



# Halacarid mites (Acari) from the Mid-Atlantic Ridge. New records

Ilse BARTSCH

Biologische Anstalt Helgoland, Notkestrasse 31, D 22607 Hamburg  
Fax 49 40 89 69 31 15

**Abstract :** Among the invertebrates taken at the hydrothermal vent areas Lucky Strike, Menez Gwen and 38°20'N zone on the Mid-Atlantic Ridge, four species of halacarid mites were found, i.e. *Agauae plutonius* sp. nov., *Halacarus prolongatus* sp. nov., *Halacarellus alvinus* Bartsch, and *Copidognathus alvinus* Bartsch. *A. plutonius* and *H. prolongatus* are described and the description of *H. alvinus* is extended.

**Résumé :** Parmi les invertébrés récoltés dans les segments hydrothermaux Lucky Strike, Menez Gwen et la zone 38°20'N de la dorsale médio-atlantique, quatre espèces d'halacariens, *Agauae plutonius* sp. nov., *Halacarus prolongatus* sp. nov., *Halacarellus alvinus* Bartsch et *Copidognathus alvinus* Bartsch, ont été capturées. Les deux espèces nouvelles *A. plutonius* et *H. prolongatus* sont décrites et la description de *H. alvinus* est complétée.

**Keywords :** Mid-Atlantic Ridge, bathyal, Halacaridae, description.

## Introduction

In recent years, the vent fauna of the Mid-Atlantic-Ridge (MAR), between 23°N and 38°20'N, has been surveyed during several cruises (Grassle *et al.*, 1986; Mevel *et al.*, 1989; Galkin & Moskalev, 1990; Segonzac, 1992; Van Dover *et al.*). The biological material collected near hydrothermal active vents also included halacarid mites. Inhabitants of deep-sea mid-Atlantic vents are *Halacarellus auzendei* (Bartsch), taken at the Snake Pit (23°22'N, 44°57'W, 3500 m), and *Halacarellus alvinus* Bartsch and *Copidognathus alvinus*, both from the Lucky Strike area (37°20'N, 32°17'W, 1600 m) (Bartsch, 1990, 1994).

## Material and Methods

The DIVA 1 and 2 cruises (Diving In Vents at the Azores) concentrated on the three areas 37°17'N (Lucky Strike),

37°50'N (Menez-Gwen) and 38°20'N zone. Biological material was taken during dives with the manned submersible 'Nautile' which was operated from the R/V 'Nadir'. The invertebrates were sorted by the Centre National de Tri d'Océanographie Biologique (CENTOB, IFREMER, Brest).

The mites were cleared in lactic acid and mounted in glycerine jelly. Drawings were prepared using a camera lucida.

Type and voucher specimens are deposited in the Muséum National d'Histoire Naturelle, Paris (MNHN) and the author's halacarid collection.

Abbreviations used in the descriptions: 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-2, second palpal segment; pas, parambulacral setae; PD, posterior dorsal plate; PE, posterior epimeral plate; pgs, perigenital setae. Legs numbered I to IV, leg segments 1 to 6, trochanter, basifemur, telofemur, genu, tibia, tarsus.

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## Results

### *Agaua plutonius* sp. nov.

(Figs 1-13)

**Material and collecting data :** Holotype female (MNHNP), Mid-Atlantic Ridge, 38°20.35'N, 30°40.15'W (DIVA 1, DV10), 540–919 m, 17 May 1994; coll. H. Ondréas.

**Vent fauna :** Hydrozoans, gorgonids, brachiopods, polychaetes, aplacophores and other molluscs, amphipods, crinoids.

**Description :** Female. Length of idiosoma 630 µm, with frontal spine included 650 µm, width 410 µm. Dorsal plates reticulate; membranous integument with parallel striae and delicate, 20–30 µm long filaments (Fig. 6). AD 134 µm long, with frontal spine 154 µm long, 173 µm wide; apart from small frontal spine anterior margin rounded. Gland pores in lateral margin on level with insertion of leg I. OC 86 µm long, 86 µm wide; with a gland pore each in lateral and posterior angle. PD 358 µm long, 180 µm wide; plate with pair of narrow costae; integument of lateral portions with numerous canaliculi; pair of gland pore in posterior margin of the plate. First pair of dorsal setae smaller than succeeding setae, ds-1 on AD between pair of gland pores. Long ds-2, ds-3 and ds-4 within membranous integument. Setae ds-5 half as long as ds-4 and on PD; ds-6 on anal cone (Fig. 1).

Ventral plates and membranous integument densely beset with long but delicate filaments. AE 192 µm long, 320 µm wide; posterior margin short. PE with one dorsal and three ventral setae. GA 210 µm long, 164 µm wide, GO 86 µm long, 74 µm wide. Distance from anterior margin of GA to GO equalling 0.6 times length of GO. Three pairs of pgs present; anterior pair inserted within anterior margin of GA. Ovipositor long, extending beyond GO for 1.4 times length of GO, and beyond GA for almost length of GO (Fig. 2).

