Redescription of *Antennoseius (Vitzthumia) oudemansi* (Acari, Mesostigmata) from Spitsbergen, Svalbard

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Redescriptions of adult female, male and new descriptions of the deutonymph and protonymph stages of *Antennoseius oudemansi* Thor, 1930, collected from *terra tipica* (Spitsbergen in the High Arctic) are presented. Due to the absence of type material (holotype and paratypes), and also the lack of a complete description, new material became the basis for the first detailed description of this species, and female and male neotypes are designated.

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1. Introduction

In the genus *Antennoseius*, 60 species have been reported worldwide (Beaulieu et al. 2008, Gwiazdowicz & Halliday 2010). Most species of this genus inhabit the surface layers of soil, litter or moss. Some of them prefer saline habitats, such as salt meadows (Gwiazdowicz 2007). Amongst the 29 species of mesostigmatid mites reported from the Svalbard archipelago, only one, *Antennoseius oudemansi* Thor, 1930, belongs to the genus *Antennoseius* (Ávila-Jiménez et al. 2011, Coulson et al. 2013, 2014).

*Antennoseius oudemansi* was described by Thor in 1930 as *Vitzthumia oudemansi* based on specimens collected from moss and under stones in the area around Barentsburg and Hiorthhamn (Svalbard). In his study, Thor (1930) merely presented an incomplete description of a female and male with pictures and drawings showing the chelicerae, epistome and opisthontal shield of the female. Current taxonomic analysis requires the use of more detailed data to fully describe a species. Accurate figures showing the details of taxonomic characters are also necessary. Unfortunately, the type material (holotype and paratypes) upon which Thor based his original description of *A. oudemansi* were destroyed after Thor’s death in accordance with his will (Lindquist 1963). We here aim to present a complete description (e.g. biometry, chaetotaxy of legs) and illustrations not only of the female and male but also, for the first time, of deutonymph and protonymph from the *terra tipica* – Spitsbergen. Additionally, this study includes a comparison of *A. oudemansi* with its two taxonomically closest relatives *A. janus* Lindquist & Walter, 1989 and *A. granulatus* Willmann, 1949.
2. Material and methods

Chaetotaxy, symbols and the numbering system of setae on the dorsal and ventral sides are after Evans (1963), Lindquist and Evans (1965) and Lindquist (1994).

The description is based on selected 33 females, 16 males, 5 deutonymphs (D below), and 1 protonymph (P below), chosen among all the determined specimens collected from several localities on Spitsbergen: Billefjord (11♀, 9♂) (78° 43'0"N 016° 49'1"E) (August 2008); Bjørndalen (4♀, 1P) (78°13'4"N 015°17'6"E) (17.VIII. 2007); Blomstrandhalvøya (3♀, 3♂) (78° 59'10"N 011°59'3"E) (17.VII.2007); Endalen (4♀, 5♂) (78°11'1"N 015°45'5"E) (30.VI. 2009); Fjortendejulibukta (18♀, 20♂, 1D) (79° 07'4"N 011°51'3"E) (4.VIII.2007); Grønfjord
Fig. 2. Antennoseius oudemansi, female, ventral view.

(1D) (77°56′6″N 014°25′4″E) (13.VII.2008); Magdalenefjorden (4♀, 2D) (79°33′9″N 010°52′2″E) (11.VII.2008); Vårsofbukta (3♀, 1♂) (77°45′4″N 014°23′3″E) (9.VIII.2008); Vestpynten (1♀) (78°15′0″N, 15º25′3″E) (28.VII.2007); and Nordaustlandet (9♀, 4♂, 1D) (80°03′1″N 018°14′2″E) (17.VIII.2007).

