Entomol. Mitt. Zool. Mus. Hamburg	**15** (182): 157-170	Hamburg, 30. Juni 2010 ISSN 0044-5223

Halacarus excellens Lohmann, 1907 (Acari: Halacaridae), a new record a century later, re-description and notes on this and other Antarctic halacarid species

ILSE BARTSCH

(with 26 figures)

Abstract

Samples from the Amundsen Sea, taken with an epibenthic sledge, contained three halacarid species, *Agaue obscura* Bartsch, 1987, *Halacarus excellens* Lohmann, 1907 and *Lohmannella fukushimai* Imamura, 1968. *Halacarus excellens* has been described more than a century ago; this is the second record of the species. It is re-described and compared with four species with which it shares several characters. The descriptions of *Agaue obscura* and *Lohmannella fukushimai* are supplemented. The three species are expected to be circum-Antarctic in their distribution.

K e y w o r d s: Acari, Antarctica, Amundsen Sea, Halacaridae, supplementary description.

Introduction

The first halacarids from south of the Antarctic Convergence (Antarctic Polar Front) were described about a century ago. In the beginning of the 20th century 14 species were identified and described (Lohmann 1907a, b; Trouessart 1907a, b, 1914). In the following decades the one or the other new species or record was published, but a substantial number of additions to the Antarctic halacarid fauna were not made before the end of the 20th century. Newell (1984) described 18 new species (though one proved to be a synonym), Bartsch (1987, 1989, 1990, 1995, 1998) and Bartsch & Pugh (1994) presented another 18 new species which live in Antarctic waters. At present 67 species are recorded from south of the Polar Front (Bartsch 2009).

Material and methods

The halacarid mites re-described in this paper are from benthic samples taken during the Biopearl 2 expedition (**Bio**diversity, **P**hylogeny, **E**volution and **A**daptive **R**adiation of **L**ife in Antarctica) from February till April 2008. The samples were

taken in the Amundsen Sea, in the inner (BIO 4 and 5) and outer part (BIO 6) of the Pine Island Bay. An aim of this project of the British Antarctic Survey was to study the distribution of organisms, from the microbes to the megafauna.

The halacarids are from epibenthic sledge samples. They were cleared in lactic acid and mounted in glycerine jelly. Voucher specimens are deposited in the Zoological Museum in Hamburg (ZMH), the British Antarctic Survey, Cambridge (BAS) and the author's halacarid collection.

Abbreviations used in the description: *AD*, anterior dorsal plate; *AE*, anterior epimeral plate; *ds-1* to *ds-6*, first to sixth pair of dorsal setae, numbered from anterior to posterior; *GA*, genitoanal plate; *glp-1* to *glp-5*, gland pores 1 to 5, from anterior to posterior; *GO*, genital opening; *GP*, genital plate; *OC*, ocular plate(s); *P-2* to *P-4*, second to fourth palpal segment; *pas*, parambulacral seta(e); *PD*, posterior dorsal plate; *PE*, posterior epimeral plate(s); *pgs*, perigenital setae; *sgs*, subgenital setae. The legs are numbered from I to IV, their segments from 1 to 6 (from basal to apical). The position of a seta is given in a decimal system with reference to the length of a segment from its basal to apical end.

Description of the species

Halacarus Gosse, 1855

Halacarus excellens Lohmann, 1907
Figs 1-17

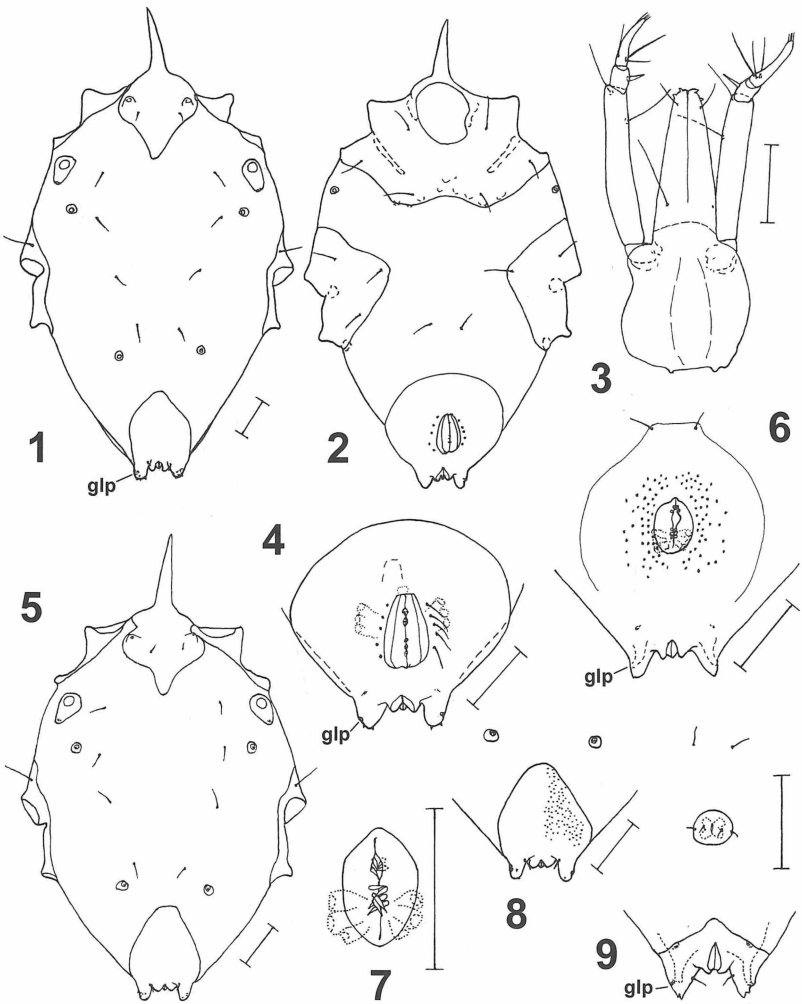
Halacarus (Halacarus) excellens Lohmann, 1907a: 11, 12.
Halacarus (Halacarus) excellens, Lohmann 1907b: 383, textfig. 10, pl. 38, figs 1-3, 6.
Halacarus excellens, Newell 1984: 39, figs 50-53; Bartsch 1993: 31, 37, fig. 6.

