

THE JAPANESE SPECIES OF THE GENERA *TRICHORIBATES* AND *DIAPTEROBATES* (ACARI : ORIBATIDA)

日本産ケタコバネダニ属
およびハシゴコバネダニ属の種について

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Synopsis

Three new species and one new subspecies of oribatid mites belonging to the genera *Trichoribates* and *Diapterobates* were found from the alpine zone of North and Central Japan. They are *Trichoribates rausensis* sp. n., *Trichoribates alpinus* sp. n., *Diapterobates japonicus* sp. n. and *Diapterobates variabilis honshuensis* subsp. n. The known species, *Diapterobates variabilis* HAMMER, previously reported from Hokkaido was found to be a new subspecies and was described under the name of *Diapterobates variabilis yezoensis*. The other two known species, *Diapterobates humeralis* (HERMANN) and *Diapterobates pusillus* AOKI, were also redescribed.

RLN (relative length to notogaster) values of prodorsal setae as well as their mutual distances were compared among the species as useful characters to separate the species of these of genera.

Oribatid mites of the genera *Trichoribates* and *Diapterobates* (family Ceratozetidae) belong to a group, whose classification is most difficult and only four species of *Diapterobates* have hitherto been reported from Japan. In the alpine and subalpine zones of Japan, however, they become rich in species and also often appear in great abundance.

Members of the genus *Trichoribates* have not been reported from Japan and the two new species described here are the first representatives of the genus in our country. The four known species of the genus *Diapterobates* from Japan are : *Diapterobates pusillus* AOKI from Shiga Heights, *D. variabilis* HAMMER and *D. humeralis* (HERMANN) from Hokkaido, and *D. izuensis* SUZUKI from Izu Peninsula. As the result of re-examination of these species, *D. variabilis* from Hokkaido should be dealt as a new subspecies of *D. variabilis*. Another new subspecies of *D. variabilis* was found in Central Japan. From the alpine zones of Mt. Hakusan and Mt. Senjo-ga-take a new species of *Diapterobates* was found. A redescription was given to *D. humeralis* and *D. pusillus*.

In the classification of these species, the author laid stress upon the relative length of body setae and their size relation. At the end of the present paper a trial was made to demonstrate the species diversity of these characters in several graphs. Leg-fin (thin plate-like appendage) on leg IV was found to be a useful feature distinguishing species from species.

The type-series is deposited in National Science Museum, Tokyo.

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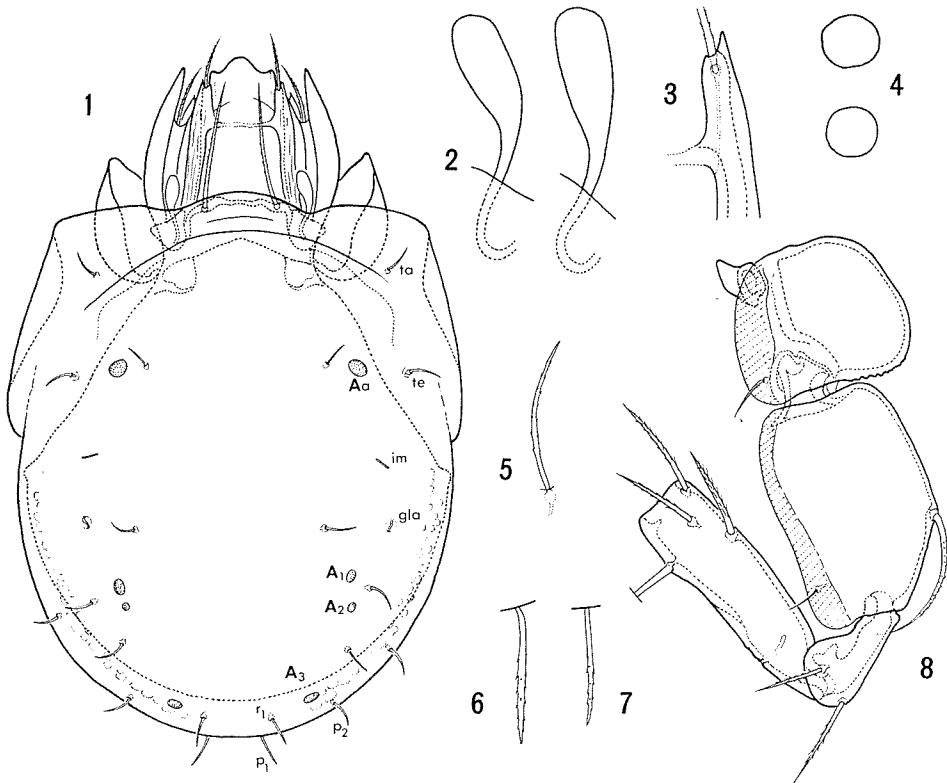
I. Description of Species and Subspecies

Trichoribates rausensis spec. nov.

(Figs. 1-8)

Measurement. Body length : 524 (538) 564 μ ; width : 332 (363) 420 μ .

Prodorsum : Rostral margin on each side bearing a distinct projection, which is the distal end of a ridge arising from under lamellar cusp. Lamellae narrow, nearly parallel to each other. Translamella is always present, but very weakly developed, light in color, being as thick as the basal portion of interlamellar seta. Lamellar cusps widely apart from each other, the width at basal part of lamellar cusp being about 1/2.5 of translamellar length ; length of lamellar cusp about 1/4-1/3 of exposed portion of lamella ; the tip of lamellar cusp provided with an outer dens (Fig. 3). In front of lamellar cusps, on the dorsal surface of rostrum, found a thin arched ridge crossing rostral ridges and being interrupted medially (the structure is well observed in crushed specimens). All the prodorsal setae distinctly barbed ; *la* sometimes a little longer and sometimes a little shorter than *ro* ; interlamellar seta *in* about 1.7 \times as long as *ro* or *la*, its insertion pore covered by anterior marginal part of notogaster.



Figs. 1-8 *Trichoribates rausensis* spec. nov. ——— 1: Dorsal 2: Sensillae. 3: Lamellar cusp (the right side). 4: Areae porosae *Aa*. 5: Anterior humeral seta *ta*. 6: Posterior seta *p*₁. 7: Posterior seta *p*₂. 8: Trochanter, femur and tibia of leg IV.

Pedotecta I with several teeth distally. Sensillus bearing an elongate clavate head slightly bending medially. Bothridium completely concealed under anterior part of notogaster.

Notogaster. Notogastral setae short and rather weakly barbed; setae *ta* and *te* a little longer than the other setae. Seta h_1 slightly longer than p_1 ; seta p_1 a little longer than p_2 . Mutual distance *ms*-*ms* somewhat wider than *ti*-*ti*; mutual distance p_1 - p_1 usually a little wider than h_1 - h_1 . Among 4 pairs of areae porosae, *Aa* is the largest; it looks like elliptical in dorsal aspect (Fig. 1), but its real shape is almost circular (Fig. 4); *A*₂ the smallest and sometimes missing, and situated very close to *A*₁.

Anogenital region. Genital opening a little wider than long. Genital plate with 6 fairly long and weakly barbed setae. Interspace between genital and anal openings nearly twice as long as genital opening. Mutual distance of aggenital setae somewhat smaller than the width of anal opening. Mutual distance of anterior anal setae (*an*₂) wider than that of posterior ones (*an*₁). Distance between *an*₁ and *an*₂ wider than the maximum width of anal plate. Adanal fissure *iad* situated in the level of *an*₂; adanal seta *ad*₃ inserted posterior to *iad*.

