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New and Unrecorded Oribatid Mites from Amami-Ohshima Island, Southwest Japan

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ABSTRACT — Soil inhabiting oribatid mites collected on Amami-Ohshima Island, Southwest Japan, contained one new genus, *Defectamerus*, and twenty new species and subspecies. These are *Euphthiracarus aggenitalis, Allodamaeus striatus, Defectamerus crassisetiger, Nellacarus lunaris, Liacarus montanus, Cultroribula angulata, Austroceratoppia japonica, Nippobodes brevisetiger yuwanensis, Acrotocepheus curvisetiger, Allosuctobelba bicuspidata, A. tricuspidata, Dometorina tuberculata, Symphauloppia plana, Scheloribates decarinatus, Ischeloribates lanceolatus, Perscheloribates clavatus torquatus, Peloribates levipunctatus, P. moderatus, Galumna granalata* and *Pergalumna amamiensis*. Other three species, *Pedrocortesia hardyi* (BALOGH), *Microtegaeus borhidi* BALOGH et MAHUNKA and *Parakalumma robustum* (BANKS), are reported for the first time from Japan.

INTRODUCTION

Amami-Ohshima is an island of special interest in zoogeography, being located nearly on the borderline between the subtropical and warm-temperate zones of Japan. Aoki [1–6] recorded 28 species of oribatid mites from the island, but they are apparently a small portion of the rich oribatid fauna. Before an adequate discussion is made on the characteristic feature of the oribatid fauna, it is necessary to describe a number of new and unrecorded species found in the island.

All the type-specimens of the new taxa described here will be deposited in the collection of the National Science Museum (Nat. Hist.), Tokyo.

COLLECTING DATA

Soil and litter samples were all collected on Amami-Ohshima Island (Lat. 28°20′ N and Long. 129°30′ E) at the following 12 stations. Collector: J. Aoki.

AMA–1 : Ayamaru-Misaki in Kasari-cho, 8–II–1980.
AMA–2 : Tonzaki in Tatsugo-mura, 8–II–1980.
AMA–3 : S of Ohtana in Yamato-mura, 9–II–1980.
AMA–4 : Near Fukumoto in Yamato-mura, 9–II–1980.
AMA–6 : N of Mt. Eboshi in Setouchi-machi, 9–II–1980.
AMA–8 : Sancho Park of Koniya in Setouchi-machi, 9–II–1980.
AMA–9 : Uken-son, 9–II–1980.
AMA–10: Near the summit of Mt. Yuwan, 10–II–1980.
AMA–11: W of the summit of Mt. Yuwan, 10–II–1980.
AMA–12: Mt. Yuwan, 10–II–1980.
AMA–14: E of Nishinakama in Sumiyo-mura, 10–II–1980.
AMA–15: Near Fukumoto in Yamato-mura, 9–II–1980.

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Euphthiracarus aggenitalis sp. n.
(Fig. 1)

Length of notogaster 460–480 μm, height of notogaster 320–330 μm, length of aspis 255–260 μm. [Aspis] Two lateral carinae on each side; the upper one strong, the lower one weak and indistinct. Setae *le* and *in* sparsely barbed. Seta *ro* nearly smooth, with tip curved inward. Their relative lengths: *in*>*le*>*ro*; mutual distance: *in*-

in>*ro-ro*>*le-le*. Sensillus weakly thickened apically in a fusiform and slightly barbed. Prodorsal surface finely and densely punctured. [Notogaster] Thirteen pairs of notogastral setae thin, only weakly barbed, shorter than *ro*. Notogastral surface finely punctured as on aspis. [Genito-anal region] Nine pairs of genital setae; g_1 and g_2 thick and long, g_3 and g_4 medium-sized, g_5 and g_6 minute. Median aggenital seta (ag_2) very thick and long, thicker than *in*, almost reaching insertion of g_2; on the contrary, ag_1 minute, being about 1/8 as long as ag_2. Two pairs of anal setae and 4 pairs of adanal setae nearly of equal length; setae *an* strongly curled at tip. [Legs] Monodactyle. [Type-series] Holotype (NSMT-Ac 9552): AMA–2; 2 paratopotypes: AMA–2.

The new species is easily distinguishable from any other species of the genus *Euphthiracarus* by the great difference in length between aggenital setae (ag_1 and ag_2) and finely pitted body surface.

Allodamaeus striatus sp. n.
(Fig. 2)

690–740×410–430 μm. [Prodorsum] Setae *le* long, inserted rather dorsally and about 2.3× as long as their mutual distance. Setae *in* minute and, in dorsal view, only their setal pores discernible. Sensillus with a barbed head which appears to be weakly or only slightly swollen according to aspects, because it is somewhat flattened distally. On the posterior part of prodorsum between bothridia found a short median and a pair of lateral arched rigdes. [Notogaster] Almost circular in dorsal view, showing a weak unevenness on the posterior margin. Indistinct ribbon-shaped striae running longitudinally on the dorsal side. Only two pairs of short setae found near the posterior margin; the anterior setae 1.5× as long as the posterior ones. [Ventral side] Genital plate with 5 setae; the anterior 4 setae situated with shorter intervals. Anal plate with 2 setae. Distance ad_1-ad_2 about 2.5× as long as ad_2-ad_3. [Type-series] Holotype (NSMT-Ac 9519): AMA–8; 6 paratopotypes: AMA–8.

The new species is closely related to *A. adpressus* Aoki et Fujikawa, 1971 [7], but the latter is different from the new species in the posterior two pairs of notogastral setae strikingly different in length from each other. Tarsus I is longer than tibia I and tarus IV is subequal in length to tibia IV in *A. adpressus*, while tarsus I is subequal to tibia I and tarsus IV is shorter than tibia IV in *A. striatus*. RLN (relative length to notogaster) of the segments (Fe, Ge, Ti and Ta) of legs I and IV — I (61, 14, 35 and 41) and IV (55, 16, 39 and 39) in *A. adpressus*; I (70, 18, 42 and 41) and IV (70, 18, 51 and 42) in *A. striatus*.

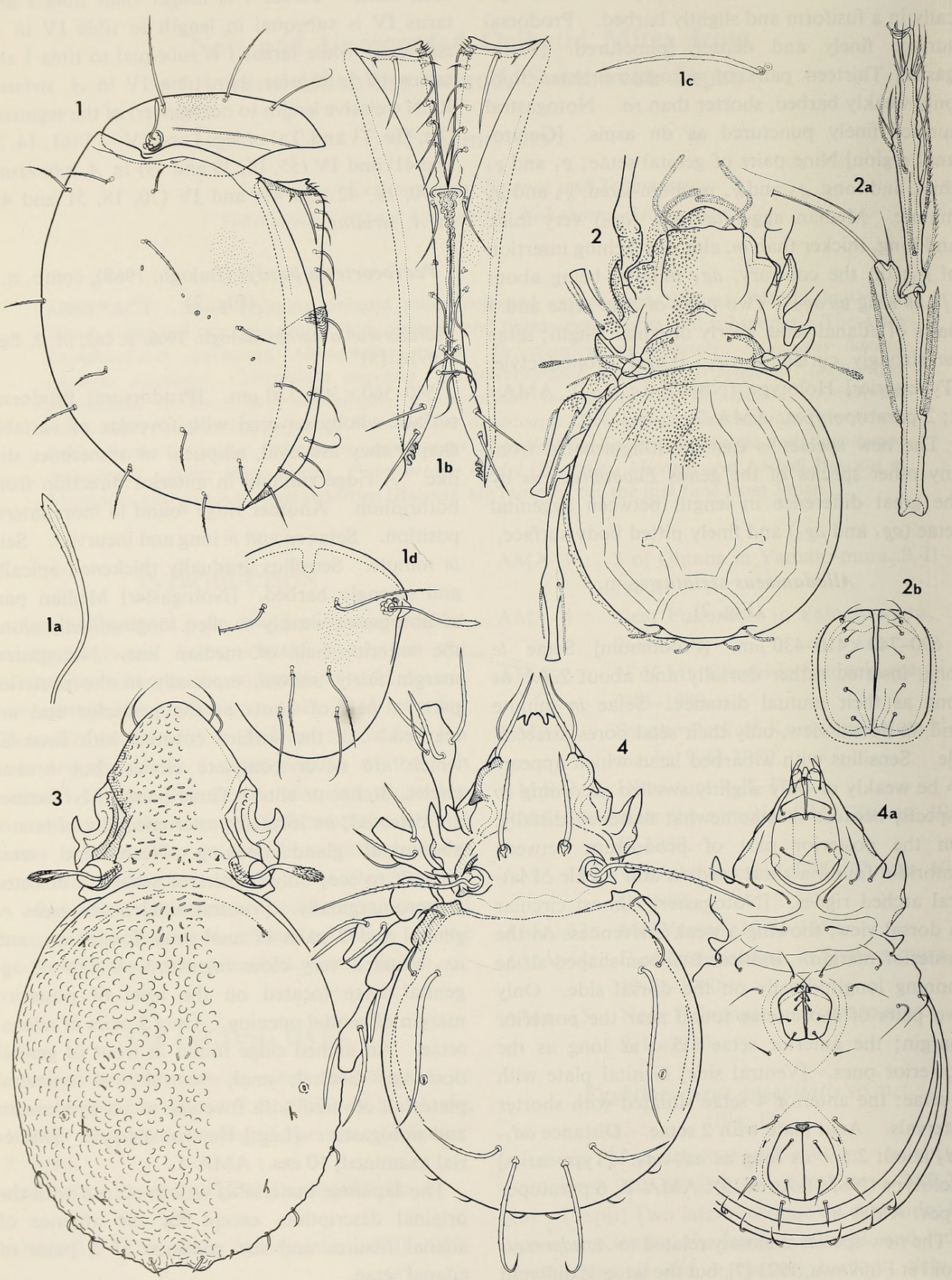
Pedrocortesia hardyi (Balogh, 1968), comb. n.
(Fig. 3)