MATERIAL AND COLLECTING DATA: Slides with 1 female, 1 male, 1 deutonymph, ZMH A20/10; Amundsen Sea, 74°24.14'-74°24.24'S, 104°36.91'-104°36.46'W, 496-509 m, Station BI04-EBS-3B-E, epibenthic sledge. Slides with 1 female, 1 male, author's collection, same collecting data.

One female, BAS, Amundsen Sea, 74°23.91'-74°24.01'S, 104°37.93'-104°37.48'W, 490-504 m, Station BI04-EBS-3A-E. One female, 3 males, 2 deutonymphs, BAS, Amundsen Sea, 74°24.14'-74°24.24'S, 104°36.91'-104°36.46'W, 496-509 m, Station BI04-EBS-3B-E. One deutonymph, BAS, Amundsen Sea, 74°24.14'-74°24.24'S, 104°36.91'-104°36.46'W, 496-509 m, Station BI04-EBS-3B-S. One deutonymph, BAS, Amundsen Sea, 74°23.45'-74°23.60'S, 104°46.04'-104°45.77'W, 506-507 m, Station BI04-EBS-3D-E. All in ethanol.

DIAGNOSIS: Large-sized, with slender frontal spine and pair of posterior horns. Idiosomal length 976-1360 µm. Dorsal plates *AD*, *OC* and *PD* punctate. *OC* with cornea and eye pigment. Posterior horns extending beyond very small anus. Epicuticula of plates delicately reticulated, that of membraneous integument fingerprint-like ornamented. Female *GA* rounded, with uniform, slightly thickened epicuticular layer; five pairs of setae close to *GO*. Male *GA* faintly developed. Pair of outlying setae in anterior margin. Legs slender. Telofemur to tibia I with 2, 2, 4 spiniform, tapering setae. Claws smooth.

DESCRIPTION: Female: Length of idiosoma (from tip of frontal spine to end of anal cone) 1150-1360 µm, width 640-710 µm; length:width 1: 0.54-0.63. Dorsal plates *AD*, *OC* and *PD* coarsely punctate (cf. Fig. 8), their surficial epicuticula very delicately and irregularly reticulated; membraneous



Figs 1-9. *Halacarus excellens* Lohmann: **1**. idiosoma, dorsal, female; **2**. idiosoma, ventral, female; **3**. gnathosoma, ventral, female; **4**. genitoanal plate, ventral, female; **5**. idiosoma, dorsal, male; **6**. genitoanal plate, ventral, male; **7**. genital opening, male; **8**. posterior dorsal plate with punctation, male; **9**. posterior part of idiosoma, ventral, deutonymph. (glp, gland pore). (Scales = 100 µm.)

integument outside plates with fingerprint-like ornamentation. Brown eye pigment present beneath basis of frontal spine and pair of *OC*. The latter with cornea and pore canaliculus. Setae and gland pores situated as illustrated (Fig. 1). Pair of *ds-6* delicate, distinctly smaller than the other pairs of setae. Pair of *glp-5* on horns which extend beyond anus. Horns with up to five minute, pointed cuticular spurs at their apex.

Outline of ventral plates vague, discernable on the basis of change in epicuticular ornamentation. *GA* of female with uniform, slightly thickened cerotegumental layer. One pair of setae within membraneous integument (Fig. 2), five to seven pairs of *pgs* close to *GO* (Fig. 4), and five pairs of delicate *sgs*, often obscured by genital sclerites. Ovipositor extending slightly beyond *GO*. Three pairs of internal genital acetabula level with middle and anterior half of *GO* (Fig. 4). Anal valves and anal sclerites small.

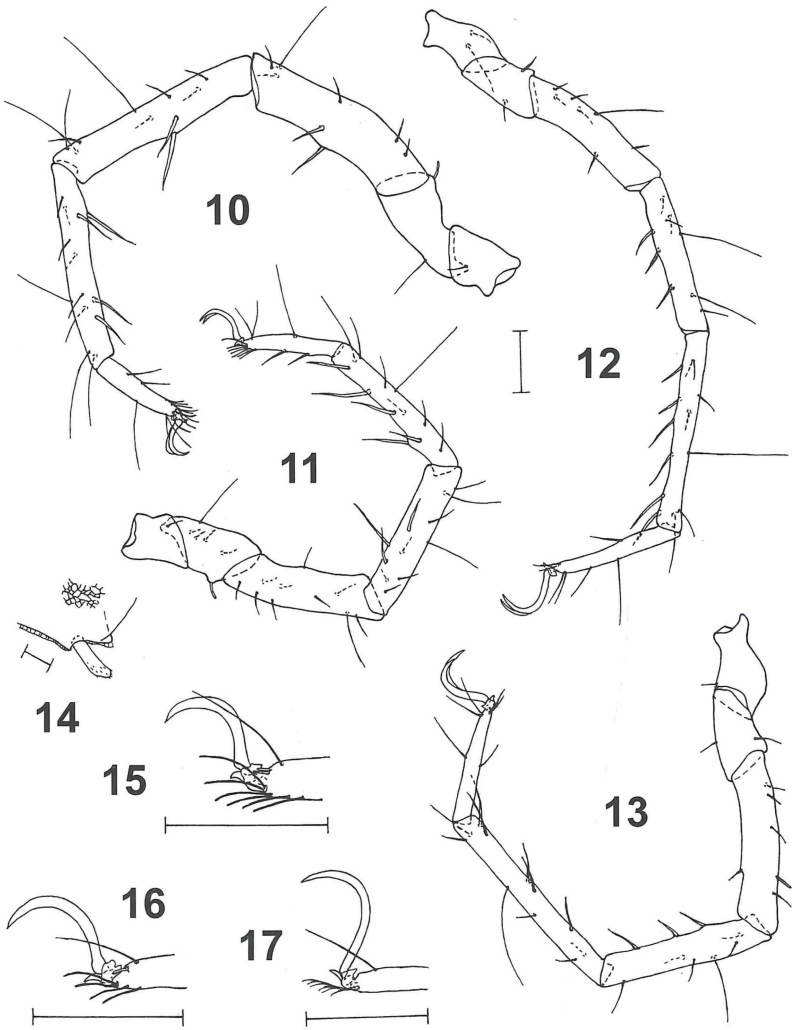
Rostrum somewhat longer than gnathosomal base. Rostral sulcus extending to basal pair of maxillary setae (Fig. 3). *P-2* with two setae, situated at about 0.76 and 0.97 (from basal to distal). *P-3* with spiniform medial seta. *P-4* with three setae in basal whorl and two small setulae and spurs at its tip.

