

A NEW SPECIES OF *ANCORABOLINA* (COPEPODA, HARPACTICOIDA, ANCORABOLIDAE) FROM A MEDITERRANEAN SUBMARINE CAVE, WITH A KEY TO SPECIES

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MEIOBENTHOS
CAVE FAUNA
SUBLITTORAL
SYSTEMATICS
TAXONOMY
ANCORABOLINA CAVERNICOLA
DEEP SEA
CAVE 3PP
MARSEILLE

ABSTRACT. - *Ancorabolina cavernicola* sp. nov. (Harpacticoida, Ancorabolidae) is described from the Mediterranean submarine cave 3PP near La Ciotat, France. The new species clearly fits the generic apomorphies (i) cephalothorax posteriorly with pair of lateral, backwardly turned processes; (ii) antennal endopod lacking third subterminal seta. Inside *Ancorabolina*, the new species can be characterized by seven apomorphic features, (1) cephalothorax posteriorly with dorsal cuticular protrusion; (2) peak on cephalothorax with a pair of frontolateral “horns” ending in long tube pores; (3) lateral pairs of tube pore-bearing projections on cephalothorax well developed; (4) lateral processes of cephalothorax bifurcated with rami well developed; (5) furcal rami considerably elongate, reaching length of abdomen; (6) basis of first swimming leg showing remarkable longitudinal elongation at side of endopod; (7) baseoendopod of fifth swimming leg considerably elongate, reaching end of genital double somite. The record of the new species may support the hypothesis of coastal aphotic habitats showing similar environmental conditions as the deep sea. Furthermore, the genus presents an East-Atlantic-Mediterranean distribution that may, however, be an artefact of recent meiofauna sampling. *A. cavernicola* sp. nov. is the sixth representative since the description of the first species of the genus in 2006. A key to the species of *Ancorabolina* is provided.

INTRODUCTION

Only a few years ago, George (2006) described a new species of Ancorabolinae Sars, 1909 (Copepoda, Harpacticoida, Ancorabolidae) from the Angola and Guinea deep-sea basins (Southeast Atlantic). Because it did not fit any of the so far known ancorabolina genera, the genus *Ancorabolina* George, 2006, was established to include *A. chimaera* George, 2006. Although sharing some plesiomorphic characters with Laophontodinae Lang, 1944 (e.g., 5-segmented female antennule, third exopodal segments of P2-P4 with 3 outer spines), *A. chimaera* at the same time presents some eminent ancorabolina apomorphies like e.g., the lack of an antennary exopod and the transverse prolongation of the P1 basis (George 2006). Thus, following Hennig's (1982) concept of phylogeny, George (2006) concluded that *Ancorabolina* has to be assigned to Ancorabolinae due to the synapomorphies shared with ancorabolina representatives.

The finding of *A. chimaera* marked a break; after its first detection in the South-Atlantic deep sea, the genus has been collected from several other localities (Gheerardyn & George in press, George pers obs). A possible reason for such an overlook in the past may be a certain (superficial) similarity of *Ancorabolina* to the laophontodina species *Laophontodes bicornis* A. Scott, 1896 (cf Gheerardyn & George in press). Thus, former findings of *Ancorabolina* might have been erroneously determined as

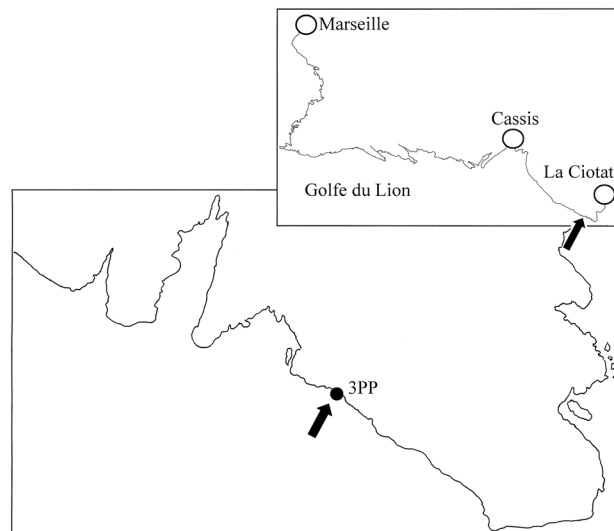


Fig. 1. – Map showing the location of the submarine cave 3PP at the Mediterranean coast of France. No scale.

L. bicornis, which happened for instance with some specimens collected from Sedlo and Seine Seamounts (sub-tropical Northeast Atlantic; George pers obs).

Whereas all remaining *Ancorabolina* species were sampled from deep-sea localities (George 2006, Gheerardyn & George in press), the here described *Ancorabolina cavernicola* sp. nov. was collected from a sublittoral submarine cave, called “3-Pépés” (“three grand-daddies”,

3PP) (Fig. 1). Former investigations of the cave fauna focused on Bryozoa, Porifera, Tardigrada, and Echiura (see Harmelin 1997) and it is reported that the faunal association in cave 3PP encloses “true bathyal or bathyo-abyssal organisms” (Harmelin 1997, p. 140). The results presented here are part of the project DEEPSETS (Deep-sea & Extreme Environments, Patterns of Species and Ecosystem Time Series), which is embedded into the EU Network of Excellence MarBEF (Marine Biodiversity and Ecosystem Functioning).

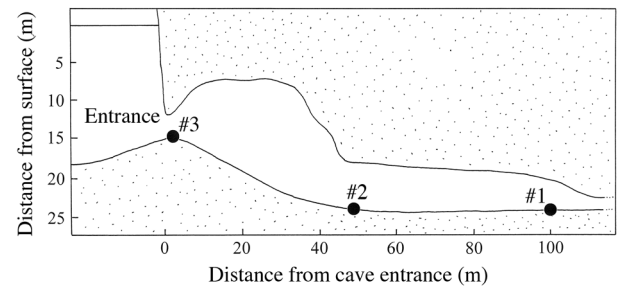


Fig. 2. – Longitudinal section of submarine cave 3PP, indicating the length of the cave, water depth, and stations # 1- # 3.

