

## Halacarid mites (Acari) from hydrothermal deep-sea sites. New records

I. Bartsch

Biologische Anstalt Helgoland, Notkestrasse 31, D 22607 Hamburg

**Abstract** : Among the invertebrates recovered from the walls of the hydrothermal areas Lucky Strike and Snake Pit, vents on the mid-Atlantic ridge, four species of halacarid mites were present. Descriptions of *Halacarellus alvinus* sp. nov., *Copidognathus alvinus* sp. nov. and *Bathyhalacarus* sp. are presented and that of *Halacarellus auzendei* (Bartsch) is emended.

**Résumé** : Parmi les invertébrés récoltés sur les sites hydrothermaux Lucky Strike et Snake Pit de la dorsale médio-atlantique, quatre espèces d'halacariens ont été capturées. *Halacarellus alvinus* sp. nov., *Copidognathus alvinus* sp. nov. et *Bathyhalacarus* sp. sont décrites et la description de *Halacarellus auzendei* (Bartsch) est complétée.

### INTRODUCTION

Since a century, halacarid mites are known to inhabit depths greater than 1000 m (Trouessart, 1896). The deepest record is that of *Bathyhalacarus quadricornis* Sokolov & Jankovskaja, which was taken in the western Pacific in almost 7000 meters depth (Jankovskaja, 1978). Almost 50 species are presently recorded from the bathyal and hadal, and some few species have been found closely associated with deep-sea hydrothermal vent sites (Krantz, 1982 ; Bartsch, 1990, 1991).

### MATERIAL AND METHODS

In May and June 1993, during the FARA (French American Ridge Atlantic) joint project, hydrothermal sites along sea-floor spreading axis between the Eurasian, African and American plates were investigated. From 27 May to 05 June, six dives were made at the site Lucky Strike (37°20'N, 32°17'W, 1636 m, chief scientist C. Langmuir). From 05 to 30 June during the MAR 93 cruise (chief scientists C. van Dover and A. Fiala), 14 dives were made at the sites TAG (26°08'N, 44°50'W, 3700 m) and Snake Pit (23°23'N, 44° 56'W, 3520 m). The dives with the manned submersible "Alvin" were operated from the R/V "Atlantis II". The invertebrates recovered were sorted by the Centre National de Tri d'Océanographie Biologique (CENTOB, Brest).

Abbreviations used in the description : AD, anterior dorsal plate ; AE, anterior epimeral plate ; ds, dorsal setae on idiosoma, ds-1, first pair of dorsal setae ; GA, genitoanal plate ;

GO, genital opening ; OC, ocular plate(s) ; P, palp, P-3, third palpal segment ; pas, parambulacral setae ; PD, posterior dorsal plate ; PE, posterior epimeral plate ; pgs, perigenital setae ; sgs, subgenital setae ; vl, ventrolateral ; vm, ventromedial, vs ventral setae on idiosoma. Legs numbered I to IV, leg segments 1 to 6, I-6, tarsus on leg I.

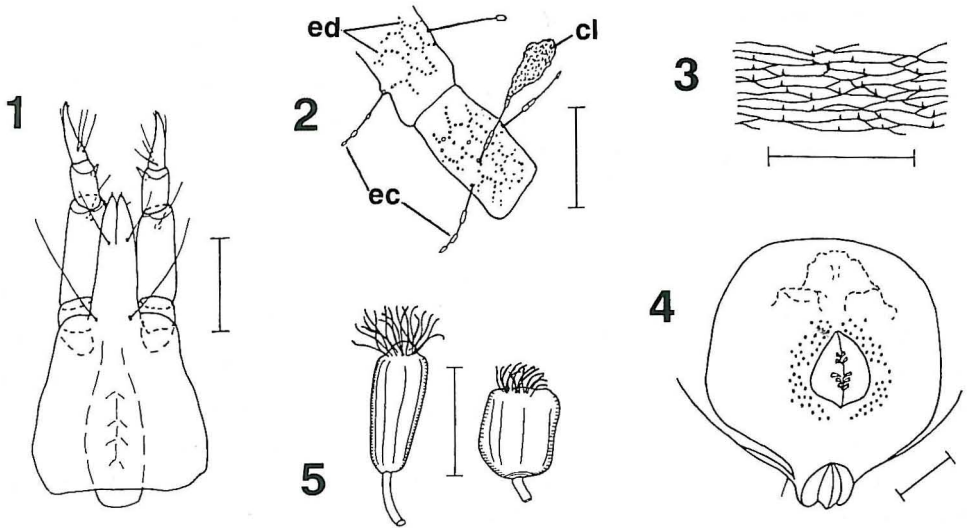
Holotypes and other representatives of the mites described are deposited in the Muséum National d'Histoire Naturelle, Paris (MNHNP).

## DESCRIPTIONS

### *Halacarellus auzendei* (Bartsch, 1990) (Figs. 1-5)

= *Agauopsis auzendei* Bartsch 1990, 70-72 fig. 1A-K

*Material* : One female (MNHNP 63 A 16), 23°23'N, 44°56'W, Snake Pit, site Elan, 3520 m, Alvin/Atlantis II, dive 2614, June 1993 ; 1 male (MNHNP 63 B 1) and 1 male (author's collection), same site, dive 2615 ; 7 females, 6 males, 1 deutonymph, 2 protonymphs (author's collection), same site, dive 2617 ; 1 female (MNHNP 63 B 2), 1 female (MNHNP 63 B 3), 1 female, 1 deutonymph (MNHNP 63 B 4), same site, dive 2619 ; one female (author's collection), same site, dive 2620.