Legs long and slender (Figs 10-13). Integument delicately reticulate (Fig. 14). Leg I distinctly longer and wider than leg II. Genu I longer than both telofemur and tibia I. Telofemur, genu and tibia II rather similar in length. Tibiae III and IV longer than these legs genua and telofemora. Telofemur, genu and tibia I with 1, 1 and 2 pairs of tapering ventral spines, respectively. Basifemora I to IV with 2, 5-6, 2-4, 2-3 setae; dorsal seta blunt, slightly spinose (Fig. 14). Tibiae II, III and IV with 4-5, 4-6 and 5-6 tapering, slightly spiniform ventral setae. Tarsi I and II each with two tapering, spiniform ventral setae, tarsi III and IV with one to two such setae. Tarsus III in general with four, rarely with three long dorsal setae, tarsus IV with three dorsal setae. Tarsus I with short dorsolateral solenidion and famulus; tip of tarsus I with 11-12 eupathid *pas* (cf. Fig. 15). Tarsus II with an eupathid dorsomedial solenidion; tip of tarsus with four pairs of *pas*, viz. one pair of doublets and two pairs of singlets (Fig. 16). Tips of tarsi III and IV each with pair of slender singlets. Number of setae on the leg segments variable as shown in Table 1.

Table 1. *Halacarus excellens* Lohmann, number of setae on the leg segments (two females, two males). Solenidion, famulus, parambulacral setae and ventral eupathidia of tarsi omitted.

Legs	I	II	III	IV
Segment				
1	1	1	0-2	1
2	2	5-6	2-4	2-3
3	8	9-10	10-12	5-6
4	9-10	10-12	9-13	10-12
5	12-13	12-13	9-13	10-12
6	5	5	4-5	4-5

Male: Length of idiosoma 976-1010 µm. Dorsal aspect (Fig. 5) similar to that of female. Margins of *GA* very faint, recognizable due to slight change in surficial ornamentation. One pair of setae within anterior



Figs 10-17. *Halacarus excellens* Lohmann: **10**. leg I, medial, female; **11**. leg II, medial, female; **12**. leg III, medial, female; **13**. leg IV, medial, female; **14**. part of basifemur II, lateral, male; **15**. tip of tarsus I, lateral, male (medial setae and claw omitted); **16**. tip of tarsus II, medial, female (lateral setae and claw omitted); **17**. tip of tarsus IV, lateral, male (medial setae and claw omitted). (10-13, 15-17 scale = 100 µm; 14, scale = 10 µm.)

slightly truncate margin of *GA*, about 90 setae around *GO* (Fig. 6). Five pairs of short stump- or spur-like genital spines at genital slit. Three pairs of internal genital acetabula close to posterior half of *GO* (Fig. 7). On tarsus IV both lateral and medial *pas* plumose (Fig. 17).

Deutonymph: Length 840-1120 µm. Outline of dorsal plates as illustrated in Bartsch (1993: fig. 6). Venter with small genital plate, the latter with one pair of minute *sgs* and one pair of short *pgs*; another pair of *pgs* in membraneous integument anterior to genital plate (Fig. 9). Anal plate with pair of canaliculi. Anus rather small, situated between horns which include *glp-5*. Horns ending with minute cuticular spurs. Pairs of *ds-6* much smaller than *ds-1* to *ds-5*. Genua to tibia I with 2, 2, 4 tapering ventral spines. Tarsi I to IV with 3/2, 3/2, 4/2, 3/2 dorsal/ventral setae.

BIOLOGICAL DATA: The majority of the individuals contained an ovoid markedly stratified body of accumulated excretory material, 265-510 µm in length, 160-230 µm in diameter. Most of the females held two or three ovoid eggs, each about 250 µm in length and 170 µm in diameter.

REMARKS: *Halacarus excellens* was amongst the material collected during the German South Polar Expedition 1901-1903 in East Antarctica (Gauss Station). Lohmann (1907b) described the species on the basis of females, a deutonymph and protonymph (Lohmann 1907b: 383, text-fig. 10, plate 38, figs 1-3, 6). The given length of the females (1320-1470 µm) may include the gnathosoma. Newell (1984) and Bartsch (1993) re-examined and re-described the paratype deutonymph.

The species is easily recognized on the basis of its rather large size and the pair of horns extending beyond the anal sclerites. Other characters are: *AD*, *OC* and *PD* present though *OC* and *PD* small; all dorsal plates conspicuously punctate; cerotegument on plates very minutely reticulate; anal cone and anal sclerites small; female with rounded *GA*, cerotegumental layer faint and uniform, anterior pair of *pgs* within membraneous integument, more than four pairs of *pgs* close to *GO*; male with one pair of outlying setae; ventral spines on leg I tapering.