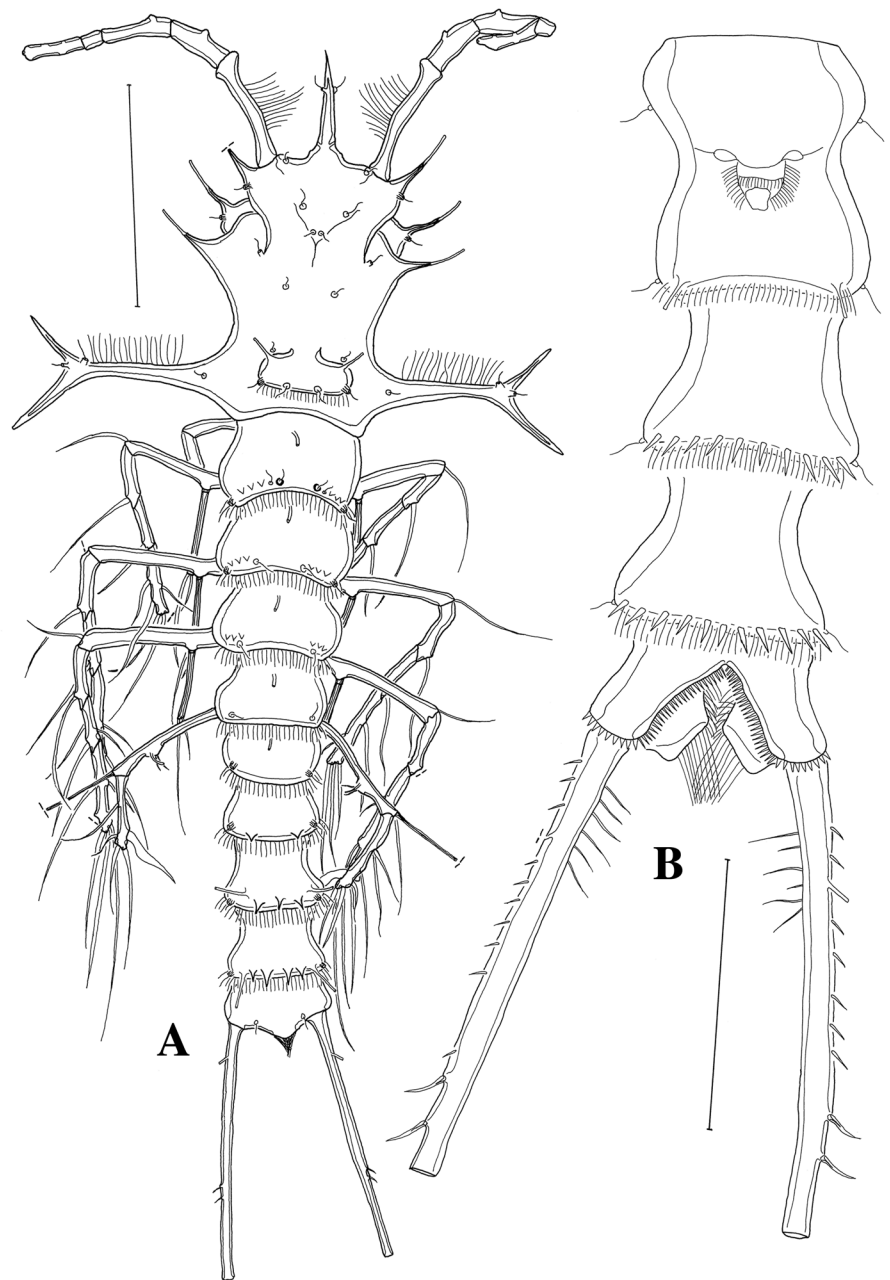


Fig. 3. – *Ancorabolina cavernicola* sp. nov., female. A. Habitus, dorsal view; B. Genital double somite, abdomen, telson, and FR (distal half not drawn), ventral view. Scales: A: 100 μ m, B: 50 μ m.

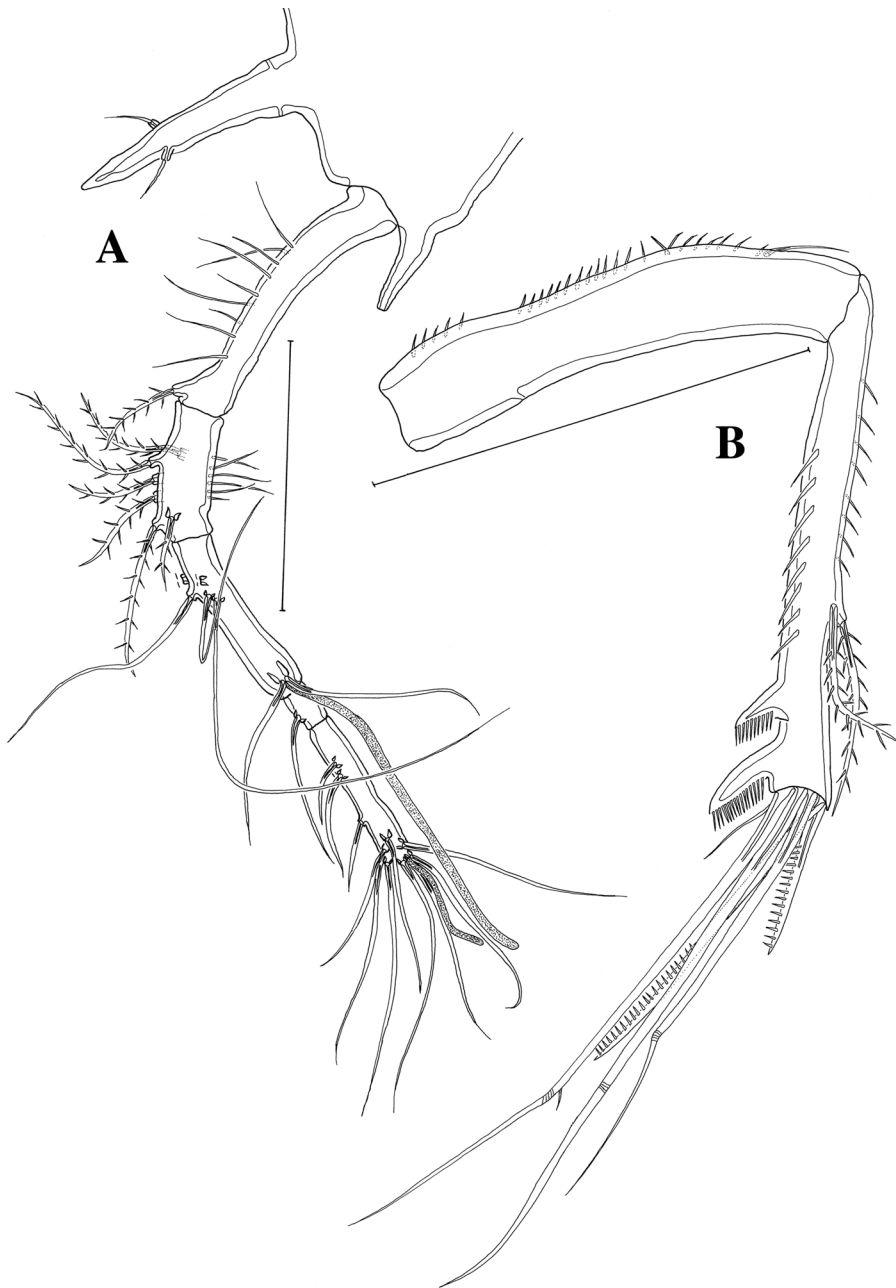


Fig. 4. – *Ancorabolina cavernicola* sp. nov., female. A. A1 with rostrum, ventral view; B. A2. Scales: 50 μ m.

MATERIAL AND METHODS

For detailed description of the sampling locality see Harmelin (1997). The first sampling station (# 1) was located 100 m behind the entrance, the second station (# 2) 50 m behind the entrance and the third station (# 3) was situated at the entrance (Fig. 2). Samples were taken between 7 and 11 May, 2007 by SCUBA diving and using a “Push Corer” that is pushed into the sediment by hand.

Harpacticoida were sorted in the laboratory at Senckenberg am Meer Wilhelmshaven, Abt. Deutsches Zentrum für Marine Biodiversitätsforschung (DZMB), Wilhelmshaven (Germany). Three specimens of the here described new species were obtained from # 1 (including holotype and allotype), and one

specimen was collected at # 2.

Specimens were dissected in glycerine under a Leica MZ 9.5 stereo microscope. Dissected parts of both the holotype and allotype were mounted on several slides using glycerol as embedding medium (Westheide & Purschke 1988). Drawings were made with the aid of a drawing tube on a Leica DMLB differential interference contrast microscope.

Abbreviations used in the text and figures: cphth: cephalothorax, A1: antennule, A2: antenna, aes: aesthetasc, benp: baseoendopod, enp: endopod, enp-1(2,3): proximal (middle, distal) segment of endopod, exp: exopod, exp-1(2,3): proximal (middle, distal) segment of exopod, FR: furcal rami, GF: genital field, md: mandible, mxl: maxillula, mx: maxilla, mxp: maxilliped, P1-P6: swimming legs 1-6, R: rostrum.

