in front of setae h1. Lateroabdominal gland opening behind setae f2.

Distances (c1,c1) > (d2-d2) > (c1-c1) > (h1,h1) > (c1-d1) > (d1-c1) > (d1-d2).

**Ventral side.** Genital plate somewhat pentagonal in form, with a transversal suture; suture notched. Genital setae variable in number and length; Setae g1, g2, g3, g4 and g5 long; g6 and g7 short; longer setae about three times as large as shorter ones. Anal and adanal setae not extending to insertions of the next setae. Lyrifissures iad and ips aligned obliquely (Fig. 7C). Gnathosoma stenarthric, bearing one pair of anterior, three pairs of medial, and one pair of posterior subcapitular setae; setae a and m smooth; setae h roughened (Figs. 7A, E & 8). Pedipalpal setae 0-2-1-2-10[1] (Fig. 7D). Epimeral setae 3-1-3-4; setae smooth.

**Legs.** All legs heterotridactyous; claws serrate. Leg chaetotaxy including famulus: I(1-7-5-6-74); II(1-8-5-6-24); III(2-4-5-5-19); IV(2-4-4-4-18). Setae on femur III variable in number. Tarsus II bearing two small projections like conic (Fig. 5C). Tarsus III with one small projection like finger (Fig. 5F). Solenidiotaxy: I(2-4-3); II(1-1-3); III(1-1-0); IV(1-1-0). Famulus on tarsus I short bacilliform (Fig. 5A).

**Remarks.** In the same 1960, two tridactyl members of the family Perlohmanniidae were referred to different new genera, Apolohmannia by Aoki on March and Neolohmannia by Bulanova-Zachvatkina on December. BALOGH & BALOGH (1992) treated these genera as junior synonyms of *Perlohmannia Berlese*, 1916 by having genital plates with transverse suture. SUBIAS (2004) regarded Apolohmannia and Neolohmannia as a subgenus and a synonym of *Perlohmannia*, respectively. However, Neolohmannia should be treated as *Perlohmannia* (Apolohmannia). The new species differs from *P. (A.) gigantean* Aoki, 1960 and *P. (A.) zachvatkini* (Bul.-Zakhv., 1960) in length of lamellar, dorsal, epimeral and genital setae, their mutual distance of setae c, number of medial subcapitular setae, and presence of dorsal projections on tarsi II and III.

**EPLOHMANNIA FOVEOLATA** n. sp.

[Nipponese name: Arame-haramizodani]

(Figs. 9)

**Material examined:** Holotype (NSMT-Ac 11966) from soil materials of Konsenji Temple (No. 3), 30 Nov., 2001, T. FUJIKAWA & Y. NAKAMURA; 1 paratype from soil material of Maegamiji Temple (No. 64), 31 Oct., 2003, T. FUJIKAWA & Y. NAKAMURA

**Etymology:** After the body surface.

**Measurements and body aspect** (2 females): length, 371(400)429; width, 150(179)207. Light reddish yellow. Whole surface sparsely foveolate.
FIG. 8. — Perlohmanniæ (Apolohmanniæ) heterostr n. sp. adult ♂; setæ.
FIG. 9. — Epilohmannia foveolata n. sp., adult ♀; A. — dorsal view; B. — ventral view showing pointed apex by arrow; C. — right pedipalp; D. — right tarsus I; E, right tibia I; F. — right genu I; setae.
FIG. 10. — *Epilohmannia serrata* n. sp., adult ♂; A. — dorsal view; B. — ventral view.
Dorsal side. Rostrum rounded bearing setae ro short sparsely barbed unilaterally. Foveolae on surface between rostral and lamellar setae forming longitudinal stripes (Fig. 9A). Prodorsum protuberant posteriorly. Setae le, in and ex sparsely barbed. Setae ro, le and in shorter than their own mutual distance. Sensilli fusiform, spine throughout the length. Setae ss>le ≠ in>ex>ro. Distances (in-in)>(left ro-left le)>(left le-left in)>(ro-ro). Fourteen pairs of dorsal setae sparsely barbed, shorter than their own mutual distance of setae e, the shortest in their own mutual distances of all dorsal setae. Distances (d₁-d₂) = (f₁-f₂) > (h₁-h₂) > (d₁-d₂) > (ps₁-ps₂) > (e₁-c₁) > (e₁-c₂) > (e₁-e₂).

