

Some notes on Antarctic mites (Acari)

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(With 23 figures)

A b s t r a c t

Four species of mites are reported from a site on the Antarctic Peninsula: *Alaskozetes antarcticus* (Michael, 1903), *Halozetes belgicae* (Michael, 1903), *Pretriophyteus tilbrooki* (Strandtmann, 1967) and *Tyrophagus* cf. *putrescentiae* (Schrank, 1781). Brief morphological remarks on particular species are presented. It is possible that the sample has been infested by *T.* cf. *putrescentiae* (Schrank).

Keywords: Antarctica, Acari, taxonomy.

I n t r o d u c t i o n

Among only a few invertebrate taxa inhabiting Antarctic terrestrial ecosystems, mites represent an important and relatively well known animals. About eighty taxa have been hitherto found in the Maritime and Continental zones with the majority of them recorded from the former.

Recently, the Collection of Chelicerata at the Zoological Institute and Museum in Hamburg has been enriched by a large sample of mites collected by the members of the West German Antarctic expedition. That material has been kindly put at my disposal by Dr. G. Rack. The examination revealed the presence of four species belonging to three families, viz. Podacaridae, Tydeidae and Acaridae. Three species have already been reported from that region. Considering the fact that our knowledge about distributional pattern of these arthropods in the Antarctic is still far from being sufficient, I list below the species and include brief remarks on their morphology.

M a t e r i a l s a n d M e t h o d s

The sample was collected in the area of the British Faraday Station (65° 12.9' S; 64° 06.9' W), by Prof. Dr. G. Hartmann on 28 November, 1987. It contained several non-calciferous stones covered with a thin layer of crustaceous lichens. The mites were either hidden among the lichens or floated in preserving medium (70 % ethanol).

The animals were carefully separated from the substrate with a needle under dissecting microscope and picked up with a micropipete. The oribatids (adults and a part of nymphs) were rinsed in distilled water for 20

minutes, transferred into 10 % potassium hydroxide for 4 hours and again rinsed in water for 6 hours. After that, the specimens were mounted on slides in Swan's medium. For additional observations some nymphs were mounted as temporary slide preparations in lactic acid. The remaining mites were mounted in Swan's medium after a short rinse in water. Observations and drawings were carried out using interference contrast microscopy.

The specimens selected for SEM observations were dehydrated in graded ethanols, critical-point-dried, arranged on double-stick tape and coated with gold. Micrographs were made using scanning electron microscope CamScan S4.

The whole material, including permanent slides and several hundred oribatid nymphs, is housed in the Zoological Museum of the University of Hamburg.

Species list

Cryptostigmata Berlese, 1896
Podacaridae Granjean, 1955

Alaskozetes antarcticus (Michael, 1903)
(Figs 1-7, 16, 22, 23)

Material examined: 39 adults (27 females, 12 males), 55 tritonymphs, 61 deutonymphs, 43 protonymphs, 34 larvae, 36 eggs.

Measurements: Males: average length 1102.3 μm (range: 1085.6-1122.4 μm). Females: 1135.8 μm (1030.4-1288.0 μm). Tritonymphs: 1052.0 μm (1012.3-1177.4 μm); deutonymphs: 784.2 μm (699.1-883.0 μm); protonymphs: 591.4 μm (570.3-625.5 μm); larvae: 458.6 μm (423.3-478.1 μm). Eggs: 382.7 x 223.8 μm (368.0-423.2 x 184.0-257.6 μm).

The adults exceed slightly the variability range given by Wallwork (1962a) for that species. All specimens belong to the nominate form. The length of lamellar setae in adults is 7.7-43.6 % of the length of the interlamellar setae ($x = 16.6$ %; $n = 21$). A pair of aggenital setae is always present in females. A strong aggenital neotrichy is characteristic for males and the number of aggenital setae developed on each side varied from 3 to 5 (Figs 1, 16). The aggenital formula is always as follows: 3:4 (frequency 8.3 %), 4:4 (66.6 %), 5:4 (16.6 %), 5:5 (8.3 %).