Collected soil was brought to the laboratory in plastic self-seal bags. Samples were placed into Tullgren funnels and the mites were extracted into 96% alcohol for 3–4 days according to the humidity of the samples. At the end of this process, the contents of the bottles were transferred into petri dishes and mites were separated under a stereomicroscope. They were placed in Hoyer’s medium for clearing and were mounted onto permanent microscope slides. The material was examined using the Zeiss Axioskop 2 microscope.
with differential interference contrast optics. The material is deposited in the collections of Poznan University of Life Sciences, Department of Forest Protection and in the University Centre in Svalbard (UNIS), Longyearbyen, Svalbard.

3. Redescription of female and male, and description of deutonymph and protonymph of *Antennoseius (Vitzthumia) oudemansi* Thor, 1930

**Neotypes.** Neotype female: Vestpynten, heath vegetation composed of *Salix polaris*, grasses, and *Cassiope tetragona*, 78°15’N, 15°25’E, leg. D. J. Gwiazdowicz, 28.VII.2007 (deposited in Department of Forest Protection, Poznan University of Life Sciences (PULS), slide label: Spit 55).

Neotype male: Endalen, *Dryas octopetala* heath, 78°11’13.3N, 15°45’50.8E, leg. D. J. Gwiazdowicz, 30.VI.2009 (deposited in Department of Forest Protection, Poznan University of Life Sciences (PULS), slide label: A 11–1).

Measurements of the neotypes are given in square brackets below.

3.1. Redescription of female


coxae I, extending posterior to stigmata to partially embrace coxae IV; area outside peritremes with multiple short transverse lines; inner area exposing granulate ornamentation, with one pair of large post-stigmatal pores and two pairs of smaller pores. Peritremes beginning anterior to coxae I, slightly sinuate, stigmata at level of coxae IV.

Gnathosoma. Hypostome with robust horn-like corniculi and four pairs of smooth setae (Fig.
3a). Rostral setae h1 longest (43–47 [43] µm), external posterior setae h2 short (28–31 [30] µm), internal posterior setae h3 of similar length (27–32 [28] µm), palp coxal setae of medium length (30–35 [35] µm). Hypostomal groove with seven rows of denticles, with 10, 8, 8, 8, 9, 10, 10 denticles per row. Anterior margin of tectum rounded, denticulate, with 18–20 denticles (Fig. 3b), dorsal surface with an undulating posterior transverse line of approx. 90 denticles. Fixed digit of chelicera multidentate with a row of twenty-one small teeth, a larger blunt distal tooth
and a minute pilus dentilis; movable digit 67–73 µm with a small distal tooth and two larger medial teeth (Fig. 3c). Palps (Fig. 3e) 244–249 [249] µm long, palp tarsal claw two-tined (Fig. 3d).

Legs (Fig. 4a–d). Lengths: I=760–795 [790] µm, II=530–563 [563] µm, III=513–540 [535] µm, IV=675–720 [710] µm. Trochanter I with setae ad and pd serrated; femur I with ad1, ad2, ad3, pd1 and pd2 serrated as well, other leg setae

Fig. 6. *Antennoseius oudemansi*, male, ventral view.

3.2. Redescription of male

Dorsum (Fig. 5). Idiosoma 475–605 (531 ± S.D.=40) [475] µm long and 310–370 (335 ± 19) [330] µm wide. Podonotal and opisthonal

Venter (Fig. 6). Tritosternum (Fig. 7d) and pre-sternal plates (ca. 35 × 7 µm) as for female. Sterno-genital shield (243–265 [265] µm) smooth except for a few weak lateral lines and fused conspicuous endopodal plates at the level
residuing between coxa III and IV. Genital opening between setae st1. Ventri-anal shield large (155–165 × 290–305 [160 × 300] µm), united completely with peritrematal shields, with reticulate ornamentation throughout covering the major part – from the level of a lineation between first and second pairs of setae JV and ZV up to the posterior border, with seven pairs of ventral setae (20–23 [20–23] µm long) and three circum-anal setae 14–18 [16] µm, post-anal seta the longest (18–21 [damaged] µm). Additional unpaired setae may be present. Peritremes reaching coxa I, slightly sinuate as in female; covered with lineate patterning on the inner side adjacent to peritremes, on the outer side with granular ornamentation, combined with that of ventri-anal shield.