Gnathosoma 254 µm long; rostrum very slender (Fig. 3), 167 µm long. Integument of gnathosomal base covered with

slender filaments. Long basal pair of maxillary setae on gnathosomal base; shorter and more slender second pair of maxillary setae on base of rostrum. Both pairs of rostral setae 1 µm long; apicalmost pair spur-like; both pairs of rostral setae with distinct afferent canal (Fig. 5). P-2 with long distodorsal seta. P-3 with 16 µm long distodorsal seta; P-4 with three setae in basal whorl; apically with setula and two spurs (Fig. 4). Claw of chelicera 25 µm long, with denticles along its dorsal edge; shaft slender.

Legs slender; evenly covered with filaments. Tibiae I and II slightly shorter than telofemora I and II (Figs 7, 8); tibiae of legs III and IV longer than telofemora (Figs 9, 10). Leg chaetotaxy, from trochanter to tibia: leg I, 1, 2, 6–7, 5, 15; leg II, 1, 3, 6, 5, 14; leg III, 2, 2, 6, 4, 13; leg IV, 0, 2, 4, 3, 13. One of the dorsal setae of telofemur I short, spine-like. Tibiae I–IV each with six ventral setae; setae of tibia I smooth and slender; distalmost ventromedial seta of II–5 coarsely pectinate; corresponding seta of III–5 and IV–5 smooth but wider and shorter than ventrolateral seta. Tarsi I–IV each with three dorsal setae, the two distal setae paired and inserted on membranes of claw fossa. Solenidion on tarsus I 21 µm long, dorsolateral in position, vestigial famulus represented by afferent canal. Solenidion on tarsus II 25 µm long and dorsomedial in position. Tarsus I with a ventral seta in middle of segment and a distal cluster with 13 pairs of eupathid setae (Fig. 12). Tarsus II with a ventral and a pair of doubled eupathid setae (Fig. 13). Tarsi III and IV each with pair of single pas.

Paired claws with accessory process and long but very delicate pecten (Fig. 11). Much smaller median claw unidentate.

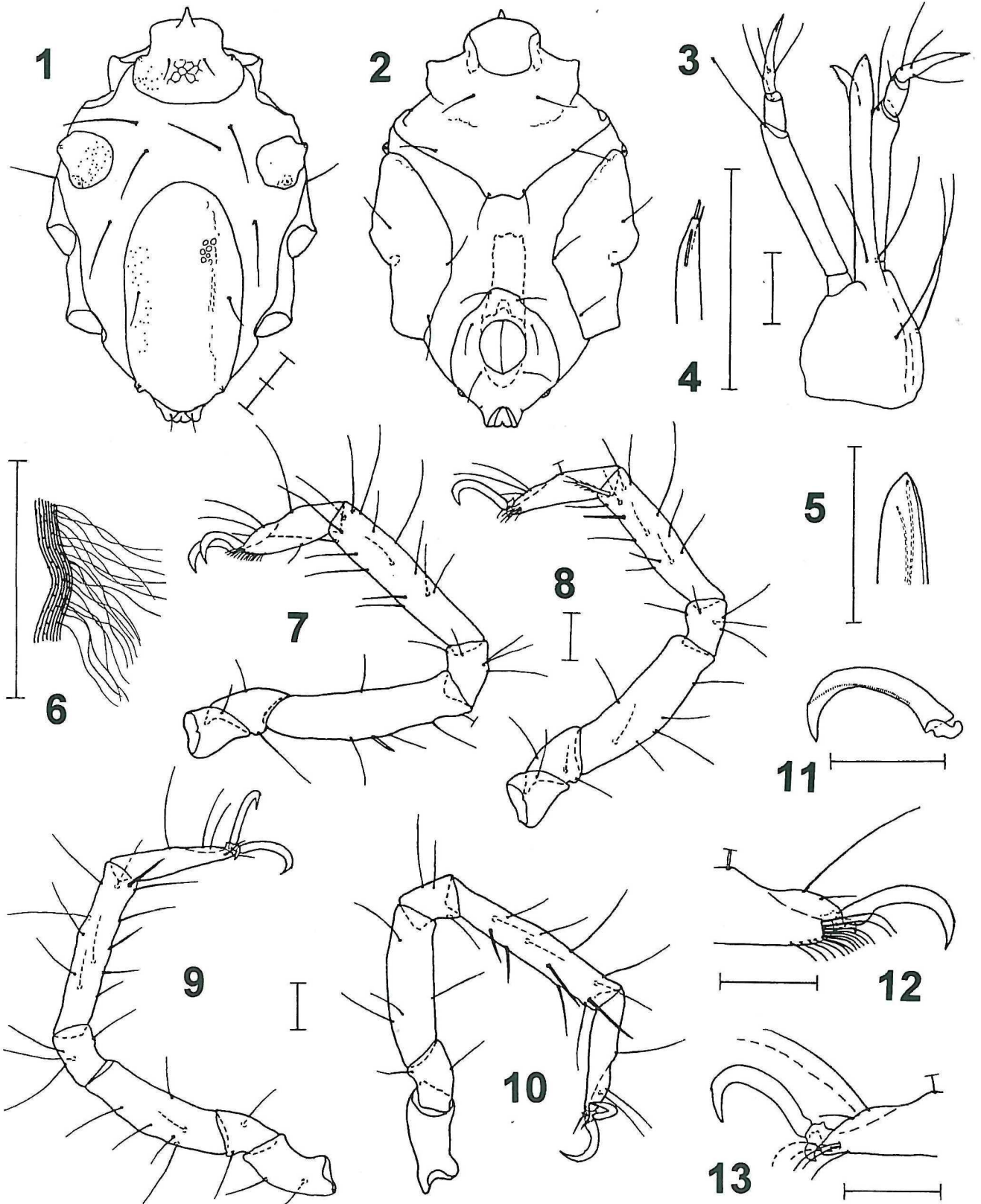
**Remarks :** At a first glance, *Agaua plutonius* is similar to *Agaua abyssorum* (Trouessart), a species taken in the Bay of Biscay, from depths of 400 to 1400 m (Trouessart, 1896). Distinguishing characters are, the anterior margin of the AD is truncate in *A. abyssorum* and the OC bear corneae and eye pigment, in contrast, the AD of *A. plutonius* has a small frontal spine and the OC have no corneae.