Figs. 1-4 : *Halacarellus auzendei* (Bartsch)

1. Gnathosoma, ventral, male ; 2. telofemur and genu IV, setae with encrustations, female ; 3. membranous integument between AD and PD, female ; 4. genitoanal plate, male ; cl, claviform encrustation ; ec, encrustations ; ed, epicuticular droplets.

Fig. 5 : Suctorians, moderately extended and contracted. Scale bar = 50  $\mu$ m.

*Female* : Idiosoma 562-675  $\mu\text{m}$  long. AD, OC and PD with reticulate ornamentation. PD with two narrow longitudinal costae, each costa 1-2 polygons wide. Setae ds-2, ds-3 and ds-4 inserted within membraneous integument, ds-5 on PD almost on level with insertion of leg IV. Membraneous integument with anastomosing rather than parallel striae and with minute cuticular points (Fig. 3). Ventral plates with delicate porosity. GA with 2 pairs of sgs, genital sclerites with 1.5-2 pairs of short subgenital setae. GO rather large, occupying more than half the length of genital plate. Ovipositor extending slightly beyond GA.

Gnathosoma slender. Rostrum with almost parallel margins (cf. Fig. 1). Basal pair of maxillary setae inserted at base of rostrum, distal pair of setae at 0.6 (relative to length of rostrum). Palps extending beyond rostrum.

Leg I with conspicuously long, bluntly ending ventral spines ; none of the setae on the other legs spine-like. Epicuticular droplets on telofemora and genua form a reticulum (Fig. 2). Number of ventromedial and ventrolateral spines and setae of I-3, 3 vm and 2 vl spines ; of I-4, 1 vm and 1 vl spine ; of I-5, 3 vm and 2 vl spines plus 1 vm and 1 vl seta ; of I-6, 1 vm spine. Ventrolateral spine on I-4 longer than length of genu. II-5 with 2-3 ventromedial and 1-2 ventrolateral setae ; III-5 with 1 ventromedial and 1-2 ventrolateral setae ; IV-5 with 1 ventromedial and 1 ventrolateral seta.

*Male*. Idiosoma 502-560  $\mu\text{m}$  long, 310-385  $\mu\text{m}$  wide, smaller than that of female. Dorsal aspect same as that of female. A male, 530  $\mu\text{m}$  in length, with 222  $\mu\text{m}$  long, 204  $\mu\text{m}$  wide GA. GO 65  $\mu\text{m}$  long, 50  $\mu\text{m}$  wide. Genital sclerites with 5 pairs of spur-like subgenital setae of which 2 pairs are inserted in anterior half of the sclerites and 3 pairs in posterior half (Fig. 4). Pairs of 37-39 perigenital setae arranged closely around GO. Spermatopositor large, reaching almost to anterior margin of GA.

*Nymphs* : Idiosomal length of deutonymphs 434-515  $\mu\text{m}$ , that of protonymphs 384-409  $\mu\text{m}$ . Deutonymphs with 2 pairs of spines on I-3, a pair of spines on I-4, 2 pairs of spines and a pair of ventral setae on I-5. Protonymphs with a pair each on I-3 and I-4, and a pair of spines plus a pair of ventral setae on I-5.

*Epibionts and fouling* : Several of the adult specimens have Suctorina fixed on the idiosoma and legs. Stem of suctorians 20-30  $\mu\text{m}$  long and 4  $\mu\text{m}$  wide ; extended body 60-70  $\mu\text{m}$ , long and 25-35  $\mu\text{m}$  wide ; ending with apical cluster with up to 30 tentacles, each tentacle about 25  $\mu\text{m}$  long (Fig. 5). Body with 8 longitudinal ridges. Pellicle with small droplets fused to striae.

The majority of specimens bear light-brown or black particles on idiosoma, legs and setae. Small encrustations, 2-10  $\mu\text{m}$  long, are fixed to the setae like beads on a string (Fig. 2). Other setae have clavate encrustations from delicate filaments and entangled particles. Some of the specimens have idiosoma and trochanters to tibiae completely covered with particles which are fused and form a solid sheath. The sheath in turn bears debris and concretions. It is easily removed while handling the mites.

*Remarks* : In the original description which was based on a female and 3 deutonymphs, Bartsch (1990) stressed the resemblance with the genus *Halacarellus*. In the material at hand both females and males are present. The arrangement of the perigenital setae in males is dissimilar from that described for *Agauopsis* but in accordance with that often found in

*Halacarellus*. Accordingly, the species is moved to the genus *Halacarellus*. *H. auzendei* is closely related to *H. princeps* (Trouessart) and *H. aculeatus* (Makarova), the former is recorded from the northern Atlantic (Trouessart, 1902), the latter from the northern Pacific (Makarova, 1978). *H. auzendei* lacks the frontal spine present in both *H. princeps* (cf. Bartsch 1983) and *H. aculeatus*.

Epibionts are frequently found on halacarids. Several of tidal and subtidal species of *Rhombognathus* and *Isobactrus* are densely fouled with diatoms and sporelets of algae, and representatives of the genera *Halacarellus* and *Copidognathus* often carry large numbers of suctorians (Lohmann, 1889 ; Bartsch, 1989, 1992 and unpublished records). Suctorians from two closely related *Copidognathus* are figured in Bartsch (1989).

