Damaeid Mites (Acari: Oribatei) from the Kushiro Wetland of Hokkaido, North Japan (I)

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ABSTRACT

A new oribatid mite of the family Damaeidae is described from Hokkaido, north of Japan under the name of *Damaeus ainu*. This species is related to *Damaeus arvernensis* Grandjean, 1960 in having a vestigial seta *d* coupled with solenidion on tibiae of legs II-IV and opening of humeral organ in lateral region of the podosoma, but the former is distinguishable from the latter mainly by numerical formulae of setae on epimera and legs.

Key words: *Damaeus ainu*, Japan, new species, Oribatida

In the course of faunal and ecological study on the oribatid mites of the Kushiro Wetland, a new species of the family Damaeidae was collected from bark of a decayed tree, litter and moss and is described here. This species is named *Damaeus ainu* sp. n. after the Ainu, the aboriginal inhabitants of the northern Japan.

DESCRIPTION

Damaeus ainu sp. n.

(Figs.1-5)

Type series: Holotype (NSMT-Ac 10827): Male, Kirakotan in the Kushiro Wetland, Hokkaido, 11-XII-1995, J. Aoki and Y. Suma; 3 paratypes (NSMT-Ac 10828 to 10830): 1 male and 2 females, the same data as holotype. The type series is preserved in the collection of Department of Zoology, National Science Museum, Tokyo.

Measurements: Ventral length (from rostral tip to posterior end of ventral plate): female (n=4) 803 μ m (range 790-826); male (n=6) 761 μ m (742-798). Notogastral width: female 612 μ m (range 588-659); male 541 μ m (520-568). Sex of mites was determined by the genital organ.

Prodorsum (Fig.1A): Width at level of acetabulum II 0.66 times notogastral width. Propodolateral apophysis (*p*) present, directed anterolaterad in dorsal aspect. Tubercles *Da* and *Ba* broadly rounded, sometimes truncate, directed posteriad and laterad, respectively. Tubercles *Bp* well developed, with mutual distance wider than that of *Ba*. Opening of humeral organ found in lateral region of podosoma approximately above the base of the leg

II (Fig.4C), its cuticular region being invaginated obviously and surrounded by a ridge slightly projecting posterolaterad (Fig.4D); this opening not easily recognized in light microscopic investigation. Setae *ro* (about $118\ \mu\text{m}$) and *le* (about $176\ \mu\text{m}$) attenuating, with distinct barbs. Seta *ex* very short (about $23\ \mu\text{m}$) and hidden by bothridium in dorsal aspect. Sensillus (*ss*) about $209\ \mu\text{m}$, straight, tapered but not flagellate, often broken at tip, with fine barbs except in proximal one-fourth.

Notogaster: Outline nearly circular in dorsal view. A distinct longitudinal groove found between pair of setae *c*₁ (Figs.4A and B). Spinae adnatae (*sa*) about $50\ \mu\text{m}$, directed anteroventrad, pointed distally, but not so sharply, with mutual distance almost equal to that of prodorsal tubercles *Ba*, and to that of setae *c*₂. Notogastral setae of *c*-, *l*- and *h*-series distinctly barbed; setae *c*₁ and *c*₂ light brown, almost equal in length ($58\text{--}59\ \mu\text{m}$), longer than setae of *l*-series ($46\text{--}56\ \mu\text{m}$); setae of *h*-series the shortest ($38\text{--}41\ \mu\text{m}$), strongly curved; setae of *l*- and *h*-series almost colorless. Seta *la* located rather posteriorly, *lp* inserted at the level of latro-opisthosomal gland (*gla*). Setae of *ps*-series barbed, strongly directed laterally; *ps*₁ (about $46\ \mu\text{m}$) slightly shorter than *ps*₂ and *ps*₃ (about $50\ \mu\text{m}$).

Ventral region (Fig.1B): Enantiophysis *E2p* present as a small tubercle; a chitinous ridge present instead of enantiophysis *E2a*. Propodoventral (*V*) and parastigmatic (*S*) enantiophyses well developed: tubercle *Va* truncated; *Vp* rather broad, evenly rounded, bearing seta *3b*; *Sa* triangular, projecting laterad, with a narrowly rounded tip; *Sp* quadrate.