#### Figs 1–13. *Agaua plutonius* sp. nov., female.

1. Idiosoma, dorsum; 2. idiosoma, venter; 3. gnathosoma, ventrolateral; 4. tip of palp, lateral; 5. tip of rostrum, ventrolateral; 6. portion of membranous integument between PD and right PE; 7. leg I, medial; 8. leg II, medial; 9. leg III, medial; 10. leg IV, medial; 11. lateral claw and median claw of tarsus IV; 12. tip of tarsus I, lateral (medial setae and claw omitted); 13. tip of tarsus II, medial (lateral setae dashed). Each scale division = 50 µm.

#### Figs 1–13. *Agaua plutonius* sp. nov., femelle.

1. Idiosome, vue dorsale ; 2. idiosome, vue ventrale ; 3. gnathosome, vue ventrolatérale ; 4. extrémité du palpe, vue latérale ; 5. extrémité du rostre, vue ventrolatérale ; 6. tégument membraneux entre les plaques PD et PE droite ; 7. patte I, vue antérieure ; 8. patte II, vue antérieure ; 9. patte III, vue postérieure ; 10. patte IV, vue postérieure ; 11. griffe latérale et griffe intermédiaire du tarse IV ; 12. extrémité du tarse I, vue postérieure (sans les soies et la griffe antérieures) ; 13. extrémité du tarse II, vue antérieure (les soies postérieures en ligne discontinue). Échelles = 50 µm.



*A. plutonius* bears two gland pores on the OC, whereas the majority of *Agauae* species has a single gland pore over the pore canaliculus which generally is near the gland pore.

**Biology** : *A. plutonius* assumedly is a species of the bathyal zone and not bound to hydrothermal sites.

***Halacarus prolongatus* sp. nov.**

(Figs 14-27)

**Material and collecting data** : Holotype male (MNHNP), Mid-Atlantic Ridge, Site Menez-Gwen, near the smoker Mogueud Gwen, 37°50.46'N, 32°31.35'W (DIVA 1, DV 14-6), 845 m, 22 May 1994; coll. J.-L. Charlou. Paratype female (author's collection), type locality and date.

**Vent fauna** : Hydrozoans (*Tubularia*), bivalves, polychaetes, limpets and other gastropods, copepods, ostracods, amphipods, isopods, tanaidaccans.

**Description** : Male. Length of idiosoma 615 µm, with frontal spine included 740 µm, width 295 µm. Membraneous integument maze-like reticulated (Fig. 17). AD with very delicate epicuticular reticulation; with frontal spine included 241 µm long, 100 µm wide; frontal spine slender, 125 µm long. Posterior portion of AD slender, on level of gland pores abruptly widening. OC and PD lacking. Pair of gland pores II placed ventromarginally within membraneous integument. Pair of gland pores III slightly posterior to level with gland pores II; pair of gland pores IV level with insertion of leg IV, and pair of gland pores V near end of idiosoma. Setae ds-1 on AD slightly anterior to gland pores; ds-2 to ds-6 within membraneous integument, ds-3 immediately lateral to gland pores III, ds-5 adjacent to glands IV, and ds-6 slightly posterior though adjacent to gland pores V (Fig. 14).

Ventral plates with very delicate, reticulate epicuticula. AE 74 µm long, 292 µm wide. Posterior margin of AE concave. Apodemes of AE and PE 75-80 µm long; apodemes of PE extending almost to medial margin of PE (Fig. 15). Ventral setae long and slender; AE with three pairs of setae; PE with one dorsal and three ventral setae. GA 179 µm long, 167 µm wide. Anterior margin of plate rounded. GO 50 µm long, 43 µm wide; surrounded by 72 perigenital setae. Right genital sclerite with four, left sclerite with five subgenital setae (Fig. 16). One pair of outlying setae within membraneous integument anterior to GA; interval between pair of outlying setae and anterior margin of GA equalling 0.6 times length of GO. Genital sclerites with two anterior and three posterior pairs of subgenital setae. Spermatopositor short, extending antieriad slightly beyond anterior pgs.