The light-brown particles and encrustations are thought to be from bacteria and inorganic precipitates. At the Snake Pit site, blocks around and in the vicinity of active formations are covered with films or granulose crusts from bacteria (Segonzac *et al.*, 1993). These bacteria may settle also on halacarids.

*H. auzendei*, taken at several dives to the site Elan at the Snake Pit, is thought to be member of that vent fauna.

*Halacarellus alvinus* sp. nov. (Figs. 6-16)

*Material* : Holotype female (MNHNP 63 B 5), 37°20'N, 32°17'W, Lucky Strike site, 1636 m, dive 2606, Alvin/Atlantis II, 1 June 1993.

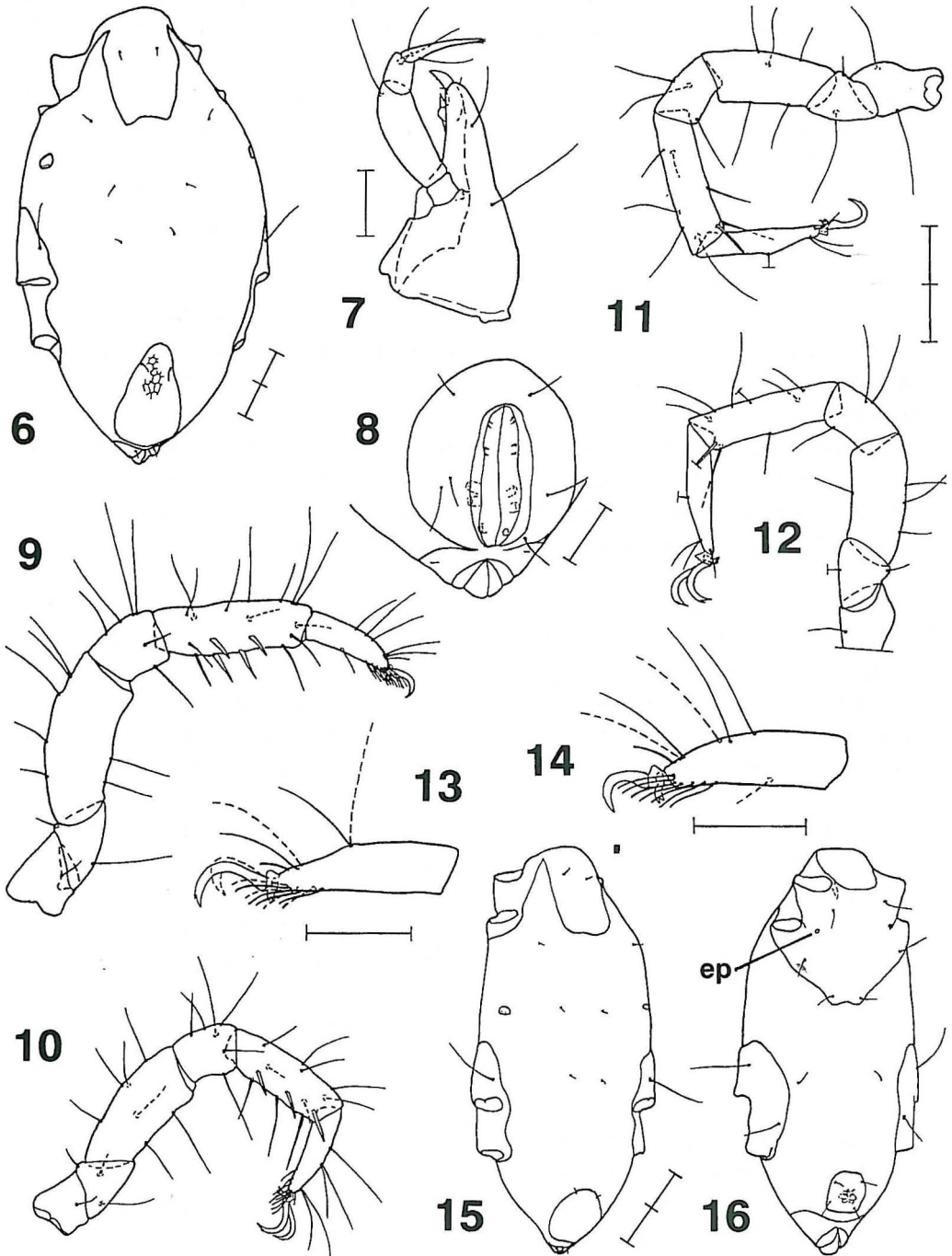
One deutonymph (MNHNP 63 B 6), Lucky Strike, dive 2604, 30 May 1993.

*Female* : Length of idiosoma 645 µm, width 347 µm. Surface of AD smooth, that of PD reticulate (Fig. 6). Membraneous integument with numerous parallel striae. AD 164 µm long, 102 µm wide. Surface of plate lack sculpturing, but some few scattered canaliculi are present in posterior AD. OC almost circular, 19 µm wide, with transverse pore canaliculus. Dorsal setae small ; ds-1 inserted in anterior half of AD. Setae ds-2, ds-3 and ds-4 inserted on 5 µm wide sclerites within membraneous integument, ds-5 within margin of PD ; ds-6 on anal cone. PD 139 µm long, 86 µm wide, hardly extending beyond ds-5. Surface of PD reticulate.