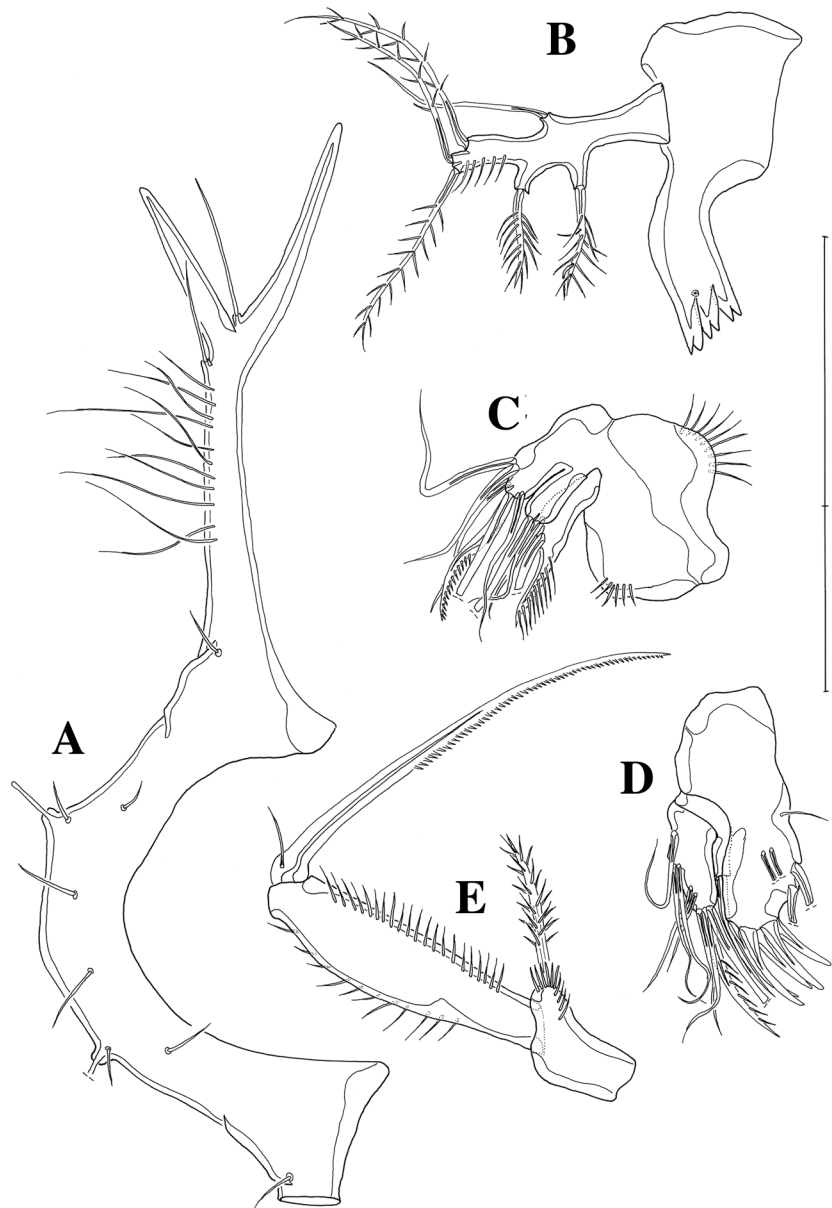


Fig. 5. – *Ancorabolina cavernicola* sp. nov., female. A. Lateral process of cphth, posterior view; B. Md; C. Mx; D. Mxl; E. Mxp. Scales: 50 μ m.

Table I. – *Ancorabolina cavernicola* sp. n., setation of swimming-legs 2-4 (after Sewell 1949).

	Exopod			Endopod		
	1	2	3	1	2	3
P2 female	I-0	I-0	III-2-1	0	0-2-0	-
male	I-0	I-0	III-2-1	0	0-2-0	-
P3 female	I-0	I-0	III-2-1	0	0-2-0	-
male	I-0	I-0	III-2-1	0	Apophysis	0-2-0
P4 female	I-0	I-1	III-2-1	0	0-2-0	-
male	I-0	I-1	III-2-1	0	1-2-0	-

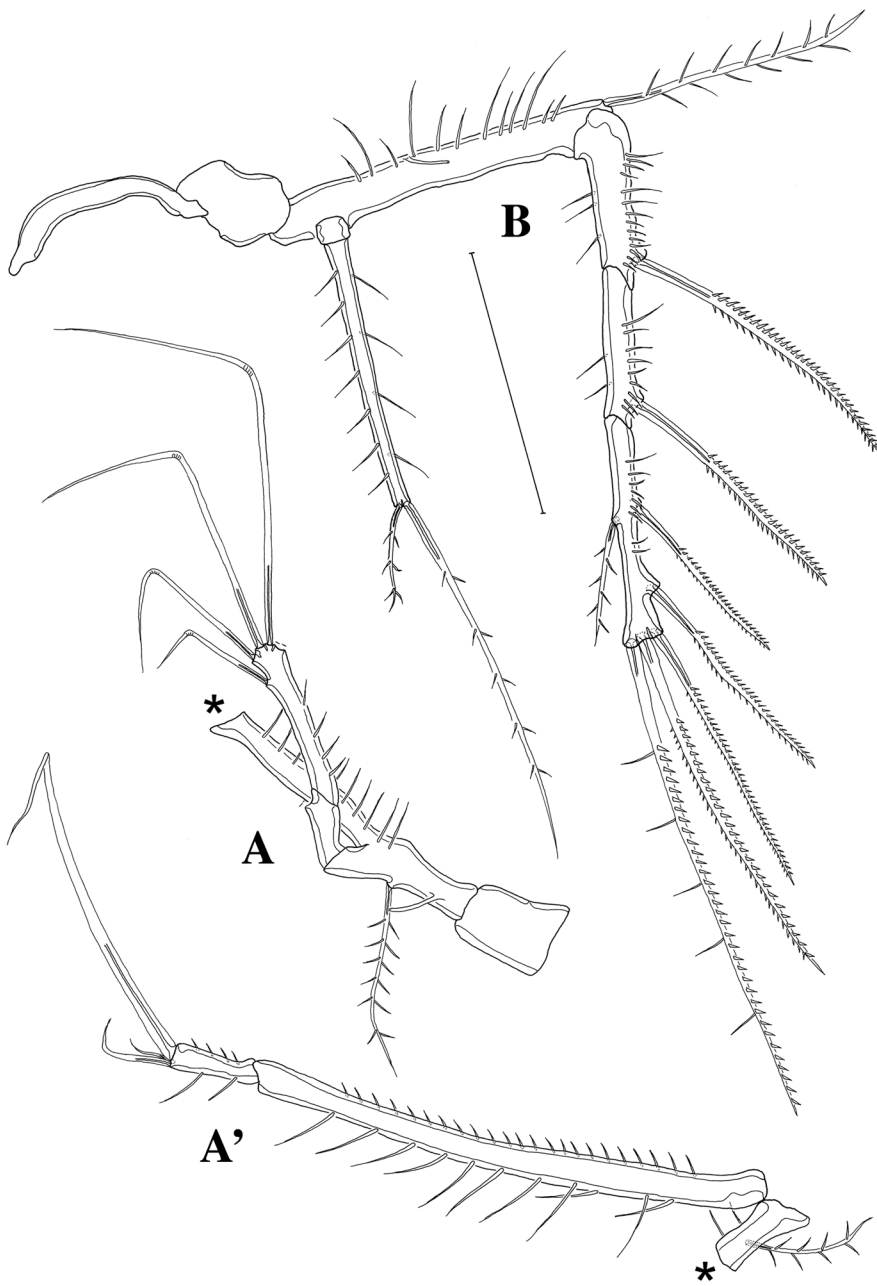


Fig. 6. – *Ancorabolina cavernicola* sp. nov., female. A, P1 coxa, basis (broken) and exp, A'. P1 basis (broken), enp. * indicating basal fracture; B. P3. Scale: 50 μ m.

RESULTS

Harpacticoida Sars, 1903
 Ancorabolidae Sars, 1909
Ancorabolina George, 2006

Ancorabolina cavernicola sp. nov.

Type locality: Mediterranean Sea, submarine cave 3PP near Marseille (43°09.47'N, 05°36.01'O [after Harmelin 1997]).

Holotype: female, collected by SCUBA diving with a push corer at # 1 (100 m inside the cave, 23 m depth), sample 4, distributed over 15 slides, Coll. Nos. SMF

34836/1-15; paratype 1 (allotype): male, collected at # 1, sample 3, distributed over 6 slides, Coll. Nos. SMF 34837/1-6; paratype 2: female, collected at # 1, sample 1, Coll. No. SMF 34838; paratype 3: copepodid (CIV), collected at # 2 (50 m inside the cave, 23 m depth), sample 6, Coll. No. SMF 34839, the type material is deposited at Senckenberg Forschungsinstitut und Naturmuseum, Frankfurt/Main (Germany).

Etymology: The species is named after the habitat (submarine cave) where it has been found.