Gnathosoma 217 µm long, rostrum 123 µm long, longer than gnathosomal base. Basal pair of maxillary setae on base of rostrum, distal pair near apex of rostrum. Interval

between two setae of P-2 equalling greatest height of that segment (Fig. 18). Spine of P-3 almost as long as P-3.

Legs long and slender; legs I, III and IV, with claws included, longer than idiosoma, leg II about as long as idiosoma. Chaetotaxy, from trochanter to tibia, of leg I, 1, 2, 9-10, 10, 13; leg II, 1, 4, 8, 10, 12; leg III, 2, 2, 7, 9, 11; leg IV, 1, 2, 5, 6, 10. Dorsal setae of basifemora I-IV short and blunt. A similar short, bluntly ending seta on telofemur IV. Telofemur, genu and tibia I with one, one and two pairs of long, tapering ventral bristles (Fig. 22). Telofemur and genu II each with long ventral bristle but short ventromedial seta (Fig. 23); tibia II with two pairs of bristles, both ventral bristles smooth and tapering, the distal one of ventromedial bristles coarsely bipectinate (Fig. 27). Tibiae III and IV with four ventral bristles each (Figs 24, 25). Tarsus I with pair of ventral tapering bristles, apically with pair of ventral eupathidia and pair of doubled eupathid pas; dorsally with three long setae, dorsolateral 7 µm long solenidion and 10 µm long famulus (Fig. 26). Tarsus II with two pairs of ventral bristles, an apical pair of single eupathidia and a pair of doubled ones; dorsally with three setae; 7 µm long solenidion in dorsomedial position. Tarsus III with two pairs of ventral setae, pair of tapering pas and four dorsal setae. Tarsus IV with four (left tarsus IV of holotype with three) ventral setae, pair of slender, basally plumose pas and three dorsal setae.

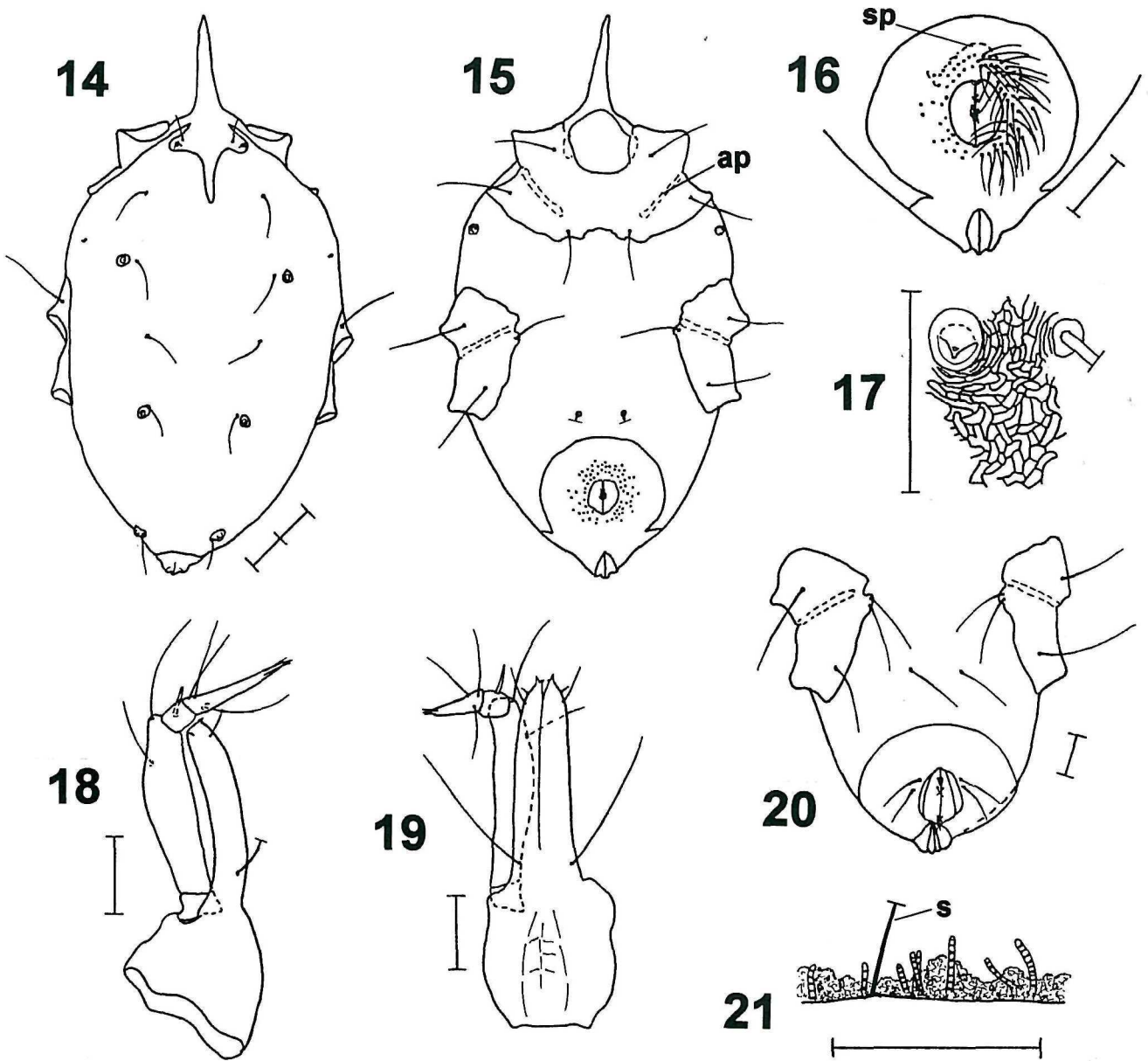
Major claws of tarsus I shorter than those of succeeding tarsi. Claws with accessory process. No claw comb present. Median claw small.