Juvenile forms (nymphs, larvae: Figs 3, 5-7) agree with the Wallwork's description (op. cit.). Sclerites bearing porouse areas are arranged in pairs and the only exception is a single sclerite located at the posterior part of the hysterosoma (Figs 22, 23). The sclerites are less numerous and rather poorly developed in larvae and protonymphs and well developed in deutonymphs and tritonymphs. The eggs are oval and resemble those described by Granjean (1955) in *Podurus auberti*. The "ventral" side of eggs is covered with numerous roundish and usually slightly flattened processes (Fig. 4). In contrast to the egg shell these processes readily dissolve in potassium hydroxide.

Distribution: Widely distributed in the Antarctic and sub-Antarctic region (Dalenius & Wilson 1958; Wallwork 1962a).

Halozetes belgicae (Michael, 1903)
(Figs 8-11, 17-21)

Material examined: 115 adults (47 females, 69 males), 63 tritonymphs, 40 deutonymphs, 56 protonymphs, 38 larvae.

Measurements: Males: average length 636.7 μm (range 570.4-699.2 μm). Females: 665.4 μm (607.2-717.6 μm). Tritonymphs: 635.2 μm (552.0-680.8 μm); deutonymphs: 491.5 μm (441.6-552.0 μm); protonymphs: 406.6 μm (349.6-441.6 μm); larvae: 312.8 μm (294.4-331.2 μm).

This is a highly variable species. The examined specimens represent the nominate form and are larger than the subspecies **brevipilis** described by Wallwork (1963). The length of lamellar setae in adults (Figs 10, 20) is 38.4-71.0 % of the length of the interlamellar setae ($x = 58.3$ %; $n = 47$). A pair of aggenital setae usually occurs in females (Fig. 9), with their number varying from 0 to 2 on each side. The aggenital formula found in 46 females was as follows: 0:0 (frequency 10.8 %), 1:0 (6.5 %), 2:0 (4.3 %), 2:1 (6.5 %) and 2:2 (2.1 %). Males have strong aggenital neotrichy and the number of setae varies from 5 to 10 on each side. The aggenital formula observed in 69 males was: 5:7 (frequency 1.4 %), 6:6 (1.4 %), 6:7 (17.4 %), 6:8 (7.2 %), 6:9 (4.3 %), 6:10 (1.4 %), 7:7 (5.8 %), 7:8 (17.4 %), 7:9 (7.2 %), 8:8 (14.4 %), 8:9 (13.0 %), 8:10 (1.4 %), 9:9 (1.4 %) and 9:10 (5.8 %).

The chaetotaxy of genito-anal region in juvenile forms resembles that of **Alaskozetes antarcticus**. Five small sclerites bearing porouse areas occur on propodosoma and one larger sclerite occurs in ventro-lateral position on each side of the anal field (Fig. 11). Porouse areas are also developed between coxae of the legs. Dorsal side of hysterosoma bears no such sclerites. Its median and posterior parts have only variable bow-like cuticular folds which form a characteristic pattern in all immature individuals. The cuticular pores on hysterosomal dorsum have slightly different shape and are dispersed differently from those in the delimited porouse areas. Wallwork (1963: 753) writes that "specimen of a nymph of **belgicae** (see Dalenius 1958, fig. 5d) and tritonymph of **crozetensis** (see Wallwork 1962b, fig. 1) indicate a close resemblance in form of porouse sclerites in the 2 species". In fact, the illustration provided by Dalenius & Wilson (1958: fig. 5d) depicts only the bow-like folds of cuticle in the median part of the nymphal hysterosoma but no porouse sclerites. The cuticular folds are identical to those found in the examined specimens of **H. belgicae** (Fig. 11).

Distribution: Recorded from the Antarctic Peninsula and sub-Antarctic Islands (Heard, Macquarie) (Dalenius & Wilson 1958; Wallwork 1963).

Prostigmata Kramer, 1877
Tydeidae Kramer, 1877

Pretriophtydeus tilbrooki (Strandtmann, 1967)
(Figs 15, 16)

Material examined: 20 adults (13 females, 7 males), 2 tritonymphs, 1 deutonymph, 1 larva.

Measurements: Males: average length 243.0 μm (range 227.7-244.2 μm). Females: average length 247.8 μm (198.0-298.3 μm). Tritonymph: 203.5 and 211.2 μm ; deutonymph 181.5 μm , larva 140.8 μm .

The specimen size in this collection is smaller from that given in the re-description of the species by Usher & Edwards (1986). One male has genital setae ge_3 not plumose but nude. In one female, doubled aggenital setae ag_4 are developed on one side of the genital region (Fig. 14). A degree of variation is present in the setae barbing as well.