Gnathosoma. Hypostome (Fig. 7a) and tectum (Fig. 7b) as for female. Corniculi reaching 43–47 [43] µm. Hypostome setae h1=29–33 [30] µm, external posterior setae h2=22–27 [23] µm, internal posterior setae h3=20–23 [23] µm, palp coxal setae h4=27–30 [27] µm. Fixed digit of chelicera multitentate with a row of twenty-one small teeth, a larger blunt distal tooth and a minute pilus dentilis; movable digit 43–50 [46] µm with a small distal tooth and two larger medial teeth, spermatodactyl (39–43 [40] µm) shorter than movable digit (Fig. 7c). Palps 198–212 [198] µm long, palp tarsal claw two-tined.


3.3. Description of deutonymph

Dorsum (Fig. 8). Idiosoma 470–840 (614 ± S.D.=85) µm long and 470–840 (400 ± 56) µm wide. Podonotal shield (295–305 × 295–303 µm) with 15 pairs of setae and opisthodonotal shield (200–215 × 218–245 µm) with 15 pairs of setae. Both, as in adult stages, covered with granular ornamentation in the background, and more conspicuous granules forming a net, giving it a granulate-reticulate patterning. All setae finely barbed. Vertical setae j1=27–31 µm long, paravertical setae z1 the shortest (11–15 µm), other setae as followed: dorsocentral row setae: j2=23–27 µm, j3=24–28 µm, j4=26–29 µm, j5=27–28 µm, j6=27–32 µm; mediolateral setae: z2=21–26 µm, z3=24–28 µm, z4=25–30 µm, z5=25–29 µm, z6=22–27 µm; lateral: s3=30–34 µm, s4=25–29 µm, s5=26–29 µm, s6=24–25 µm; one supernumeral paired either unpaired setae located posterolateral to s3–sx2=25 µm; lateral setae: s1=16–20 µm, s2=16–18 µm located outside podonotal shield and none of the marginal setae (five to six pairs) located on the shield; humeral seta r3 the longest ca. 20–25 µm, other r-row setae 15–21 µm. Opisthodonotal shield bearing 15 pairs of barbed setae. Dorsoentral setae: J1=23–25 µm, J2=21–25 µm, J3=21–25 µm, J4 µm=23–25 µm, J5=20–26 µm; mediolateral setae: Z1=22–25 µm, Z2=21–25 µm, Z3=21–24

Venter (Fig. 9). Tritosternum as for mature forms. Pre-sternal plates slender, reaching approximately 35 × 4 µm. Sterno-genital shield (260–270 µm long and 138–150 µm wide at the level of st1 pair) plain, with three pairs of simple slender setae; the first pair longest st1=36–40 µm, four succeeding pairs gradually shorter st2=30–31 µm, st3=28–31 µm, st4=22–24 µm, st5=21–24 µm; anal shield sub-oval (75–85 × 80–85 µm) with three circum-anal setae of similar length (16–21 µm). Additional unpaired setae may be present. Peritremes reaching coxa I, slightly sinuate as in adult forms.
Hypostome (Fig. 10a) and tectum (Fig. 10b) as for mature forms. Corniculi reaching 40–46 µm. Hypostome setae h1=36–41 µm, external posterior setae h2=27–31 µm, internal posterior setae h3=25–28 µm, palp coxal setae h4=30–42 µm. Fixed digit of chelicera multitentate, pilus dentilis present; movable digit 46–54 µm with a small distal tooth and two larger medial teeth (Fig. 10c). Palps 197–210 µm long, palp tarsal claw two-tined.

Legs as for adults. Measures: leg I=513–628 µm, leg II=390–470 µm, leg III=361–433 µm,
leg IV=478–545 µm, each with well-developed ambulacra measuring I=25–36 µm, II=23–31, III=23–32, IV=28–36, respectively.