Pedrocortesella hardyi Balogh, 1968, p. 262, pl. 2, figs. 9–10. [8]

540–560×300–320 μm. [Prodorsum] Prodorsal surface wholly covered with foveolae of variable shape; they are oval, elliptical or sometimes slit-like. A ridge running in anterior direction from bothridium. Another ridge found in more lateral position. Setae *ro* and *le* long and incurved. Seta *in* minute. Sensillus gradually thickened apically and strongly barbed. [Notogaster] Median part of notogaster weakly swollen longitudinally along the anterior half of median line. Notogastral margin fairly uneven, especially in the posterior part; a pair of knots at the posterior end are marked. All the surface covered with foveolae which are never complete circles, but broken circles, arches or slits. Three pairs of lyrifissures are detected; *im* located posteromedially of latero-abdominal gland opening. Notogastral setae difficult to see; only 5 pairs of setae are detected posteromarginally. [Ventral side] Seven pairs of genital and 2 pairs of anal setae found; an_1 and an_2 situated very close together. A pair of aggenital setae located on the level of posterior margin of genital opening. Only 2 pairs of adanal setae. An arched ridge found in front of genital opening. Genital, anal, ventral and epimeral plates all covered with foveolae as on prodorsum and notogaster. [Legs] Heterotridactyle. [Material examined] 10 exs.: AMA–1.

The Japanese material is well in accord with the original description, except for the absence of adanal fissures and the presence of 2 pairs of adanal setae.

Distribution: New Guinea and Japan.


1
1a
1b
1c
1d
2
2a
2b
3
4
4a

Defectamerus gen. n.

[Diagnosis] Notogaster with only 8 pairs of setae. Bothridia not so near to each other. Setae *in* strong. Rostrum with 2 incisions. Notogaster with humeral projections (cristae). Genital apertures with 6 pairs of setae. Legs monodactyle.

Type-species: *Defectamerus crassisetiger* sp. n.

By the number of notogastral setae the new genus is easily distinguishable from the two known genera of the family Ameridae, *Amerus* and *Cristamerus*, which have 10 pairs of setae on notogaster.

Defectamerus crassisetiger sp. n.
(Fig. 4)

610–660×380–450 μm. [Prodorsum] Rostrum with 2 incisions; the median projection between them usually with a small indentation. Seta *ro* long, with a fine tip. Setae *le* and *in* strong, slightly roughened; *le* arising from an apophysis on an arch-shaped ridge which is provided posteriorly with a triangular projection; *in* inserted on an oval apophysis; relative lengths of the prodorsal setae: *in*>*le*>*ro*. Bothridium well separated from each other; each bothridium with a sharp lateroposterior projection and a short and weak anterior ridge. Sensillus strong, as thick as seta *in*, finely barbed. Seta *ex* fine and short. [Notogaster] Dorsosejugal suture lacking; two weak transverse lines are interior structures. Humeral projection with a short protrusion on the median side. Only 8 pairs of notogastral setae are present; *te*, r_2 and r_3 markedly longer and thicker than the remaining setae; their relative lengths — r_2: r_1: *te*=1: 1.6: 2.5–2.8; *ta*, *te*, p_1, p_2 and p_3 short and fine; setae *ms* and r_3 lacking. [Ventral side] Genital plate with 6 setae, the anteriormost one being the longest. Three pairs of adanal setae thicker than genital, aggenital or anal setae. Adanal fissure aligned parallel to the lateral margin of anal opening, being remote from the margin for a distance longer than its own length. A dark-colored preanal plate exists. Both genital and anal apertures surrounded each by an obscure shield-shaped rim. Epimeral chaetotaxy: 3–1–3–3. [Legs] Total chaetotaxy (Fe–Ge–Ti–Ta): I(4–4–6–22), II(4–4–5–16), III(2–2–4–15), IV(2–2–4–11). Solenidial chaetotaxy: I(0–1–2–2), II(0–1–1–2), III(0–1–1–0), IV(0–0–1–0). Setae *p* of legs II–IV short, thick and conical. [Type-series] Holotype (NSMT-Ac 9532): AMA–2; 12 paratopotypes: AMA–2.

Nellacarus lunaris sp. n.
(Fig. 5)

260–270×180–200 μm. [Prodorsum] Rostrum pointed at tip. Anterior tip of lamella with a short dent on each side and a shallow concavity between the dents, in which a sword-shaped lamellar seta is inserted. Median margins of lamellae irregularly undulating posteriorly, forming a spindle-shaped interspace between lamellae. In the posteromedian part of each lamella found a crescent-shaped structure. A short, fine seta *in* located near the basal part of lamella, outside the crescent. Seta *ro* inserted each on a distinct apophysis and strongly curved inward, so that they are crossing each other. Sensillus bending posteriorly, being densely barbed on the outer side. [Notogaster] Humeral projection with some longitudinal striae and small granules on the outer side. The posterior margin has 3 small indentations, one medially between setae p_1 and the other two each in front of seta p_3. Ten pairs of notogastral setae short and fine. [Ventral side] Genital opening pentagonal, with 6 pairs of setae, of which one pair of setae are inserted close to the lateral margins; the anteriormost pair of genital setae much longer than the remaining setae. Adanal fissure very long, situated close and parallel to the lateral margin of anal opening. [Type-series] Holotype (NSMT-Ac 9514): AMA–2; 7 paratopotypes: AMA–2, 2 paratypes: AMA–9.

Nellacarus hellenicus Mahunka, 1977 [9], from Greece seems to be most similar to *N. lunaris* sp.

FIG. 1. *Euphthiracarus aggenitalis* sp. n. 1a. Sensillus, 1b. Ano-genital region, 1c. Notogastral seta, 1d. Aspis.

FIG. 2. *Allodamaeus striatus* sp. n. 2a. Tarsus and tibia of leg IV, 2b. Genital plates.

FIG. 3. *Pedrocortesia hardyi* (Balogh, 1968).

FIG. 4. *Defectamerus crassisetiger* gen. et sp. n. 4a. Ventral side.

n., but it differs from the new species in (1) the shorter lamellar setae, (2) the humeral projections with toothed tip and without granular structure, (3) the absence of large crescent-shaped structures in the basal part of lamellae, and (4) the small body size (230–240 μm).

Microtegaeus borhidi Balogh et Mahunka
(Fig. 6)

Microtegaeus borhidi Balogh et Mahunka, 1974 [10], p. 3, fig. 2.

225×150 μm. [Prodorsum] Median field of prodorsum coarsely reticulated. Two pairs of obscure small knobs found posteriorly. Most part of lamella finely granulated. Setae *ro* and *le* smooth, the former being thicker than the latter. Seta *in* minute. Sensillus provided apically with dense papillae. [Notogaster] Wholly covered with polygonal reticulation as on prodorsum. Ten pairs of minute notogastral setae exist; the posteriormost 3 pairs not visible from above. Humeral projections weakly developed. [Ventral side] Ventral plate with polygonal surface structure except for the 8-shaped area around genital and anal openings. Genital and anal plates smooth, the former with 5 pairs and the latter with 2 pairs of setae. Epimeral plates very finely granulated; some light spots found in part. [Legs] Monodactyle. [Material examined] 5 exs.: AMA–2, 1 ex.: AMA–3, 1 ex.: AMA–4.