Ventral plates with delicate porosity. AE 186 µm long ; with 3 pairs of ventral setae, and a pair of very distinct epimeral pores. PE with 1 dorsal and 2 ventral setae ; another ventral seta inserted within membraneous integument slightly anterior to a level with insertion of leg III. GA, 182 µm long, 130 µm wide, with 3 pairs of perigenital setae (Fig. 8). GO 111 µm long. Distance from anterior margin of GO to that of GA about one-fourth of length of GO. Genital sclerites with 4 pairs of sgs, with each two pairs adjacent anteriorly and in middle of genital sclerites.

Gnathosoma 186 µm long (Fig. 7). Integument of gnathosomal base delicately porose. P-3 with medial spine. Chelicera with serrate dorsal edge.

Leg I shorter than idiosoma. Telfemora I and II slightly longer than tibiae, telfemora III and IV shorter than tibiae, respectively. Number of setae, from trochanter to tibia : leg I, 1, 2, 7, 6, 17 ; leg II, 1, 3, 7, 6, 13 ; leg III, 2, 2, 5, 3, 8-9 ; leg IV, 1, 2, 4, 3, 9. Tibia I with



Figs. 6-16 : *Halacarellus alvinus* sp. nov.

6. Idiosoma, dorsum, female ; 7. gnathosoma, lateral, female ; 8. genitoanal plate, female ; 9. leg I, medial, female ; 10. leg II, medial, female ; 11. leg III, medial, female ; 12. leg IV, medial, female ; 13. tarsus II, medial (lateral setae and claw dashed), female ; 14. tarsus I, lateral (medial setae dashed, medial claw omitted), female ; 15. idiosoma, dorsum, deutonymph ; 16. idiosoma, venter, deutonymph. (ep, epimeral pore). Scale bar = 50  $\mu$ m.

4 pairs of ventral setae, 2 of which are spine-like and 2 are bristle-like (Fig. 9). Tibia II with 3 pairs of ventral bristles, ventromedial ones delicately bipectinate, ventrolateral ones smooth and pointed (Fig. 10). Tibia III with 5 dorsal setae, and 1 delicately bipectinate ventromedial and 2-3 smooth ventrolateral bristles (Fig. 11). Tibia IV with 5-6 dorsal setae and 3-4 ventral bristles (Fig. 12). Tarsus I with 5 dorsal setae, a seta-like dorsolateral solenidion, a single ventromedial seta and 7 pairs of eupathidia (Fig. 14). Tarsus II with 0-1 unpaired plus 2 pairs of dorsal setae (Fig. 13), the 2 dorsomedial setae being shorter than the dorsolateral ones; solenidion seta-like and dorsomedial in position; ventroapically 8 setae present (pas included). Tarsi III and IV with 3 dorsal setae, slender pas on either side of apex; ventral seta lacking.

Claws with accessory process. Claw pecten lacking. Median claw bidentate.

*Deutonymph*: Idiosoma 496  $\mu\text{m}$  long. Outline of AD same as in female. OC reduced to small platelet around pore canaliculus. PD surpassing setae ds-5 for about 7  $\mu\text{m}$  (Fig. 15). AE with epimeral pores and 3 pairs of ventral setae (Fig. 16). Genital plate 50  $\mu\text{m}$  long; with 2 pairs of pgs and 2 pairs of small sgs. Number of setae on trochanters to genua: leg I, 1, 2, 5, 5; leg II, 1, 2, 5, 5; leg III, 2, 2, 3, 3; leg IV, 1, 2-3, 2, 3. Tibia I with 7 dorsal setae and 3 pairs of ventral setae, of which the distal pair is seta-like, the 2 basal pairs spine-like. Tibia II with 4-5 dorsal setae and 2 pairs of ventral bristles. Tibia III with 3-4 slender dorsal and 3 bristle-like ventral setae, and tibia IV with 3 dorsal and 2 ventral setae. Tarsi I and II each with 4 dorsal setae, tarsi III and IV with 3 dorsal setae. Tarsus I with a ventromedial seta, and apically with 5 pairs of eupathid setae; tarsus II with 3 pairs of eupathidia. Tarsi III and IV with a pair of slender pas.

*Remarks.* *Halacarellus alvinus* is closely related to *H. caecoides* Bartsch, a species taken in the Norwegian Basin from 2 600 m depth (Bartsch, 1978). A combination of characters present only in these two species is: OC reduced to pair of minute platelets, epimeral pores present also in nymphs and females, the pair of setae in the majority of species present on epimera III is inserted within the striated integument. Number and arrangement of the subgenital setae is the same in both species, and tarsi I and II have 5 and 4 dorsal setae (solenidion excluded). Differences between the two species are: PD in *Halacarellus alvinus* short, extending beyond ds-5 for 16  $\mu\text{m}$ , PD in *H. caecoides* much larger, surpassing ds-5 for 110  $\mu\text{m}$  and reaching beyond level with insertions of legs IV; telofemora in *H. alvinus* more slender than in *H. caecoides*.

