

## Two new species of Spionidae (Annelida: Polychaeta) from Mid-Atlantic Ridge hydrothermal vents

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**Abstract:** Two new species of polychaetous annelids *Prionospio unilamellata* sp. nov. and *Laonice asaccata* sp. nov. (Spionidae) are described from samples collected at Mid-Atlantic hydrothermal vent fields close to the Azores Triple Junction and in the Snake Pit vent field. These two species are important components of the communities associated with active venting. *Prionospio unilamellata* differs from all other *Prionospio* species in the form of anterior notopodial lamellae. *Laonice asaccata* differs from other *Laonice* species by lacking interparapodial pouches.

**Résumé:** Deux nouvelles espèces de Spionidae (Annelida: Polychaeta) des sources hydrothermales de la ride médio-atlantique. Deux nouvelles espèces d'annélides polychètes *Prionospio unilamellata* sp. nov. et *Laonice asaccata* sp. nov. (Spionidae) sont décrites à partir des collections recueillies par les submersibles sur les sources hydrothermales actives de la ride médio-atlantique, à proximité du point triple des Açores et dans le champ hydrothermal Snake Pit. Ces deux espèces sont fréquentes dans les communautés associées aux fluides hydrothermaux. *Prionospio unilamellata* sp. nov. diffère de toutes les espèces de ce genre par la forme de la lamelle notopodiale antérieure. *Laonice asaccata* sp. nov. diffère des autres espèces de ce genre par l'absence de poche inter-parapodiale.

**Keywords:** Polychaetes, Spionidae, *Laonice*, *Prionospio*, new species, hydrothermal vent, M.A.R.

### Introduction

Approximately 90 polychaete species have been described from deep-sea hydrothermal vent communities on the Eastern Pacific Rises and the Western Pacific Back-Arc Basins (Desbruyères & Segonzac, 1997). Conversely only five species of polychaetous annelids have been presently described from the Mid-Atlantic Ridge (M.A.R.) hydrothermal vents, despite of impressive sampling

programmes, mainly conducted by American, Russian and French submersibles for ten years.

Three new genera of Spionidae have been reported from the Pacific hydrothermal vents (Desbruyères & Segonzac, 1997): *Laubieriellus* Maciolek, 1981, *Xandaros* Maciolek, 1981 and *Lindaspio* Blake & Maciolek, 1992. One new species of the genus *Prionospio*, *P. sandersi* Maciolek, 1981, has also been described from the same locality as *Xandaros* and *Laubierellus*. Undescribed spionids have been reported as being important components of the M.A.R. hydrothermal communities, frequently sampled in mussel

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washings, sulphide «sediments» and chimney walls (Desbruyères et al., 2001). In this paper we describe two new species of Spionidae from the Azores Triple Junction area and the Snake Pit vent field on the Mid-Atlantic Ridge, sampled from various habitats at depths of 800 to 3520 metres.

### Materials and methods

The examined materials have been collected by the manipulator of the French manned submersible *Nautilie* during the diving cruises DIVA 1 (1994), DIVA 2 (1994), MARVEL (1997) and PICO (1998) in the Azores Triple Junction (Rainbow, Lucky Strike and Menez Gwen hydrothermal vent fields) and MICROSMOKE (1995) for the southernmost sites (Snake Pit and Logatchev hydrothermal vent fields). Description of the settings and ecology can be found in Van Dover et al. (1996) and Desbruyères et al. (2001) for the Azores Triple Junction vent fields (Rainbow, Lucky Strike and Menez Gwen), in Segonzac (1992) for the Snake Pit vent field and in Gebruk et al. (1997) for the Logatchev vent field.

The type material is deposited at: Muséum National d'Histoire Naturelle, Paris (MNHN), Museu Municipal do Funchal (MMF), Swedish Museum of Natural History (SMNH) and United States National Museum (USNM).

### Systematics

#### *Prionospio unilamellata* sp. nov.

#### *Material examined*

DIVA2 PL 935, 2 paratypes (USNM 1011974 and MMF 35186); DIVA1 14-4 PL 906, 2 paratypes (USNM 1011975); DIVA2 PL 913, 1 paratype (USNM 1011976); DIVA2 PL 917, 1 paratype (SMNH 5887); DIVA2 PL 918, 2 paratypes (SMNH 5888); MARVEL PL 1205, 2 paratypes (USNM 1011977); MARVEL PL 1195, 1 paratype (SMNH 5889); MARVEL PL 1196, 1 holotype, 1 paratype (MNHN POLY TYPE 1427, MNHN POLY TYPE 1428); PICO PL 1264, 1 paratype (USNM 1011978); PICO PL 1267, 2 paratypes (USNM 1011979); PICO PL 1272, 2 paratypes (USNM 1011980); MICROSMOKE PL 14, 1 paratype (USNM 1011981).