Distribution: Known from the maritime Antarctic (Strandtmann 1967; Usher & Edwards 1986).

Astigmata Canestrini, 1891
Acaridae Ewing & Nesbitt, 1942

Tyrophagus cf. purtescentiae (Schrank, 1781)
(Figs 12, 13)

Material examined: 13 adults (12 females, 1 male).

Measurements: Male idiosomal length without gnathosoma is 330.4 μm . Setae d_1 are 33.6 μm long, $d_2 = 84.0 \mu\text{m}$, $l_2 = 42.0 \mu\text{m}$. Distance ratio on the IV tarsus ($a+b/c$) is 2.1. Ration X/Y is equal 2.7. Females: length of idiosoma (\bar{x}) is 369.0 μm (range: 330.4-420.8 μm). Setae d_1 (\bar{x}) are 31.4 μm long (range: 30.8-39.2 μm); d_2 (\bar{x}) = 95.7 μm (84.0-112.0 μm); l_2 (\bar{x}) = 36.0 μm (33.6-42.0 μm). Ratio $d_2 : l_2$ (average) is 2.6; its range: 2.0-3.0.

The solenidion ω_1 on tarsus I is slightly enlarged at its tip, supra-coxal setae have usually a broad lanceolate shaft and 5-8 pectinations (Fig. 13). The adeagus is slightly "S" shaped, when seen in the dorso-ventral positioned specimen; its sclerite supports are turned outwards.

The taxonomy of the genus **Tyrophagus** presents severe difficulties at species level (Griffiths 1979). According to the keys of Robertson (1959) and Johnston & Bruce (1965) the examined individuals are identified as **T. putrescentiae**. They differ from a recently described and related species, **T. savasi**, by apically swollen solenidion ω_1 and relatively broader supra-coxal setae (Lynch 1989). Unfortunately, due to the dorso-ventral position of the mounted male, the lateral aspect of its adeagus, an important taxonomic character, cannot be observed. Thus, the specimens could be identified only as **T. near putrescentiae**.

Distribution: **T. putrescentiae** is a cosmopolitan species, but has not been reported from the Antarctic. The species is well known as a pest of various stored products and easily penetrates a wide range of synanthropic habitats. However, its humid- and thermopreferenda are relatively high and its minimal survival temperature lies above -2° C (Kevan & Sharma 1963). These properties suggest that the survival of **T. putrescentiae** in severe Antarctic environments is rather unlikely (G. Rack, pers. comm.). It should be noted that the sample (stones with lichens) had not been preserved in the field immediately after collection, but brought on ship and exposed on a table for about 20 minutes. After that the material was placed into ethanol. Thus, the sample could have been infested by this mite, were it present on the ship. On the other hand, other representative of the genus [**Tyrophagus longior** (Gervais, 1844)] has already been recorded from the Antarctic (St. Paul Island and King George V Land) (André 1947: cit. after Dalenius 1965). Therefore one can not exclude the presence of another introduced species of the genus in Antarctica.