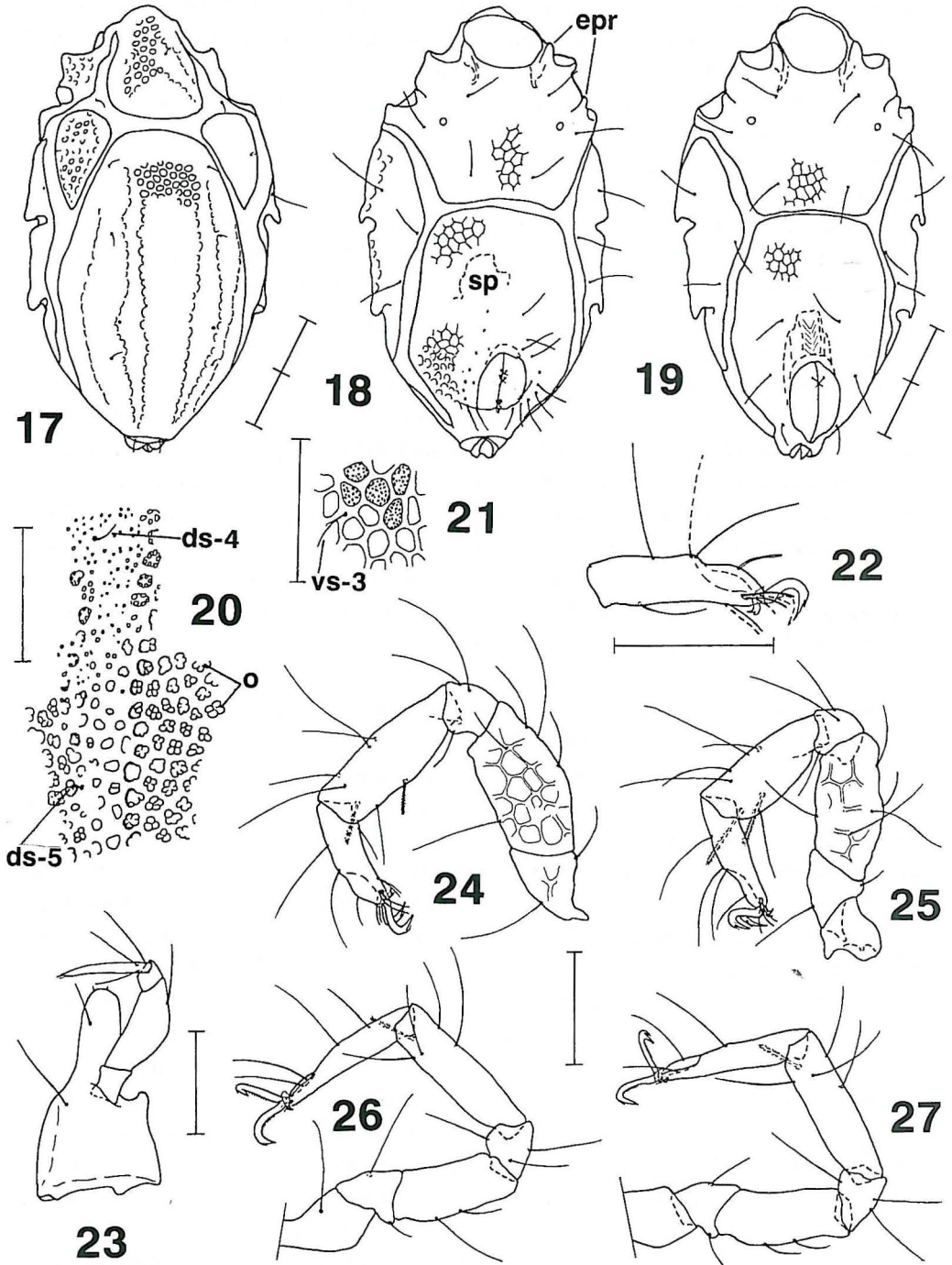
*H. alvinus* is thought to be a deep-sea species and not bound to hydrothermal vents.

#### *Copidognathus alvinus* sp. nov. (Figs 17-27)

*Material*: Holotype male (MNHNP 63 B 8), 37°20'N, 32°17'W, Lucky Strike, 1 636 m dive 2607, Alvin/Atlantis II, 2 June 1993.

Paratype female (MNHNP 63 B 7) and paratype female (author's collection), site and date as mentioned for holotype.

*Male*: Idiosoma 370  $\mu\text{m}$  long, 210  $\mu\text{m}$  wide. Dorsal plates coarsely reticulate (Fig. 17). Rosette pores lacking. Membraneous integument with densely arranged parallel striae; not



Figs. 17-27 : *Copidognathus alvinus* sp. nov.

17. Idiosoma, dorsum, male ; 18. idiosoma, venter, male ; 19. idiosoma, venter, female ; 20. portion of left costae of PD on a level with ds-4 - ds-5, female ; 21. portion of righth AE on a level with vs-3, female ; 22. tarsus I, lateral (medial setae dashed), male ; 23. gnathosoma, lateral, male ; 24. telofemur - tarsus I, lateral, male ; 25. leg II, lateral, male ; 26. leg III, lateral, male ; 27. leg IV, lateral, male (epr, epimeral process ; ds-4, ds-5, fourth and fifth pair of dorsal setae ; o, ornamentation with polygons subdivided ; sp, spermatopositor ; vs-3, third ventral seta). Scale bar = 50  $\mu$ m.