#### *Type locality*

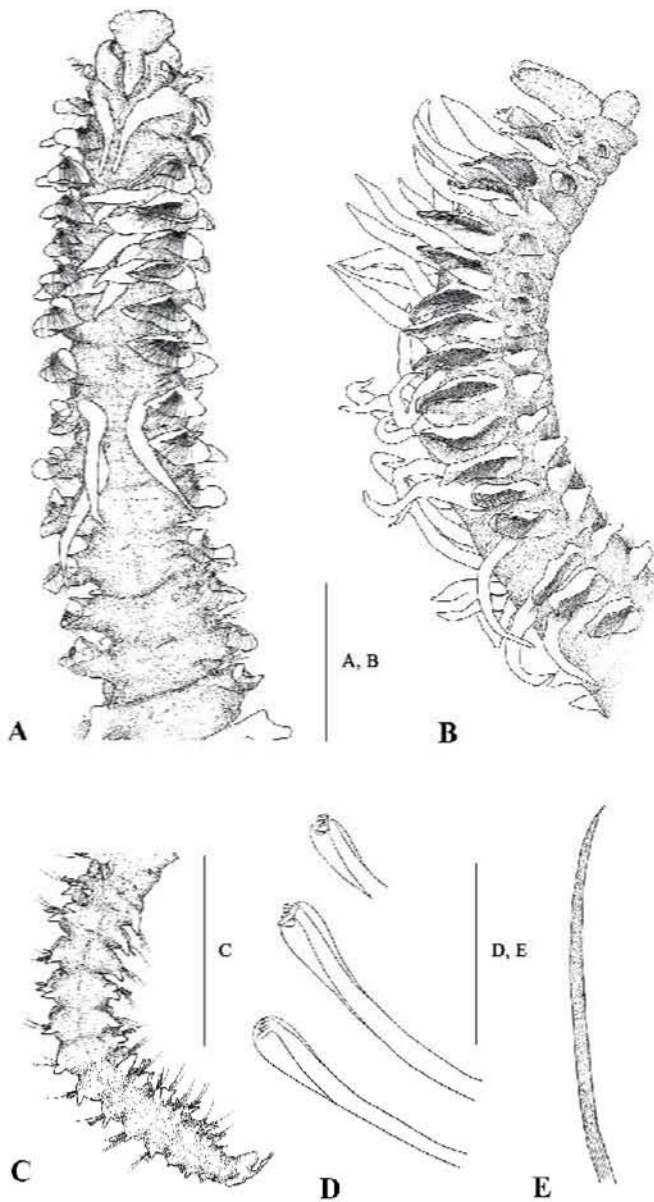
Mid-Atlantic Ridge, 37°17'18"N, 32°16'29"W, 1690 metres («Tour Eiffel» site on the Lucky Strike vent field). Additional material is coming from Snake Pit vent field («Elan» site 23°22'54"N, 44°55'48"W, 3520 metres) on the Mid-Atlantic Ridge and from Rainbow vent field («Atos» site 36°13.76'N, 33°54.11'W, 2275 meters).

#### *Description*

Largest complete specimen (holotype) 17 mm long, 0.9 mm width at chaetiger 10, with 114 chaetigers. Colour in ethanol opaque white to brown. Prostomium broadly triangular, widest at anterior margin, narrowing into a raising caruncle, reaching to posterior delineation of first chaetiger (Figs 1A, 2A). Anterior margin sometimes with three or four ciliated tubercles. Eyes absent (Fig. 1A). Peristomium partly surrounding prostomium, forming a low collar, not fused to chaetiger 1. Pair of indistinct ciliated nuchal organs situated on each side of caruncle (Figs 1A, 2A). Postchaetal notopodial lamella of chaetiger 1 reduced, dorsally pointed, free from prechaetal lamella. On chaetigers 2 to 16-17, a single large notopodial lamella enclose chaetae (Figs 1A-B, 2B & D). Postchaetal lamellae on postbranchial segments becoming smaller, separated from prechaetal lamellae, round in form. On anterior chaetigers postchaetal lamellae with dorsal tip. On posteriormost chaetigers lamellae dorsally pointed (Fig. 1C). Prechaetal lamellae small on postbranchial chaetigers. Dorsal crests absent. Neuropodial postchaetal lamellae reduced on first chaetiger, elliptical in shape (Figs 1B, 2B). Lamellae largest on branchial chaetigers, successively becoming smaller. On chaetigers 2 and 3 lamellae ventrally round, dorsally with a tip (Figs 1B, 2B), on subsequent chaetigers becoming more round. On posteriormost chaetigers lamellae leaflike, dorsally pointed (Fig. 1C). Prechaetal lamellae small in all chaetigers, separated from postchaetal lamellae.