Ventral side. Transverse suture present on ventral plate. Genital aperture large almost pentagonal in form, wider than anal aperture. Genital plates with a transverse suture near the posterior margin. Genito-anal setae 7[8]-3-3[4]-3; genital and anal setae variable in number; setae sparsely barbed; genital setae arranged in two rows. Lyrifissures iad situated inversely anterolaterally to anterior margin of anal aperture. Subcapitular setae 1-1-1; setae minutely sparsely barbed. Epimerata divided medially. Epimeral setae 3-1-3-3; setae minutely, sparsely barbed. Solenidion on pedipalpal tarsus short, bristle-like at tip.

Legs. All legs monodactyl. Leg chaetotaxy including famulus: I(1-3-4-5-15); II(1-5-4-4-12); III(2-4-2-3-10); IV(2-3-2-4-10); femur I bearing only 3 setae. Each of the trochantera III and IV with two narrow pointed apex (Fig. 9B). Solenidiotaxy: I(1-1-3); II(1-1-2); III(1-1-0); IV(1-1-0); e₁I lack (Fig. 9F). Seta ft”I smooth, minute, coupled to ω₁I (Fig. 9D). Famulus reduced to a small conical projection. Solenidia ω₁I and αI setiform contiguous to seta d (Figs. 9D-F).

Remarks. The new species is similar in appearance to those of Epilohmannia maurii Fernandez, 1978 and E. neotricha Wallwork, 1962. The new species differs, however, from them in having smaller body size, direction of lyrifissures iad or their larger mutual distances of each of the setae in, d₁ and d₂.

Epilohmannia serrata n. sp.
[Nipponese name: Misaki-haramizodani] (Figs. 10 & 11)

Material examined: Holotype (NSMT-Ac 11967) from soil materials of Kongō-Fukuji Temple (No. 38), 3 Jan., 2004, Yoshinori Nakamura.

Etymology. After the form of rostral margin.

Measurements and body aspect (1 male): length, 500; width, 271. Reddish yellow. Whole surface finely punctulate.

Dorsal side. Rostrum medially protruding with serrate margin (Fig. 10A). Punctures on rostral surface forming stripes. Rostral setae inserted in front and in the rear, not reaching to rostral margin. Setae ro, le and in minutely, sparsely barbed. Setae exa and exp smooth. Bothridia opening laterally. Sensilli with spinose mid-potion very slightly expanded, and smooth, short stem. Distances (in-in)>(le-le)>(posterior ro-left le)>(ro-ro). Setae in>ss>le>exp>exa ≠ ro. Setae ro longer than their own mutual distance; setae le and in shorter than their own mutual distance. Notogaster barrel shaped. Fourteen pairs of dorsal setae bearing minutely, sparsely shortened bars. Setae f₁ vestigial. Distances (f₁-f₂) > (d₁-d₂) > (h₁-h₂) > (e₁-c₁) > (d₁-d₂) > (e₁-e₂) = (ps₁-ps₂).

Lyrifissures ia situated obliquely.

Ventral side. Ventral plate with transverse suture; genital plates without transverse suture. Genital aperture elongate, smaller than anal aperture. Genital setae arranged in a paraxial row of 5 and an antiracial row of 3 setae. Genito-anal setae 8-3-3-3; setae g and ag smooth; setae an and ad minutely, sparsely barbed. Lyrifissures ian aligned longitudinally and iad inverse apodal at the level of anterior margin of anal aperture. Setae ad₁ inserted slightly posterolaterally to iad. Gnatostoma diarthric with subcapitular setae (1-1-1); setae a smooth; setae m and h roughened. Epimerata fused medially. Epimeral setae 3-1-3-3; setae smooth. Solenidion on pedipalpal tarsus bacilliform, long and elongated near the tip (Fig. 11D).