Description of the female holotype

Body (Fig. 3A) long and slender. Body length (mea-

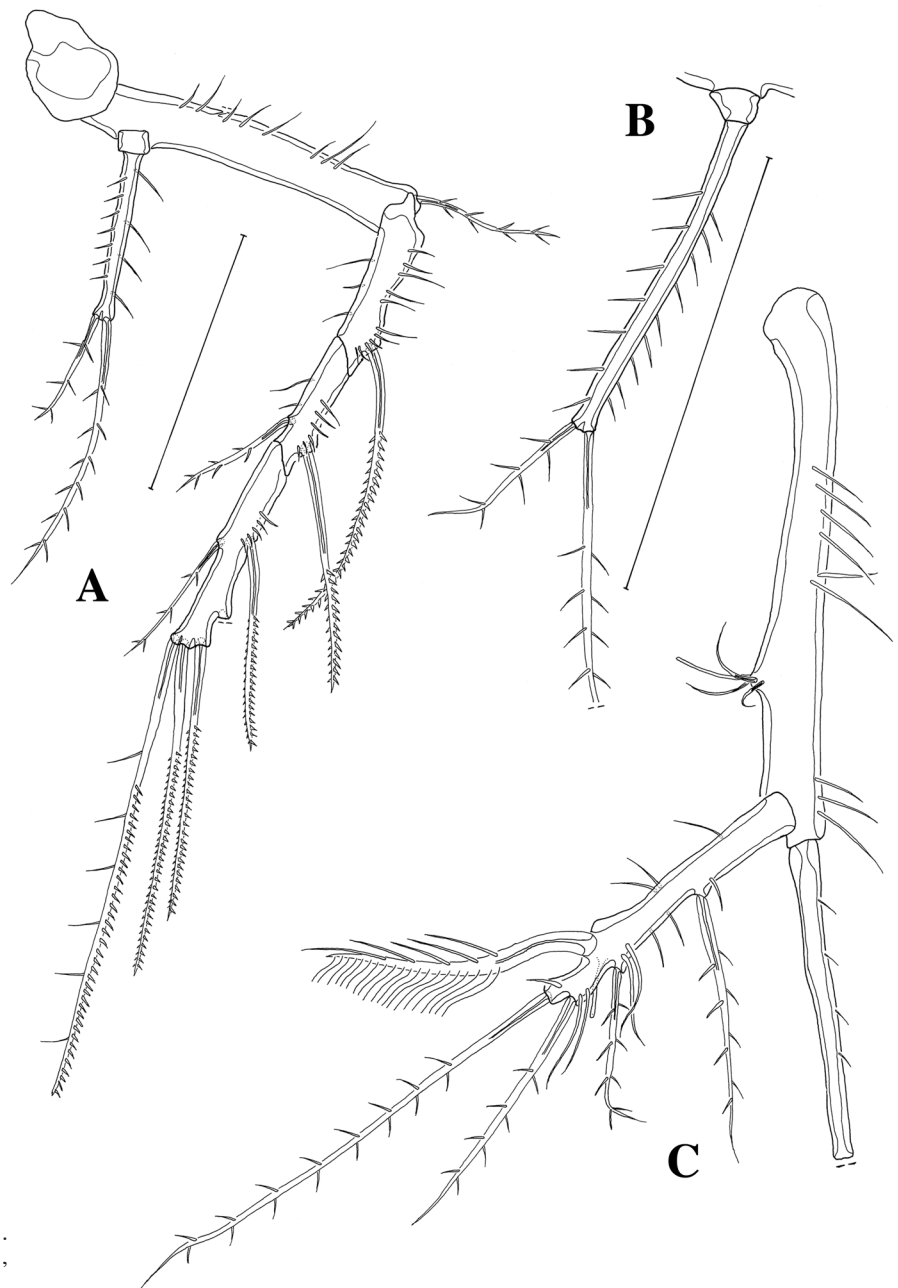


Fig. 7. – *Ancorabolina cavernicola* sp. nov., female. A. P4; B. P2 enp; C. P5, showing tube pore. Scales: 50 μ m.

sured from rostral tip to end of FR) of about 520 μ m. Cphth frontally with peak that bears a pair of frontolateral horns ending in long tube pores. Laterally with 2 pairs of tube pore-bearing projections. At the posterior part with a pair of large lateral processes (Fig. 5A), strongly cuticularized and bifurcated, with a row of setules at their anterior margin and small sensillate projections. Cphth with pattern of sensillar as figured, dorsally at posterior margin with protrusion that bears 1 pair of tube pores anteriorly and a row of setules posteriorly.

Body somites bearing P1-P6 dorsally with a single tube pore. Free body somites 1-3 at their posterior margins with small processes and sensilla arising from small pedestals. All body somites posteriorly with row of setules. Last thoracic and first abdominal somite lateroventrally

fused, forming the genital double somite. Second and third abdominal somites dorsally with pair of long tube pores. Telson (Figs. 3A, B) broader than long, slightly trapezoid in shape, with anal operculum not ornamented, weakly developed. Ventrally with rows of spinules at inner margins. Rostrum (Figs. 3A, 4A) straight, fused with cphth, remarkably long, reaching length of first segment of A1, showing elongation both anteriorly to and posteriorly from the pair of lateral sensilla. FR (Fig. 3A) about 16 times longer than broad, with 7 setae (most of which broken in Fig. 3, but cf Fig. 8B): I and II inserting closely together at distal half of FR. III inserting subterminally, IV, V, VI inserting terminally. VII inserting dorsally at distal margin. GF located ventrally on genital double somite. P6 completely reduced, represented by

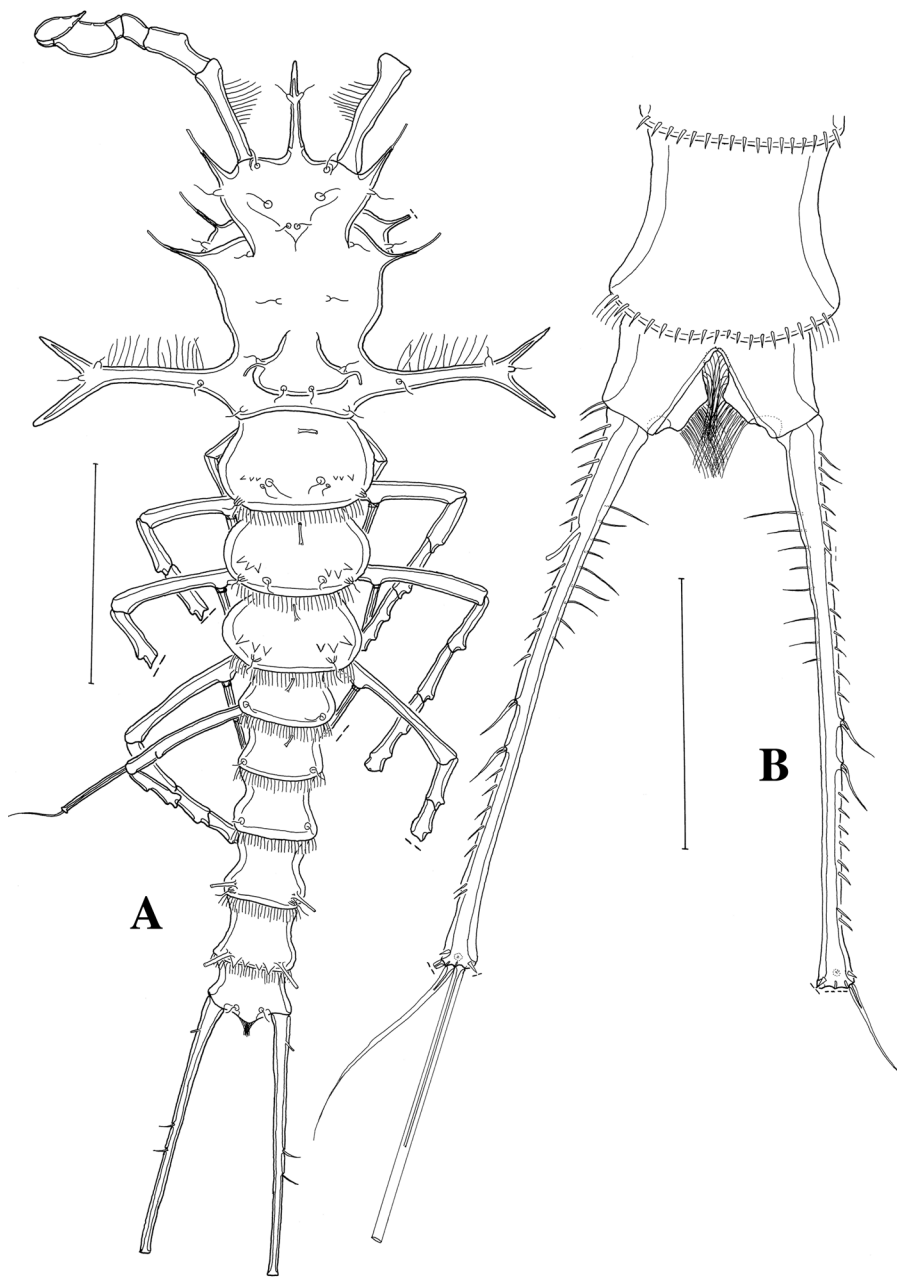


Fig. 8. – *Ancorabolina cavernicola* sp. nov., male. A. Habitus, dorsal view; B. Telson and FR, ventral view. Scales: A: 100 μ m, B: 50 μ m.