Halacarus excellens shares several characters with *H. longior* Bartsch, 1981, *H. profundus* Newell, 1984, *H. lamellipes* Newell, 1984, and *H. setifer* Newell, 1984, namely, epicuticula on plates delicately reticulate, dorsal plates markedly punctate, *ds-1* slightly posterior to the level of *glp-1*, anal sclerites minute, female *GA* with uniformly arranged faint cerotegument and three to eight pairs of *pgs* close to *GO*, tarsus I with more than three pairs of ventral eupathidia. Several of these characters are else rarely found within congeners and their combination is expected be evidence of close relationships.

Characters to discriminate between the five species are the (1) number of setae and ventral spines on the legs, (2) presence or absence of pair of corneae and (3) size of the posterior horns (large and extending beyond the anal cone or small, hardly reaching the level of the end of anal cone) (Table 2). *Halacarus lamellipes* and *H. setifer* both have two pairs of ventral spines on genu I and three pairs on tibia I (one and two pairs in the other

species). *Halacarus profundus* lacks ventral spiniform setae on tarsus II, the other species bear two such setae. *Halacarus excellens* is characterized by its pair of posterior horns extending beyond the anal cone, such large horns are lacking in *H. longior*, *H. profundus* and *H. setifer*.

Table 2. Species of the *Halacarus excellens* group and discriminating characters.

[* according to Newell (1984); ** 6 specimens re-examined; *** according to Newell (1984) there are 1-2 and 3 setae on tarsi III and IV, respectively, according to a re-examination of a type specimen there are 6 and 5 setae (Bartsch 1993); ? character state unverified or unknown; rare character states in parentheses.]

Halacarus	*excellens*	*lamellipes**	*longior***	*profundus**	*setifer**
Length, female (in µm)	1150-1360	1098	965-1225	1449-1474	1342
Length, male (in µm)	976-1010	?	790-995	1068-1220	?
Corneae	present	absent	absent	absent	present
Size of posterior horns	large	small	small	small	small
Number of *pgs* close to female *GO*	10-13	6	12-16	24	6
Position of anterior *pgs* in male	on *GP*	?	outside *GP*	on *GP*	?
Number of ventral spines on I-4	2	4	2	2	4
Number of ventral spines on I-5	4	6	4	4	6
Number of ventral spines on II-5	4-5	?	4-5	5	7
Number of ventral setae on I-6	2	8	2	2	4
Number of ventral setae on II-6	2	7	2	0	5-8
Number of ventral setae on III-6	1(-2)	4	0	0	1-2/6***
Number of ventral setae on IV-6	1(-2)	6	0-1	0	3/5***

ANOMALIES: In one of the deutonymphs (ZMH) the two hind legs of one side are reduced in their length, they are six-segmented but the setation on telofemora to tarsi III and IV is incomplete.

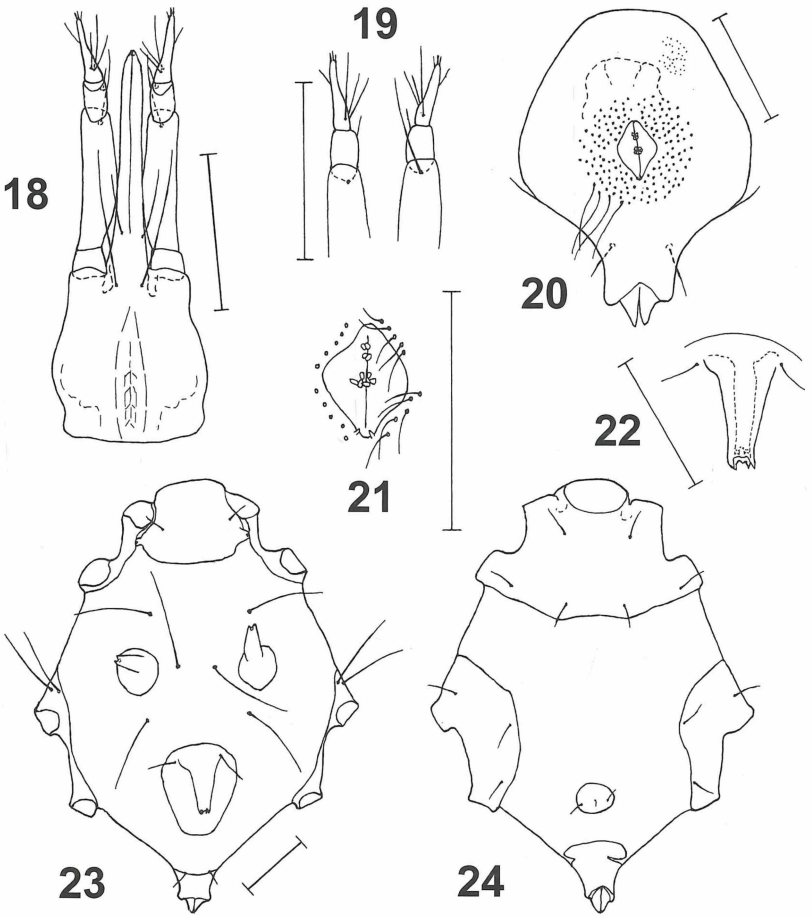
DISTRIBUTION: Records are from East Antarctica (Gauss-Station) and West Antarctica (Amundsen Sea), from a depth range of 385 to 509 m. Records of the four other species of the excellens group are from around Antarctica and the Atlantic Ocean, from the bathyal to abyssal (Table 3).