squamiform. AD 90  $\mu\text{m}$  long, 82  $\mu\text{m}$  wide. Slightly raised area, with an outline of an inverted Y, not abruptly delimited from remainder of plate. Small ridges of reticulate ornamentation coarser and surrounding foveae deeper within raised areas than in lateral and posterior areas of the plate. OC 87  $\mu\text{m}$  long, 47  $\mu\text{m}$  wide ; corneae lacking. Pore canaliculus present in middle of lateral margin. PD 258  $\mu\text{m}$  long, 160  $\mu\text{m}$  wide. With 2 medial and 2 only slightly raised lateral costae ; costae not set off distinctly from remainder of plate. Major parts of PD reticulate, with each polygon subdivided (Fig. 20). Posterior portion of PD with coarse reticulation enclosing rather deep foveae. Gland pores inconspicuous. Dorsal setae small. Setae ds-1 inserted in lateral margin of inverted Y, ds-2 within membranous integument between AD and OC, ds-3 on PD on a level with pore canaliculus of OC ; ds-4 and ds-5 lateral to medial costae of PD, ds-4 immediately posterior to level with insertion of leg III, ds-5 posterior to that of leg IV.

Major portions of ventral plates reticulate (Fig. 18). Each of the polygons intensely subdivided, giving the plate a porose-like ornamentation (cf. Fig. 21). Posterolateral areas of genital plate coarsely reticulate, its deep foveae lack the porosity present in remainder of plates. AE 112  $\mu\text{m}$  long, 182  $\mu\text{m}$  wide ; with 3 pairs of ventral setae and pair of epimeral pores. Lateral epimeral processes of epimera I and II large, triangular. PE with 1 dorsal and 3 ventral setae. GA 201  $\mu\text{m}$  long, 137  $\mu\text{m}$  wide, GO 50  $\mu\text{m}$  long, 38  $\mu\text{m}$  wide. Distance from anterior margin of GA to that of GO equalling 2.5 times the length of GO. Spermatopositor large, extending beyond GO for more than length of GO. Eleven pairs of pgs present. With 4 pairs of sgs, the 2 anterior ones being seta-like, the 2 posterior pairs spine-like.

Gnathosoma 107  $\mu\text{m}$  long. One pair of maxillary setae inserted on base of gnathosoma, one pair in apical half of rostrum (Fig. 23).

Lateral flank of telofemora I and II with reticulate sculpturing (Figs. 24, 25), with each of the polygons subdivided. Sculpturing on medial flank of telofemora and tibiae present but less prominent. Telofemora lack ventral lamellae. Telofemora, genua and tibiae with small articular membranes. Telofemur I slightly shorter than tibia I ; telofemur II almost as long as tibia II, telofemora III and IV (Figs. 26, 27) shorter than tibiae III and IV. Telofemur I twice as long as high ; telofemora II - IV 2.2, 2.4 and 2.4 times longer than high. Number of setae, from trochanter to tarsus (solenidion and pas included) : leg I, 1, 2, 5, 4, 7, 11 ; leg II, 1, 2, 5, 4, 7, 7 ; leg III, 1, 2, 2, 3, 5, 6 ; leg IV, 0, 2, 2, 3, 5, 5. Tibiae I and II with 2 bluntly ending, bipectinate and 1 slender, smooth bristle. Tibia III with bipectinate ventromedial and slender ventrolateral bristle ; right tibia IV with 1 bipectinate and 1 smooth and slender bristle, left tibia with both setae being slender. All tarsi with membranes of claw fossa. Solenidion on tarsus I inserted on enlarged lateral membrane of claw fossa (Fig. 22). Lateral membrane of claw fossa of tarsus II smaller than that of tarsus I, membrane with 17  $\mu\text{m}$  long solenidion. Apex of tarsus I with pair of doubled pas, that of tarsus II with a single medial and doubled lateral pas. Tarsi III and IV with 4 and 3 dorsal setae respectively.

Claws with accessory process. Very delicate pecten present along inner flank of claw. Median claw small, bidentate.



*Female* : Idiosoma 377-396  $\mu\text{m}$  long ; width of smaller specimen 217  $\mu\text{m}$ . Outline of dorsal plates same as in male. Costae on PD less conspicuous than those of male. GA (in specimen of 377  $\mu\text{m}$  length) 204  $\mu\text{m}$  long, 130  $\mu\text{m}$  wide. Ornamentation similar to that of male GA; GO 67  $\mu\text{m}$  long, 43  $\mu\text{m}$  wide. GO in posterior portion of genital plate ; distance from anterior margin of GA to that of GO somewhat less than twice the length of GO. Three pairs of pgs inserted as illustrated (Fig. 19). Ovipositor extending beyond GO and slightly beyond anterior pair of pgs.

*Remarks* : The first *Copidognathus* recorded from a hydrothermal vent site is *C. papillatus* Krantz, a species found both in the eastern and in the western Pacific (Krantz, 1982 ; Bartsch, 1991). *Copidognathus alvinus* is the second representative of that genus from a hydrothermal vent site and the first from such a site in the Atlantic Ocean. The two species are dissimilar, not even closely related. *C. papillatus* is characterized by a squamose sculpturing of the membranous integument and a prolonged anal cone, features not present in *C. alvinus*.

*Copidognathus alvinus* demonstrates slight similarity with *C. raekor* Bartsch, a species found within a sample with madrepores and sponges, taken on the sea-mount Great Meteorbank in the north-eastern Atlantic Ocean (Bartsch, 1973). Characters absent in *C. alvinus* but present in *C. raekor* are : OC with corneae, AD with short frontal process, foveae on AD and PD not subdivided, costae on PD without foveae or pores, ventral plates uniformly punctate.