two small cuticular plates. Genital double somite ventrally with two tube pores at posterior margin.

A1 (Fig. 4A) 5-segmented. First segment longest, with one seta and several long spinules at inner margin. Second segment smaller than third segment, with 6 setae and several spinules at outer margin. Third segment bearing 5 setae proximally and 1 aes accompanied by 2 additional setae. Fourth segment smallest, bearing 1 seta. Fifth segment of almost same length as third one, with 11 setae and 1 aes. Setal formula: I-1, II-6, III-7 + aes, IV-1, V-11 + aes.

A2 (Fig. 4B) with allobasis carrying 1 seta and row of small spinules at abexpodal margin. Exp absent. Enp with 2 bipinnate setae near the middle, and with 6 termi-

nal setae, 3 of which long and geniculate, 2 unipinnate, and 1 small and bare. Additionally with 2 rows of spinules and 2 cuticular dentate frills subterminally.

Md (Fig. 5B) with strong gnathobase bearing 3 strong, bicuspid teeth and 1 seta (broken in Fig. 5B). Md palp 1-segmented, carrying 2 inner, 1 outer, 1 subapical and 2 apical setae, and several spinules.

Mxl (Fig. 5D). Praecoxal arthrite terminally with 5 strong claw-like spines, subterminally with 2 setae, additionally with 2 surface setae. Coxa with 1 strong and 1 smaller seta. Basis, enp and exp fused, with 9 setae, 1 of which unipinnate.

Mx (Fig. 5C). Syncoxa and basis fused, with 2 endites. Proximal endite with 3 setae, the biggest one unipinnate

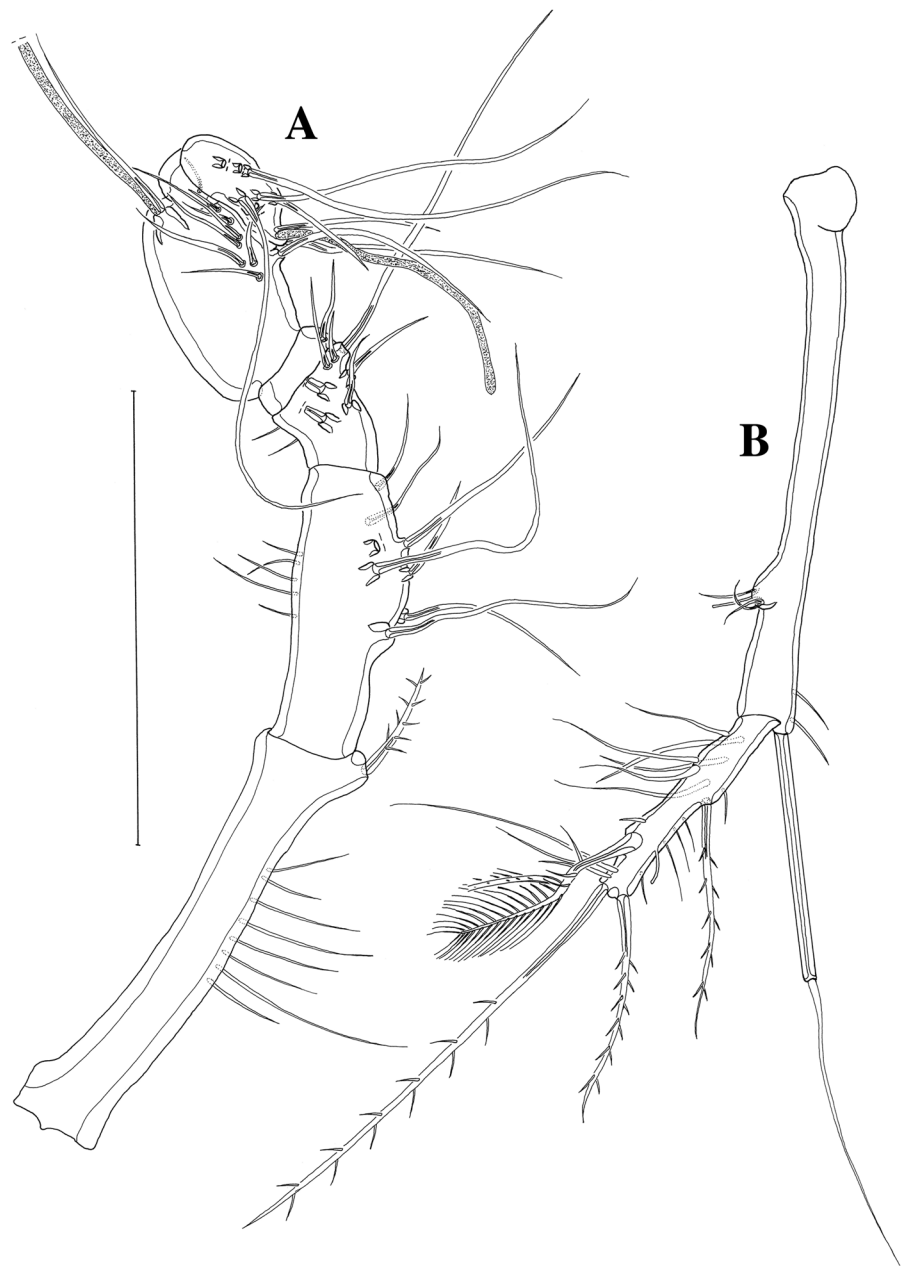


Fig. 9. – *Ancorabolina cavernicola* sp. nov., male. A. A1, ventral view; B. P5. Scale: 50 μ m.

and fused to endite, the other 2 setae small and bare. Distal endite with 2 bare setae terminally. Basis with 2 terminal setae, one of which strong and unipinnate, and 2 subterminal bare setae. Enp represented by 2 setae.

Mxp (Fig. 5E) prehensile. Syncoxa (broken) with 1 terminal multipinnate seta flanked by row of small spinules. Basis with 2 rows of long spinules. Enp produced into a long dentate claw, accompanied by 1 small seta.

P1 (Figs. 6A, A') with coxa slightly longer than broad. Basis showing moderate transverse elongation forming pedestal for exp, with inner (Fig. 6A') and outer seta (Fig. 6A), several long spinules at inner margin and 1 tube pore near the outer seta. Moreover, basis strongly elongate longitudinally, reaching distal end of exp. Enp and

exp 2-segmented. Exp1 half as long as exp2, with 1 outer spine (broken in Fig. 6A). Exp2 with 5 geniculate setae and several spinules at inner margin. Enp1 twice as long as exp, with row of long outer and short inner spinules. Enp2 much smaller, with 1 subterminal slender non-geniculate seta and 2 terminal bare setae, one of which very strong and long, the other one much smaller.

P2-P4 (Figs. 6B, 7A, B) with small coxa and strongly transversal prolonged basis, bearing several long spinules and 1 tube pore at its anterior margin. Exps 3-segmented. Exp2 of P2 and P3 without inner seta. Exps 2-segmented. Enp1 small, without ornamentation. Enp2 very long and slender bearing spinules at inner and outer margin and 2 terminal setae. Armature formula as in Table I).