Fig.1. *Damaeus ainu* sp. n. A: Dorsal view, B: Ventral view, C: Seta *1c* of epimeria I.

Discidium (*di*) broad, distally rounded. Coxisternal setation 3-1-3-4, setae *1a*, *1c*, *2a* and *3a* very short, smooth (Fig.1C); other setae attenuate with sparse barbs. Genital, anal, aggenital and adanal setae attenuate, smooth or very sparsely barbed; the anteriormost genital seta (*g*₁) markedly longer than the remaining genital setae, about 1.4 times as long as the latter. Genital plate with numerous light spots in posterior half. Adanal fissure (*iad*) located in front of adanal seta *ad*₃.

Legs (Fig.2): Relative length of legs I-IV (leg I as 1.00) I(1.00): II(0.79): III(0.96): IV(1.47). Leg IV approximately 1.9 times as long as ventral length of body. Genual solenidia σ of legs I-III coupled each with a respective seta *d*; tibial solenidia ϕ of legs II to IV coupled each with a vestigial and minute seta *d* (Figs.2E, G and K). Tibial solenidium ϕ ₁

Fig.2. *Damaeus ainu* sp. n. A: Femur I, B: Genu and tibia I, C: Tarsus I, D: Femur and genu II, E: Tibia and tarsus II, F: Trochanter and femur III, G: Genu and tibia III, H: Tarsus III, I: Femur IV, J: Genu IV, K: Tibia IV, L: Tarsus IV.

on leg I about six times as long as ϕ_2 , coupled with very minute fragment (vestigial seta d ? visible only by SEM) (Figs.5A-C). Femoral seta d and genual setae d and l' of leg IV very long, flagellate with sparse barbs; the former almost equal in length to body, slightly longer than the two latter setae. Setal formulae (famulus included, the number of solenidia in parentheses, vestigial setae d on tibiae II-IV included) from trochanter to tarsus: leg I 1-7-4(1)-4(2)-21(2); leg II 1-6-4(1)-5(1)-18(2); leg III 2-4-3(1)-4(1)-18; leg IV 1-4-3-4(1)-15.

Notogastral exuviae (Fig.3): Larval and three nymphal exuviae found in debris carried on adult notogaster. Larval and protonymphal exuviae nearly circular in outline, those of deutonymphal and tritonymphal ones ovate, approximately 1.3 times longer than broad. Lengths of larval, protonymphal, deutonymphal and tritonymphal exuviae 174 μm , 318 μm , 434 μm and 697 μm , respectively. Setae of c_1 , c_2 , l - and d -series and h_1 found on larval exuviae all brown in color, though colorless near base; lp very long (about 3 times as long as exuvia) with proximal half barbed, finely tapered; setae of c_1 , d -series, la and lm having a colorless vane-like structure in distal part (Figs.3B and E), seta h_1 barbed in whole length, directed posteriorly.

Seta d -series lacking in all nymphal exuviae. Setae l -series and h_3 with a narrow vane-like structure (Fig.3D), c_1 and h_2 with a colorless distal part. Exuvial cornicule (k) of deutonymph and tritonymph similar in size and structure to that of protonymph (Fig. 3C).

Remarks: The new species is related to *Damaeus arvernensis* Grandjean, 1960 in having vestigial tibial seta d coupled with a solenidion on legs II - IV and in having opening of humeral organ in lateral region of podosoma, but the former is distinguishable from the latter by 1) epimeron III with 3 setae, 2) leg chaetotaxy, especially femoral setation I-IV :

Fig.3. Exuvia of *Damaeus ainu* sp. n. A: Larval exuvia, B: Seta la on larval exuvia, C: Cornicule(k) on protonymphal exuvia, D: Seta h_3 on tritonymphal exuvia, E: Seta dp on larval exuvia, F: Protonymphal exuvia.

7-6-4-4 (that of *D. arvernensis* : 10-9-7-7), 3) only anterior part of notogaster irregularly costate, 4) notogastral setae shorter, 5) femoral seta *d* and genual *d* and *l'* of leg IV very long. The new species resembles also *Damaeus gracilipes* (Kulczyński, 1902) from Galicia in having three long setae (one of femur and two of genu) on leg IV, but the former is distinguishable from the latter by 1) notogastral setae relatively short, 2) femur of leg III without extremely long seta.