The *Halacarus excellens* specimens have eye pigment beneath the corneae and the base of the frontal spine, accordingly one may expect the species to be a shallow water inhabitant.

Table 3. Geographical distribution of *Halacarus* species of the *excellens* group.

Species	Collecting data and reference
excellens	66°48'S, 89°11'E, 385 m, Gauss-Station (Lohmann 1907b)
excellens	74°23'-74°24'S, 104°37'-104°46'W, 490-509 m, Amundsen Sea (present paper)
lamellipes	56°07'S, 66°25'W, 439 m, off southern Argentina (Newell 1984)
lamellipes	54°08'S, 52°12'W, 419-483 m, Scotia Ridge (unpublished record)
longior	38°14'N-38°18'N, 70°20'W-70°23'W, 3264-3356 m, North American Basin (Bartsch 1981)
longior	36°14'N, 33°54'W, 2275 m, Mid-Atlantic Ridge (site Rainbow) (unpublished record)

longior	14°45'N, 44°59'W, 3014 m, Mid-Atlantic Ridge (site Logatchev) (unpublished record)
longior	9°41'S-9°43'S, 10°55'E-10°57'E, 2644-2754 m, Angola Basin (Bartsch 1981)
longior	36°53-37°15'S, 52°45'-53°10'W, 2195-3343 m, Argentine Basin (Bartsch 1981)
longior	60°39'S, 53°57'W, 2893 m, Drake Passage (Bartsch 2005a)
profundus	74°38'S-74°39'S, 175°22'W-175°32'W, 2212-2306 m, Ross Sea (Newell 1984)
setifer	56°19'S, 27°29'W, 148 m, near South Sandwich Islands (Newell 1984)



Figs 18-24. *Agaue obscura* Bartsch: **18**. gnathosoma, ventral, male; **19**. end of palps, dorsal, male; **20**. genitoanal plate, ventral, male; **21**. genital opening, ventral, male; **22**. horn on *PD*, deutonymph; **23**. idiosoma, dorsal, deutonymph; **24**. idiosoma, ventral, deutonymph. (Scales = 100 µm.)

Agaue Lohmann, 1889

Agaue obscura Bartsch, 1987
Figs 18-26

Agaue obscura Bartsch, 1987: 1343-1345, figs 1-11.
Agaue obscura, Bartsch 1990: 186, figs 4-9; Bartsch 1993: 99, 100, fig. 38A-E.

MATERIAL AND COLLECTING DATA: Slides with 3 males, 1 deutonymph, 1 protonymph, ZMH A20/10; 74°23.45'-74°23.60'S, 104°46.04'-104°45.77'W, 506-507 m, Station BI04-EBS-3D-E. Slide with 1 male, author's collection, same collecting data. Slide with 1 female, ZMH A20/10; 74°07.93'-74°07.77'S, 105°50.27'-105°49.73'W, 1479-1486 m, Station BI05-EBS-1A-E. Slide with 1 female, author's collection, same collecting data.

One male, ZMH A20/10; 71°20.94'-71°20.77'S, 109°57.89'-109°57.91'W, 477-481 m, Station BI06-EBS-3D-S. Five females, 10 males, BAS, 74°23.91'-74°24.01'S, 104°37.93'-104°37.48'W, 490-504 m, Station BI04-EBS-3A-E. One female, 3 males, 1 deutonymph, BAS, 74°23.91'-74°24.01'S, 104°37.93'-104°37.48'W, 490-504 m, Station BI04-EBS-3A-S. Four females, 1 male, 1 protonymph, BAS, 74°24.14'-74°24.24'S, 104°36.91'-104°36.46'W, 496-509 m, Station BI04-EBS-3B-E. One female, BAS, 74°24.14'-74°24.24'S, 104°36.91'-104°36.46'W, 496-509 m, Station BI04-EBS-3B-S. Twelve females, 4 males, 3 deutonymphs, BAS, 74°23.45'-74°23.60'S, 104°46.04'-104°45.77'W, 506-507 m, Station BI04-EBS-3D-E. One female, BAS, 71°20.83'-71°20.66'S, 110°07.98'W, 478-481 m, Station BI06-EBS-3A-E. All in ethanol.

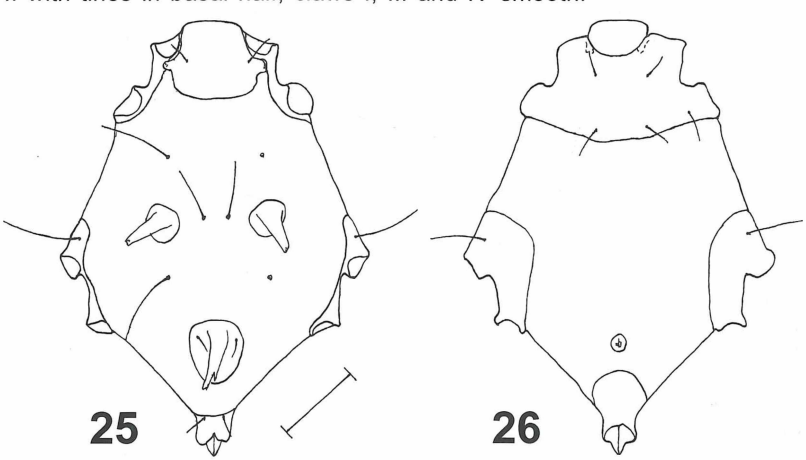
DIAGNOSIS: Large-sized. Idiosomal length of female 645-755 µm, of male 595-700 µm; length:width ratio 1: 0.63-0.79. Tegument with epicuticular spinelets and filaments. *OC* with raised wart-like horn surrounded by dense aggregation of epicuticular filaments. Anterior part of *PD* with tube-like raised median horn with pair of gland pores. *PE* with three (rarely two) dorsal setae anterior to insertion of leg III. Female *GA* with three (rarely four) pairs of *pgs*; males with about 150 *pgs*. Gnathosoma slender, rostrum longer than gnathosomal base. Female *P-2* with slightly bipectinate seta; that seta in males longer and more slender. All legs slender, distinctly longer than idiosoma. Tibiae dorsally with slight mid-segmental hump, else cylindrical; tibiae with six ventral setae.