Female. Length of idiosoma, with frontal spine included, 750 µm; with frontal spine excluded, 617 µm. Medial setae of PE doubled in this paratype female. GA 155 µm long, 185 µm wide. GA completely covered with swelled cerotegument. Two pairs of pgs adjacent to GO, one pair of long pgs within membraneous integument anterior to GA (Fig. 20).

Gnathosoma similar to that of male. Tectum scale-like. Apicalmost pair of rostral setae flap-like (Fig. 19).

Left tarsus III with five ventral bristles, right tarsus, as in male, with four bristles. Parambulacral setae of tarsus IV seta-like, smooth.

**Remarks** : *Halacarus prolongatus* is characterized by: long and slender frontal spine, absence of PD, reduced OC, long apodemes on AE and PE, pair of outlying perigenital setae, swelled female GA, long and slender legs. It is a member of the *actenos* group. Similar long frontal spine and lack of PD are found in *H. echinatus* Newell, *H. griseus* Bartsch, *H. longiunguis* Police, *H. multispinus* Bartsch, *H. perditus* Newell, *H. robustus* Lohmann, and *H. spongiphilus* Kishida. The OC and corneae are completely reduced in *H. prolongatus*, as well as in *H. multispinus*, whereas in *H. echinatus*, *H. griseus*, *H. longiunguis*,



**Figs 14–21.** *Halacarus prolongatus* sp. nov.

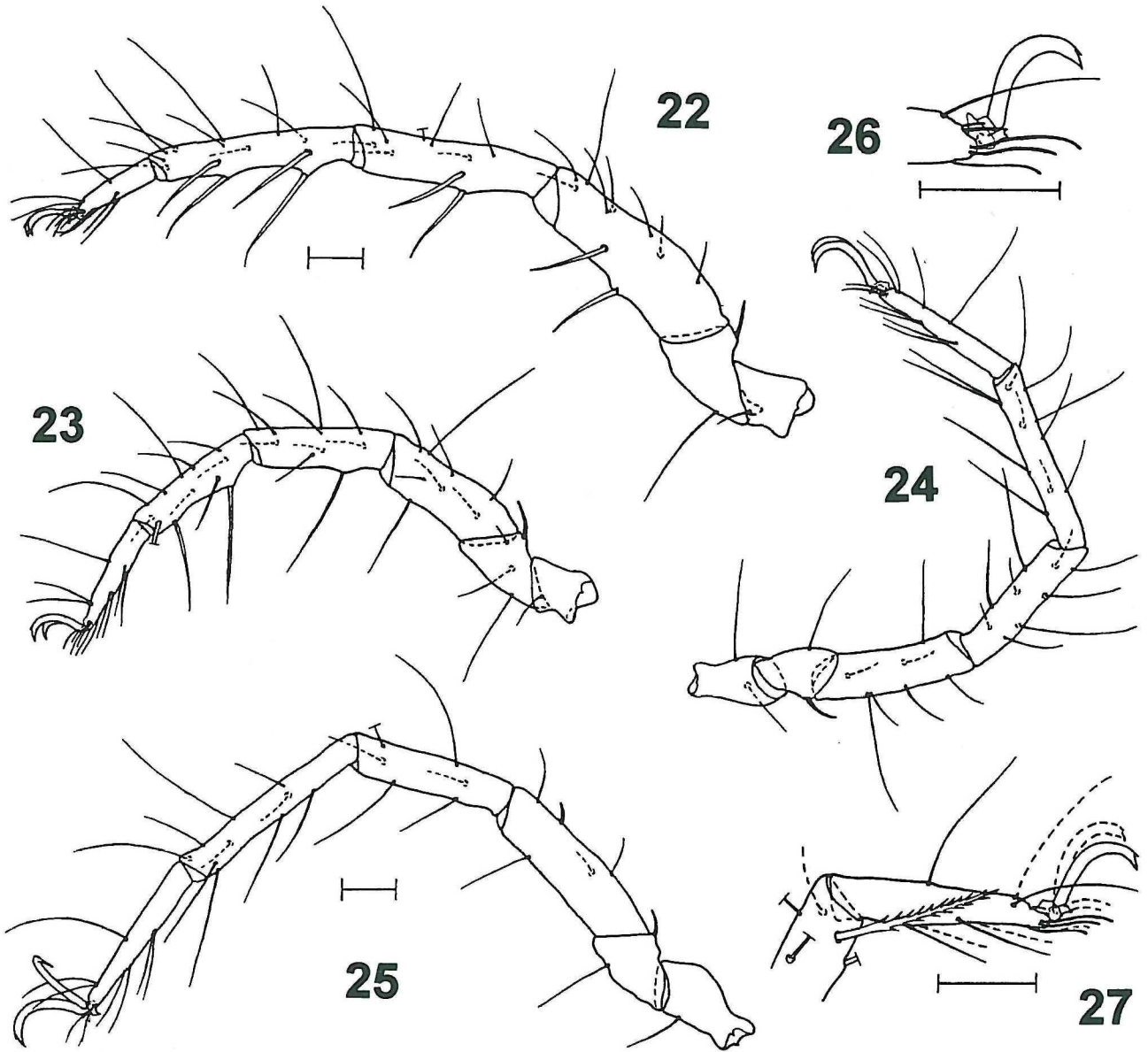
14. Idiosoma, dorsum, male; 15, idiosoma, venter, male; 16. genitoanal plate, male; 17. membraneous integument adjacent to left gland pore III and ds-3, male; 18. gnathosoma, lateral, male; 19. gnathosoma, ventral, female; 20. posterior idiosoma, ventral, female; 21. fouling on tibia I, male. (ap, apodeme; s, setae; sp, spermatopositor) Scale bars = 50 µm.