P5 (Fig. 7C) basis and enp fused, forming a remark-

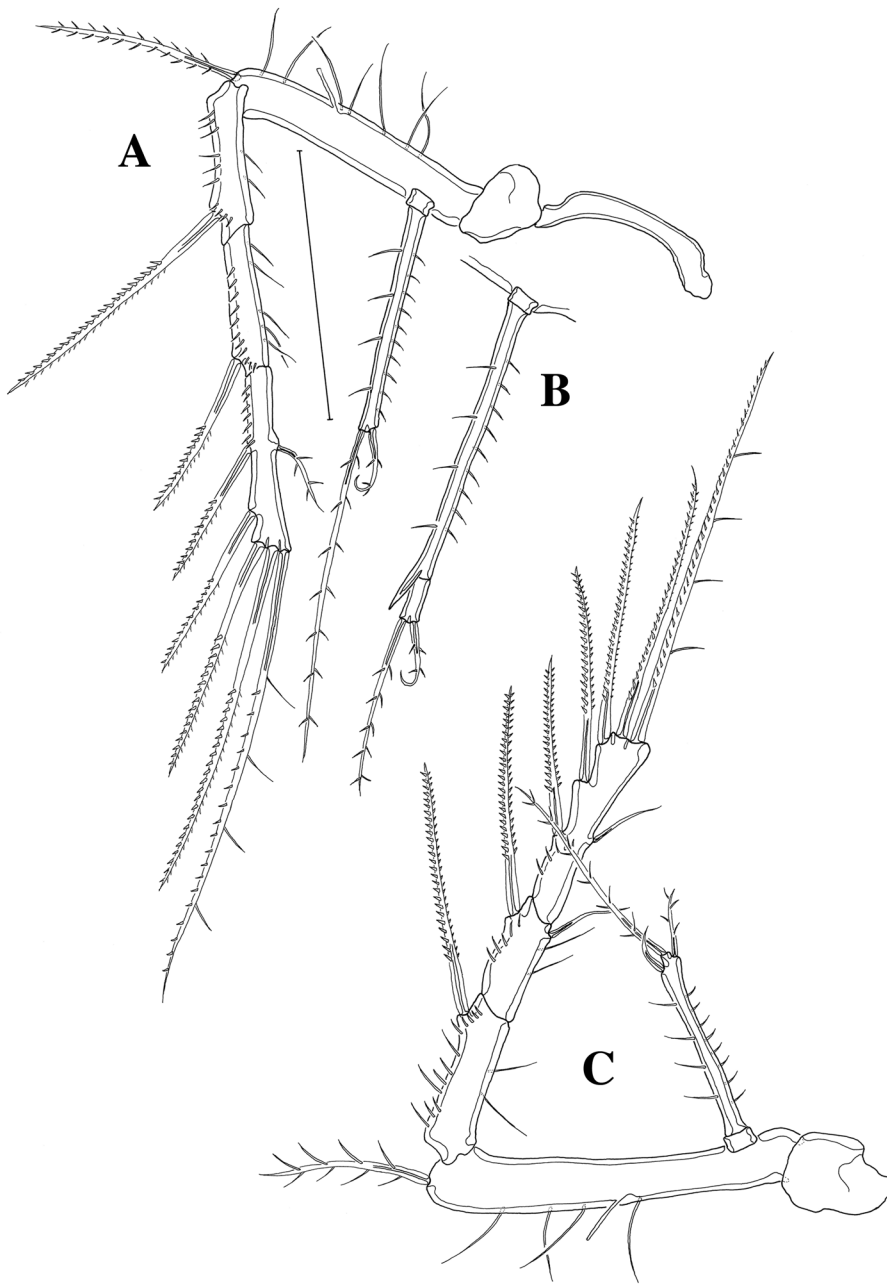


Fig. 10. – *Ancorabolina cavernicola* sp. nov., male. A. P2; B. P3 enp; C. P4. Scale: 50 μ m

ably elongate benp. Enp represented by a small pedestal with 3 setae accompanied by 1 tube pore. Exp distinct, with 2 lateral, 1 subapical and 1 terminal bipinnate setae. Additionally with several spinules, some of which very long, and with 1 tube pore. Inner margin with 1 strong, biplumose seta.

Description of the male allotype

The male of approximately the same body size as the female (measured from rostral tip to end of FR ~525 μ m). It differs from the female in following characteristics:

Body (Fig. 8A): distal protrusion on cphth without row of setules at posterior margin. First and second abdominal

somites lacking dorsal tooth-like projections. FR (Fig. 8B) about 13 times longer than broad, steae I and II translocated into distal third; telson ventrally without spinule rows.

A1 (Fig. 9A) 7-segmented, subchirocer. First segment longest, bearing 1 seta and some long spinules at inner margin. Second segment smaller than first, bearing 8 setae (1 seta broken) and several long spinules. Third segment very small, with 7 setae and some spinules. Fourth segment smallest, with 1 seta. Fifth segment slightly swollen, bearing 9 setae and 1 aes. Sixth and seventh segments of almost same length, sixth one bearing 1 seta and seventh segment with 9 setae and 1 aes. Setal formula: I-1; II-8; III-7; IV-1; V-9+aes; VI-1; VII-9+aes.

P2-P4 (Figs. 10A-C): exp and enp P2, expP3 and exp

Table II. – Geographic and bathymetric distribution of *Ancorabolina* George, 2006

Taxon	Region	Depth range	Author(s)
<i>A. anaximenesi</i>	Anaximenes Seamount, Mediterranean Sea	1965-680 m	Gheerardyn & George in press
<i>A. belgicae</i>	Porcupine Sea bight, NE Atlantic	880 m	Gheerardyn & George in press
<i>A. cavernicola</i> sp. n.	Submarine cave 3PP, France, Mediterranean Sea	23 m	Present study
<i>A. chimaera</i>	Angola Basin, SE Atlantic	5505-5447 m	George 2006
	Guinea Basin, SE Atlantic	5140-5063 m	George 2006
<i>A. divasecunda</i>	Guinea Basin, SE Atlantic	5066-5064 m	Gheerardyn & George in press
	Cape Basin, SE Atlantic	5033 m	Gheerardyn & George in press
<i>A. galeata</i>	Anaximenes Seamount, Mediterranean Sea	1261-1254 m	Gheerardyn & George in press

P4 as in female. Enp P3 3-segmented. First segment small. Without ornamentation, second segment long and slender, terminally with pointed apophysis and spinules at inner and outer margin. Third segment small but slightly longer than first segment, terminally with 2 setae. Enp of P4 2-segmented, with 2 terminal setae and additionally 1 subterminal, outer seta.

P5 (Fig 9B): Basis and enp fused to benp, which endopodal part bears 3 setae and 1 tube pore. Exp distinct, with 1 inner and 1 outer seta, and 2 terminal setae. Several spinules and one tube pore at outer margin. Inner seta strong, biplumose, with long pinnae as in female.