A c k n o w l e d g e m e n t s

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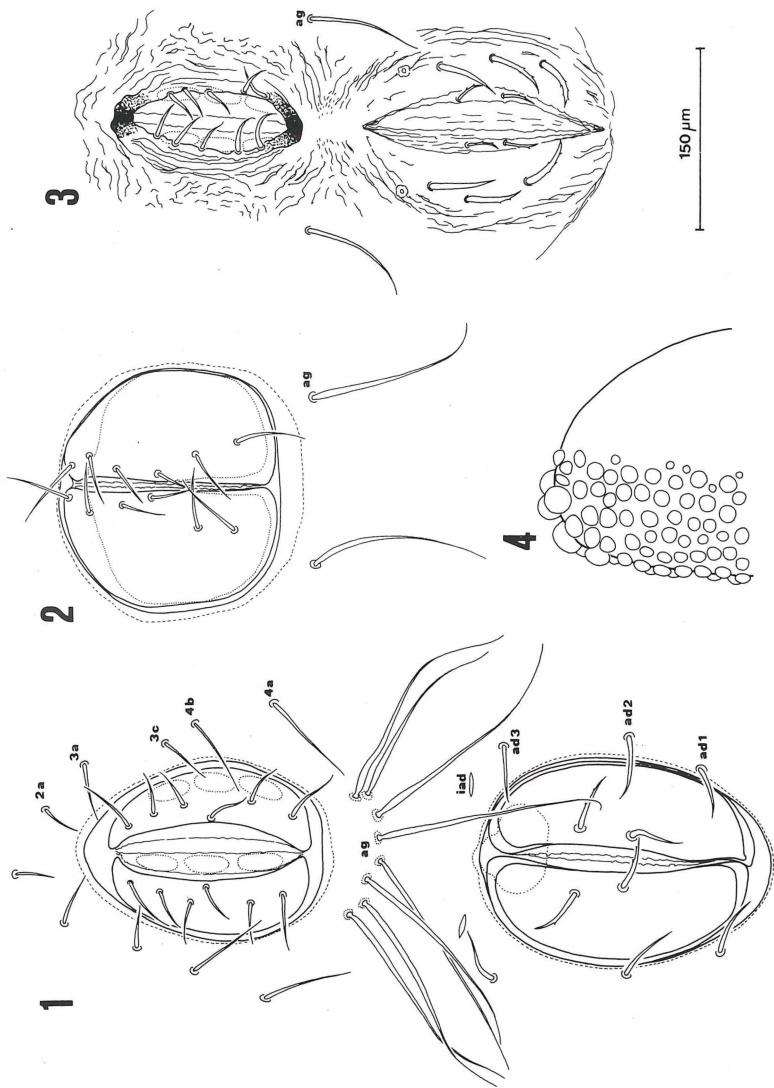
Z u s a m m e n f a s s u n g

Vier Milben-Arten wurden in einer Probe mit Flechten aus der Nähe der Faraday Station (Antarktische Halbinsel) gefunden: **Alaskozetes antarcticus** (Michael, 1903), **Halozetes belgicae** (Michael, 1903), **Pretriophtydeus tilbrooki** (Strandtmann, 1967) und **Tyrophagus** cf. **putrescentiae** (Schrank, 1781). Weiterhin werden Angaben zur Morphologie und Variabilität dieser Taxa gemacht. Es ist möglich, daß die Flechtenprobe erst nach der Entnahme durch **T. cf. putrescentiae** (Schrank) verunreinigt wurde.