**Figs 14–21.** *Halacarus prolongatus* sp. nov.

14. Idiosome, vue dorsale, mâle; 15, idiosome, vue ventrale, mâle; 16. plaque génito-anale, mâle; 17. tégument membraneux plissé auprès du pore de la glande III et ds-3 gauche, mâle; 18. gnathosome, vue latérale, mâle; 19. gnathosome, vue ventrale, femelle; 20. détail de l'idiosome, vue ventrale, femelle; 21. revêtement du tibia I, mâle (ap, apodème; s, soie; sp, spermatopositeur). Échelles = 50 µm.

*H. perditus*, *H. robustus*, and *H. spongiphilus* remnants of the OC or the corneae are present. *H. multispinus* is distinguished from *H. prolongatus* on the basis of the two pairs of ventral bristles on telofemur I, whereas *H. prolongatus*, as well as the majority of *Halacarus* species,

has a single pair of bristles. Moreover, the ds-5 are adjacent to the ring of the fourth pair of gland pores in *H. prolongatus*, but separated from this pair of glands in *H. multispinus* (setae ds-4, not figured in Bartsch, 1981: fig. 1, are present within the deformed dorsal integument).



**Figs 22–27.** *Halacarus prolongatus* sp. nov.

22. leg I, medial, male; 23. leg II, medial, male; 24. leg III, medial, male; 25. leg IV, medial, male; 26. tip of tarsus I, lateral, male (medial setae and claw omitted); 27. tibia and tarsus II, medial, female (lateral setae and claw dashed). Scale bars = 50  $\mu$ m

**Figs 22–27.** *Halacarus prolongatus* sp. nov.

22. patte I, vue antérieure, mâle ; 23. patte II, vue antérieure, mâle ; 24. patte III, vue postérieure, mâle ; 25. patte IV, vue postérieure, mâle ; 26. extrémité du tarse I, vue postérieure, mâle (sans les soies et la griffe antérieures) ; 27. détail du tibia et tarse II, vue antérieure, femelle (soies et griffe postérieures en ligne discontinue). Échelles = 50  $\mu$ m.

*Biology* : The legs of the male of *Halacarus* are fouled (Fig. 21) with more or less amorphous, angular or small black particles and 10-25  $\mu\text{m}$  long filamentous bacteria.