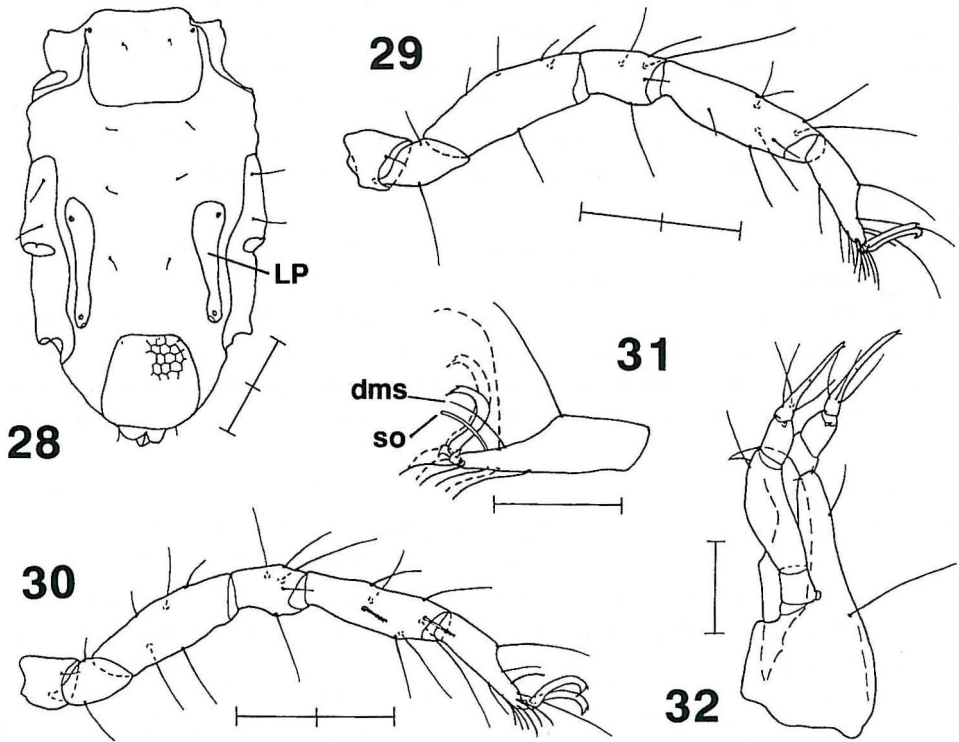
*Copidognathus alvinus* is a species of the depths of the ocean and, presumably, not bound to hydrothermal vent areas. Apart from lack of corneae, characteristic for all deep-sea species, none of the external morphological characters give any hint as to specialization to life in an unique habitat.

Both females carry eggs. One of the eggs enclosed a larva ready to hatch. Halacarids mites generally are oviparous. There are no records of ovolarvipary or larvipary.

#### *Bathyhalacarus* sp. A. (Figs 28-32)

*Material* : One deutonymph, 1 protonymph (author's collection), 23°23'N, 44°56'W, Snake Pit, site Elan, 3520 m, dive 2617, June 1993.

*Deutonymph* : Idiosoma 412  $\mu\text{m}$  long. Dorsal plates reticulate (Fig. 28). AD rectangular, 87  $\mu\text{m}$  long, 112  $\mu\text{m}$  wide, somewhat wider than long ; anterior margin truncate. Pair of gland pores in anterior half of the plate. Lateral plates elongate, 122  $\mu\text{m}$  long, 32  $\mu\text{m}$  wide, anteriorly slightly extending beyond level with insertion of leg III. Plate with anterior and posterior pair of gland pores. PD 92  $\mu\text{m}$  long, 100  $\mu\text{m}$  wide. Setae ds-1 inserted on AD, ds-2 and ds-3 in membranous integument between AD and lateral plates, ds-4 in membranous integument between lateral plates, ds-5 in anterior margin of PD, and ds-6 on either side of anal cone. Ventral plates delicately porose. AE 125  $\mu\text{m}$  long, 221  $\mu\text{m}$  wide. PE with 2 dorsal and 3 ventral setae. Genital plate quadrangular, 55  $\mu\text{m}$  in length and width, with 2 pairs of pgs and 2 pairs of internal genital acetabula.



Figs. 28-32 : *Bathyhalacarus* sp. A, deutonymph

28. Idiosoma, dorsum ; 29. leg I, medial ; 30. leg II, medial ; 31. tarsus II, medial (lateral setae and claw dashed) ; 32. gnathosoma, lateral. dms, dorsomedial seta LP, lateral plate ; so, solenidion . Scale bar = 50  $\mu$ m.

Gnathosoma 147  $\mu$ m long. Rostrum short. Palps extending beyond rostrum (Fig. 32). Pharyngeal plate large. Basal pair of maxillary setae on gnathosomal base, posterior pair on rostrum. Tip of rostrum with 2 pairs of rostral setae. Rostral sulcus extending beyond posterior pair of maxillary setae. P-3 with minute medial spur. P-4 with 3 setae in basal whorl, 1 lateral seta in middle of segment and setula at its tip.