Distribution: Cuba and Japan.

Liacarus montanus sp. n.
(Fig. 7)

700–830×448–535 μm. [Prodorsum] Rostrum with a triangular tooth on each side. Lamellar cusp bearing 2 apical teeth; the outer tooth longer than the median one. Interspace between lemellae narrow, but at the basal part it forms a rounded space of a characteristic shape. Setae *ro*, *le* and *in* smooth; their relative lengths — *ro*: *le*: *in*=2: 3: 5. Sensillus bearing a spindle-shaped head with a short sharp apical tip; the basal 1/3 of sensillus hidden under notogastral shield. Lateral part of prodorsum in the posterior half covered with dense granules. [Notogaster] Anterior margin weakly concave medially. The posteriormost setae p_1 0.7–0.8× as long as their mutual distance. [Ventral side] Genital plate with 5 setae. Adanal fissure *iad* aligned obliquely, being located at a level posterior to an_2. Sternal ridge found only in epimerata I and II. [Legs] Heterotridactyle. [Type-series] Holotype (NSMT-Ac 9568): AMA–11, 1 paratype: AMA–12.

The new species is readily distinguishable from any other congener by its peculiar shape of the basal part of lamellar interspace.

Cultroribula angulata sp. n.
(Fig. 8)

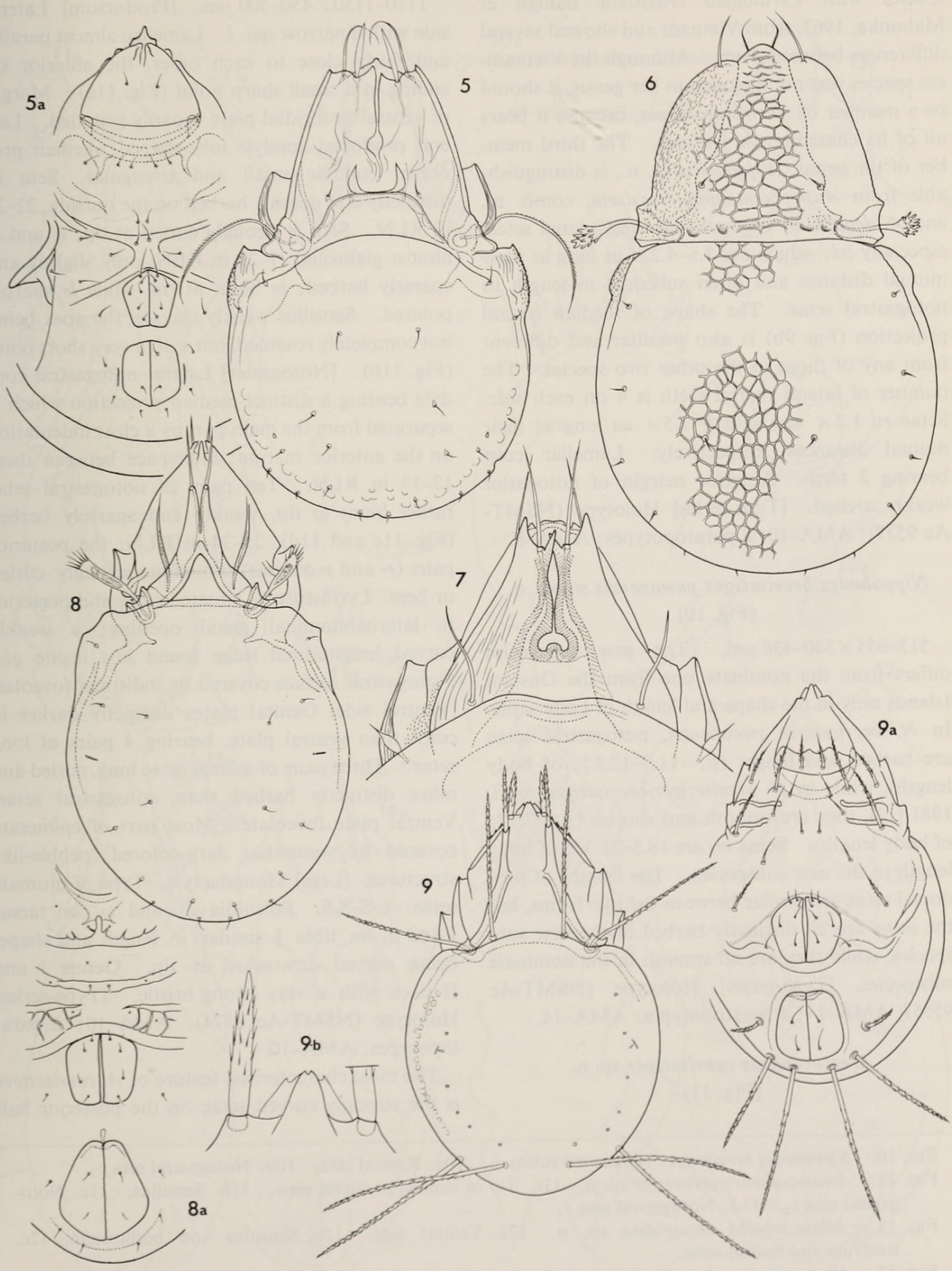
170×100 μm. [Prodorsum] Rostrum tricuspidate. Seta *ro* less than half as long as seta *le*. Seta *in* are absent. Distal 2/3 of sensillus broadened, being provided apically with 6–8 long spines. [Notogaster] Dorsosejugal suture nearly straight. Humeral projection markedly developed, wtih a rounded anterior corner and a lateral angulation. Nine pairs of minute notogastral setae discernible; setae r_3 not detected. [Ventral side] Genital aperture square-shaped, as long as wide, with 4 pairs of setae. Anal aperture a little longer than wide, being somewhat wider than genital aperture. Interspace between both the apertures 4/9 as long as genital one. Sternal ridge developed only in the posterior half of epimerata I. [Legs] Monodactyle. [Type-series] Holotype (NSMT-Ac 9530): AMA–8; 1 paratopotype: AMA–8.

The new species is quite different from any other congener in the large and angular humeral projections and the sensilli with many long spines apically.

Austroceratoppia japonica sp. n.
(Fig. 9)

470–480×290–300 μm. Hammer [11] established the genus *Austroceratoppia* with *A. dentata* from Java as the type-species. She compared her

Fig. 5. *Nellacarus lunaris* sp. n. 5a. Ventral side.
Fig. 6. *Microtegaeus borhidi* Balogh et Mahunka, 1974.
Fig. 7. *Liacacrus montanus* sp. n.
Fig. 8. *Cultroribula angulata* sp. n. 8a. Ventral side.
Fig. 9. *Austroceratoppia japonica* sp. n. 9a. Ventral side, 9b. Rostrum and rostral seta.


5a
5
6
8
7
9a
9
9b
8a

species with *Ceratoppia crassiseta* Balogh et Mahunka, 1967, from Vietnam and showed several differences between them. Although the Vietnamese species was not included in her genus, it should be a member of *Austroceratoppia*, because it bears all of its characteristic features. The third member of the genus, *A. japonica* sp. n., is distinguishable from *Austroceratoppia crassiseta*, comb. n., and *A. dentata* by its markedly long adanal setae, especially ad_1, which are 3.6–4.2× as long as their mutual distance and often subequal in length to notogastral setae. The shape of median rostral projection (Fig. 9b) is also peculiar and different from any of those in the other two species. The number of lateral rostral teeth is 4 on each side. Setae *ro* 1.2× and seta *le* 1.5× as long as their mutual distances, respectively. Lamellar cusp bearing 2 teeth. Anterior margin of notogaster weakly arched. [Type-series] Holotype (NSMT-Ac 9577): AMA–10; 8 paratopotypes: AMA–8.