Legs. All legs monodactyl; claw minutely barbed. Leg chaetotaxy including famulus: I(1-6-5-6-19); II(1-6-5-6-13); III(2-3-3-4-11); IV(2-2-4-4-10).
FIG. 11. *Epilohmannia serrata* n. sp., adult ♂; A.—right tarsus I; B.—right tibia I; C.—right tibia IV; D.—left pedipalp; E.—right genu I; F.—right tibia III and genu III; G.—left genu IV; setae.
Fig. 12. *Epilohmannia vicina* n. sp.; A. — dorsal view of female; B. — variation of rostral region of male; C. — variation of rostral region of female.
FIG. 13. *Epilohmannia vicina* n. sp., adult ♀; A. — ventral view; B. — female organ; C. — oral setae; D. — left pedipalp.
Solenidiotaxy: I(2-1-3); II(1-1-2); III(1-1-0); IV(1-1-0). Famulus reduced to a small conical projection. Solenidia $\omega_1, I, \omega_2$ and $e_r I$ bacilliform; other solenidia setiform. Seta $d$ on tibiae and genua minute, coupled to solenidion. Setae $a''III, a''IV, pr''III, pr''IV, v''III$ and $v''IV$ lanceolate and densely ciliated (Figs. 11C & F).

**Remarks.** The new species has small, elongate genital aperture which is similar to that described for *Epiloehmannia spatulata* Aoki, 1970 and *E. spatuloides* Bayartogtokh, 2000. However, the present species differs from congeners in having serrate rostral margin, bacilliform solenidia on legs, long solenidia on pedipalpal tarsus and densely ciliated hairs on legs.

**Epiloehmannia vicina** n. sp.
[Nipponese name: Giji-ooharamizodani]  
(Figs. 12-14)

**Material examined:** Holotype (NSMT-Ac 11968) from soil materials of Ryōzenji Temple (No. 1), 30 Nov., 2001, T. Fujikawa & Y. Nakamura; 5 paratypes (NSMT-Ac 11969) from soil materials of Kokubunji Temple (No. 80), 22 Feb., 2003; 1 paratype from soil materials of Kanjizaiji Temple (No. 40), 17 Dec., 2003; 2 paratypes from soil materials of Ishiteji Temple (No. 51), 12 Jan., 2003; 5 paratypes from soil materials of Taisanji Temple (No. 52), 12 Jan., 2003; 1 paratype from soil materials of Eifukuji Temple (No. 57), 5 Jan., 2002; 1 paratype from Kokubungi Temple (No. 59), 5 Jan., 2002, T. Fujikawa & Y. Nakamura.

**Etymology.** After *E. ovata* Aoki, 1961 having aggenital region similar to that of the new species.

**Measurements and body aspect.** 14 females: length, 536(608)793; width, 257(301)429. 4 males: length, 429(554)643; width, 207(262)293. Reddish brown. Whole body surface granulate sparsely.

Dorsal side. Rostrum pointed antero-centrally forming triangular in shape (Figs. 12). Rostral margin normally smooth, but abnormally undulate. Setae ro bearing a few barbs distally inserted far behind; their tips not reaching the anterior margin; setal arrangement variable including lack (Figs. 12B & C). Setae le, in, exa and exp barbed. Sensilli barbed slightly expanded distally and medially. Each of the setae le and in shorter than their own mutual distance. Distances (in-in)>(le-le)>(posterior ro-left le) ≧ (antero-central rostral margin posterior ro). Proximal setae ss ≧ in>le>exa>ro ≧ exp. Fourteen pairs of dorsal setae sparsely barbed, not longer than their own mutual distance. Distances $(f_1 f_2)>(d_2 d_3)>(p_s p_s)>(d_r d_r)>(c_r c_r)>(h_1 h_1)>(e_r e_r)$.

**Ventral side.** Ventral plate with transverse suture and strong neotrichy of aggenital setae (Fig. 13A). Genito-anal setae, 8-16-3-3; setae sparsely barbed, reaching the insertion of adjacent setae, except for antp. Lyrifissures ian aligned direct apopodal and iad inverse apopodal. Subcapitular setae 1-1-1; setae a smooth; setae m and h almost unilaterally with sparse barbs (Fig. 14). Setae or1-3 setiform sparsely barbed at the distal half. Apodemata and sternal ridge indistinct. Epimeral setae 3-1-3-3; setae sparsely barbed. On pedipalp, tarsus bearing 8 setae and bacillum solenidion, not extending in front of unguinal setae, and tibia bearing 4 setae (Fig. 13D).