DESCRIPTION: Adults: Length of female 645-755 µm, of male 595-700 µm. Males somewhat smaller than females. Dorsal aspect of idiosoma and outline of plates same as described for female (Bartsch 1987). Male *GA* extending to level of pair of mid-ventral setae on *PE*, anterior margin almost truncate. *GA* with about 150 slender *pgs* arranged densely around *GO* (Fig. 20), and a pair of minute papillae near posterior corner of *GO* (Fig. 21). Each genital sclerite with five short, cone-like *sgs*. Spermatopositor extending beyond cluster of *pgs*. Rostrum slender, longer than gnathosomal base (Fig. 18). *P-2* of female with short, slightly bipectinate seta. *P-2* of male with slender dorsal seta (Fig. 19). *P-3* with lateral seta. *P-4* with three setae in basal whorl, one mid-segmental lateral seta and apical spurs and setula. Tibiae I to IV with six ventral setae each. Tarsi I to IV with 3/1, 3/0, 3/0, 3/0 long dorsal/ventral setae (solenidia and eupathidia

excluded). Paired claws slender. Claws on tarsus I smooth, claws on tarsus II with several distinct tines, claws on tarsi III and IV either smooth or with a few very delicate tines.

Deutonymph: Length 580-675 µm. Plates and striae of membraneous integument with delicate epicuticular villi; villi on striae much shorter and more delicate than those on plates. Dorsal plates smaller though outline (Fig. 23) similar to plates of adults. Horns on *OC* and *PD* more slender than in adults. Canals of pair of gland pores on *PD* fused for most of their length but at apex separated (Fig. 22). This apex flanked by two pairs of papillae. Pairs of *ds-2*, *ds-3* and *ds-4* long, about 1/5-1/4 of idiosomal length. Outline of *AE* and *PE* (Fig. 24) similar to that of adults. *AE* with three pairs of setae, *PE* with two dorsal and three ventral setae. Genital plate small, widely separated from anal plate. Genital plate with one pair of *pgs* (Fig. 24) and two pairs of internal genital acetabula. Length of gnathosoma 440 µm. Seta on *P-2* long and slender. Genua I to IV with 3/2, 3/2, 2/1, 2/1 dorsal/ventral setae. Tibiae I to IV with 4, 4, 3, 3 dorsal setae and 4, 4, 4, 4 ventral setae. All tarsi with three dorsal setae (solenidion and famulus excluded). Tarsus I with one ventral seta (apical eupathidia excluded), tarsi II to IV lack ventral setae. Claws on tarsus II with tines, the other claws smooth.

Protonymph: Idiosomal length 415-520 µm. Dorsal plates smaller than in deutonymph. Horns on *OC* and *PD* slender. On *PD* canals of pores not completely fused (Fig. 25). *AE* with three (rarely two) setae on either side (Fig. 26). *PE* with a single dorsal and ventral seta. *GP* small, with one pair of internal genital acetabula. Length of gnathosoma 332-350 µm. Seta on *P-2* long and slender. Legs slender. Genua, tibiae and tarsi I to IV with 2/2, 2/2, 2/1, 2/1 (genua), 3/2, 3/2, 3/2, 3/2 (tibiae) and 3/1, 3/0, 3/0, 3/0 (tarsi) dorsal/ventral setae, respectively. Claws as in deutonymph, claws II with tines in basal half, claws I, III and IV smooth.



Figs 25-26. *Agaue obscura* Bartsch: **25**. idiosoma, dorsal, protonymph; **26**. idiosoma, ventral, protonymph. (Scale = 100 µm.)

REMARKS: Many *Agaue* species demonstrate sexual dimorphism in the shape of the dorsal seta on *P-2*. In females of *Agaue obscura* that seta is slightly bipectinate and short, equalling the length of *P-3*, in males and nymphs the seta is slender and twice the *P-3* length.

The legs and the idiosoma of all specimens bear a cover of debris. On the leg segments this cover forms a thick cylindrical sheet.

Agaue obscura belongs to the corollata group, named after *Agaue corollata* Bartsch, 1978. The group includes at present the five species *A. corollata*, *A. hirtella* Bartsch, 1982, *A. uncinata* Bartsch, 1990, *A. verrucosa* Bartsch, 1982, and the above mentioned *A. obscura.* The five species can be discriminated on the basis of the position and shape of the gland pores. In three species (*A. corollata*, *A. obscura*, *A. verrucosa*) the first pair of the gland pores is small, in the lateral margin of the *AD* and slightly posterior to the level of the pair of setae. *Agaue hirtella* and *A. uncinata* bear these pores in the posterior part of the *AD*. The gland pores on the *PD* are within a fused median horn. In *A. hirtella* and *A. obscura* the horn is situated in the anterior part of the *PD*, at or immediately anterior to the level of the *ds-5*, in *A. corollata*, *A. uncinata* and *A. verrucosa* the gland pores are in the posterior part of the *PD*. In *A. uncinata* the horn is hook-like. *Agaue corollata* and *A. verrucosa* can be discriminated on the basis of the formers more slender legs and wider *PD*.

ANOMALIES: In one of the males (ZMH) the *PE* of one side is reduced in its size, the three dorsal setae are lacking, the three ventral setae are present; leg III is lacking.

Table 4. Geographical distribution of *Agaue* species of the corollata group.