Nippobodes brevisetiger yuwanensis subsp. n.
(Fig. 10)

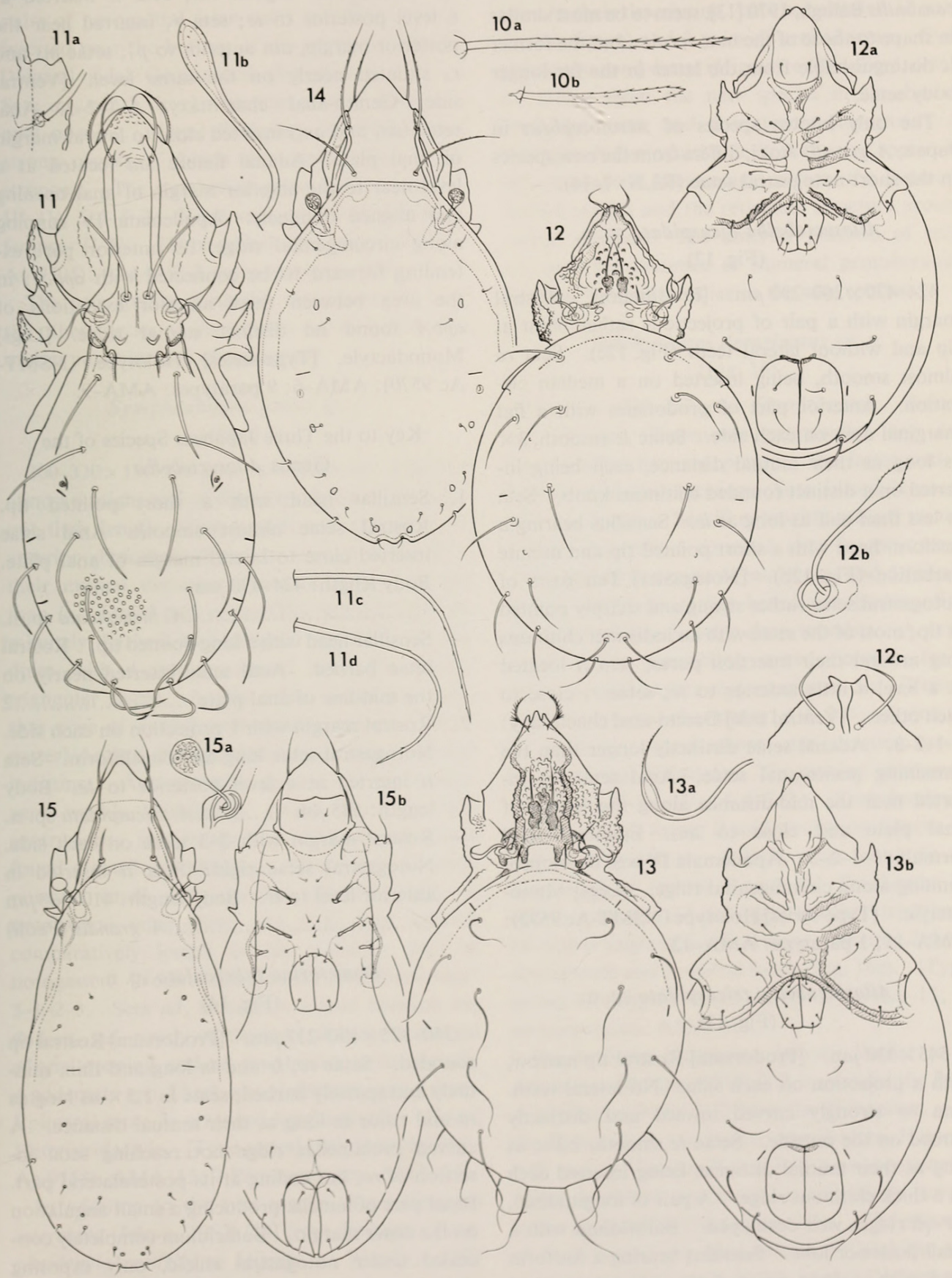
515–655×340–438 μm. The new subspecies differs from the nominate one from the Ohsumi Islands only in the shape and length of body setae. In *N. brevisetiger yuwanensis*, notogastral setae are barbed and longer (p_1=11.9–12.2% of body length), while in *N. brevisetiger brevisetiger* Aoki, 1981 [12], they are smooth and shorter (p_1=7.7% of body length). Setae *ms* are 18.5–21.3% of body length in the new subspecies. The lengths of prodorsal setae are similar between the two forms, but the setae are all distinctly barbed in the new subspecies, while they are all smooth in the nominate subspecies. [Type-series] Holotype (NSMT-Ac 9555): AMA–14; 4 paratopotypes: AMA–14.

Acrotocepheus curvisetiger sp. n.
(Fig. 11)

1110–1150×450–500 μm. [Prodorsum] Lateral side with a narrow *spa. l.* Lamellae almost parallel and fairly close to each other, the anterior tip ending in a small sharp point (Fig. 11a). Margin of ventral bothridial plate broadly rounded. Lateral prodorsal condyle lobe-shaped; median prodorsal condyle small and triangular. Seta *ro* distinctly and densely barbed on the outside, 22–25 in RLN. Seta *le* strongly curled at tip; *le* and *in* almost glabrous, 27–29 in RLN, only slightly and sparsely barbed; *in* blunt at tip, while *le* sharply pointed. Sensillus weakly clavate, the apex being not completely rounded, but with a very short point (Fig. 11b). [Notogaster] Lateral notogastral condyle bearing a distinct median projection which is separated from the main part by a clear indentation on the anterior margin; interspace between them 12–13 in RLN. Ten pairs of notogastral setae rather blunt at tip, weakly and sparsely barbed (Fig. 11c and 11d), 25–34 in RLN; the posterior pairs (*r*- and *p*-serieses) sometimes strongly curled or bent. Lyrifissure *im* situated close and posterior to lateroabdominal gland opening; a weakly curved, longitudinal ridge found just inside *gla*. Notogastral surface covered by indistinct foveolae. [Ventral side] Genital plates distinctly darker in color than ventral plate, bearing 4 pairs of long setae. Three pairs of adanal setae long, curled and more distinctly barbed than notogastral setae. Ventral plate foveolate. Most part of epimerata covered by somewhat dark-colored, pebble-like structures. [Legs] Monodactyle. Type of ultimate setae: L-S-S-S. Solenidia ω_1 and ω_2 on tarsus I and φ_1 on tibia I similar in length and shape, being curved downward at tip. Genua I and II each with a very strong bristle. [Type-series] Holotype (NSMT-Ac 9574): AMA–10; 2 paratopotypes: AMA–10.

The most characteristic feature of *A. curvisetiger* is the strongly curved setae on the posterior half

FIG. 10. *Nippobodes brevisetiger yuwanensis* subsp. n. 10a. Rostral seta, 10b. Notogastral seta p_2.
FIG. 11. *Acrotocepheus curvisetiger* sp. n. 11a. Tip of lamella in lateral view, 11b. Sensillus, 11c. Notogastral seta r_2, 11d. Notogastral seta r_1.
FIG. 12. *Allosuctobelba bicuspidata* sp. n. 12a. Ventral side, 12b. Sensillus and bothridium, 12c. Rostrum and rostral setae.
FIG. 13. *Allosuctobelba tricuspidata* sp. n. 13a. Sensillus, 13b. Ventral side.
FIG. 14. *Dometorina tuberculata* sp. n.
FIG. 15. *Symphauloppia plana* sp. n. 15a. Sensillus, 15b. Ventral side.


11a
11b
11
14
10a
10b
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13b

of notogaster. Lateral notogastral condyles of *A. consimilis* Balogh, 1970 [13], seem to be most similar in shape to those of the new species, but the former is distinguishable from the latter in the far longer body setae.

The only known species of *Acrotocepheus* in Japan, *A. gracilis* Aoki, differs from the new species in the short notogastral setae (RLN: 7–14).

Allosuctobelba bicuspidata sp. n.
(Fig. 12)

424–470×260–290 μm. [Prodorsum] Rostral margin with a pair of projections rather blunt at tip and without lateral teeth (Fig. 12c). Seta *ro* almost smooth, being inserted on a median elevation. Anterior part of prodorsum with a flat marginal area on each side. Setae *le* smooth, 3× as long as their mutual distance, each being inserted on a distinct rounded chitinous knob. Seta *in* less than half as long as *le*. Sensillus bearing a fusiform head with a short pointed tip and minute barbation (Fig. 12b). [Notogaster] Ten pairs of notogastral setae rather strong and sharply pointed at tip; most of the setae with an indistinct chitinous ring around their insertion pores; seta *ti* located at a level a little anterior to *te*; setae r_1 close to each other. [Ventral side] Genito-anal chaetotaxy: 6–1–2–3. Adanal setae distinctly longer than the remaining genito-anal setae. Anal seta an_1 inserted near the mid-distance along the length of anal plate and close to an_2. Epimeral setal formula: 3–1–2–3. Apodemata IV well developed, running along circumgenital ridge. [Legs] Monodactyle. [Type-series] Holotype (NSMT-Ac 9572): AMA–11; 1 paratype: AMA–12.