**Legs.** All legs monodactyl; claw dentate. Leg chaetotaxy including famulus: I(1-6-5-6-20); II(1-6-5-6-15); III(2-3-4-4-14); IV(2-3-4-4-12). Each of the tarsi I and II bearing a trigonal projection behind seta p. Famulus reduced to a small conical projection. Solenidiotaxy: I(2-1-3); II(1-1-2); III(1-1-0); IV(1-1-0). Seta $f_1$ coupled to $\omega_2$. Famulus inserted between solenidia $\omega_2$ and $\omega_3$. Seta $d$ coupled to solenidion on tibia and genu. Solenidia $\omega_1 I$, $\omega_1 S$ and $\omega_2$ bacilliform; other solenidia setiform.

**Remarks.** Notogaster and ventral plate of the new species very similar in appearance to those of *Epiloehmannia ovata* Aoki, 1961. The former is distinguished, however, from the latter by rostral form, length of setae in and ventral setae, and barbation of anal and adanal setae.

**Epiloehmannioides setoensis** n. sp.  
[Nipponese name: Seto-haramizodani]  
(Figs. 15 &16)

**Material examined:** Holotype (NSMT-Ac 11970) from soil materials of Sankakuji Temple (No.65),
FIG. 14. — *Epilohmannia vicina* n. sp., adult ♀; solenidial region of right leg I, showing projection by arrow.
Fig. 15. — Epilohmannoides setoensis n. sp., adult ♂; A. — dorsal view; B. — ventral view.
Fig. 16. — Epilohmannoides setoensis n. sp., adult ♀; A. — rostral margin; B. — tarsus of right pedipalp; C. — left tarsus I.
8 Feb., 2004, T. FUJIKAWA & Y. NAKAMURA; 1 paratype from soil material of Iyadaniji Temple (No. 71), 8, Feb., 2004, T. FUJIKAWA & Y. NAKAMURA.

**Etymology.** After the name of the sea in front of the temples.

**Measurements and body aspect (2 females):** length, 614(618)621; width, 300(304)307. Light reddish yellow. Body surface finely punctulate.

**Dorsal side.** Rostrum medially protruding, rather angular in form. Punctuation on rostral region forming longitudinally stripes (Fig. 15A). Rostral margin finely undulate with a small round concave (Fig. 16A). Prodorsal and dorsal setae sparsely barbed; exp bifid. Setae ro longer than their mutual distance, but not reaching the anterior margin. Right rostral seta inserted posterolaterally to left seta. Setae le shorter and in longer than their own mutual distance. Sensilli spinose, long, slightly expanded distally. Setae in > ss > le > ro > exp > exa. Distances (in-in) > (right ro-right le) = (le-le) = 6×(ro-ro). Notogaster with straight anterior margin and semicircular posterior margin. Fourteen pairs of dorsal setae thick, densely barbed, short. Lyrifissures ia and im aligned transversely; ia anterolaterally, and im posterolaterally to c,2. Distances (d2-d2)> (c1-c1) = (f1-f1) > (ps1-ps1)> (h1-h1)> (d1-d1)> (e1-e1).

**Ventral side.** Ventral plates without transverse suture. Epimerata fused medially. Genito-anal setae 8-3-2-3; setae sparsely barbed. Lyrifissures iad inversely apodan. Subcapitular setae 1-1-1; setae roughened. Epimeral setae 3-1-3-3; setae sparsely barbed; Ib the longest and Jc the shortest. Solenidion on pedipalpal tarsus long, curved distally.

**Legs.** All legs monodactyl; claws dentate. Leg chaetotaxy including famulus: I(1-5-5-6-19); II(1-5-5-6-12); III(2-3-4-5-11); IV(2-3-3-4-11). Solenidiotaxy: I(2-1-3); II(1-1-2); III(1-1-0); IV(1-1-0). Unguinal setae expanded only on tarsus I. Seta ft” coupled to ω2 I. Solenidia ω2 I setiform; ω3 I and ω3 I bacilliform. Famulus reduced to a small conical projection.

**Remarks.** The new species differs from congeners by form of rostral margin and sensilli, and distance between setae h,.