Legs. Tridactylous. Trochanter and femur of leg IV each with a plate-like appendage (leg-fin). No such a structure found on genu and tibia of leg IV.

Type-series. Holotype (NSMT-Ac 9249): Near the top of Mt. Rausu, Shari-machi, Hokkaido (SRE-1), 1660 m, 25-VI-1980, J. Aoki — 3 paratopotypes: the same data as holotype. — 25 paratypes: Mt. Rausu, Shari-machi, Hokkaido (SRE-6), 1295 m, 25-VI-1980, J. Aoki — 2 paratypes: Mt. Rausu, Shari-machi, Hokkaido (SRE-10), 1140 m, 25-VI-1980, J. Aoki. — 3 specimens (non typi): Murodo of Mt. Hakusan, Ishikawa-ken (KAN-9 and KAN-10), 2450-2490 m, 10-11-VII-1979, J. Aoki; 1 specimens (non typi): Mt. Senjo-ga-take, Yamanashi-ken (KOF-8), 2850 m, 23-VII-1978, J. Aoki & Harada; 5 specimens (non typi): Mt. Kiso-Komagatake, Nagano-ken (IID-2, 3, 7, 10 & 11), 2570-2740 m, 10-11-IX-1979, J. Aoki & H. Harada.

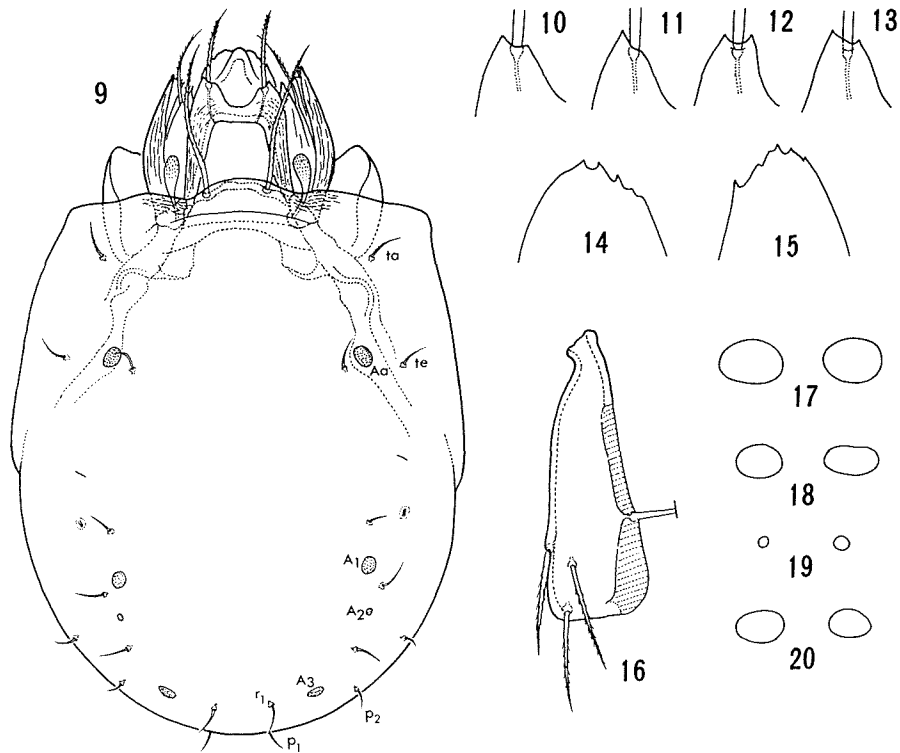
Remarks. The new species is readily distinguishable from most of the known species of *Trichoribates* by (1) the slender lamellae, (2) the lamellar cusps widely separated, (3) areae porosae *A*₂ small and situated close to *A*₁, and (4) short and thin notogastral setae. *T. lucens* (G. L. KOCH, 1879) seems to have narrow lamellae, but their cusps not so long as in *T. rausensis* and lamellar setae are far longer than those of *T. rausensis*.

***Trichoribates alpinus* spec. nov.**

(Figs. 9-20)

Measurement. Body length: 500(510)530 μ ; width: 330(340)360 μ .

Prodorsum. Rostrum with a distinct median elevation. Lamellae becoming broader distally and connected by a translamella which is twice as broad as chitinized median margin of lamella. Lamellar cusps broad, the median margins forming a converted U-shape together with anterior margin of translamella. Tip of lamellar cusp bearing always a short outer dens; an inner dens is present (Figs. 12-13) or absent (Fig. 11). Rostral setae a little longer than lamellar setae. Lamellar setae about 1.5 \times as long as their mutual distance. Interlamellar setae almost twice as long as lamellar setae. Bothridium completely concealed under the anterior part of notogaster. Sensillar head elongate oval and minutely barbed.



Figs. 9-20 *Trichoribates alpinus* spec. nov. — 9 : Dorsal. 10-13 : Lamellar cuspides (the left side). 14-15 : Tips of pedotecta I. 16 : Femur of leg IV. 17 : Areae porosae *Aa*. 18 : *A*₁. 19 : *A*₂. 20 : *A*₃.

Notogaster. All the notogastral setae short, thin and minutely barbed ; the anterior humeral seta (*ta*) is usually the longest, but difference in length from the remaining setae is small ; the ratio in length of *ta* to *te* : 0.96-1.56 (average 1.24) and that of *ta* to *p*₁ : 0.83-2.00 (average 1.24). Mutual distance *h*₁-*h*₁ sometimes longer, sometimes shorter than *p*₁-*p*₁. Area porosa *Aa* rounded oval (Fig. 17) ; *A*₁ elliptical or rounded oval, a little smaller than *Aa* (Fig. 18) ; *A*₂ rounded and very small (Fig. 19), situated close to *A*₁.

Anogenital region. Genital and anal openings a little wider than long. Interspace between both the openings nearly as long as anal opening. Adanal fissure *iad* situated in the level of anterior anal seta. Adanal seta *ad*₃ located posterior to *iad* and remote from *ad*₁ and *ad*₂.

Legs. Tridactylous ; the median claw distinctly thicker than the laterals. Trochanter, femur, genu and tibia of leg IV each bearing a leg-fin (a thin plate-like appendage) ; leg-fin on femur IV becoming broader distally in the same manner as in *Diapterobates variabilis honshuensis* (Fig. 33) ; leg-fin on genu IV very small.

Remarks. Having broad lamellar cusps, *Trichoribates latincisa* (EWING, 1909), *T. boletorum* (EWING, 1913) and *T. striatus* HAMMER, 1952, resemble the new species, *T. alpinus*. But, these 3 species have larger body size, longer notogastral setae and perhaps shorter interlamellar setae. The claws of legs IV of *T. alpinus* not equally thick as in *T. striatus*.

Type-series. Holotype (NSMT-Ac 9264): Tatamidaira of Mt. Norikura, Gifu-Ken, C. Japan (TYM-19), 2665 m, 10-X-1979, J. Aoki — 12 paratopotypes: the same data as holotype.