Allosuctobelba tricuspidata sp. n.
(Fig. 13)

545×330 μm. [Prodorsum] Rostral tip narrow, with a projection on each side. No lateral teeth. Seta *ro* strongly curved inward and distinctly barbed on the outside. Setae *le* smooth, 2.3× as long as their mutual distance, being inserted each on a thick chitinous ridge. A pair of longitudinal, curved ridges well developed. Bothridium with a small posterior lobe. Sensillus bearing a fusiform head with a long pointed tip minutely barbed (Fig. 13a). [Notogaster] Ten pairs of notogastral setae long and flagelliform; seta *ti* inserted at a level posterior to *te*; seta r_1 inserted near the posterior margin, not anterior to p_1; setae *ms* and r_3 situated nearly on the same level. [Ventral side] Genito-anal chaetotaxy: 6–1–2–3. Anal setae (an_1 and an_2) inserted close to lateral margin of anal plate. Adanal fissure *iad* located at a level near to the anterior margin of anal opening and aligned obliquely. Apodemata IV running along circumgenital ridge, its anterior part extending forward to be connected with *apo.sj*; in the area between these anterior extentions of *apo.4* found no distinct sternal ridge. [Legs] Monodactyle. [Type-series] Holotype (NSMT-Ac 9570): AMA–6; 9 paratypes: AMA–9.

Key to the Three Japanese Species of the Genus *Allosuctobelba*

1. Sensillar head with a short pointed tip. Rostral setae almost smooth. Anal setae inserted close to lateral margin of anal plate. Body length: 424–470 μm ..... *A. bicuspidata* sp. n.
— Sensillar head with a long pointed tip. Rostral setae barbed. Anal setae inserted nearly on the mid-line of anal plate 2
2. Rostral margin with 1 projection on each side. Notogastral setae long and flagelliform. Seta *ti* inserted at a level posterior to *te*. Body length: 545 μm ..... *A. tricuspidata* sp. n.
— Rostral margin with 2–3 teeth on each side. Notogastral setae rigid. Seta *ti* inserted in anterior level to *te*. Body length: 410–460 μm ..... *A. grandis* (Paoli)

Dometorina tuberculata sp. n.
(Fig. 14)

350–375×190–217 μm. [Prodorsum] Rostral tip rounded. Setae *ro*, *le* and *in* long and thin, minutely and sparsely barbed; setae *in* 1.5× as long as *ro* and twice as long as their mutual distance. A curved prolamellar ridge not reaching setal insertion of *ro*, but ending at its posterolateral part. Basal part of lamella producing a small angulation on the outer margin. Bothridium completely concealed under notogastral shield, only exposing globular head of sensillus. [Notogaster] Elongate oval, 1.4× as long as wide. Two distinct indents

found on the posterior end of notogaster. Ten pairs of notogastral setae short and fine; setae p_1 inserted near the bottom of the posterior notches. [Ventral side] Genito-anal chaetotaxy: 4–1–2–3. Seta ad_3 nearly level with the anterior margin of anal opening. [Legs] Each legs provided with 3 strong claws, of which the median one is the strongest. The number of setae on femora I–II–III–IV: 5–5–3–2. Keels very poorly developed on femora II–IV. [Type-series] Holotype (NSMT-Ac 9505): AMA–9; 3 paratopotypes: AMA–9.

The new species is readily distinguishable from the other species of *Dometorina* by the indentation on the posterior end of notogaster.

Symphauloppia plana sp. n.

(Fig. 15)

300–330×128–140 μm. [Prodorsum] Lamellae almost straight and of the same thickness throughout their length, being weakly converging in the anterior direction. Setae *ro* and *le* as long as their mutual distances. Seta *in* a little shorter than *le*. Distal part of sensillus strongly swollen, minutely barbed and directed upward. Bothridium with a narrow lateral lobe of rounded triangular shape. A thin ridge connecting insertion pore of *in* and dorsosejugal suture. [Notogaster] Arched dorsosejugal suture very weak and indistinct. Anterolateral margin of notogaster very weakly undulating, producing two slight protrusions; just inside the anterior protrusion found a small protuberance. Four pairs of areae porosae small and circular. Twelve pairs of notogastral setae short and fine; they become comparatively longer in the posterior part of notogaster. [Ventral side] Genito-anal chaetotaxy: 3–1–2–3. Seta ad_1 located at a level between an_1 and an_2, ad_2 nearly on the level of anterior margin of anal opening, and ad_3 far anterior to the margin. Apodemata *apo. 2* and *apo. sj* distinct; *apo. 3* short. Epimeral setae *3a* arranged longitudinally. [Legs] Heterotridactyle. [Type-series] Holotype (NSMT-Ac 9558): AMA–15; 7 Paratopotypes: AMA–15.

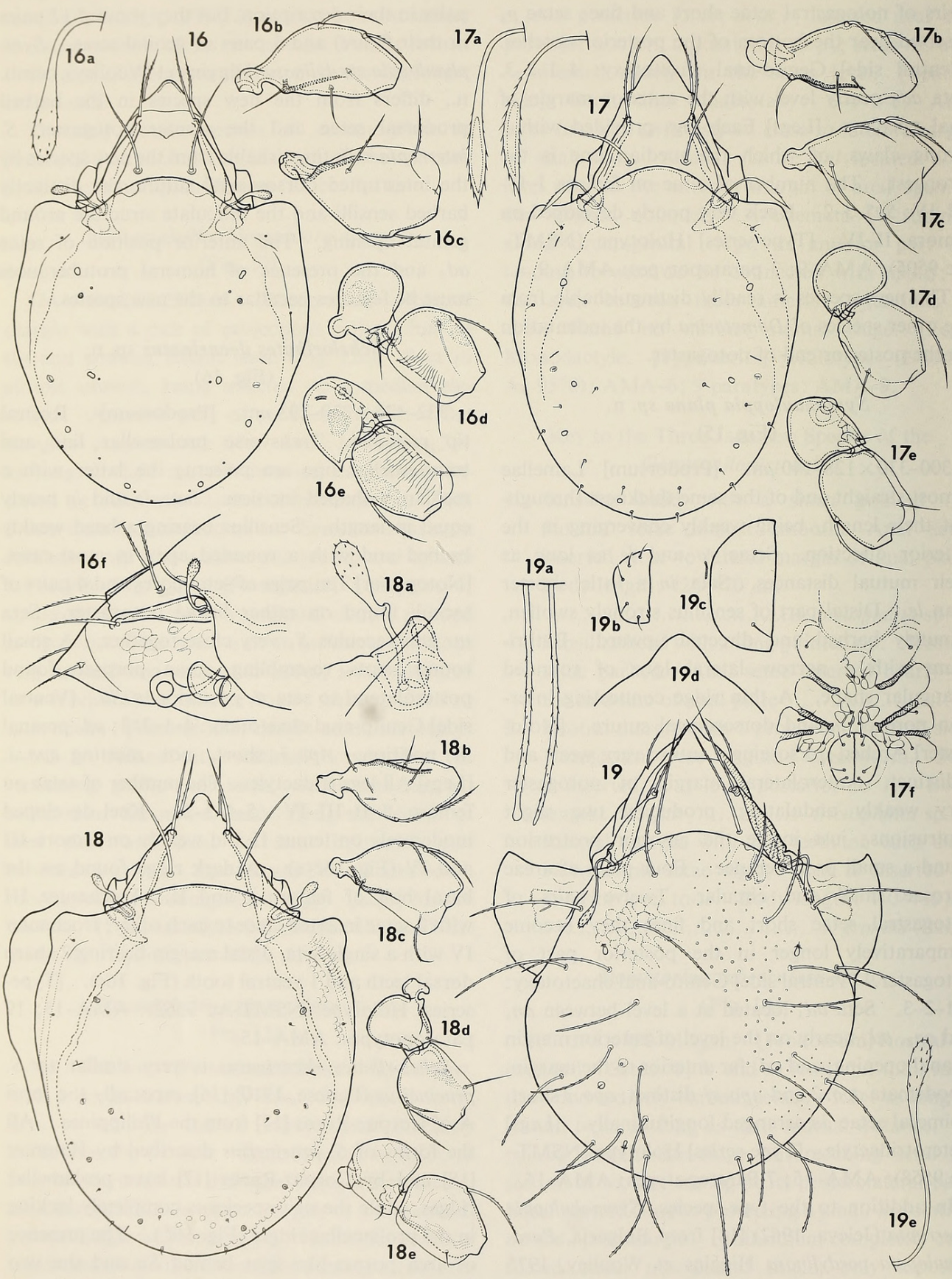
In addition to the type-species, *Sympahuloppia interrupta* (Jeleva, 1962) [14] from Bulgaria, *Paraphauloppia cordylinosa* Higgins et Woolley, 1975 [15] from U.S.A. should be included in the genus *Symphauloppia*, because it has more than 10 pairs of notogastral setae (the authors mentioned 11 pairs in their description, but they showed 12 pairs in their figure) and 3 pairs of genital setae. *Symphauloppia cordylinosa* (Higgins et Woolley), comb. n., differs from the new species in the barbed prodorsal setae and the stouter notogaster. *S. interrupta* is distinguishable from the new species by the interrupted dorsosejugal suture, the distinctly barbed sensilli and the reticulate structure around genital opening. The anterior position of setae ad_2 and the presence of humeral protuberances must be features peculiar to the new species.