---

**MIXACARUS HEXAGONUS** n. sp.

[Nipponese name: Urashima-futotsutsuharadani]

(FIGS. 17 & 18)

**Material examined:** Holotype (NSMT-Ac 11971) from soil materials of Sairinji Temple (No. 48), 12 Jan., 2003, T. FUJIKAWA & Y. NAKAMURA; 2 paratypes (NSMT-Ac 11972) from Kongōfukuji Temple (No. 38), 3 Jan. 2004; 10 paratypes from Dainichiji Temple (No. 4), 30 Nov., 2001; Anrakuji Temple (No. 6), 1 Dec., 2001; Yasakaji Temple (No. 47), 12 Jan, 2003; Daikōji Temple (No. 67), 8 Feb., 2004; Mandaraji Temple (No. 72), 7 Feb., 2004, T. FUJIKAWA & Y. NAKAMURA.

**Etymology.** After the form of the ornament of integument.

**Measurements and body aspect (13 females):** length, 671(679)686; width, 321(333)350. Light yellow. Whole body surface bearing hexagonal ornament.

**Dorsal side.** Rostrum normally rounded, abnormally undulate (Fig. 18A). Prodorsum with three kinds of ridge; a pair of short ridges directed backwards from the lateral side of lamellar setae. A complete arched ridge running through the insertions of setae ro, le and exa; a long transverse ridge behind insertions of setae in. Prodorsal setae flattened; setae ro, exa and exb bearing a few serrations or barbs unilaterally; setae le and in with serrations like small scale. Sensillus with 8 to 12 long, bacilliform branches, the length of which gradually decreases distally oppositely several short spins (Fig. 18). Setae ro, le, in and exp slightly expanded at the midportion. Setae le> in> ro> ss> exp > exa. A total of 10 notogastral transverse ridges present; S1, S2, S6, S8 and S9 complete; S6, S8 and S9 medially arched; S3, S4, S5 and S10 interrupted medially; a short transverse ridge present between S4 and S5 (Fig. 17A). Ventrally four pairs of ridges present; two pairs long and other two pairs small. Sixteen pairs of dorsal setae sparsely serrated, and various in length or number. Abnormally right c,1 lack; c,2 the shortest; ps,2 the longest; setae c,2> c,3> c,1, Distances (f1-f1)> (d1-d1)> (h1-h1)> (c1-c1)> (e1-e1)> (ps1-ps1).
FIG. 17. — Mixacarus hexagonus n. sp., adult ♀; A. — dorsal view; B. — ventral view; C. — left leg I.
Fig. 18. — *Misacarus hexagonus* n. sp., adult ♂; A. — variation of rostral margin; B. — dorsal surface of rostral region; C. — right tarsus II; D. — right genu I; E. — tarsus of left pedipalp.
Fig. 19. — *Papillacarus conicus* n. sp., adult 9; A. — dorsal view; B. — ventral view.
Ventral side. Genital plates without a transverse suture. Preanal plate wide; adanal plates separated. Genito-anal setae 10-0-2-4. Setae g smooth; g₁ and g₇ short; others long. Setae an and ad with a few serrations. Subcapitular setae 1-2-1. Setae a smooth; 2 pairs of medial setae m; sparsely barbed; setae h with a few barbs. Epimerata with indistinct apodemata and sternal ridge. Epimeral setae 3-1-3-4.

Legs. All legs monodactyl; claw bearing a dent posto-ventrally and serrate dorsally. Leg chaetotaxy including famulus: I(1-6-3-4-14); II(1-6-3-4-12); III(2-3-2-3-11); IV(2-3-2-3-11). Solenidiotaxy: I(2-1-2); II(1-1-1); III(1-1-0); IV(1-0-0). Famulus reduced to a short blunt structure inserted between solenidia o₁ and o₂. Solenidia o₁ bacilliform and other solenidia filiform (Fig. 17C).

REMARKS. The new species is similar to *Mixacarus exilis* Aoki, 1970, however, the former differs from the latter in having large body size, lateral ridges at the side of setae le, notogastral ridges between S₄ and S₅, and at the side of genito-anal plates.