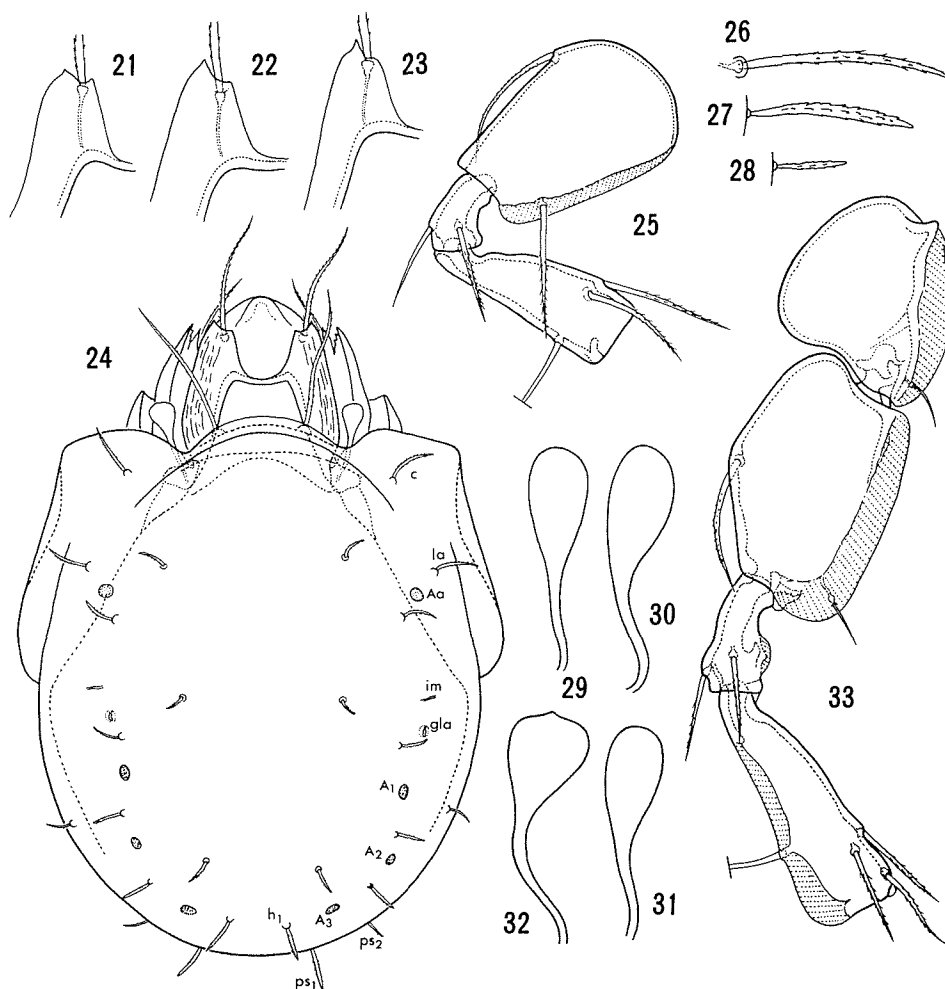
***Diapterobates variabilis honshuensis* subsp. nov.**

(Figs. 21-33)

Diapterobates sp. J: ITOH & AOKI, 1981, p. 149.

Measurement. Body length: 490-530 μ ; width: 320-342 μ .

Prodorsum. Lamellae broad, being always connected by a distinct translamella, which is as broad as median chitinized margin of lamella. Lemellar cusps almost as long as broad; their median margins together with translamella form a converted U-shaped arch. Tip of



Figs. 21-33 *Diapterobates variabilis honshuensis* subsp. nov. — 21-23: Lamellar cuspides. 24: Dorsal. 25: Femur, genu and tibia of leg III. 26: Anterior humeral seta *c*. 27: Posterior seta *ps*₁. 28: Posterior seta *ps*₂. 29-32: Sensillae. 33: Trochanter, femur, genu and tibia of leg IV.

lamellar cusp variable in shape (Fig. 21-23), bearing a sharp or rather blunt outer dens; the median corner of cusp a little pointed (Fig. 21), nearly rectangular (Fig. 22) or rounded (Fig. 23). Lamellar seta usually a little longer than rostral seta and a little shorter than the exposed portion of lamella. Interlamellar seta about $1.5\times$ as long as lamellar one, its insertion pore concealed under the anterior margin of notogaster. Sensillus seems to have a strongly swollen head in usual dorsal aspect (Figs. 24 & 32), but the real shape of the sensillar head is elongate oval as shown in Fig. 29-31.

Notogaster. Dark brown. Thirteen pairs of notogastral setae short, thick and barbed. Setae *c* are actually the longest setae among them, but not so markedly longer than the others; seta *c* only $1.1-1.3\times$ as long as posteriormost seta p_1 ; seta p_1 usually $1.2-1.4\times$ as long as p_2 . Setae of *p*-series often and also setae of *h*-series sometimes thickened as shown in Figs. 26-28. Seta h_1 usually slightly longer than half the mutual distance h_1-h_1 . Area porosa *Aa* nearly circular; A_1 larger in diameter than $1/2$ of *Aa*; area porosa A_2 sometimes very small (as small as insertion pore of notogastral setae) and difficult to find, being situated a little closer to A_1 than to A_3 .

Anogenital region. Size relation of genital and anal openings and arrangement of setae are almost the same as in the next subspecies. Distance ad_3-ad_3 about $3\times$ as long as ad_1-ad_2 .

Legs. Tridactylous; the median claw distinctly thicker than laterals. Trochanter, femur, genu and tibia of leg IV (Fig. 33) each bearing a leg-fin (a thin plate-like appendage); leg-fins on tibia IV and femur IV becoming broader distally and the anterior margin round; leg-fin on genu IV very small.

Type-series. Holotype (NSMT-Ac 9260): Near the top of Mt. Hakusan, Ishikawa-ken, C. Japan (KAN-2), 2490 m, 10-VII-1979, J. Aoki. — 10 paratopotypes: the same data as holotype.

***Diapterobates variabilis yezoensis* subsp. nov.**

(Figs. 34-36)

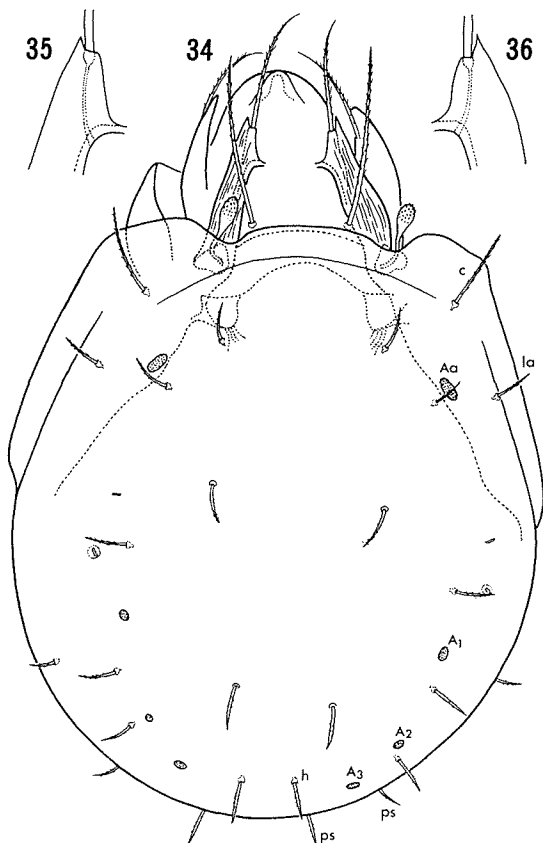
Diapterobates variabilis: FUJIKAWA, 1972, p. 167, fig. 63.