3.4. Description of protonymph

Dorsum (Fig. 11). Idiosoma 460 µm long and 275 µm wide. Pronotal shield (185 × 175 µm) with 11 pairs of setae and pygydial shield (60 × 60 µm) with 2 pairs of setae. As in all stages, covered with granular, yet delicate, ornamentation. All setae finely barbed. Vertical setae j1=22–25 µm long, paravertical setae z1 the shortest (11–13 µm), other setae as following: dorsocentral row setae: j3=19–20 µm, j4=23 µm, j5=21–22 µm, j6=23–25 µm; mediolateral setae: z2=19–20 µm, z4=20–23 µm, z5=20 µm; lateral: s4=23–25 µm, s5=19–20 µm; s6=19–20 µm located outside pronotal shield and marginal setae: r2=21 and r3=17 µm. Pygydial shield bearing 16–17 µm J1 and J2 pairs of setae. Remaining 13 pairs of setae, located in a soft cuticle, reaching 15–19 µm, except the shortest R1=10 µm and the longest Z5=21 µm.

Venter (Fig. 12). Tritosternum as for mature forms, although smaller. Tritosternal base 39 µm with 65–70 µm laciniae. Sternal shield (185 µm length and 105 µm width at the level of st1 pair) plain, with three pairs of simple slender setae: first pair st1=27 µm, st2=29 µm, st3=26 µm, in a soft membrane a genital setae st5=15 µm; anal shield sub-oval (50 × 50 µm), with three circum-anal setae of similar length (13–15 µm). Peritremes not reaching coxa II, stigmata at the level of IV coxa.

Hyposome (Fig. 13a) and tectum (Fig. 13b) as for mature forms. Corniculi reaching 39–40 µm. Hyposome setae h1=30 µm, external posterior setae h2=20 µm, internal posterior setae h3=25 µm, palp coxal setae h4=28 µm. Fixed digit of chelicera multidentate, pilus dentilis present; movable digit 43–45 µm with a small distal tooth and two larger medial teeth (Fig. 13c). Palps 170–171 µm long, palp tarsal claw two-tined.

Legs as for adults. Measures: leg I=565 µm, leg II=400 µm, leg III=360 µm, leg IV=462 µm, each with well-developed ambulacrum measuring I=25–36 µm, II=23–31 µm, III=23–32 µm, IV=28–36 µm, respectively.

4. Occurrence

In Svalbard, *A. oudemansi* has been reported from Barentsburg, Hiorthhamn (Thor 1930), Adventdalen, Bjørndalen, Endalen, Florabukta, Magdalenefjorden and Petuniabukta (this study). The species has been found in the surface layer of soil, between roots of many bryophyte and grass species and also in plant communities dominated by *Dryas octopetala* L., *Cassiope tetragona* (L.) D. Don or *Salix polaris* Wahlenb. (Ávila-Jiménez et al. 2011, Coulson et al. 2011, Gwiazdowicz & Coulson 2011).

5. Differential diagnosis

*Antennoseius oudemansi* resembles two species: *A. janus* and *A. granulatus*. The main distinguish-
ing characters from *A. janus* is the size of idiosoma, which, due to its broad size range should be treated with caution since the smallest specimens of *A. oudemansi* almost overlap with the largest *A. janus*. Measurements of the dorsal shields (characters without great size ranges) and the number of setae on the podonotal shield are more reliable. *Antennoseius oudemansi* is the largest species among the whole family with females reaching lengths of up to 1,000 µm. In contrast to the 13–17 pairs of setae on the posterior dorsal shield of *A. janus*, *A. oudemansi* bears a reduced number of setae (13–14 pairs).

*Antennoseius oudemansi* differs from the second similar species, *A. granulatus*, by the granular patterning of the dorsal shields. All known stages of *A. oudemansi* are covered with a fine granular ornamentation in the background and with more conspicuous granules forming a net, providing a granulate-reticulate patterning, while in *A. granulatus* this patterning forms only a uniform background surface, without any trace of reticulation.

**References**