Papillacarus conicus n. sp.
[Nipponese name: Tsurumaki-kebukatsutsuharadani]
(Figs. 19 & 20)

Material examined: Holotype (NSMT-Ac 11973) from soil materials of Anrakuji Temple (No. 6), 1 Dec., 2001, T. FUJIKAWA & Y. NAKAMURA; 1 paratype with the same data as holotype.

Etymology. After the form of ornaments on integument.

Measurements and body aspect (2 females): length, 579-593; width, 271-279. Light yellow. Whole surface bearing spiculae together with fine granules forming reticulation (Fig. 20B).

Dorsal side. Rostrum truncate with undulate margin (Fig. 20A). Transverse ridges present at the level of insertions of setae ro and in. Longitudinal ridges connecting the rostral ridge, insertions of setae le and exa, and bothridia (Fig. 19A). Setae ro spiculate. Prodorsal setae le, in, exa and exp, slightly expanded at the mid-portion barbed bilaterally. Sensillus with 16 long setiform pectinations and 6 short barbs opposite to long pectinations. Setae ss>exp>in  ³  exa>le>ro. Notogastral margin truncate anteriorly; parallel laterally rounded posteriorly. Notogaster posteriorly with strong neotrichy of dorsal setae; 26 pairs of dorsal setae present. Dorsal setae various in form and length; setae barbed bilaterally or unilaterally. Notogastral ridges S₁ and S₂ long; S₃, S₄ and S₆ interrupted medially. Distances (d₁,d₁)> (f₁,f₁)> (c₁-c₁) ³  (e₁-e₁).

Ventral side. Genital plates with a transverse suture; 5 setae on each part; genital setae sparsely barbed, various in length. Aggenital setae absent. Preanal plate narrow with a bilobed prolongation. Anal and adanal plates separated bearing 2 pairs of anal and 4 pairs of adanal setae; setae barbed bilaterally. Epimerata I and II with indistinct sternal ridge; epimerata III and IV with partly distinct ridge (Fig. 19B). Epimeral neotrichy evident; setal formulae (4-3-4-9); setae 1a, 2a and 3a short, smooth; setae 1b barbed unilaterally; other setae barbed bilaterally. Subcapitular setae 1-3-1; setae a smooth; 3 pairs of medial setae and posterior setae barbed.

Legs. All legs monodactyl. Leg chaetotaxy including famulus: I(1-7-3-5-15); II(1-6-3-5-14); III(2-4-2-3-13); IV(2-3-2-3-11); setal number on femur I impossible to be studied. Solenidiotaxy: I(2-1-2); II(1-1-1); III(1-1-0); IV(1-0-0). Famulus reduced to a short blunt structure, situated antero-laterally to solenidion. On tibia I, seta d coupled to solenidion.

REMARKS. The new species is similar to *Papillacarus undirostratus* Aoki, 1965 and *P. aequalis* MAHUNKA, 1991. The new species is, however, different from other congeners in presence of notogastral ridge S₁, length and density of pectinations of sensillus and epimeral formula.

Ceratoppia rarus n. sp.
[Nipponese name: Taira-rikishidani]
(Fig. 21)

Material examined: Holotype (NSMT-Ac 11975) from soil materials of Kanwonji Temple (No. 69), 8 Feb., 2004, T. FUJIKAWA & Y. NAKAMURA; 1 paratype with the same data as holotype.
Fig. 20. — *Papillocarus conicus* n. sp., adult ♀: A. — rostral region; B. — surface of seta *d₁* region; C. — posterial margin of notogaster, D. — solenidial region on leg I.
Fig. 21. — *Ceratoppia rarus* n. sp., adult ♀; A. — dorsal view; B. — ventral view; C. — solenidial region of right tarsus I.
Fig. 22. — Gustavia oominensis n. sp., adult ♂; A. — ventral view; B. — dorsal view.
Etymology. After the rostral margin.

Measurements and body aspect (2 females): length, 786; width, 557. Light yellow. Surface smooth.

Dorsal side. Rostrum with only dent at each lateral margin. Rostrum protruding like snout. Lamellae and cuspidis, narrow converging; cuspis bearing a remarkable dent at the outer side; cuspis extending at the level of insertions of rostral setae (Fig. 21A). Setae ro, le and in ciliate. Setae in extending for a short distance in front of rostral tip. Sensilli thin, setiform, ciliate. Hysterosoma almost as broad as long, bearing 2 pairs of dorsal setae alveoli. Lyrifissures ia large aligned obliquely. Setae in>ss>le>ro. Distances (in-in)>(le-le) ~2x(ro-ro).