Measurement. Body length: 480μ ; width: 330μ

Prodorsum. Lamellar cusps comparatively narrow and widely apart from each other; each cusp with a distinct outer dens; inner dens is absent (Figs. 35-36). Translamella is absent. Rostral and lamellar setae almost equal in length. Interlamellar seta about $1.5\times$ as long as lamellar one. Insertion pores of interlamellar setae situated just in front of anterior margin of notogaster and not concealed under the latter. Sensillar head elongate oval, bearing minute barbs.

Notogaster. Thirteen pairs of notogastral setae barbed and rather blunt at tip. Anterior humeral seta (*c*) distinctly longer than (about twice as long as) the remaining notogastral setae. Setae h_1 slightly shorter than their mutual distance. Seta p_1 more than $1.5\times$ as long as p_2 . Area porosa *Aa* twice as long as broad, distinctly larger than the remaining areae porosae; the longer diameter of *Aa* more than twice as long as that of A_1 ; area porosa A_2 situated closer to A_3 than to A_1 .

Anogenital region. Genital opening a little wider than long. Interspace between genital



Figs. 34-36 *Dipterobates variabilis yezoensis* subsp. nov. ——— 34 : Dorsal. 35-36 : Lamellar cuspides.

Table 1 Comparison among subspecies and variety of *Dipterobates variabilis*.

	<i>D. variabilis variabilis</i> HAMMER, 1952	<i>D. variabilis</i> var. <i>allissimus</i> PIFFL, 1971	<i>D. variabilis</i> <i>honshuensis</i> subsp. nov.	<i>D. variabilis</i> <i>yezoensis</i> subsp. nov.
Body length (μ)	460-540	?	490-530	480
Translamella	present or absent	absent	present	absent
<i>Aa</i>	oval	circular	circular	oval
<i>in</i> (RLN)	< 35	> 40	< 35	< 35
<i>c</i> (RLN)	> 15	> 20	< 13	< 14
<i>la</i> (RLN)	> 13	> 16	< 8	< 11
<i>h_i</i> (RLN)	< 10	> 10	< 10	< 10
<i>le/le-le</i>	< 1.5	≈ 2	1.5 — 1.8	≈ 1.5
<i>in/in-in</i>	< 2	> 2.5	1.5 — 2.7	< 2
<i>c/ps_i</i>	> 1.5	> 1.5	< 1.5	> 1.5
Distribution	Alaska	Himalaya	Japan (Honshu)	Japan (Hokkaido)

and anal openings slightly longer than the width of anal opening. Mutual distance of aggenital setae about $3/4$ as long as the width of anal opening. Anterior anal setae (an_2) and adanal fissures (iad) situated on the same level. Distance ad_2 - ad_3 twice or more than twice as long as ad_1 - ad_2 .

Legs. Tridactylous. The median claw slightly thicker than the lateral ones.

Type-series. Holotype (NSMT-Ac 9259): Nonaka in Ashoro-gun, Hokkaido, N. Japan, 11-XI-1968, T. Fujikawa.

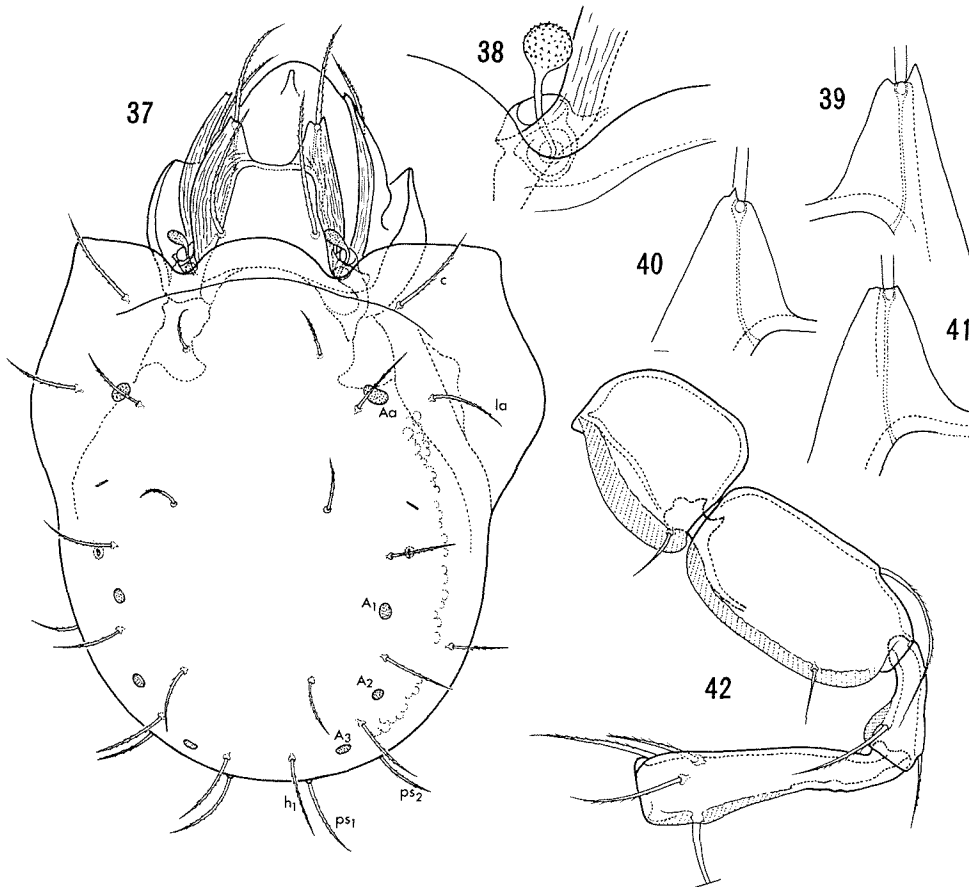
***Diapterobates japonicus* spec. nov.**

(Figs. 37-42)

Diapterobates sp. H : AOKI & HARADA, 1979, p. 144.

Measurement. Body length : 570-585 μ ; width : 345-370 μ .

Prodorsum. Rostrum with an inconspicuous dorsal projection not extending beyond the anterior margin of rostrum. Lamellae fairly broad, connected by a distinct translamella. Lamellar cusp with an outer dens and a small inner dens (Fig. 39); the inner dens is absent on



Figs. 37-42 *Diapterobates japonicus* spec. nov. — 37: Dorsal. 38: Bothridium and sensillum (the left side). 39-41: Lamellar cuspids. 42: Trochanter, femur, genu and tibia of leg IV.

the left lamellar cusp in the specimen from Mt. Hakusan (Fig. 40) and both the lamellar cusps lacking in dens in the specimen from Mt. Senjo-ga-take (Fig. 41). Rostral seta subequal in length to lamellar seta. Interlamellar seta $1.25-1.28\times$ as long as lamellar seta, its insertion pore being situated in front of notogastral margin. Bothridium mostly or completely uncovered by the anterior marginal part of notogaster. Sensillus short, its head being elongate oval and minutely barbed.

Notogaster. Anterior margin has a pair of deep notches, allowing bothridia to be mostly or completely exposed. Pteromorphae markedly developed and well expanded laterad. Notogastral setae long and barbed. Anterior humeral seta the longest, RLN : 17-20 ; even posterior setae of ps - and h -series show the value of RLN larger than 10 ; ps_1 (RLN : 12.5-14.5) a little longer than h_1 (RLN : 10.3-13.4). Difference in length between c and ps_1 not large, the ratio c/ps_1 being 1.32-1.35 ; the ratio c/la 1.15-1.22. Areae porosae oval ; Aa the largest and A_2 the smallest ; but in one specimen examined, the left A_3 longer than Aa .