Scheloribates decarinatus sp. n.

(Fig. 16)

332–428×230–293 μm. [Prodorsum] Rostral tip rounded. Transverse prolamellar line and translamellar line are present; the latter with a median V-shaped incision. Seta *le* and *in* nearly equal in length. Sensillus bearing a head weakly barbed and with a rounded apex in most cases. [Notogaster] Ten pairs of setal pores and 4 pairs of sacculi found on rather broad notogaster. Seta *ms* and sacculus S_1 very close together. A small round spots resembling areae porosae found posterolateral to seta *ti*, posterior to *Sa*. [Ventral side] Genito-anal chaetotaxy: 4–1–2–3; ad_3 preanal in position. *Apo.3* short, not meeting *apo.sj*. [Legs] All legs tridactyle. The number of setae on femora I–II–III–IV: 5–4–3–2. Keel developed moderately on femur II and weakly on femora III and IV (Fig. 16c–e). A dark ridge found on the basal half of femora I and II. Trochanter III with 2 setae inserted close to each other; trochanter IV with a single seta, distal margin bearing 2 sharp dorsal teeth and 1 ventral tooth (Fig. 16e). [Type-series] Holotype (NSMT-Ac 9562): AMA–15; 19 paratopotypes: AMA–15.

Scheloribates decarinatus is very similar to *S. praeincisus* (Berlese, 1910) [16], especially the form A of Corpuz-Raros [17] from the Philippines. All the forms of *S. praeincisus* described by Hammer [18] and by Corpuz-Raros [17] have prolamellar ridges, while the new species is completely lacking in the prolamellar ridges (Fig. 16f). The presence of area porosa-like spot behind *Sa* and the two sharp dorsodistal teeth on trochanter IV may also be characteristic of the new species.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Ischeloribates lanceolatus sp. n.
(Fig. 17)

314–350×197–210 μm. [Prodorsum] Prolamellar ridges and a faint prolamellar transverse line are present. Translamellar line very short. Setae *ro*, *le* and *in* all weakly barbed; their relative lengths — *ro*: *le*: *in*=1: 1.2: 1.4; *in* 1.7× as long as their mutual distance. Sensillus with a slender lanceolate head bending backward and barbed; the pointed apex short; the organ appears to be evenly swollen on both sides in dorsal view (Fig. 17 and 17a, left). [Notogaster] Anterior margin arched. Ten pairs of minute notogastral setae and 4 pairs of sacculi are present. [Ventral side] Genito-anal chaetotaxy: 4–1–2–3. Seta ad_3 located anterior to anal opening. Fissure *iad* situated near the anterior corner of anal opening. Epimeral chaetotaxy: 3–1–3–3. [Legs] The number of setae on femora I–II–III–IV: 5–5–2–2. Trochantera III and IV each with a single seta. Keel developed most markedly on femur II (Fig. 17c), fairly well on femur III, and narrowly on femur IV; femur I without keel. [Type-series] Holotype (NSMT-Ac 9508): AMA–9; 12 paratopotypes: AMA–9.

In the shape of sensilli, the arrangement of setae *ms*, r_3 and p_3, and the shape and size of body, *Ischeloribates rustenburgensis* (Pletzen, 1963), comb. n., from South Africa is similar to the new species. The African species differes from the Japanese one in having kidney-shaped *Sa*, a narrow keel on femur II and 3 setae on femur III [19].

Perscheloribates clavatus torquatus subsp. n.
(Fig. 18)

395–430×240–290 μm. [Prodorsum] Rostrum drawn out into a distinct snout, the tip not pointed, but rounded. Setae *ro*, *le* and *in* weakly barbed and sharply pointed at tip; *in* slightly larger than *le*; *ro* about 5/8 as long as *le*. Sensillus directed anterolaterad at an angle of 45° to axis; peduncle strongly twisted in dorsal aspect (Fig. 18a); the head elongate oval, with minute barbs. [Notogaster] Ten pairs of notogastral setae very minute and hardly visible. In dorsal view anterior end of pteromorpha somewhat protruding; lateral outline of pteromorpha has a weak concavity; lateral margin in laterodorsal view weakly undulating (Fig. 18, left); obscure striation found on pteromorpha. [Ventral side] Genito-anal chaetotaxy: 4–0–2–3; *ag* are absent; ad_3 situated nearly on the level of anterior margin of anal opeining. Epimeral ridges *bo.2* connected to sternal ridge; *bo.sj*, *bo.3* and *apo.sj* connected to circumgenital part; *apo.2* and *apo.3* short. [Legs] Monodactyle. Femora II–IV and trochanter III each with a keel; keel on femur II triangular and most conspicuous; femora I and II with a strong ridge on ventral side; femora I–IV with 5, 4, 3 and 2 setae, respectively; trochanter III with 2 setae and trochanter IV with 1 seta. [Type-series] Holotype (NSMT-Ac 9525): AMA–4, 6 paratopotypes: AMA–4.

The nominate subspecies *Perscheloribates clavatus clavatus* Hammer, 1973 [20] differs from the new subspecies in (1) the short sensilli with smooth head and peduncle not twisted, (2) the presence of aggenital setae and (3) the small body size (375 μm).

Peloribates levipunctatus sp. n.
(Fig. 19)

290–350×200–270 μm. [Prodorsum] Prodorsal surface glabrous, without foveolate sculpture. Rostral tip extending beyond the outline of prodorsal margin (Fig. 19d). A transverse line found in the anterior part of prodorsum. Setae *ro*, *le* and *in* weakly barbed; *ro* short, just reaching, or only slightly extending beyond,

FIG. 16. *Scheloribates decarinatus* sp. n. 16a. Sensillus, 16b. Femur I, 16c. Femur II, 16d. Trochanter and femur III, 16e. Trochanter and femur IV, 16f. Dorsolateral view of prodorsum.

FIG. 17. *Ischeloribates lanceolatus* sp. n. 17a. Sensilli, 17b. Femur I, 17c. Femur II, 17d. Trochanter and femur III, 17e. Trochanter and femur IV. 17f. Epimeral and genital region.

FIG. 18. *Perscheloribates clavatus torquatus* subsp. n. 18a. Sensillus and bothridium, 18b. Femur I, 18c. Femur II, 18d. Trochanter and femur III, 18e. Trochanter and femur IV.

FIG. 19. *Peloribates levipunctatus* sp. n. 19a. Notogastral setae ps_2, 19b. Genital plate, 19c. Anal plate, 19d. Tip of rostrum, 19e. Sensillus.

rostral tip; *le* 1.78× and *in* 2.04× as long as *ro*. Sensillus with a long slender peduncle and an elongate oval head with barbation. [Notogaster] Small foveolae found on notogaster, but they are very obscure. No foveolae found on pteromorphae. On the basal part of pteromorpha found a rectangular area with fine irregular margin including lyrifissure *ia*. Notogastral setae long, weakly barbed, blunt at tip; their RLN: 22–34; setae c_1, c_2 and *la* a little longer than the remainder; setae *dp* and h_3 the shortest; setae of *ps*-series (Fig. 19a) sometimes slightly thickened in apical portion. A network-like structure around seta *da* distinct. [Ventral side] Ventral plate sculptured with small obscure foveolae as on notogaster. Anal and genital plates smooth, with neither foveolae nor punctures. Genito-anal chaetotaxy: 5–1–2–3; all the setae fine and short. Adanal fissure close and parallel to the lateral margin of anal opening. Mentum smooth. [Legs] Tridactyle. [Type-series] Holotype (NSMT-Ac 9539): AMA–2; 9 paratopotypes: AMA–2.