Fig.4. *Damaeus ainu* sp. n. A: Dorsosejugal groove (longitudinal groove of notogaster indicated by arrow), B: Prodorsum, C: Humeral region (humeral organ indicated by arrow), D: Enlarged humeral organ, E: Notogastral seta *c*₁, F: Notogastral setae (*lm-h*₂).

Fig.5. *Damaeus ainu* sp. n. A and B: Basal part of tibial solenidion ϕ_1 on left and right leg I, respectively (fragment in area of seta d indicated by arrow), C: Enlarged photo of A, D-F: Basal part of tibial solenidion ϕ with vestigial seta d on leg II-IV, respectively.

DISCUSSION

The genus *Damaeus* was at first characterized by loss of all tibial setae *d* in adult. Grandjean (1960) described, however, a species of this genus under the name of *D. arvernensis*, which has vestigial setae *d* on tibiae II-IV. Later, Norton and Ryabinin (1994) noted that the ontogeny of tibial seta *d* may be labile, i.e. homoplasous, within groups considered monophyletic. We think this concept is well acceptable also in the case of the new species. The genus *Damaeus* was also characterized by well developed propodolateral apophysis (*p*). Propodolateral apophysis of the present species is rather narrow at its base adhering to acetabulum II compared with that of the other two Japanese *Damaeus* species, *Damaeus* (*Tectodamaeus*) *armatus* (Aoki, 1984) and *Damaeus* (*Tectodamaeus*) *striatus* (Enami and Aoki, 1988). We, however, consider the new species as a member of *Damaeus*, because its extremely long leg IV, setation of tarsi I-IV :21-18-18-15 (solenidia not included) and well developed postbothridial and ventrosejugal tubercles (B, D and V) would be more important characters of this genus.

Norton (1977) mentioned in detail about the vane-like structure on some pairs of notogastral setae in immature stage of two American *Damaeus* species, *Damaeus angustipes* (Banks, 1905) and *Damaeus atlanticus* Norton, 1977. The investigation of notogastral exuviae of *D. ainu* showed that the arrangement of setae with vanned structure is almost the same between the Japanese and the two American species.

REFERENCES

- Aoki, J. (1984): New and unrecorded oribatid mites from Kanagawa, central Japan., *Bull. Inst. Envir. Sci. Tech., Yokohama Univ.*, 11: 107-118.
- Enami, Y. and J. Aoki (1988): A new species of the genus *Tectodamaeus* (Acari: Damaeidae) from Japan. *Acta Arachnol.*, 37: 33-36.
- Grandjean, F. (1960): *Damaeus arvernensis* n. sp. (Oribate). *Acarologia*, 2: 250-275.
- Kulczyński, V. (1902): Species Oribatarum (Oudms.) (Damaeinarum Michael) in Galicia collectae. *Rozpr. Wydz. mat.-przr. pol. Akad. Umiejet.*, 42: 9-56, pls. 3-4.
- Norton, R. A. (1977): The genus *Damaeus* Koch (Acarina: Oribatei) in the eastern United States. *Acarologia*, 19: 331-353.
- Norton, R. A. and N. A. Ryabinin (1994): New alpine damaeid mite (Acari: Oribatida) from New Hampshire, USA. *Acarologia*, 35: 373-380.

摘 要

北海道釧路湿原のジュズダニ類(I) 江波義成(東北農業試験場畑地利用部)・青木淳一(横浜国立大学環境科学研究センター)

北海道釧路湿原より採集されたジュズダニ属の新種を記載し、アイヌジュズダニ(新称) *Damaeus ainu* sp. n. と命名した。本種は、II—IV脚脛節の単条毛 ϕ に痕跡的な背脛毛 *d* が付随して生じることと前体部後側方に肩域器官(humeral organ)が開口していることにおいて、*Damaeus arvernensis* Grandjean, 1960 に似るが、基節板毛式ならび歩脚毛式、背板形態の違いにより区別される。