Anogenital region. Genital opening a little wider than long. Anal opening only slightly wider than long. Interspace between both the openings $1.43-1.44\times$ as long as anal opening. Mutual distance of aggenital setae equal to the length of anal opening.

Legs. Tridactylous ; the median claw slightly thicker than the laterals. Leg IV (Fig. 42) bears a leg-fin on trochanter, femur, genu and tibia ; leg-fins on tibia and femur very narrow ; leg-fin on trochanter a little broader and that on genu short, being attached only distal half of genu.

Type-series. Holotype (NSMT-Ac 9270) : Murodo of Mt. Hakusan, Ishikawa-ken, C. Japan [KAN-3], 2520 m, 10-VII-1979, J. Aoki. — 1 paratype : Mt. Senjo-ga-take, Yamanashi-ken, C. Japan [KOF-16], 2300 m, 23-VII-1978, J. Aoki. — 1 specimen (non typus) : Mt. Kiso-komagatake, Nagano-ken [IID-41], 10-IX-1979, J. Aoki & H. Harada.

Remarks. Having prominent notogastral setae, *Diapterobates notatus* (THORELL, 1871) has a resemblance to the new species, but the bothridia are completely concealed under the anterior part of notogastral shield and the interlamellar as well as notogastral setae are longer than those of the new species. *D. variabilis* HAMMER, 1955, var. *altissimus* PIFFL, 1971 has also prominent body setae, but this Himalayan form has almost circular areae porosae Aa , longer interlamellar setae and no translamella.

***Diapterobates humeralis* (HERMANN)**

(Figs. 43-46)

Notaspis humeralis HERMANN, 1804, p. 94, pl.4, figs. 5.

Sphaerozetes numerosus SELLNICK, 1924, p. 67, figs. 2-5.

Murcia numerosa : SELLNICK, 1928, p. 11.

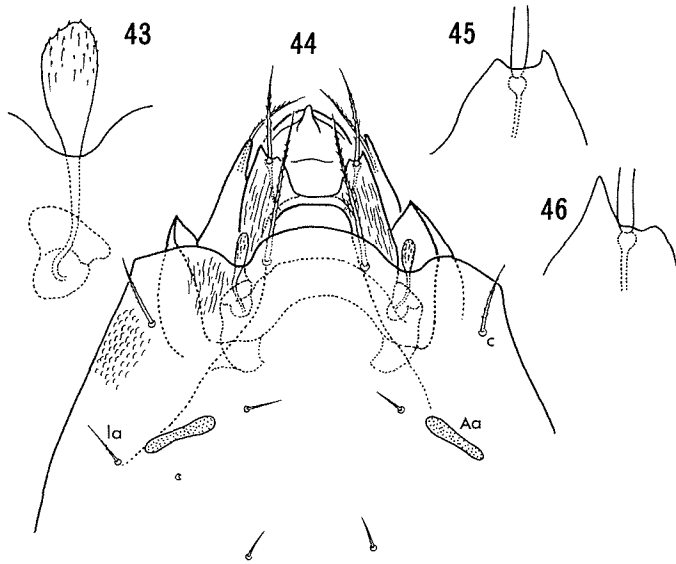
Trichoribates numerosus : WILLMANN, 1931, p.16, fig. 274 ; HAMMER, 1952, p. 50, fig. 79.

Diapterobates humeralis : GRANDJEAN, 1936, p. 77, fig. 8A ; SHALDYBINA, 1965, p. 59, figs. 1-10 ; FUJIKAWA, 1970, p.

72 ; 1972, p. 166, fig. 62 ; PÉREZ-ÍÑIGO, 1972, p. 297, fig. 39.

Diapterobates sp. D : AOKI & HARADA, 1979, p. 144.

Measurement. Body length : 700μ ; width : 520μ .



Figs. 43-46 *Dipterobates humeralis* (HERMANN) ——— 43 : Sensillus and bothridium. 44 : Anterior half of dorsal side. 45-46 : Lamellar cuspides.

Prodorsum. Rostrum with a marked horny projection. Lamellae broad and connected by a distinct translamella. Lamellar cusp bearing a sharp outer dens and inconspicuous inner dens (Figs. 45-46). Rostral seta longer than lamellar seta and shorter than interlamellar seta. Lamellar setae a little longer and interlamellar setae far longer than their mutual distances. Insertion pore and basal portion of intrerlamellar seta concealed under the anterior marginal part of notogaster. Sensillar head elongate oval and weakly barbed (Fig. 43).

Notogaster. Notogastral setae barbed. Anterior humeral seta (*c*) 1.5-1.6× as long as posterior humeral seta (*la*) and nearly 3× as long as posterior setae (*p* and *h*). Setae *p*₁ and *h*₁ far shorter than their mutual distance. Area porosa *Aa* much elongate, being about 5× as long as wide, and 2.8-3.7× as long as *A*₁; areae porosae *A*₁, *A*₂ and *A*₃ subequal in size.

Anogenital region. Genital opening slightly wider than long. Genital setae *g*₁ and *g*₂ equally distant from the median margin of genital plate. Mutual distance of aggenital setae slightly shorter than the width of anal opening. Adanal fissure (*iad*) and anteriormost adanal seta *ad*₃ situated close together, distance between insertion pore of *ad*₃ and posterior end of *iad* being shorter than the length of *iad*. The posteriormost adanal seta *ad*₁ twice as long and thick as the other adanal setae.

Material examined. 1 ex. : Nopporo in Hokkaido, N. Japan, 26-V-1967, T. Fujikawa.

Distribution. Europe, Canada and Japan (Hokkaido and Honshu).

***Dipterobates pusillus* AOKI, 1969**

(Figs. 47-53)

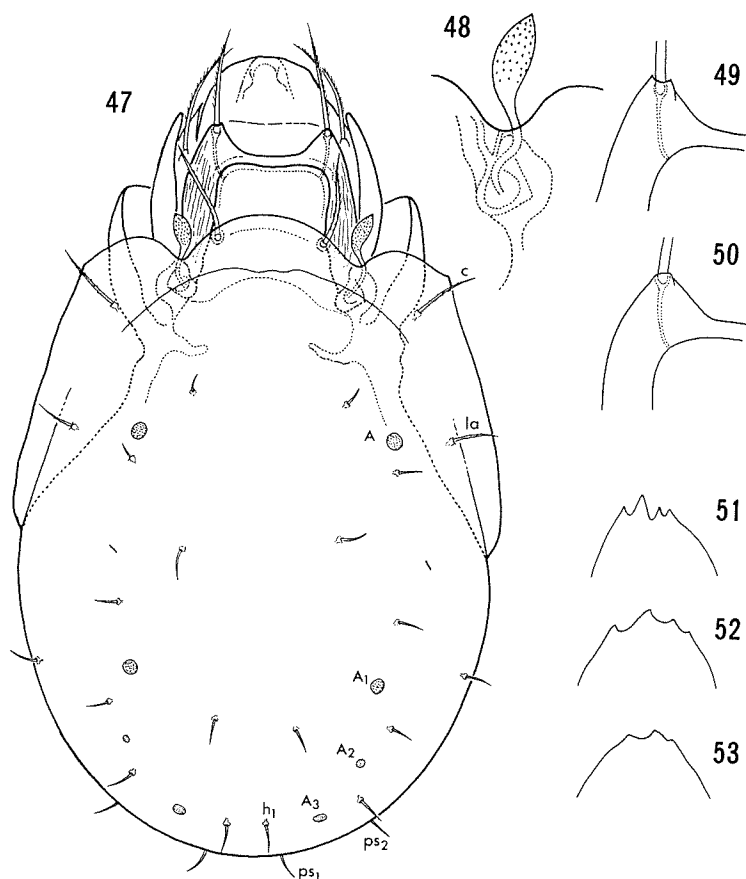
Dipterobates pusillus AOKI, 1969, p. 136, figs. 40-41, fig. 64 ; 1977, p. 213, fig. 118 ; 1980, p. 479, fig. 227-A ; FUJIKAWA, 1972, p. 167, fig. 64.