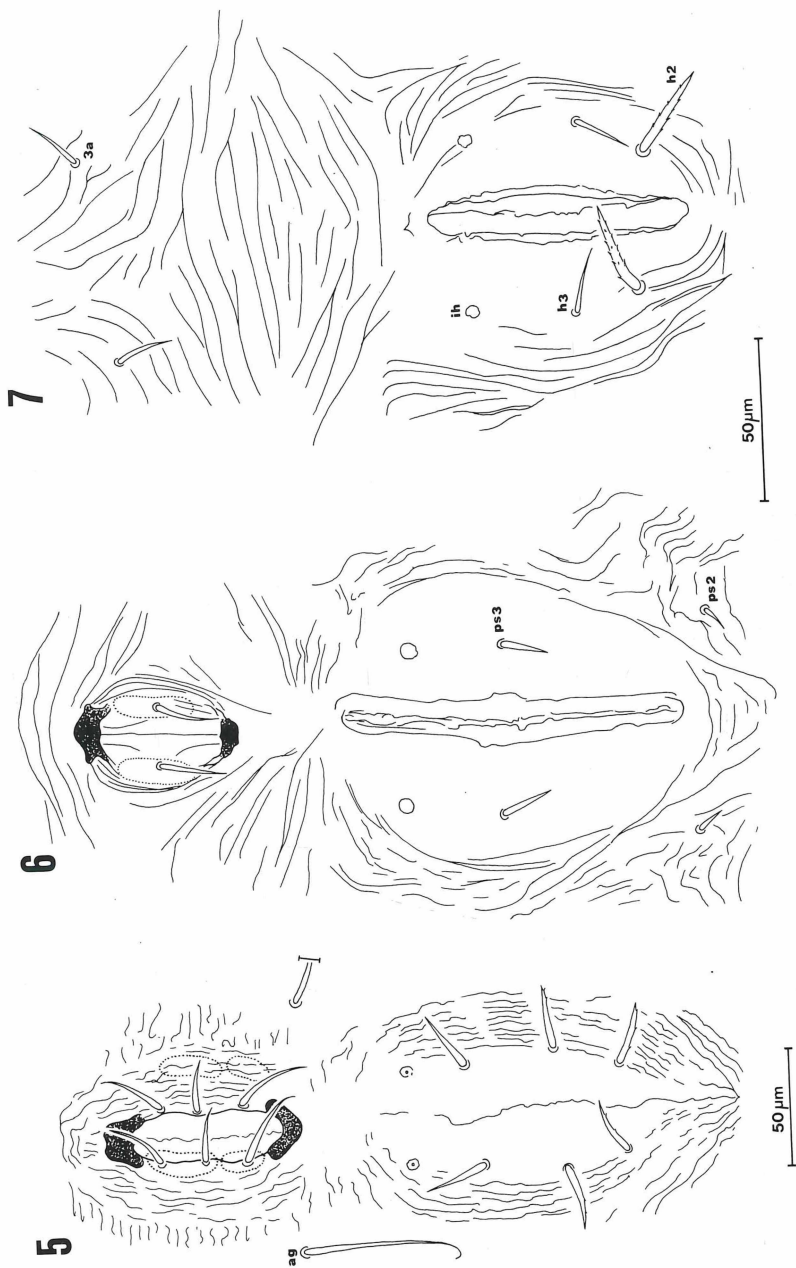
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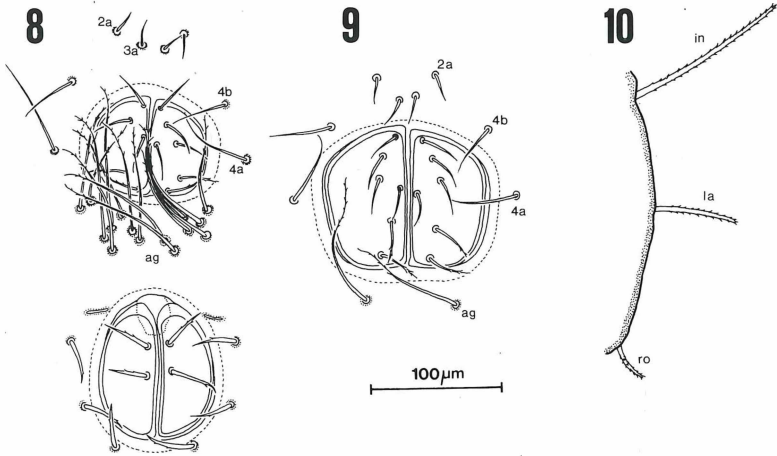
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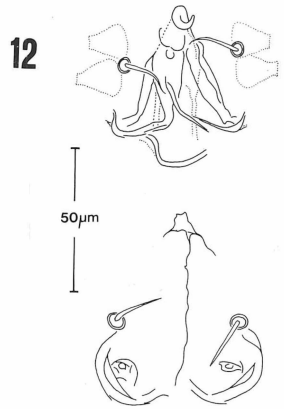
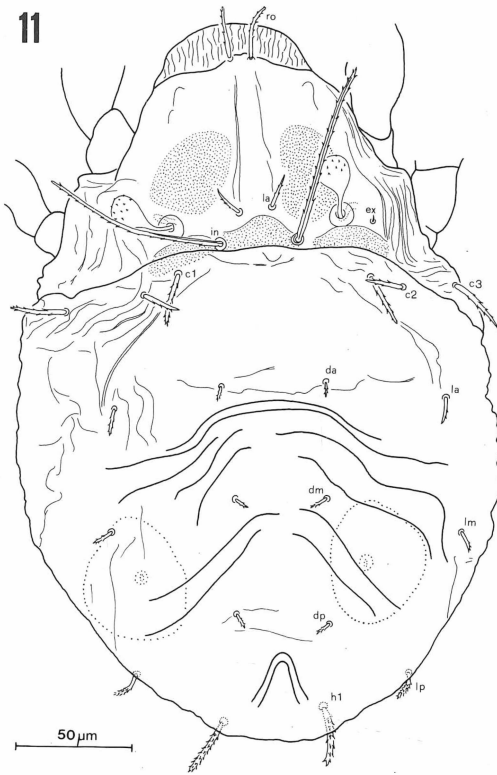
Figs 1-4: *Alaskozetes antarcticus* (Michael, 1903): 1 = genito-anal region, male; 2 = genital region, female; 3 = genito-anal region, tritonymph; 4 = fragment of egg.