Species	Collecting data and Reference
corollata	58°48'N, 52°56'W, 3610 m, Labrador Basin (Bartsch 1978)
corollata	44°06'N, 4°22'W, 2006 m, Bay of Biscay (Bartsch 1978)
corollata	38°14'N, 70°20'W, 3264-3356 m, Northamerican Basin (Bartsch 1982)
corollata	36°48'N, 27°06'W, 3663 m, near Azores (Bartsch 1978)
corollata	9°05'-14°49'S, 9°56'-12°17'E, 1427-4223 m, Angola Basin (Bartsch 1978, 1982)
corollata	9°31'N, 56°21'W, 3392-3429 m, Guayana Basin (Bartsch 1982)
hirtella	52°14'S, 57°05'W, 520-530 m, east of Falkland Islands (Bartsch 1982)
obscura	72°05'S, 172°08'E, 344-351 m, Ross Sea (Bartsch 1987)
obscura	76°07'S, 170°12'W, 71-87 m, Ross Sea (Bartsch 1987)
obscura	61°25'S, 56°30' W, 300 m, off South Shetlands (Bartsch 1987)
obscura	71°21'-74°24'S, 104°36'-110°08'W, 477-1486 m, Amundsen Sea (present paper)
uncinata	72°03'S, 172°22'E, 350 m, Ross Sea (Bartsch 1990)
verrucosa	36°56'S, 53°01'W, 2707 m, Argentine Basin (Bartsch 1982)
verrucosa	59°35'S, 27°17'W, 1190-1469 m, South Sandwich Trench (Bartsch 1990)
verrucosa	53°38'S, 40°55'W, 201 m, Scotia Sea, off Shag Rock (unpublished record, Biopearl 1 expedition)
aff. *verrucosa*	60°39'S, 53°57'W, 2893 m, Drake Passage (Bartsch 2005a)

DISTRIBUTION: Circum-Antarctic (Ross Sea, Amundsen Sea, Palmer Archipelago), within a depth range of 71 to 1486 m. At present there are no records from north of the Polar Front.

Most species of the corollata group were taken in polar and cold-temperate southern hemisphere areas (Table 4), but *A. corollata* is widely spread in the Atlantic Ocean, in both northern and southern Atlantic basins (Bartsch 1978, 1982). Most of present records of the corollata group are from the bathyal and abyssal zone.

Lohmannella Trouessart, 1901

Lohmannella fukushimai Imamura, 1968

Lohmannella fukushimai Imamura, 1968: 472-475, pl. I, II.
Lohmannella fukushimai, Bartsch 1993: 153-155, fig. 60A-E.

MATERIAL AND COLLECTING DATA: Slide with 1 female, ZMH A20/10; 71°10.51'-71°10.56'S, 109°51.39'-109°51.87'W, 1041-1047 m, Station BI06-EBS-2A-S. Slide with 1 male, ZMH A20/10; 71°10.51'-71°10.56'S, 109°51.39'-109°51.87'W, 1041-1047 m, Station BI06-EBS-2A-E.

Two females, BAS, 74°23.91'-74°24.01'S, 104°37.93'-104°37.48'W, 490-504 m, Station BI04-EBS-3A-E. One female, BAS, 74°24.14'-74°24.24'S, 104°36.91'-104°36.46'W, 496-509 m, Station BI04-EBS-3B-S. All in ethanol.

DIAGNOSIS: Idiosomal length of female 495-540 µm, of male 491 µm; length:width ratio 1:0.75-0.84. Gland pores small, *glp-3* and *glp-4* replaced by small setae. Plates without marked ornamentation. Gnathosoma about as long as idiosoma (1:0.99-1.02). Legs slender, slightly longer than length of idiosoma. Genu and tibia I with four and seven bipectinate ventral bristles, respectively.

DISTRIBUTION: Circum-Antarctic, with records from the Prince Harald Coast, western Ross Sea, Amundsen Sea (new record) and western Wedell Sea (Table 5). Depth range is from 190 to 1047 m. Presence of spots of eye pigment beneath the corneae and in the middle of the *AD* indicates that it is a shallow water rather than a deep water species.

Table 5. Geographical distribution of *Lohmannella fukushimai* (collecting data and references).

Position	Depth (m)	Area	References
68°53'S, 30°56'E,	190	off Prince Harald Coast	Imamura 1968
72°03'-72°04'S, 172°38'-172°06'E	342-360	Ross Sea	Bartsch 1993
71°15'-71°37'S, 13°00'-12°11'W	193-211	Weddell Sea	Bartsch 1993
74°35'S, 29°40'W	820	Weddell Sea	Bartsch 1993
71°11'S, 109°52'W	1041-1047	Amundsen Sea	present paper
74°24'S, 104°37'W	490-509	Amundsen Sea	present paper

REMARKS: *Lohmannella fukushimai* is at present the only *Lohmannella* species which has the pairs of gland pores on the *OC* and anterior part of *PD* replaced by small setae. In many southern hemisphere species these gland pores are enlarged whereas in northern hemisphere species these pores are minute, not or hardly discernable (Bartsch 2005b).

Discussion

Halacarus excellens, *Agaue obscura* and *Lohmannella fukushimai* are expected to be circum-Antarctic in their distribution, though there are still gaps in the knowledge of the Antarctic and adjacent sub-Antarctic halacarid fauna. Two of the species, *A. obscura* and *H. excellens*, belong to identified natural species groups which are wide-spread on the southern and northern hemisphere, in the bathyal and abyssal zone. At least one species of each species group (*Agaue corollata*, *Halacarus longior*) has been found in deep sea basins, the same species both in North and South Atlantic basins. There are no records of species of these groups from the temperate Pacific and Indian Ocean. The absence may be the result of lack of adequate samples.