Measurement. Body length : 370-420μ; width : 215-250μ.

Supplement to the original description. Body color light yellowish brown. Rostral seta usually a little longer than lamellar seta. Interlamellar seta subequal to or slightly longer than lamellar seta. Lamellar setae usually only slightly longer than their mutual distance. Lamellar cusps broad and triangular, widely separated from each other. Tip of lamellar cusp without dens (Fig. 50) or sometimes with a tiny outer or inner dens (Fig. 49). The holotype specimen bears 14 setae on the left side and 13 setae on the right side of notogaster. However, all the 8 specimens examined this time bear 13 setae on each side. Anterior humeral seta (*c*) distinctly longer than the other setae, being 1.6-1.7× as long as seta *la* and about twice as long as seta *ps*₁. All the notogastral setae weakly barbed. Femur, genu and tibia of leg IV without leg-fin; only trochanter IV with very narrow leg-fin.

Material examined. 18 exs. : Mt. Norikura, Gifu-ken, C. Japan [TKM-24], 2420 m, 10-X-1979, J. Aoki.

Distribution. Japan (Hokkaido and Honshu).



Figs. 47-53 *Diapterobates pusillus* AOKI. —47: Dorsal. 48: Sensillus. 49-50: Lamellar cusps (the left side). 51-53: Tips of pedotecta I.

Diapterobates izuensis SUZUKI

Diapterobates izuensis SUZUKI, 1971, p. 13, figs. 1-19 ; AOKI, 1980, p. 479, fig. 227-B.

This species is very characteristic in having very minute notogastral setae and areae porosae *Aa* divided into two parts. Most of the Japanese *Diapterobates* species are distributed in the alpine and the subalpine zones, but *D. izuensis* is found in the warm-temperate zone.

Key to the Japanese Species of the Genus *Diapterobates*

1. Translamella is absent. Body length about 480 μ *D. variabilis yezoensis* subsp. n.
—Translamella is present 2
2. Sensillar head spindle-shaped ; lamellar cusp short, nearly as long as wide. Body length 370-420 μ *D. pusillus* AOKI, 1969
—Sensillar head oval ; lamellar cusp longer than wide 3
3. Median margin of lamellar cusps strongly convex ; notogastral setae very minute, RLN of the longest seta smaller than 2. Body length 600-690 μ *D. izuensis* SUZUKI, 1971
—Median margin of lamellar cusps nearly straight ; notogastral setae well developed, RLN of the longest setae larger than 5 4

Table 2 Length(RLN) and ratio of body setae and their mutual distances
in some species of the genera *Trichoribates* and *Diapterobates*.

		<i>T. rausensis</i>	<i>T. alpinus</i>	<i>D. variabilis</i>	
				<i>variabilis</i> *	<i>altissimus</i> *
<i>ro</i>		12.6(16.3)18.8	14.5(16.8)18.1	20.9—26.8	17.9
<i>le</i>		12.6(14.9)17.4	14.8(16.3)16.9	19.8—25.6	22.5
<i>in</i>		26.4(27.8)29.6	28.6(29.4)30.7	29.9—31.4	41.4
<i>ta, c</i>		5.5(6.9)8.4	6.0(7.0)8.4	16.3—19.8	22.9
<i>ta, la</i>		4.6(6.2)7.1	4.8(5.8)7.0	13.2—14.0	16.4
<i>r₁, h₁</i>		4.4(6.4)7.4	3.6(5.6)6.1	8.8	11.4
<i>p₁, ps₁</i>		4.8(6.1)7.1	4.2(5.7)7.1	7.7—9.3	10.0
<i>p₂, ps₂</i>		3.9(5.5)6.5	2.4(4.5)5.7	6.2—7.7	8.6
<i>le—le</i>		9.6(11.4)13.0	9.8(10.6)11.9	15.4—16.3	11.4
<i>in—in</i>		10.9(13.0)14.4	10.8(11.7)12.7	17.7—18.7	15.0
<i>r₁—r₁, h₁—h₁</i>		8.2(9.8)13.2	8.3(10.4)12.5	10.3—16.3	8.2
<i>p₁—p₁, ps₁—ps₁</i>		9.3(10.2)12.6	9.8(10.9)12.1	18.6—23.1	10.0
<i>le/le—le</i>		1.11(1.33)1.82	1.45(1.55)1.65	1.29—1.57	1.97
<i>in/in—in</i>		1.84(2.48)2.60	2.29(2.58)2.83	1.60—1.78	2.76
<i>r₁/r₁—r₁, h₁/h₁—h₁</i>		0.33(0.66)1.15	0.35(0.56)0.71	0.54—0.85	1.39
<i>p₁/p₁—p₁, ps₁/ps₁—ps₁</i>		0.48(0.61)0.75	0.35(0.53)0.69	0.33—0.50	1.00
<i>p₁/p₂, p₁/ps₂</i>		1.00(1.10)1.28	0.88(1.34)1.75	1.21—1.25	1.17
<i>ta/te, c/la</i>		0.87(1.06)1.20	0.96(1.24)1.56	1.17—1.50	1.39
<i>ta/p₁, c/ps₁</i>		1.00(1.15)1.30	0.95(1.24)2.00	1.75—2.57	2.29

* Calculated from the figures in the original descriptions

4. Areae porosae *Aa* long, about 5× as long as wide. Body length about 700μ
*D. humeralis* (HERMANN, 1804)
 —Areae porosae *Aa* rounded5
5. Notogastral setae long, anterior humeral seta (*c*) subequal in length to the distance between *c* and *la*; areae porosae *Aa* oval. Body length 570–585μ*D. japonicus* sp. n.
 —Notogastral setae short, anterior humeral seta (*c*) far shorter than the distance between setae *c* and *la*; areae porosae *Aa* circular. Body length 490–530μ
*D. variabilis honshuensis* subsp. n.

II. Relative Length of Body Setae and Their Mutual Distances

In the oribatid taxonomy, length of body setae is often used as an important feature distinguishing species from species. As a general tendency, body setae of the same species become longer in proportion to body size. It is obvious that the relative length of the setae to body size is more significant as a taxonomical character than the absolute length in μ. In this regard, Aoki (1965) proposed to use "relative length of the setae to notogaster" and called the value RLN :