Having notogastral setae partly showing a tendency of being slightly swollen at the tip, *P. levipunctatus* resembles the next species, *P. moderatus*, but it is distinguishable from the latter (1) the longer notogastral setae, (2) the shorter rostral setae, (3) the small and obscure foveolae on notogaster and ventral plate, and (4) the smooth pteromorphae, genital and anal plates.

Peloribates moderatus sp. n.
(Fig. 20)

280–340×200–230 μm. [Prodorsum] Prodorsal surface sculptured by foveolae and small punctures; the foveolae disappear only in the part along the anterior margin of notogaster. Setae *ro*, *le* and *in* weakly barbed and pointed at tip; *le* and *in* subequal in length, being equal to, or somewhat longer than, their mutual distance; they are about 1.3× as long as *ro*. Sensillus with a long slender peduncle and an elongate oval head which is distinctly barbed and not so strongly swollen; minute barbs also found on the distal half of the peduncle. [Notogaster] Longer than wide. Surface of notogaster and pteromorphae sculptured as on prodorsum. Notogastral setae moderately long, their RLN: 15–25; setae c_2, *la*, ps_2 and ps_3 a little longer than the remaining setae; seta *dp* and h_2 the shortest; all notogastral setae weakly barbed and blunt at tip; some of them, especially setae of *ps*-series, seem to be slightly thickened in apical portion (Fig. 20a). [Ventral side] Ventral plate sculptured as on notogaster. Anal plates also sculptured so, but foveolae are smaller. On genital plates only small punctures are found. Genito-anal chaetotaxy: 5–1–2–3; all the setae fine and short. Adanal setae ad_3 situated on, or slightly posterior to, the level of the anterior margin of anal opening. Mentum finely and densely punctured. [Legs] Tridactyle. [Type-series] Holotype (NSMT-Ac 9544): AMA–2; 29 paratopotypes: AMA–2.

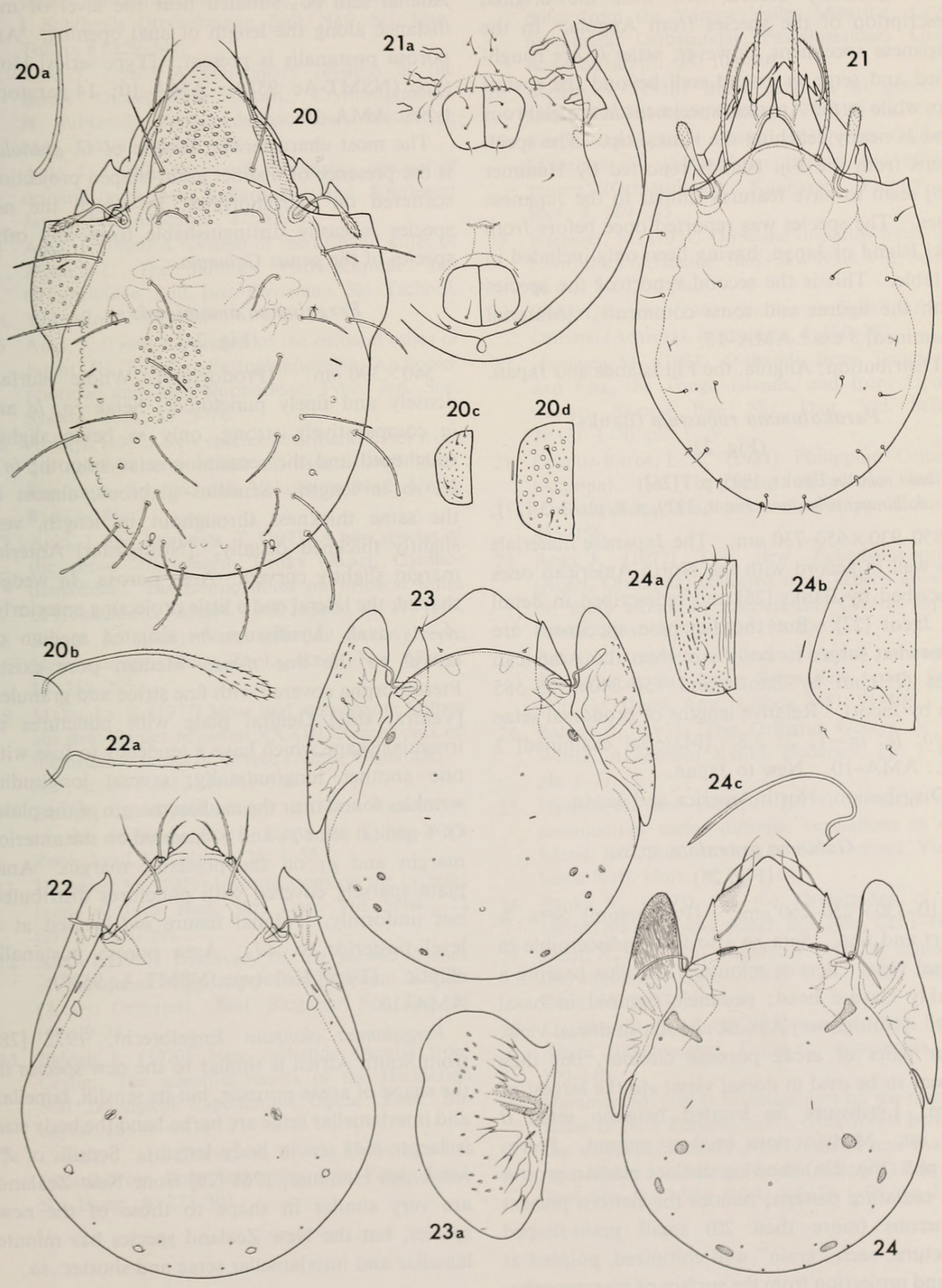
Three *Peloribates*-species from the Philippines, *P. varisculptus* Corpuz-Raros, 1981, *P. buntotanus* Corpuz-Raros, 1981, and *P. pilipinus* Corpuz-Raros, 1981 [21], as well as one Japanese species, *P. nishinoi* Aoki, 1977 [22], have notogastral setae swollen at the tip. Notogastral setae of the two new species also have such a tendency, but are not so markedly swollen as in the species mentioned above. Sensilli of the two new species are most similar to those of *P. varisculptus*, but not so strongly clavate as in the remaining three species. *P. varisculptus* has longer notogastral and interlamellar setae, all of which are swollen at the tip.

Paralamellobates schoutedeni (Balogh)
(Fig. 21)

Oribatella schoutedeni Balogh, 1959, p. 106, figs. 50–51 [23]; Hammer, 1971, p. 33, fig. 36 [18].
Paralamellobates schoutedeni: Balogh, 1972, pl.57 [24]; Harada & Aoki, 1978, p. 159 [25].

252–265×173–180 μm. The Japanese speci-

Fig. 20. *Peloribates moderatus* sp. n. 20a. Notogastral seta ps_2, 20b. Sensillus, 20c: Genital plate, 20d: Anal plate.
Fig. 21. *Paralamellobates schoutedeni* (Balogh, 1959). 21a. Ventral side.
Fig. 22. *Parakalumma robustum* (Banks, 1895). 22a. Sensillus.
Fig. 23. *Galumna granalata* sp. n. 23a. Pteromorpha.
Fig. 24. *Pergalumna amamiensis* sp. n. 24a. Genital plate, 24b. Anal plate, 24c. Sensillus.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mens generally accord well with the original description of the species from Angola. In the Japanese specimens, however, setae *le* are roughened and setae *in* extend well beyond the rostral tip, while in the Angolan specimens *le* are glabrous and *in* nearly reaching the rostral tip. The specimens from the Fiji Islands reported by Hammer [18] seem to have features similar to the Japanese ones. The species was reported once before from Oki Island of Japan, having been only included in a table. This is the second report of the species with the figures and some comments. [Material examined] 3 exs.: AMA–15.

Distribution: Angola, the Fiji Islands and Japan.

Parakalumma robustum (Banks)
(Fig. 22)

Oribata robusta Banks, 1895, p. 7[26].
Parakalumma robustum: Jacot, 1929, p. 8, pls. 1–3 [27].

850–930×650–730 μm. The Japanese materials are well in accord with the North American ones described by Banks [26] and redescribed in detail by Jacot [27]. But the Japanese specimens are somewhat larger in body size than the American ones (750 μm by Banks and 750–840×525–585 μm by Jacot). Relative lengths of prodorsal setae —*ro*: *le*: *in*=1: 2: 2.8. [Material examined] 3 exs.: AMA–10. New to Japan.