Ventral side. Apodemata sejugal straight sclerotized, not connected with the anterior margin of genital aperture. Genito-anal setae 6-1-2-3; setae g and ad thin, roughened; setae an and ad thick barbed. Lyrifissures iad transversely situated in front of anal aperture. Setae ad1>ad2>ad3>an. Epimeral setae ciliate. Sensilli lanceolate, bearing barbs distally. Setae ss =in>le>ro. Distances (le-in)≥(in-ss)>(le-le) ≥2x(ro-ro). Notogaster bearing 7 pairs of alveoli and 3 pairs of postero-marginal setae (Figs. 22A & B). Lyrifissures ia aligned obliquely, im obliquely, ih and ip longitudinally.

Legs. All legs heterotridactylous. Leg chaetotaxy including famulus: I(1-5-3-4-19); II(1-5-3-4-14); III(2-3-2-3-12); IV(1-2-3-3-10). Solenidiotaxy: I(1-2-2); II(1-1-2); III(1-1-0); IV(0-1-0). Femora III, IV, and trochanter II bearing carina. Femur II bearing carina. Famulus w2 located posterolaterally to w2; famulus between solenidia.

Remarks. The new species differs from congeners by having protruding rostrum forming U-shaped; insertion with a dent at the inner side (Fig. 23A). Rostral setae sparsely barbed. Lamellar setae spinose, originating on free raised cuspis; cuspis without dent. Translamella absent. Setae in sparsely barbed. Sensilli lanceolate, bearing barbs distally. Setae ss = in>le>ro. Distances (le-in)≥(in-ss)>(le-le) ≥2x(ro-ro). Notogaster bearing 7 pairs of alveoli and 3 pairs of postero-marginal setae (Figs. 22A & B). Lyrifissures ia aligned obliquely, im obliquely, ih and ip longitudinally.

Legs. All legs homotridactylous. Leg chaetotaxy including famulus: I(1-5-3-4-19); II(1-5-3-4-14); III(2-3-2-3-12); IV(1-2-3-3-10). Solenidiotaxy: I(1-2-2); II(1-1-2); III(1-1-0); IV(0-1-0). Femora III, IV, and trochanter II bearing carina. Famulus w2 located posterolaterally to w2; famulus between solenidia.

Remarks. Prodorsum of the new species is similar in appearance to those Gustavia aethiopica Mahunka, 1982 and G. oceanica Pérez-Iñigo, 1987. However, the new species differs from congeners by having lanceolate sensilli, protruding rostrum forming U-shaped, and lamellae without translamella.

Gustavia aominensis n. sp.

[Nipponese name: Aomine-itonokodani]

(Figs. 22 & 23)

Material examined: Holotype (NSMT-Ac 11976) from soil materials of Negoroji Temple (No. 82), 22 Feb., 2003, T. FUJIKAWA & Y. NAOKAURA.
Fig. 23. — *Gustavia aominensis* n. sp., adult ♂; A. — rostral region; B. — solenidial region on right tarsus I; C. — left genu III; D. — carina on right femur III.
Fig. 24. — Disparagulumma rostrata n. sp., adult ♂; dorsal view.
Fig. 25. — Disparagalamna rostrata n. sp., adult ♂; ventral view.
Disparagalumna rostrata n. sp.  
[Nipponese name: Yamato-furisodedani]  
(Figs. 24-26)

Material examined: Holotype (NSMT-Ac 11977) from soil materials of Maegamiji Temple (NO. 64), 31 Oct., 2003, T. FUKIWA & Y. NAKAMURA.

Etymology. After the alias for Nippon.