Figs 5-7: *Alaskozetes antarcticus* (Michael, 1903), genito-anal region: 5 = deutonymph; 6 = protonymph; 7 = larva.

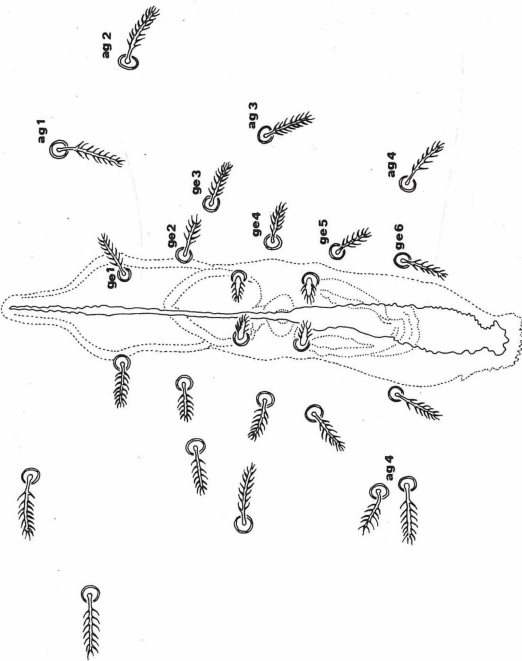


Figs 8-10: **Halozetes belgicae** (Michael, 1903): 8 = genito-anal region, male; 9 = genital plates, female; 10 = prodorsal setae, lateral view (in - interlamellar, la - lamellar, ro - rostral setae).

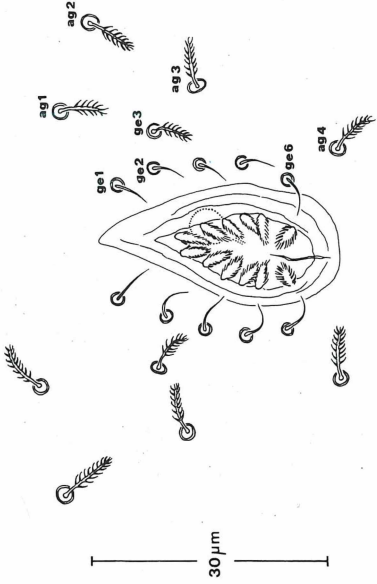


Figs 11-13: *Halozetes belgicae* (Michael, 1903), Fig. 11: larva, dorsal view; *Tyrophagus* cf. *putrescentiae* (Schrank, 1781), Figs 12 and 13: 12 = genito-anal region, male; 13 = supracoxal seta, dorsal view.