$$RLN = \frac{\text{setal length}}{\text{notogastral length}} \times 100$$

<i>D. variabilis</i>		<i>D. japonicus</i>	<i>D. humeralis</i>	<i>D. pusillus</i>	<i>D. izuesis</i>
<i>honshuensis</i>	<i>yezoensis</i>				
14.0(17.8)22.4	20.4	20.7–22.7	16.9–19.6	18.7(20.3)22.5	13.3–13.8
18.0(19.5)22.1	19.8	21.7–22.7	15.0–17.7	16.4(18.7)22.5	14.9–15.8
27.9(30.0)33.5	29.3	27.2–29.1	23.8–23.9	16.4(19.5)23.3	17.2–18.1
8.1(9.9)12.4	12.7–13.4	16.9–19.2	9.2–11.3	8.4(10.2)11.5	1.2–1.6
7.1(7.3)7.5	10.8	11.9–15.7	6.9–7.1	5.2(6.0)6.7	0.8–1.0
5.3(6.3)7.1	7.3	10.3–13.4	4.0–6.2	4.2(4.6)5.3	1.5–1.7
6.2(7.7)8.7	7.3	12.5–14.5	4.2–5.4	4.1(4.9)5.3	1.4–1.6
4.2(4.7)5.3	4.5	8.2–11.1	3.8–5.2	3.6(4.2)4.7	1.2–1.6
10.0(12.3)14.3	13.4	15.7–15.8	12.9–14.6	14.9(16.5)18.07	12.2–12.6
12.4(15.7)18.9	16.2	17.9–18.3	13.5–14.2	14.9(16.7)18.0	15.5–16.5
7.5(10.2)12.4	8.6	11.3–13.6	12.3–15.4	3.7(5.8)6.7	5.8–6.2
9.9(14.9)19.3	15.9	15.1–15.2	10.8–14.6	9.7(11.2)12.1	8.5–12.1
1.45(1.62)1.76	1.48	1.38–1.44	1.16–1.21	1.05(1.14)1.42	1.22–1.25
1.46(1.92)2.70	1.80	1.52–1.59	1.68–1.77	1.00–1.42	1.10–1.11
0.53(0.65)0.96	0.85	0.76–1.18	0.26–0.50	0.67(0.83)1.12	0.24–0.30
0.45(0.58)0.64	0.46	0.82–0.96	0.37–0.38	0.39(0.44)0.49	0.10–0.19
1.21(1.47)2.06	1.64	1.32–1.35	1.04–1.11	1.00(1.17)1.24	1.00–1.25
1.08(1.37)1.74	1.26	1.15–1.22	1.33–1.59	1.61(1.69)1.73	1.11–2.00
1.13(1.29)1.43	1.83	1.32–1.35	1.71–2.70	1.94(2.09)2.17	0.80–1.00

In some oribatid species propodosoma and hysterosoma are hinged movably to allow the propodosoma bending downward or extending forward, so that measurement of the total body length may vary according to different conditions. This is the reason for that the notogastral length (not the total body length) was adopted in calculating the relative length of setae.

In the course of taxonomical study of the genera *Trichoribates* and *Diapterobates* in Japan the following features were found to be useful distinguishing characters: (1) RLN of body setae. (2) RLN of mutual distance of body setae. (3) Ratio of body setae to their mutual distance. (4) Ratio of a certain seta to another seta. Among the body setae the propodosomal setae (*ro*, *le* and *in*), the long humeral setae (*ta* and *te*; *c* and *la*) and the short posterior setae (*r*₁, *p*₁ and *p*₂; *h*₁, *ps*₁ and *ps*₂) were selected for the measurement in the present paper. The result of the measurements on the Japanese species and two foreign forms is shown in Table 2. The values on the body setae of *Diapterobates variabilis variabilis* HAMMER, 1952 and *D. variabilis* var. *altissimus** PIFFL, 1971 may be somewhat underestimated, because I made the measurement on the printed figures of their original descriptions.

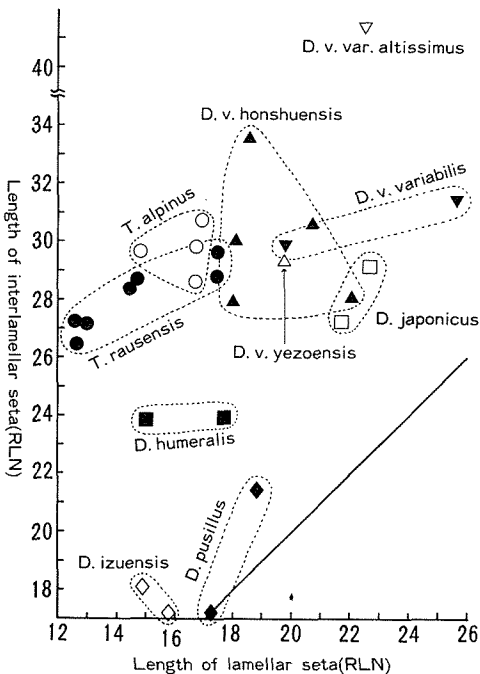


Fig. 54 RLN values and size relations of interlamellar setae and lamellar setae; the oblique line in the graph indicates the ratio of 1 : 1.

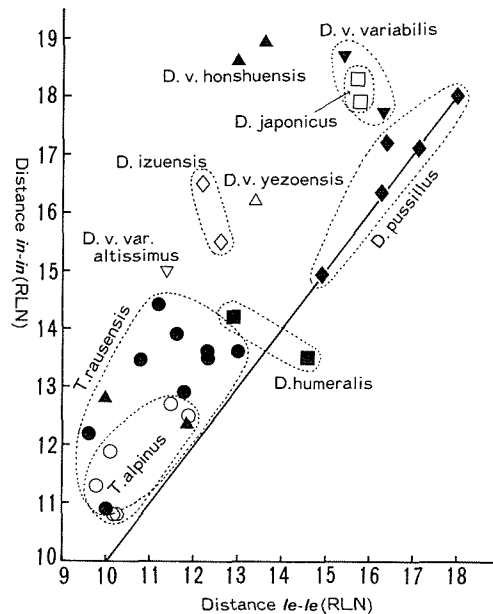


Fig. 55 RLN values and size relations of mutual distances of interlamellar setae and those of lamellar setae.

* PIFFL (1971) mentioned this form with the term "nov. var." in the heading of his original description. But, at the end of his paper and in the caption of his figure (p. 48) he mentioned it with the term "nov. sspec." and "nov. ssp." meaning a new subspecies. Although there is a problem in dealing the form as variety or subspecies, "variety" was adopted in the present paper, laying stress upon the heading and "neue Varietät" in his description. If the form is considered a subspecies, the name of the author and the date of publication must be changed.

Figs. 54-57 show relation between some pairs of these values. Fig. 54 shows that (1) the interlamellar setae of the *Trichoribetes* species are medium long (RLN : 26-30) and very similar to those of most *Diapterobates* species, but their comparative length to the lamellar setae is very long, (2) on the contrary, the interlamellar setae and the lamellar setae of *D. pusillus* are not so different in length. Fig. 55 shows that the mutual distance of *in* and that of *le* are both short in *Trichoribetes* species and they are both long in *D. variabilis variabilis*, *D. japonicus* and *D. pusillus*. In the case of *D. pusillus* the ratio of *in-in* to *le-le* mostly 1. *D. variabilis honshuensis* shows a large variety in this relationship. Figs. 56 and 57 show that the three forms (*D. variabilis* var. *altissimus*, *D. variabilis variabilis* and *D. japonicus*) occupy positions widely separated from the remaining forms. In Fig. 56, *D. humeralis* and *D. variabilis honshuensis* occupy the same area in the graph, but they are distinctly separated from each other in Fig. 57.

Such a method of graphic analysis was found to be useful to distinguish *Diapterobates* species. In the case of the two Japanese *Trichoribetes* species, however, the ranges of their positions in the graphs are always overlapping and this analysis was unsuccessful for their segregation.