Dorsal side. Rostrum protruding, antero-centrally forming triangular in shape, medially with a large circular light area (FIG. 24), from which a long protuberance like sack is hanging at the ventral side; the protuberance include large granules (FIG. 26A). Prodorsum without lamellar line, but with sublamellar line. Setae ro, le and in barbed; setae ex smooth. Sensillus with fusiform head, spinose, expanded, and thin stem, strongly elbowed near the base. Setae ss>le>ro>in>ex. Distances (in-in)>(le-le)>(le-in)>(ro-ro). Hysterosoma longer than broad. Dorsosejugal suture absent. Area porosae, Ad, Aj, Al, Aaa, Aap, A1, A2, A3 and Ap discernible. All area porosae irregular in form; with a light spot, surrounded by a slightly dark ring. Aa divided into large and small ones. Of all area porosae, Ap is the longest (FIG. 26D). Dorsal setae smooth.

Ventral side. Male organ well discernible within the body. Genital aperture smaller than anal aperture, about two-third as long as their mutual distance. Genito-anal setae 6-1-2-3; setae smooth, short. Gnathosoma suctorial. Subcapitular setae 1-1-1; setae smooth. Epimeral sternal ridge indistinct. Epimeral setae 3-1-3-3; setae smooth. Lyrifissures iad inverse apoanal, situated posterolaterally to anterior margin of anal aperture, and in front of setae adp. Setae ad1, postanal; ad2 and ad3 analan. Setae ta = a ≡ h > g = an ≡ ad = m > 1a > ag.

Legs. All legs heterotridactylous; claws dentless. Leg chaetotaxy including famulus: I(1-4-3-4-20); II(1-4-3-4-16); III(2-2-1-3-16); IV(1-2-2-3-12). Sole nidotaxy: I(1-2-2); II(1-1-2); III(1-1-0); IV(0-1-0). Famulus inserted in front of solenidia o1I and o2I; fI”I minute, coupled with o1I (FIG. 26E).

Remarks. The new species is probably closely related to Disparagalumna tonguensis Hammer, 1973. as (1) lamellar line and dorsosejugal suture are absent, (2) notogastral setae, divided Aa and three claws are present, and (3) lyrifissures iad is aligned in front of setae adp. However, the former differs from the latter by having small body size, area porosa Ap, different form and size of area porosae, and a long protuberance of rostrum. In the key by BALOGH & BALOGH (1992), the genus Disparagalumna Hammer, 1973 should be grouped together with the genus Aegyptogalumna Al-Assiuty et al, 1985 by having sublamellar line, virtual notogastral setae and three claws. However, Disparagalumna is distinguished from Aegyptogalumna by having divided area porosa Aa, lyrifissure iad in front of adp, and by not having dorsosejugal suture. The definition or notation of rostral protuberance is uncertain whether the appendage can be regarded as naso (VAN DER HAMMEN, 1980).

Acknowledgments

The author wishes to express her sincere thanks to all Temples, especially to the chief priests, Mr. YOSHIMURA CHOZEN (No. 1), Mr. TSURUMOTO SHOKO (No. 3), Mr. MANABE SHUNSHO (No. 4), Mr. HATAKEDA SHUHO (No. 6), Mr. NAGASAKI SHOKYO (No. 38), Mr. MIYOSHI RYUTAI (No. 40), Mr. YASAKA KANKYO (No. 47), Mr. MIURA SHOKYO (No. 48), Mr. KATO SHUNSHO (No. 51), Mr. YOSHIZAKA SHUNKO (No. 52), Mr. SHIRAKAWA MITSUHIDE (No. 57), Mr. YUYAMA KOHO (No. 59), Mr. SASAKI ZENKOU (No. 64), Mr. KAWAMURA SHINSUKE (No. 65), Mr. IKEKU GUKAI (No. 67), Mr. HABARA KYODOU (No. 69), Mr. TATEBAYASHI RYOGO (No. 71), Mr. TAKAYOSHI SEIJUN (No. 72), Mr. MIYOSHI KAN (No. 80), Mr. AOYAMA RYUSHI (No. 82), Mr. NAKAI RYUSHI (No. 84) for their kindness in allowing her sampling and valuable advices. She would also like to thank to Prof. Dr. Y. NAKAMURA of Ehime University, Dr. Y-N. NAKAMURA of Kinki University and Mr. K. NAKAMURA of Kyushu University who kindly assisted with sampling.
Fig. 26. — Disparzugluma rostrata n. sp., adult ♂: A. — ventral view of rostral region; B. — interlamellar region; C. — left bothridial region; D. — area porosae; E. — solenidial region on right tarsus I.
REFERENCES