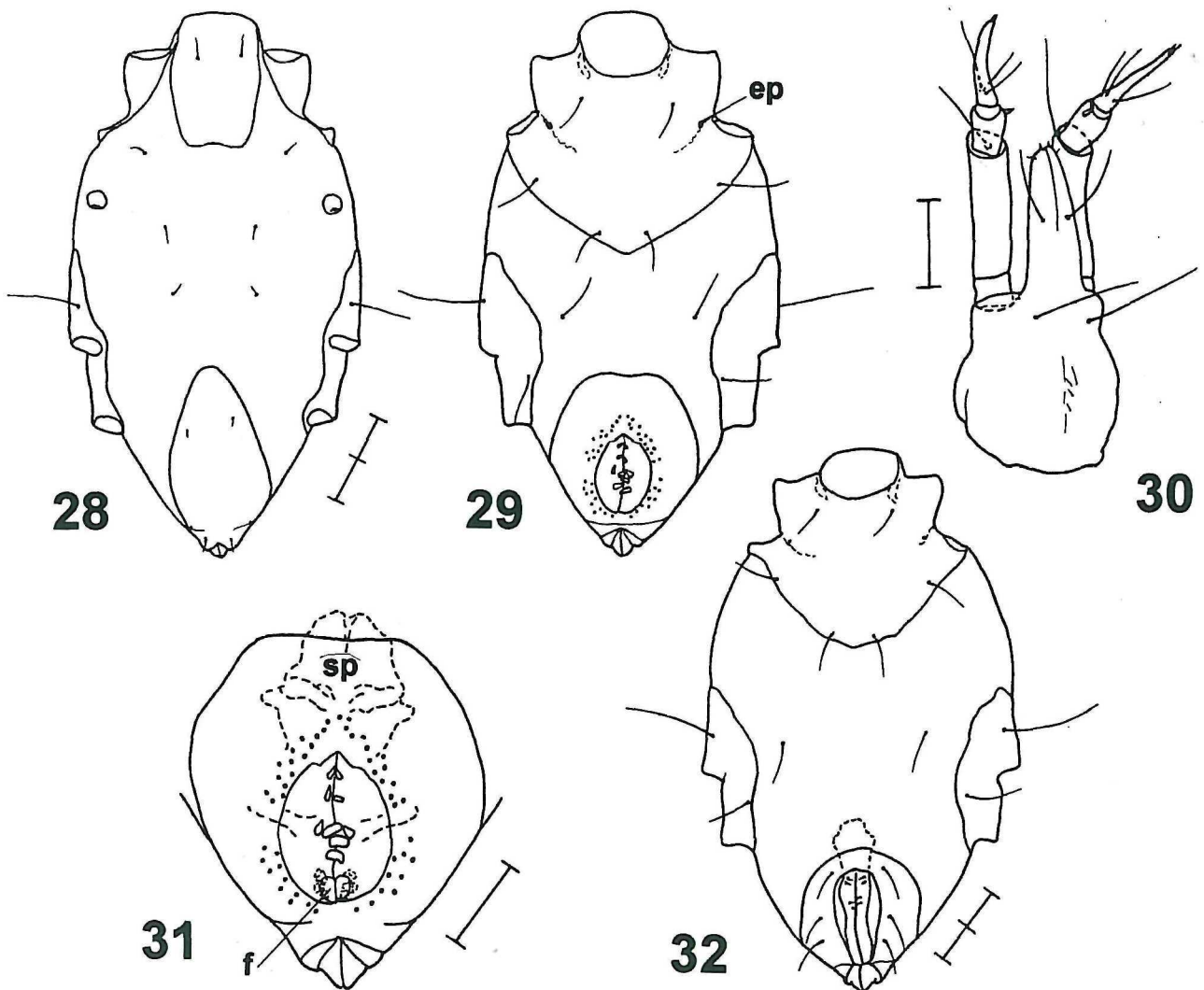
***Halacarellus alvinus* Bartsch, 1994**

(Figs 28-32)

*Material and collecting data* : Male (MNHNP), Mid-Atlantic Ridge, Site Lucky Strike, smoker Nuno, 37°17.50'N, 32°17'W (DIVA 1, DV 19-2), 1727 m, 27 May 1994; coll. Y. Fouquet. One female (MNHNP), Site Isabel,

37°17.36'N, 32°16.64'W (DIVA 2, PL 03), 1685 m, 05 June 1994; coll. L. Saldanha. One female (author's collection), collecting data as above. Two females, 2 males, 1 deutonymph (author's collection), site Pagode, 37°17.63'N, 32°16.95'W (DIVA 2, PL 07), 1629 m, 09 June 1994; coll. P.-M. Sarradin.

*Fauna of smoker Nuno* : Turbellarians, mussels (in large numbers), gastropods, polychaetes, copepods, ostracods, tanaidaceans, and ophiuroids. Fauna of site Isabel : Mussels, gastropods and limpets, polychaetes, amphipods,



**Figs 28-32.** *Halacarellus alvinus* Bartsch.

28. Idiosoma, dorsum, male; 29. idiosoma, venter, male; 30. gnathosoma, ventrolateral, female; 31. genitoanal plate, male; 32. idiosoma, venter, female. (ep, epimeral pore; f, foveae and genital acetabula; sp, spermatopositor) Scale bars = 50  $\mu\text{m}$ .

**Figs 28-32.** *Halacarellus alvinus* Bartsch.

28. Idiosome, vue dorsale, mâle ; 29. idiosome, vue ventrale, mâle ; 30. gnathosome, vue ventrolatérale, femelle ; 31. plaque génito-anale, mâle ; 32. idiosome, vue ventrale, femelle. (ep, pore épiméral ; f, fovéoles et acétabula génitales ; sp, spermatopositeur). Échelles = 50  $\mu\text{m}$ .

tanaiidaceans, and pycnogonids. Fauna of site Pagode : Sponges, platyhelminthes, nematodes, limpets and other gastropods, mussels, polychaetes, copepods, ostracods, cumaceans, amphipods, tanaiidaceans, shrimps and brachyuran crabs.

*Description* : Male. Length of idiosoma 502–582  $\mu\text{m}$ . In dorsal aspect similar to female. AD 140  $\mu\text{m}$  long, 92  $\mu\text{m}$  wide. OC 17  $\mu\text{m}$  long, 16  $\mu\text{m}$  wide. PD 175  $\mu\text{m}$  long, 105  $\mu\text{m}$  wide (Fig. 28), slightly longer than that of female. AE 179  $\mu\text{m}$  long; with pair of epimeral pores. GA of the large male (length 582  $\mu\text{m}$ ) 194  $\mu\text{m}$  long, 160  $\mu\text{m}$  wide; anterior margin truncate (Fig. 29). GO large, 85  $\mu\text{m}$  long, 62  $\mu\text{m}$  wide; distance from anterior margin of GO to that of GA 0.7 times length of GO. GO surrounded by 47–51 perigenital setae. Genital sclerites with five pairs of subgenital setae, the three posterior pairs wide and spur-like (Fig. 31). Posterior angle of genital sclerites with pair of foveae, beneath these foveae are three pairs of internal genital acetabula. Spermatopositor extending slightly beyond anterior margin of GA.