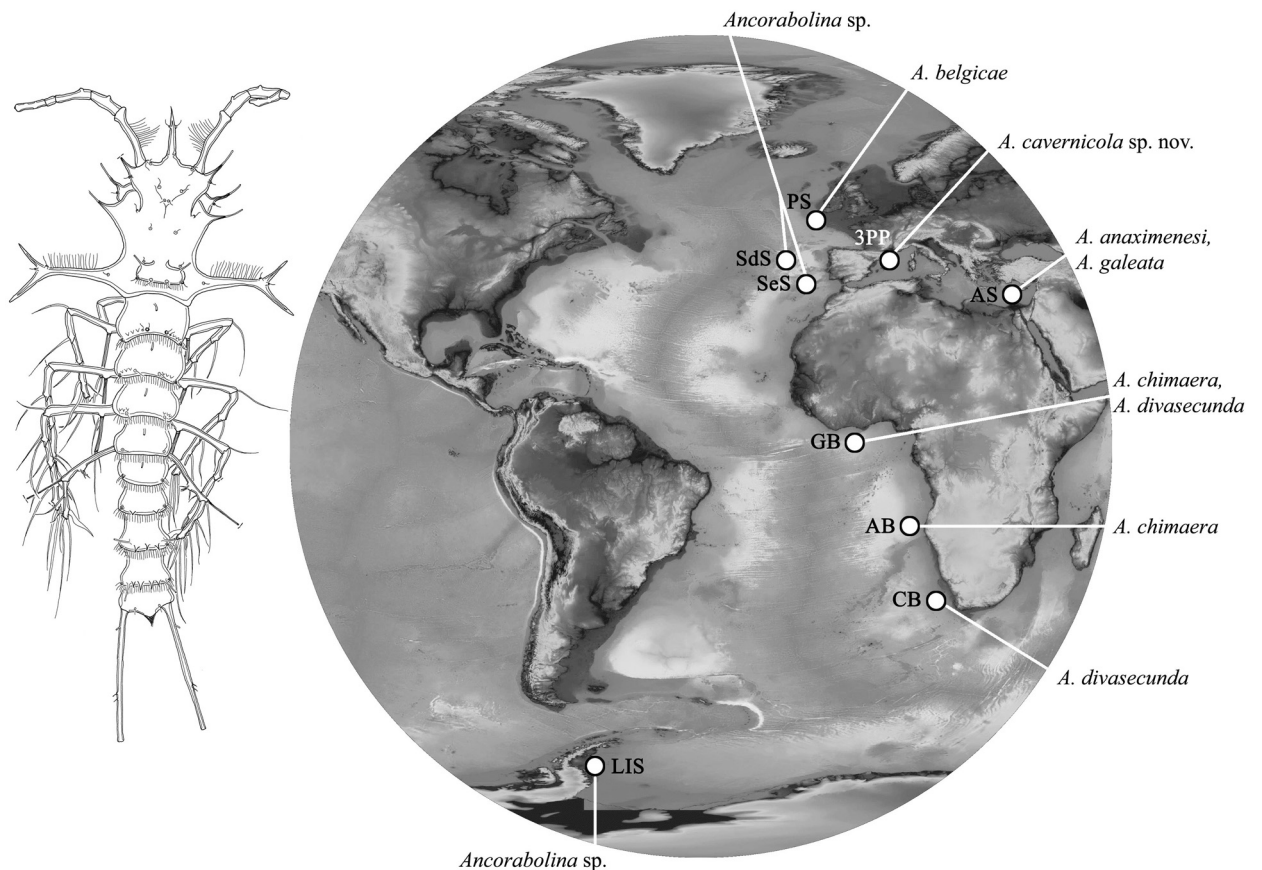


Fig. 11. – Map showing the geographical distribution patterns of the taxon *Ancorabolina* George, 2006. PS = Porcupine Sea bight; 3PP = submarine cave near La Ciotat (France); SdS = Sedlo Seamount; SeS = Seine Seamount; AS = Anaximenes Seamount; GB = Guinea Basin; AB = Angola Basin; CB = Cape Basin; LIS = Larsen "B" Ice Shelf.

Diagnostic key to the Ancorabolina species

- 1. Lateral processes on cphth strongly bifurcated; inner part of P1 basis longitudinally strongly elongate, reaching distal end of P1 exp *A. cavernicola* sp. nov.
 – Lateral processes on cphth not strongly bifurcated; inner part of P1 basis not even reaching distal end of P1 exp 1. 2
- 2. P1 exp 3-segmented 3
 – P1 exp 2-segmented 4
- 3. Rostrum long, strongly curved in lateral view; first antennular segment not longer than second one; lateral processes of cphth triangular, sturdy
 *A. galeata* Gheerardyn et George, in press
 – Rostrum straight, not longer than first antennular segment, the latter being remarkably elongate, lateral processes of cphth slender, bow-like
 *A. divasecunda* Gheerardyn et George, in press
- 4. FR reaching length of abdomen; enp2 of female P3-P4 without inner seta; male P4 without inner seta
 *A. chimaera* George, 2006
 – FR shorter than abdomen; enp2 of female P3-P4 with inner setae; enp2 of male P4 with inner seta (male unknown in *A. belgicae*) 5
- 5. Lateral processes of cphth with forwardly directed, tooth-like projection; P1 enp2 with small inner seta subterminally
 *A. anaximenesi* Gheerardyn et George, in press
 – Lateral processes of cphth without tooth-like projection; P1 enp2 lacking small inner subterminal seta
 *A. belgicae* Gheerardyn et George, in press

DISCUSSION

Systematic allocation of Ancorabolina cavernicola sp. nov.

While George’s (2006) generic diagnosis of *Ancorabolina* was based on the description of *A. chimaera* and therefore identical with the species characterization, the description of four new *Ancorabolina* species enabled Gheerardyn & George (in press) to refine the characterization of a monophylum *Ancorabolina*. In their extensive phylogenetic discussion the authors detected the following autapomorphies for *Ancorabolina* [plesiomorphic states in square brackets]:

- 1. Cphth posteriorly with pair of ventrolateral cuticular processes turning backwardly [no processes];
- 2. Loss of third setal element subterminally on A2 enp [minute seta present].

A. cavernicola sp. nov. fits both apomorphies and can therefore be allocated into that genus without doubt. Inside *Ancorabolina*, the new species shows remarkable deviations compared with the remaining five species, and is characterized by seven autapomorphic characters [ple-

siomorphic states in square brackets]:

- 3. Cphth posteriorly with dorsal cuticular protrusion [protrusion absent];
- 4. Peak on cphth with a pair of long frontolateral “horns” ending in long tube pores [no frontolateral horns developed];
- 5. Lateral pairs of tube pore-bearing projections on cphth well developed [lateral projections at most indicated];
- 6. Lateral processes of cphth strongly bifurcated, both furcated rami well developed [no bifurcation of lateral processes, or anterior ramus at most quite weakly developed];
- 7. FR strongly elongate, reaching length of abdomen [FR much shorter, not as long as abdomen];
- 8. P1 basis showing remarkable longitudinal elongation at enp’s side [basis not elongate longitudinally];
- 9. P5 benp strongly elongate, reaching end of female genital double somite [P5 benp of moderate length, reaching at most to the middle of genital double somite].

Character 3: Cphth posteriorly with dorsal cuticular protrusion

None of the remaining *Ancorabolina* species presents such a protrusion on the cphth, and inside Ancorabolinae only *Echinopsyllus* Sars, 1909 shows a similar structure, which is considered as apomorphic for that genus (Conroy-Dalton 2003, Wandeness *et al.* 2009). According to George (2006) and Gheerardyn & George (in press), there is no closer phylogenetic relation between *Echinopsyllus* and *Ancorabolina*. Therefore, the development of a protrusion is considered as apomorphic for *A. cavernicola* sp. nov., having developed independently in both taxa.

Character 4: Peak on cphth with a pair of frontolateral “horns” ending in long tube pores

No other species of *Ancorabolina* shows paired “horns” frontolaterally on the cphth. Together with the increased size of the corresponding tube pores, this feature indicates a derived condition rather than an original state that should then have become lost in all remaining *Ancorabolina* species. In Ancorabolinae, the development of similar frontolateral “horns” is widespread (*e.g.*, *Ancorabolutus* Norman, 1903, *Arthuricornua* Conroy-Dalton 2001, *Ceratonotus* Sars, 1909, *Dendropsyllus* Conroy-Dalton, 2003, *Echinopsyllus*; *Juxtaramia* Conroy-Dalton et Huys, 2000, *Polyascophorus* George, 1998, *Pseudechinopsyllus* George, 2006). However, in all species, except *A. cavernicola* sp. nov., these “horns” bear sensilla instead of tube pores at their tips, indicating analogue but not homologue conditions. Therefore, the possession of such tube pore-bearing “horns” is regarded here as an apomorphy of the new species.

Character 5: Lateral pairs of tube pore-bearing projections on cphth well developed

Like in character 4, none of the remaining *Ancorabolina* species shows such strong development of lateral projections, and comparison with other basal Ancorabolidae (*i.e.*, Laophontodinae Lang, 1944) reveals, that the absence of such projections constitutes the primitive condition. Thus, their development in *A. cavernicola* sp. nov. clearly shows the derived, that is the apomorphic state.