Little is known about anomalies within halacarid populations. In the course of studies of the halacarid fauna in northern Germany (Elbe estuary, Baltic), northern France (Brittany, Roscoff), and Rhode Island (Pettaquamscutt, Narragansett Bay) thousands of individuals were examined microscopically, anomalies were very rarely found. Amongst the 78 halacarid mites collected in the Amundsen Sea, two individuals showed anomalies, in an *A. obscura* male one of the hind legs is lacking and in a juvenile *H. excellens* the size and chaetotaxy of the hind legs is reduced. At present, the number of anomalies described is too small for an analysis, still it might be worth to present notes on anomalous structures or ornamentations.

Acknowledgements

The material described in this paper is from the Biopearl 2 expedition of the British Antarctic Survey. Thanks are due to organizers and performers, especially to Chester J. Sands and David Barnes who forwarded the specimens and relevant collecting data.

Zusammenfassung

In mit einem Epibenthos-Schlitten genommenen Proben aus der Amundsen See, Westantarktis, wurden drei Halacariden-Arten gefunden, dies sind *Agaue obscura* Bartsch, 1987, *Halacarus excellens* Lohmann, 1907 und *Lohmannella fukushimai* Imamura, 1968. Seit dem Erstfund von *Halacarus excellens* vor über 100 Jahren ist dies der zweite Fund. Anhand des neuen Materials wird die Art wiederbeschrieben, zudem auf verwandte Arten eingegangen. Die Beschreibungen von *Agaue obscura* und *Lohmannella fukushimai* werden ergänzt. Die drei Arten weisen eine zirkum-antarktische Verbreitung auf.

References

Bartsch, I., 1978: Halacaridae (Acari) aus der Tiefsee des atlantischen Ozeans. – Cah. Biol. mar., **19**: 47-62. Roscoff.

Bartsch, I., 1981: Fünf neue Arten der Gattung *Halacarus* (Acari, Halacaridae) aus dem Atlantik. – Zool. Scr., **10**: 203-215. Stockholm.

Bartsch, I., 1982: Zur *corollata*-Gruppe der Gattung *Agaue*, Verbreitung und Beschreibung von zwei neuen Arten. – Acarologia, **23**: 45-53. Paris.

Bartsch, I., 1987: *Agaue obscura* n. sp. (Acari, Halacaridae), a new circumpolar Antarctic mite. – Can. J. Zool., **65**: 1343-1345. Washington, D.C.

Bartsch, I., 1989: *Rhombognathus auster*, a new rhombognathine mite (Acari, Halacaridae) from southern South America. – Zool. Scr., **18**: 423-425. Stockholm.

Bartsch, I., 1990: Antarctic Halacaroidea (Acari): Genera *Agaue*, *Bradyagaue*, and *Halacarellus*. – Antarct. Res. Ser., **52**: 185-217. Washington, D.C.

Bartsch, I., 1993: Synopsis of the Antarctic Halacaroidea (Acari). – In: Synopses of the Antarctic Benthos, **4**: 176 pp., Koeltz, Koenigstein.

Bartsch, I., 1995: *Halacarellus obsoletus* n. sp. (Arachnida: Acari: Halacaridae), an associate with Antarctic hexactinellid sponges. – Mitt. Zool. Mus. Berl., **71**: 121-128. Berlin.

Bartsch, I., 1998: *Colobocerasides koehleri* (Trouessart) und *C. auster* n. sp. (Arachnida: Acari: Halacaridae), Beschreibung der Arten. – Mitt. Mus. Nat.kd. Berl., Zool. Reihe, **74**: 225-232. Berlin.

Bartsch, I., 2005a: Halacaridae from the depths of Western Antarctica (Arachnida: Acari). – Senckenberg. biol., **85**: 31-41. Frankfurt a. M.

Bartsch, I., 2005b: *Lohmannella* and *Simognathus* (Halacaridae: Acari) from Western Australia: description of two new species and reflections on the distribution of these genera. – Rec. West. Aust. Mus., **22**: 293-307. Perth.

Bartsch, I., 2009: Halacaridae. In: SCAR-MarBIN: Register of Antarctic Marine Species (RAMS). – accessed at www.scarmarbin.be.

Bartsch, I. & Pugh, P.J.A., 1994: Two new species of *Halacarellus* (Halacaridae: Acari) from South Georgia. – J. nat. Hist., **28**: 493-499. London.

Imamura, T., 1968: A new species of halacarid mites from the Antarctic Ocean. – Acarologia, **10**: 472-476. Paris.

Lohmann, H., 1907a: Über einige faunistische Ergebnisse der Deutschen Südpolar-Expedition unter besonderer Berücksichtigung der Meeresmilben. – Schr. naturw. Ver. Schlesw.-Holst., **14**: 1-14. Kiel.

Lohmann, H., 1907b: Die Meeresmilben der Deutschen Südpolar-Expedition 1901-1903. – Dt. Südpol. Exped. 1901-1903, **9**: 361-413. Berlin.

Newell, I.M., 1984: Antarctic Halacaroidea. – Antarct. Res. Ser., **40**: 1-284. Washington, D.C.

Trouessart, E. L., 1907a: Acari (Acariens marins). National Antarctic Expedition. – Discovery R.N. Scot. Nat. Hist. **3**, Zool. Bot. 1-6. London.

Trouessart, E. L., 1907b: Acariens marins. Expédition Antarctique Française (1903-1905), commandée par le Dr. Jean Charcot. – Sci. nat. Docums scient., 1-9. Paris.

Trouessart, E., 1914: Acariens. Deuxième Expédition Antarctique Française (1908-1910), commandée par le Dr. Jean Charcot. – Sci. nat. Docums scient., 1-16. Paris.

Author's address:

Dr. I. BARTSCH, Forschungsinstitut Senckenberg, c/o DESY, Notkestr. 85, 22607 Hamburg, Germany (email: bartsch@meeresforschung.de).