Female. Length of idiosoma 544–665  $\mu\text{m}$ . Dorsum as described in Bartsch (1994), venter as illustrated (Fig. 32). Rostrum with almost parallel margins. Rostral sulcus extending posteriorly just beyond pair of maxillary setae (Fig. 30).

Deutonymph. Length of idiosoma 551  $\mu\text{m}$ . OC reduced to platelets, 5–7  $\mu\text{m}$  in diameter, around pore canaliculus. PD extending to level of ds-5. AE with three pairs of setae and a pair of epimeral pores; posterior margin truncate. Genital plate rectangular, 45  $\mu\text{m}$  long, 47  $\mu\text{m}$  wide; with three perigenital setae, two pairs of subgenital setae and two pairs of internal genital acetabula. Tibia I with four spiniform and two slender ventral setae; tibiae II to IV with four, three and two ventral setae, respectively.

*Remarks* : Most unique is the presence of the pair of epimeral pores and the fovea in the posterior part of the male genital sclerites, adjacent to the three pairs of internal genital acetabula. Within the genus *Halacarellus*, epimeral pores are present in larvae (Bartsch, 1973; Krantz, 1977) but, generally, not in nymphs and adults. In contrast, both the nymphs and adults of the two closely related deep-sea species *H. caecoides* Bartsch and *H. alvinus* (Bartsch, 1978a, 1994), and the protonymphs of *H. capuzinus* (Lohmann), *H. procerus* Viets and *H. subcrispus* Bartsch have small epimeral pores. The three latter species belong to a natural species group, the *capuzinus* group; they live in shallow water sandy deposits, often in brackish water areas. Foveae in the posterior edge of the male genital sclerites, similar to those of *H. alvinus*, are found in males of *Halacarellus capuzinus*, *H. floridiarum* (Lohmann), *H. procerus*, and *H. subcrispus*, as well as, e.g., in males of *Halacarellus basteri* (Johnston) and *Halacarus rismondoi*

Viets (Bartsch, 1972, 1978b, unpublished observation). The majority of the *Halacarellus* species have three ventral setae on each PE, but *H. caecoides*, *H. alvinus*, as well as e.g. *H. dissimilis* Bartsch, *H. hexacanthus* Viets, *H. longipes* (Trouessart), *H. reticulatus* Bartsch, and *H. robustus* Bartsch have two setae on the PE and a third pair of setae within the membraneous ventral integument.

The special significance of the epimeral pores and the foveae adjacent to the genital acetabula of the deep-sea species is not known. In halacarids in general, epimeral pores and genital acetabula are ion-permeable areas (Alberti, 1977, 1978; Bartsch, 1973, 1974), and in species living in brackish, almost fresh water, the epimeral pores often are enlarged, fulfilling the increased requirement for osmoregulation (Bartsch, 1982). Epimeral pores are also present in adults of the exclusively arenicolous genera *Anomalohalacarus* and *Arenihalacarus*, and the pores are enlarged in several psammobiont littoral species of the genera *Arhodeoporus* and *Copidognathus*. The genera *Werthella* and *Pelacarus*, with records from shallow and deep-sea areas, have very conspicuous epimeral pores. The deep-sea species *Werthella atlantica* Bartsch, taken in the South Atlantic Ocean in 1400–2300 m depth (Bartsch, 1986), and *Pelacarus aculeata* (Trouessart), a species found in the Mediterranean and the North Atlantic, in subtidal as well as in 1400 m depth (Trouessart, 1896; Morselli & Mari, 1982, 1985; Bartsch, 1986), have pores as large as shallow water representatives.

*Distribution* : *Halacarellus alvinus* is recorded from the Lucky Strike vent site, but as yet not from other areas of the Mid-Atlantic Ridge.

#### *Copidognathus alvinus* Bartsch, 1994

*Material and collecting data* : Male (MNHNP), Mid-Atlantic Ridge, Lucky Strike vent site, Tour Eiffel, 37°17.32'N, 32°16.51'W (DIVA 1, DV04-6), 1685 m, 10 May 1994; coll. M. Segonzac. One male, one female (author's collection), collecting data as above.

*Vent fauna* : Thick fouling with hydrozoans, sponges, nematodes, bivalves, limpets and other gastropods, the polychaetes Ampharetidae, copepods, ostracods, amphipods, isopods, tanaiidaceans, and pycnogonids.

*Description* : Length of males 377–384  $\mu\text{m}$ , of female 390  $\mu\text{m}$ . Male GA with 10–11 pairs of perigenital setae. Rostral sulcus extending posteriad just beyond pair of maxillary setae. More detailed description in Bartsch (1994).

*Biology* : The species seems to be common on rocky formations in the depth of the Atlantic Ocean.

*Distribution* : At present, *Copidognathus alvinus* is known only from the Lucky Strike site.



### Acknowledgements

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