Character 6: Lateral processes of cphth bifurcated; rami well developed

The formation of projections of increasing size reflects more and more derived conditions (*cf* George 2008). Consequently, the development of lateral processes in *Ancorabolina* has been considered as autapomorphic by Gheerardyn & George (*in press*). Their development in *A. cavernicola* sp. nov. goes even beyond that in the remaining *Ancorabolina* species, presenting a strong bifurcation with expression of a second, forwardly directed ramus. Although *A.anaximenesi* also presents a bifurcation on the process to a certain extent (Gheerardyn & George *in press*), the former ramus of that species remains quite small, resembling a tooth-like projection rather than a real ramus like in *A. cavernicola* sp. nov. Thus, the strong bifurcation in the latter can doubtlessly be considered as an autapomorphy.

Character 7: FR considerably elongate, reaching length of abdomen

While Laophontodinae show moderately elongate furcal rami, in many Ancorabolinae a remarkable furcal elongation may be observed. Inside *Ancorabolina*, the new species shows the strongest elongation of FR, which is therefore interpreted as an apomorphic state.

Character 8: P1 basis showing remarkable longitudinal elongation at enp's side

A. cavernicola sp. nov. shows an extreme elongation of that part of the P1 basis, from which the endopod arises. It reaches at least the length of the whole P1 exp. This character is not only unique inside *Ancorabolina* but also within all Ancorabolidae and doubtlessly an apomorphy of the new species.

Character 9: P5 benp considerably elongate, reaching end of genital double somite

The elongation of the baseoendopod of the P5 benp is unique inside all Ancorabolinae, and considered as an apomorphic character state in *A. cavernicola* sp. nov.

A. cavernicola sp. nov. shares some derived characters

with certain remaining *Ancorabolina* species. This may be an indication for possible close relationships:

- with *A.anaximenesi*, because the latter shows a weak bifurcation on the lateral processes of cphth (*cf* character 6);
- with *A. chimaera*, as both species lack the inner seta on the enp2 of female P2 and P3; moreover, males of *A. chimaera* and *A. cavernicola* sp. nov. have lost the inner seta on P4 enp2;
- with *A. divasecunda*, due to the loss of 1 seta in the distal endite of mx.

Distribution of Ancorabolina: geographic distributional patterns

It may happen that a supraspecific taxon is overlooked for years or even decades in meiobenthic samples, despite long-time and global sampling in the oceans. However, once been detected, it may then be regularly found in corresponding material. This holds for *e.g.*, Loricifera Kristensen, 1983 and Tantulocarida Boxshall & Lincoln, 1983: being discovered just in the beginning of the 1980s (and therefore being overlooked before), representatives of both taxa are nowadays frequently found in meiobenthic samples (*e.g.* Vincx *et al.* 1994, Vanhove *et al.* 1995, George & Schminke 2002, Gad 2004, Gutzmann *et al.* 2004). Similar applies to *Ancorabolina*. That genus was established three years ago by George (2006) to accommodate a peculiar new species. However, since the first record of *Ancorabolina chimaera* from Southeast Atlantic in 2006 (Fig. 11: GB, AB), several new species have been detected in quite different marine regions: *A. belgicae* from the Porcupine Sea Bight (Fig. 11: PS), Northeast Atlantic, *A.anaximenesi* and *A. galeata* from Anaximenes Seamount (Fig. 11: AS) (Eastern Mediterranean Sea), and *A. divasecunda*, again from the Southeast Atlantic (Fig. 11: GB, CB) (Gheerardyn & George *in press*). Additionally, sorting of material from recently sampled localities at Sedlo and Seine Seamounts (Northeast Atlantic; Fig. 11: SdS and SeS, respectively) provided another, yet unknown *Ancorabolina* species (George *pers. obs.*), and even Antarctic material (Fig. 11: LIS) encloses unknown species of that genus (George *pers. obs.*). Thus, as shown in Fig. 11, the step from the description of the first *Ancorabolina* species in 2006 to the detection of an Atlantic-Mediterranean-Antarctic-wide distribution of a monophylum *Ancorabolina* was quite short. The apparent distribution of the genus along the eastern Atlantic and the Mediterranean Sea is remarkable. However, it seems to be rather an artefact of sampling than a reflection of the real generic distribution. Some of the deep-sea expeditions with particular interest in taxonomical research on meiofauna (DIVA 1, 2, ANDEEP I-III, R.V. "Meteor" cruise M 71/1) focused explicitly on the areas where the species have been found (Brandt & Hilbig 2004, Martínez Arbizu & Schminke 2005, Martínez Arbizu & Brix 2008,

Brökeland & George 2009). Therefore, it is to be expected that the examination of remaining Antarctic material (ANDEEP III: southern Cape Basin, Weddell Sea) as well as future research cruises to the western Atlantic (DIVA 3: Argentinean and Brazil Basin, summer 2009) will possibly provide more *Ancorabolina* material even from these regions. This will prove whether the genus presents an Atlantic-wide distribution, or if the Mid-Atlantic Ridge may constitute a biogeographic barrier. So far, results suggest in our opinion an Atlantic-wide distribution, as e.g., the Walvis Ridge and the Guinea Rise, two strong submarine elevations in the south eastern Atlantic, and also the Gibraltar Rise, apparently do not play any role for the distribution of *Ancorabolina*, as they did not inhibit its north- or southward distribution nor the migration into/out of the Mediterranean Sea.

Bathymetric distribution

In addition to its wide geographical distribution, the monophylum *Ancorabolina* also shows a wide bathymetric distribution, and clearly represents an eurybathic taxon. Table II lists the depths from which the known *Ancorabolina* species have been collected. Apart from *A. cavernicola* sp. nov., which was collected in the sublittoral (23 m, Table II), all remaining known *Ancorabolina* species can be considered as at least bathyal ones. The maximum depth (5,505 m) was registered for *A. chimaera* (Angola and Guinea Basins), which together with *A. divaseconda* (Guinea and Cape Basins) represent abyssal species. Both taxa from the eastern Mediterranean Anaximenes Seamount (*A. anaximenesi*, *A. galeata*) as well as *A. belgicae* (Porcupine Sea Bight) were collected from bathyal depths (Table II). This depth range is extended to the sublittoral zone with the record of *A. cavernicola* sp. nov. from the submarine cave 3PP (France, Mediterranean Sea). It should be remarked, however, that the record from 23 m water depth (Table II) does not necessarily characterize this species as a sublittoral one. Cave 3PP accommodates several true bathyo-abyssal species, for instance Demospongiae and Hexactinellidae (Porifera) and Tardigrada (Harmelin 1997). Harmelin (1997) concluded that the community of cave 3PP is not an isolated one. There seems to exist exchange with faunal components from outside the cave, particularly with other aphotic areas. The “motor” of such faunal input may be “the episodic cross-shelf and downcave inputs of water parcels upwelled from the nearby canyon” (Harmelin 1997, p. 150). Until now, no representative of *Ancorabolina* has been reported from littoral areas (such as sandy beaches, tidal flats etc.), and all records are from bathyo-abyssal regions. Therefore, we assume that the genus probably may represent a true deep-sea taxon. The occurrence of *A. cavernicola* sp. nov. in the sublittoral cave 3PP would then be due to the particular and specific deep-sea-like conditions predominating in this locality.

Ancorabolina supports the general eurybathic character of Ancorabolinae Sars, 1909, as already noted for *Ancorabolus* Norman, 1903, *Ceratonotus* Sars, 1909, and *Echinopsyllus* Sars, 1909.

ACKNOWLEDGEMENTS. - The authors would like to thank Drs P Chevaldonné and C Lejeune (Marseille, France) for sampling the material at 3PP by SCUBA diving. T Perez and R Graille (Marseille, France) organized the sampling. Prof Dr P Martínez A (Wilhelmshaven, Germany) gently provided the *Ancorabolina cavernicola* sp. nov. material for the present description. We are indebted to three anonymous reviewers for their quite helpful and constructive critics on the manuscript. AT's co-operation was financially supported by MarBEF.

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Received March 30, 2009

Accepted June 29, 2009

Associate Editor: N Coineau