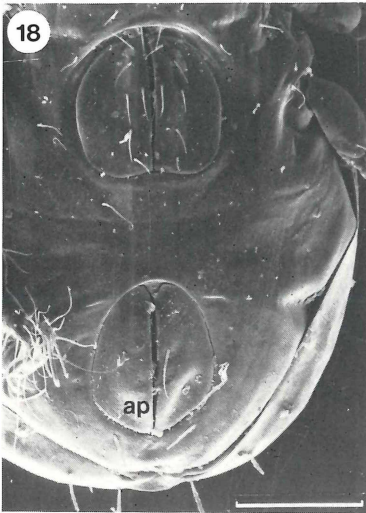
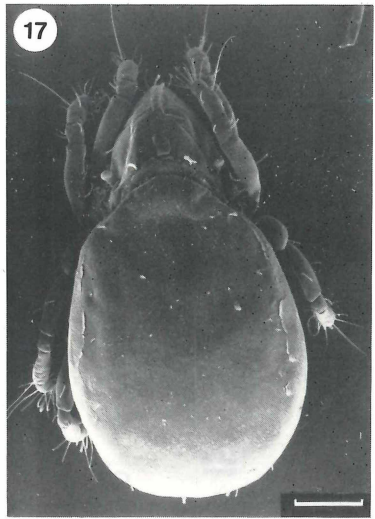
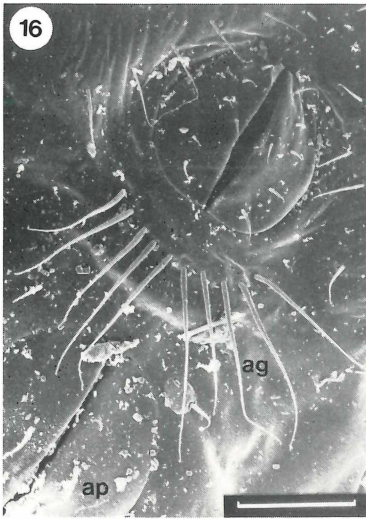
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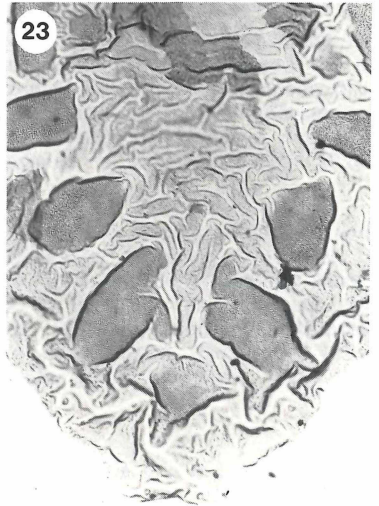
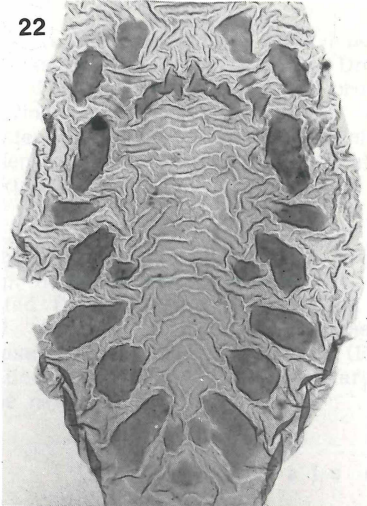
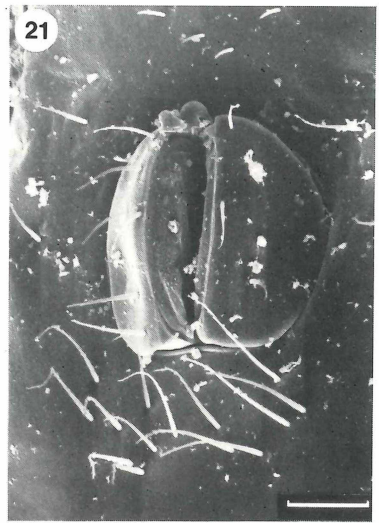
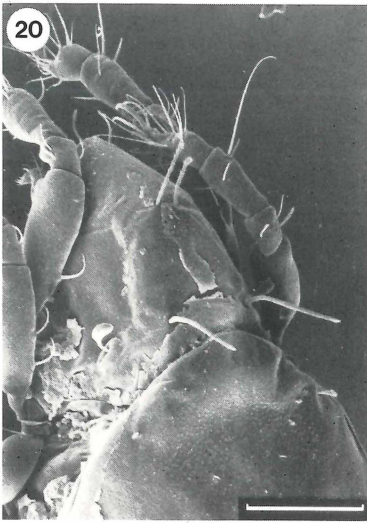
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Figs 14-15: *Pretriophtydeus tilbrooki* (Strandtmann, 1967), genital region: 14 = female; 15 = male.



Figs. 16-19: *Alaskozetes antarcticus* (Michael, 1903), Fig. 16: genito-anal region, male; *Halozetes belgicae* (Michael, 1903), Figs 17-19: 17 = habitus, male, dorsal view; 18 = genito-anal region, female; 19 = genito-anal region, male (ap - anal plates; ag - aggenital setae). Scale lines = 100 μ m. SEM micrographs).



Figs 20-23: **Halozetes belgicae** (Michael, 1903), Figs 20 and 21: 20 = front of the body, male, dorso-lateral view; 21 = genital region with aggenital setae, male; **Alaskozetes antarcticus** (Michael, 1903), Figs 22 and 23: 22 = tritonymph, hysterosomal dorsum with porouse sclerites; 23 = as above, posterior part of hysterosoma (Scale lines: Fig. 20 = 100 μ m, Fig. 21 = 30 μ m. SEM micrographs: Figs 20, 21; bright light microscopy: Figs 22, 23).

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