Legs slender. Tibiae I with 3 slender ventral bristles (Fig. 29) ; tibia II with 2 bluntly ending, delicately bipectinate ventromedial and 1 slender, tapering ventrolateral bristle (Fig. 30) ; tibia III with 1 bluntly ending bristle and 2 slender ventrolateral bristles ; tibia IV with the 3 ventral bristles being slender and tapering. Tarsi I - IV each with 3 dorsal setae. Dorsomedial seta on tarsus II much shorter than dorsolateral seta and even more slender than adjacent solenidion (Fig. 31). Paired dorsal setae on the other tarsi subequal in size. Tarsus I with a ventral seta, a pair of eupathidia and tripled pas. Tarsus II with 7 ventral eupathidia (doubled pas included). Tarsi III and IV each with 2 ventral setae and a pair of slender pas.

*Protonymph* : Idiosoma 408  $\mu\text{m}$  long. Dorsal plates smaller than in deutonymph. Lateral plates include anterior and posterior gland pores. PE with 1 dorsal and 2 ventral setae. Tibiae I - IV each with 2 ventral bristles. Lateral seta on P-4 not discernible.

*Remarks.* *Bathyhalacarus* sp. A is characterized by the combination of : AD rectangular, anterior margin truncate, lateral plates elongate, not extremely constricted, palps extending beyond rostrum, P-4 with lateral setula, ventromedial bristles on tibiae II and III delicately bipectinate, dorsomedial seta on tarsus II distinctly smaller than dorsolateral seta. Five species of *Bathyhalacarus* are so far recorded from the Atlantic Ocean, viz., *B. abyssiculus* Bartsch, *B. acanthophorus* Bartsch, *B. aculifer* Bartsch, *B. acutus* Bartsch, and *B. atlanticus* Bartsch (Bartsch, 1982). The specimens from the Snake Pit lack the frontal spine present in *B. acanthophorus*, *B. aculifer*, *B. acutus*, and *B. atlanticus*. The AD is not as wide as in *B. abyssiculus*, the latter species lacks the lateral setula on P-4. *Bathyhalacarus* sp. A is distinct also from the species reported from the Pacific Ocean.

#### ACNOWLEDGEMENTS

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#### REFERENCES

- BARTSCH, I., 1973. *Copidognathus raekor*, eine neue Halacaride (Acari) von der Großen Meteorbank. *Meteor Forsch.-Ergebn.*, D, 16 : 65-68.
- BARTSCH, I., 1978. Halacaridae (Acari) aus der Tiefsee des atlantischen Ozeans. *Cah. Biol. mar.*, 19 : 47-62.
- BARTSCH, I., 1982. Zur Gattung *Bathyhalacarus* (Acari, Halacaridae), nebst Beschreibung fünf neuer Arten. *Zool. Scr.*, 11 : 209-220.
- BARTSCH, I., 1983. *Halacarellus coecus* (Trouessart) und *H. princeps* (Trouessart) (Halacaridae, Acari). Wiederbeschreibung der Arten. *Acarologia*, 24 : 49-57.
- BARTSCH, I., 1989. *Copidognathus brifacius* sp. nov. (Halacaridae, Acari) und Bemerkungen zu weiteren Bewohnern des Seeigels *Spatangus purpureus* (Echinoidea). *Mitt. hamb. zool. Mus. Inst.*, 86 : 315-328.
- BARTSCH, I., 1990. Hydrothermal vent fauna : *Agauopsis auzendei* sp. nov. (Acari, Halacaridae). *Bull. Mus. natn. Hist. nat. Paris*, ser. 4, A, 12 : 69-73.
- BARTSCH, I., 1991. *Copidognathus papillatus* Krantz (Acari, Halacaridae), a hydrothermal vent mite in the Pacific Ocean. *Zool. Sci.*, 8 : 789-792.
- BARTSCH, I., 1992. Hong Kong rhombognathine mites (Acari : Halacaridae). In B. Morton (ed.). The marine flora and fauna of Hong Kong and southern China, III, 251-276. *Hong Kong University Press*, Hong Kong.
- JANKOVSKAJA, A.I., 1978. The first finding of ultra-abyssal Halacaridae (Acari) in the Pacific. *Zool. Zh.*, 57 : 295-299 (In Russian, English summary).

- KRANTZ, G.W., 1982. A new species of *Copidognathus* Trouessart (Acari : Actinedida : Halacaridae) from the Galapagos Rift. *Can. J. Zool.*, 60 : 1728-1731.
- LOHMANN, H., 1889. Die Unterfamilie der Halacaridae Murr. und die Meeresmilben der Ostsee. *Zool. Jb. (Syst.)*, 4 : 269-408.
- MAKAROVA, N.G., 1978. Marine mites (Acarina, Halacaridae) from the intertidal zone of the Gulf of Anadyr (Bering Sea). In O.G. Kussakin (ed.). The intertidal zone of the Bering Sea and south-eastern Kamchatka, 131-149. Nauka, Moscow, (In Russian, English summary).
- SEGONZAC, M., M. DE SAINT LAURENT & B. CASANOVA, 1993. L'énigme du comportement trophique des crevettes Alvinocarididae des sites hydrothermaux de la dorsale médio-atlantique. *Cah. Biol. mar.*, 34 : 535-571.
- TROUESSART, E., 1896. Note préliminaire sur les acariens marins dragués à de grandes profondeurs par M. Koehler dans le Golfe de Gascogne (août - septembre 1895). *Bull. Soc. zool. Fr.*, 21 : 102-105.
- TROUESSART, E., 1902. Note préliminaire sur les Acariens marins (Halacaridae) recueillis par SAS le Prince de Monaco, dans les mers arctiques. *Bull. Soc. zool. Fr.*, 27 : 66-70.