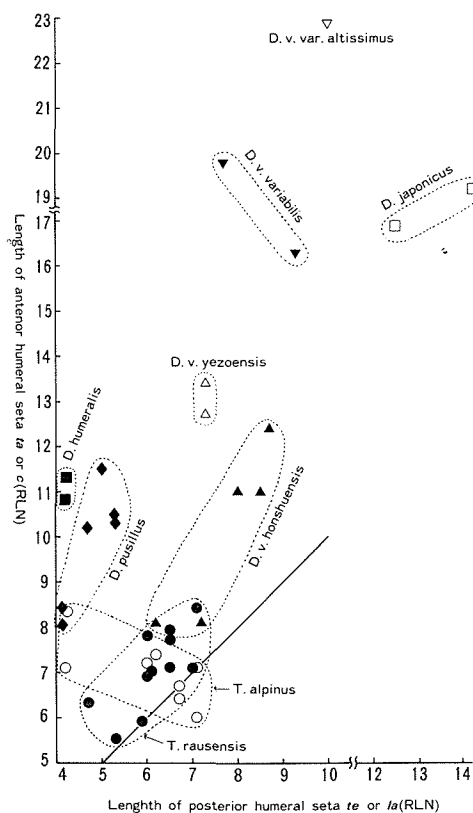


Fig. 56 RLN values and size relations of anterior humeral setae and posterior humeral setae.

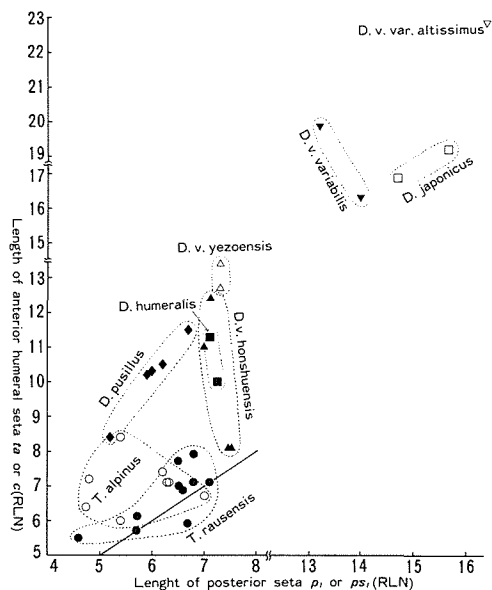


Fig. 57 RLN values and size relations of anterior humeral seta and posterior setae *p*, or *ps*.

摘 要

日本の北部や高山帯から亜高山帯にかけては、ケタコバネダニ属(新称) *Trichoribates* およびハシゴコバネダニ属 *Diapterobates* に属するササラダニ類の種が多く生息し、しばしば土壤ササラダニ群集の優占種となっている。しかし、その分類学的研究はおこなわれておらず、わずかに4種の種名が確定しているにすぎない。本報告では羅臼岳(北海道)、乗鞍岳(岐阜県)、仙丈ヶ岳(山梨県)、白山(石川県)などから得られた標本に基づき、ラウスコバネダニ(新称) *Trichoribates rausensis* spec. nov., タカネコバネダニ(新称) *T. alpinus* spec. nov., ホンシュウコバネダニ(新称) *Diapterobates variabilis honshuensis* subsp. nov., ケ

ナガコバネダニ(新称) *D. japonicus* spec. nov. などの新種・新亜種を記載し、同時にモンナガコバネダニ(新称) *D. humeralis* (HERMANN) およびチビコバネダニ *D. pusillus* AOKI の再記載を行なった。また、北海道から知られていた *D. variabilis* HAMMER は新亜種とし、エゾコバネダニ(新称) *D. variabilis yezoensis* subsp. nov. と命名した。

本研究では体毛の毛長や毛間距離の後体部背板比長(RLN)(後体部背板の長さを100としたときの相対長)を種を識別する場合の特徴として重視し、更にそれらの値の二つの組合せを種間で比較するためにグラフ上に示す方法を試み、これによって一層種の特徴を握りうるようになった。

References

- Aoki, J., 1965. A preliminary revision of the family Otocephleidae (Acari, Cryptostigmata). I. Subfamily Otocephleinae. *Bull. Natn. Sci. Mus., Tokyo*, 8 : 259-341.
- 1969. Taxonomic investigation on free-living mites in the subalpine forest on Shiga Heights IBP area. III. Cryptostigmata. *Ibid.*, 12 : 117-141.
- 1977. Identification of oribatid genera from Japan. In : Sasa, M. & J. Aoki (ed.), Contribution to Acarology in Japan. Zukan-no-Hokuryukan, Tokyo, 602 pp.
- 1980. Cryptostigmata. In : Ehara, S. (ed.), Illustrations of the Mites and Ticks of Japan. Zenkoku Noson Kyoiku Kyokai, Tokyo, 562 pp.
- Aoki, J. & H. Harada, 1979. Vertical distribution of oribatid mites on Mt. Senjo, Central Japan. *Mem. Natn. Sci. Mus.*, (12) : 139-149. (In Japanese, with English summary)
- Ewing, H. E., 1909. New American Oribatoidea. *J. N. Y. Ent. Soc.*, 17 : 116-136, pls. 2-6.
- 1913. New Acarina. *Bull. Amer. Mus. Nat. Hist.*, 32 : 93-121.
- Fujikawa, T., 1970. Relation between oribatid fauna and some environments of Noppo National Forest in Hokkaido (Acarina : Cryptostigmata). II. Oribatid fauna in soils under four different vegetations. *Appl. Ent. Zool.*, 5 : 69-83.
- 1972. A contribution to the knowledge of the oribatid fauna of Hokkaido (Acari : Oribatei). *Ins. Mats.*, 35 : 127-183.
- Grandjean, F., 1936. Les oribates de Jean Frédéric Hermann et de son père. *Ann. Soc. Ent. Fr.*, 105 : 27-110.
- Hammer, M., 1952. Investigations on the microfauna of northern Canada. Part I. Oribatidae. *Acta Arct.*, (4) : 3-108.
- 1955. Alaskan oribatids. *Ibid.*, (7) : 3-36.
- Hermann, J. F., 1804. Mémoire Aptérologique. Strassbourg.
- Itoh, H. & J. Aoki, 1981. Oribatid communities in the alpine zone of Mt. Hakusan. *Bull. Inst. Envir. Sci. Techn. Yokohama Natn. Univ.*, 7 : 145-153. (In Japanese, with English summary)
- Pérez-Íñigo, C., 1972. Ácaros oribátidos de suelos de España peninsular e Islas Baleares (Acari, Oribatei). *"Eos", Rev. Españ. Ent.*, 47 : 247-333.
- Piffel, E., 1971. Neue Oribatiden (Acari) aus dem Himalaya. *Khumbu Himal*, 4 : 23-54.
- Sellnick, M., 1924. Oribatiden. In : A. Dampf, Zur Kenntnis der estländischen Hochmoorfauna. *Sitz.-ber. Naturf.*

- Ges. Dorpat*, 31 : 65-71
- 1928. Formenkreis Hornmilben, Oribatei. In : P. Brohmer, Die Tierwelt Mitteleuropas, 3 : 1-42.
- Suzuki, K., 1971. Some new species of oribatid mites from the Izu Peninsula. II. *Diapterobates izuensis* sp. n. *Bull. Biogeogr. Soc. Jap.*, 27 (3) : 13-18.
- Thorell, T., 1871. Om Arachnider från Spitzbergen och Beeren-Eiland. *Öfvers. Kongl. Vet. Akad. Förh.*, 28 : 683-702.
- Willmann, C., 1931. Moosmilben oder Oribatiden (Cryptostigmata). In : Dahl, Die Tierwelt Deutschlands, 22 : 79-200.