Distribution: North America and Japan.

Galumna granalata sp. n.
(Fig. 23)

310–330×250–260 μm. [Prodorsum] Seta *le* short and fine. Seta *ro* also fine, indiscernible in dorsal view. Seta *in* minute. Sensillus bearing a weakly clavate head; peduncle sigmoid in basal part. [Notogaster] Almost circular in dorsal view. Four pairs of areae porosae circular, but they appear to be oval in dorsal view; *Aa* the largest of them. Lyrifissure *im* located between setae *ti* and *ms*. Median pore (*mp*) is present. Pteromorpha (Fig. 23a) showing distinct median groove and radiating pattern; besides the pattern present numerous (more than 20) small grain-shaped structure; each "grain" well chitinized, pointed at tip and projection from the surface of pteromorpha. [Ventral side] Setae in genito-anal region very minute. Genito-anal chaetotaxy: 6–1–2–3. Adanal seta ad_3 situated near the level of mid-distance along the length of anal opening. Area porosa postanalis is present. [Type-series] Holotype (NSMT-Ac 9583): AMA–10; 14 paratopotypes: AMA–10.

The most characteristic feature of *G. granalata* is the presence of distinct grain-shaped projections scattered on pteromorphae, by which the new species is easily distinguishable from any other species of the genus *Galumna*.

Pergalumna amamiensis sp. n.
(Fig. 24)

540×390 μm. [Prodorsum] Whole surface densely and finely punctured. Setae *ro*, *le* and *in* comparatively strong, only *ro* being slightly roughened and the remaining setae smooth; *in*>*le*>*ro* in length. Sensillus glabrous, almost of the same thickness throughout its length, very slightly thickned distally. [Notogaster] Anterior margin slightly curved. Area porosa *Aa* wedge-shaped, the lateral end a little projecting anteriorly; A_1–A_3 oval. Lyrifissure *im* situated median or lateral to the line *ti-ms*. Median pore exists. Pteromorpha covered with fine striae and granules. [Ventral side] Genital plate with punctures of irregular shape which have a tendency to fuse with one another longitudinally; several longitudial wrinkles found near the median margin of the plate. Of 6 genital setae g_5 and g_6 inserted on the anterior margin and g_1 on the posterior margin. Anal plate sparsely covered with punctures distributed not uniformly. Adanal fissure *iad* located at a level posterior to Ad_3. Area porosa postanalis elliptic. [Type] Holotype (NSMT-Ac 9587): AMA–10.

Pergalumna elongata Engelbrecht, 1972 [28] from South Africa is similar to the new species in the shape of areae porosae, but its sensilli, lamellar and interlamellar setae are barbed and the body size is larger (648 μm in body length). Sensilli of *P. reniformis* Hammer, 1968 [29] from New Zealand are very similar in shape to those of the new species, but the New Zealand species has minute lamellar and interlamellar setae and shorter *Aa*.

REFERENCES

1 Aoki, J. (1965) A preliminary revision of the

family Otocepheidae (Acari, Cryptostigmata). I. Subfamily Otocepheinae. Bull. Natl. Sci. Mus. Tokyo, **8**: 259–341.

2 Aoki, J. (1967) A preliminary revision of the family Otocepheidae (Acari, Cryptostigmata). II. Subfamily Tetracondylinae. Bull. Natl. Sci. Mus. Tokyo, **10**: 297–359.

3 Aoki, J. (1970) New and interesting species of oribatid mites from Kakeroma Island, Southwest Japan. Acta Arachnol., **27**: 85–93.

4 Aoki, J. (1980) A revision of the oribatid mites of Japan. I. The families Phthiracaridae and Oribotritiidae. Bull. Inst. Environm. Sci. Technol. Yokohama Natl. Univ., **6**: 1–88.

5 Aoki, J. (1980) A revision of the oribatid mites of Japan. III. Families Protoplophoridae, Archoplophoridae and Mesoplophoridae. Proc. Jap. Soc. System. Zool., **18**: 5–16.

6 Aoki, J. (1982) New species of oribatid mites from the southwestern island of Japan. Bull. Inst. Environm. Sci. Technol. Yokohama Natl. Univ., **8**: 173–188.

7 Aoki, J. and Fujikawa, T. (1971) A new species of the genus *Allodamaeus* Banks (Acari, Gymnodamaeidae). Taxonomic notes on oribatid mites of Hokkaido. V. Annot. Zool. Japon., **44**: 113–116.

8 Balogh, J. (1968) New oribatids (Acari) from New Guinea. Acta Zool. Acad. Sci. Hung., **14**: 259–285.

9 Mahunka, S. (1977) Neue und interessante Milben aus dem Genfer Museum XXXIII. Recent data on the oribatid fauna of Greece (Acari: Oribatida). Rev. Suisse Zool., **84**: 541–556.

10 Balogh, J. and Mahunka, S. (1974) A foundation of the oribatid (Acari) fauna of Cuba. Acta Zool. Acad. Sci. Hung., **20**: 1–25.

11 Hammer, M. (1979) Investigations on the oribatid fauna of Java. Biol. Skr. Dan. Vid. Selsk., **22** (9): 1–79, 47 pls.

12 Aoki, J. (1981) Discovery of the second species of the genus *Nippobodes* from Ohsumi Islands (Acari: Oribatei). Bull. Biogeogr. Soc. Jap., **36** (4): 29–33.

13 Balogh, J. (1970) New oribatids (Acari) from Ceylon. The scientific results of the Hungarian Soil Zoological Expeditions. Opusc. Zool. Budapest, **10**: 33–67.

14 Csiszár, J. and Jeleva, M. (1962) Oribatid mites (Acari) from Bulgarian soils. Acta Zool. Acad. Sci. Hung., **8**: 273–301.

15 Higgins, H. G. and Woolley, T. A. (1975) New mites from the Yampa Valley (Acarina: Cryptostigmata; Oribatulidae, Passalozetidae). Great Basin Naturalist, **35**: 103–108.

16 Berlese, A. (1910) Brevi diagnosi di generi e specie nuovi di Acari. Redia, **9**: 77–111, pls. 1–8.

17 Corpuz-Raros, L. A. (1980) Philippine Oribatei (Acarina). V. *Scheloribates* Berlese and related genera (Oribatulidae), Kalikasan. Philipp. J. Biol., **9**: 169–245.

18 Hammer, M. (1971) On some oribatids from Viti Levu, the Fiji Islands. Biol. Skr. Dan. Vid. Selsk., **16** (6): 1–60, 35 pls.

19 Pletzen, R. van (1963) Studies on South African Oribatei (Acarina). Acarologia, **4**: 690–703.

20 Hammer, M. (1973) Oribatids from Tongatapu and Eua, the Tonga Islands, and from Upolu, western Samoa. Biol. Skr. Dan. Vid. Selsk., **20** (3): 1–70, pls. 1–29.

21 Corpuz-Raros, L. A. (1981) Philippine Oribatei (Acarina). IV. The genus *Peloribates* Berlese (Oribatuloidea, Haplozetidae). Philipp. Ent., **4**: 435–456.

22 Aoki, J. (1977) Two new *Peloribates*-species (Acari, Oribatida) collected from lichens growing on tomb stones in Ichihara-shi, Central Japan. Annot. Zool. Japon., **50**: 187–190.

23 Balogh, J. (1959) Oribates (Acari) nouveaux d'Angola et du Congo Belge (lère serie). Publ. cult. Co. Diam. Ang., Lisboa, (48): 91–108.

24 Balogh, J. (1972) The Oribatid Genera of the World. Akademiai Kiado, Budapest. pp. 1–188, pls. 1–71.

25 Harada, H. and Aoki, J. (1978) Oribatid mite communities under different vegetations in Oki Island. Bull. Inst. Environm. Sci. Technol. Yokohama Natl. Univ., **4**: 155–164.

26 Banks, N. (1895) On the Oribatoidea of the United States. Trans. Amer. Ent. Soc., **22**: 1–16.

27 Jacot, A. P. (1929) American oribatid mites of the subfamily Galumninae. Bull. Mus. Comp. Zool., **69**: 3–37, pls. 1–6.

28 Engelbrecht, C. M. (1972) Galumnids from South Africa (Galumnidae, Oribatei). Acarologia, **14**: 109–140.

29 Hammer, M. (1968) Investigations on the oribatid fauna of New Zealand with a comparison between the oribatid fauna of New Zealand and that of the Andes Mountains, South America. Part III. Biol. Skr. Dan. Vid. Selsk., **16** (2): 1–96, pls. 1–33.