Branchiae from chaetiger 2, numbering 15 or 16 pairs. Anterior branchiae slightly longer than notopodial lamellae, on subsequent chaetigers branchiae successively longer than lamellae, more slender. Two or three posterior pairs of branchiae reduced. Branchiae apinnate with dense lateral ciliation (Figs 1A-B, 2A & D). Interparapodial pouches absent. Small, papilla-like structures sometimes observed laterally between neuropodia (Fig. 2C). These structures start on 2 or 3 posteriormost branchial segments, or posterior to these segments, reaching over 7 or 8 segments.

Chaetae on anterior chaetigers slender capillaries, arranged in dense double rows; on posterior chaetigers capillaries becoming longer, more sparse, only one or two per ramus. Neuropodial hooded hooks from chaetiger 19-27; in larger individuals starting from more posterior segments. Hooks with 4-6 secondary teeth arranged in two vertical rows above main fang (Figs 1D, 2E). Notopodial hooks from chaetiger 25-46. Notopodial hooks longer than neuropodial ones. Sabre chaetae from chaetiger 12-20, one or two per ramus; chaetae short, stout, slightly curved, with small distal projection (Figs 1E, 2F). Sabre chaeta distally granulated. Pygidium with long median cirrus and two rounded lateral flaps (Fig. 1C).



**Figure 1.** *Prionospio unilamellata* sp. nov. **A.** paratype SMNH 5889, **B-E.** paratype USNM 1011974. **A.** Anterior end, dorsal view. **B.** Anterior end, lateral view. **C.** Posterior end, dorsal view. **D.** Neuropodial hooded hooks from chaetiger 15, lateral view. **E.** Sabre chaeta from chaetiger 15. Scale bars A, B, C = 2 mm; D, E = 0.5 mm.

**Figure 1.** *Prionospio unilamellata* sp. nov. **A.** paratype SMNH 5889, **B-E.** paratype USNM 1011974. **A.** Vue dorsale de la partie antérieure. **B.** Vue latérale de la partie antérieure. **C.** Vue dorsale de la partie postérieure. **D.** Crochet neuropodiale encapuchonné du segment sétigère 15, en vue latérale. **E.** Soie sabre du même segment. Echelles A, B, C = 2 mm ; D, E = 0,5 mm.

**Etymology:** the Latin name *unilamellata* refers to the unique form of the notopodial lamellae.

#### **Distribution**

This species is not known outside the hydrothermal vent area of the Mid Atlantic Ridge system.

#### **Remarks**

*Prionospio unilamellata* can be separated from all other *Prionospio* species by the shape of anterior notopodial postchaetal lamellae forming a single lamellae enclosing chaetae, and by having distal projection on sabre chaetae. These characters have not been described in any other species of the genus. *P. unilamellata* resembles most *P. patagonica* Augener, 1923, *P. multibranchiata* Berkeley, 1927, *P. wireni* Maciolek, 1985, *P. lighti* Maciolek, 1985 and *P. wambiri* Wilson, 1990 in having a large number of apinnate branchiae. It differs from these species in having distinctly longer branchiae on posterior chaetigers than on anterior ones, opposite to having the longest pair of branchiae on the first segment, followed by branchiae subsequently decreasing in size. *Prionospio sandersi* Maciolek, 1981, the only species of the genus described earlier from hydrothermal vents, differs in almost all characters from *P. unilamellata*.

Species possessing only apinnate branchiae are sometimes combined in a separate subgenus (*Minuspio*) (Maciolek, 1984; Blake & Kudenov, 1978). In a cladistic analysis of *Prionospio* taxa performed by Sigvaldadóttir (1998), this subgenus, however, appeared paraphyletic. Further analysis of *Prionospio* taxa is needed to prove the phylogenetic position of *P. unilamellata* within the genus.

#### ***Laonice usaccata* sp. nov.**

#### **Material examined**

MARVEL PL 1194, 2 paratypes (USNM 1011982 and MMF 35187); MARVEL PL 1198, 2 paratypes (SMNH 5890); MARVEL PL 1205, 2 paratypes (USNM 1011983); MAR93 PL 2619, 2 paratypes (USNM 1011984); MAR93 PL 2621, 2 paratypes (USNM 1011985); MICROSMOKE PL 20, 1 paratype (USNM 1011986); PICO PL 1267, 1 holotype (MNHN POLY TYPE 1426).

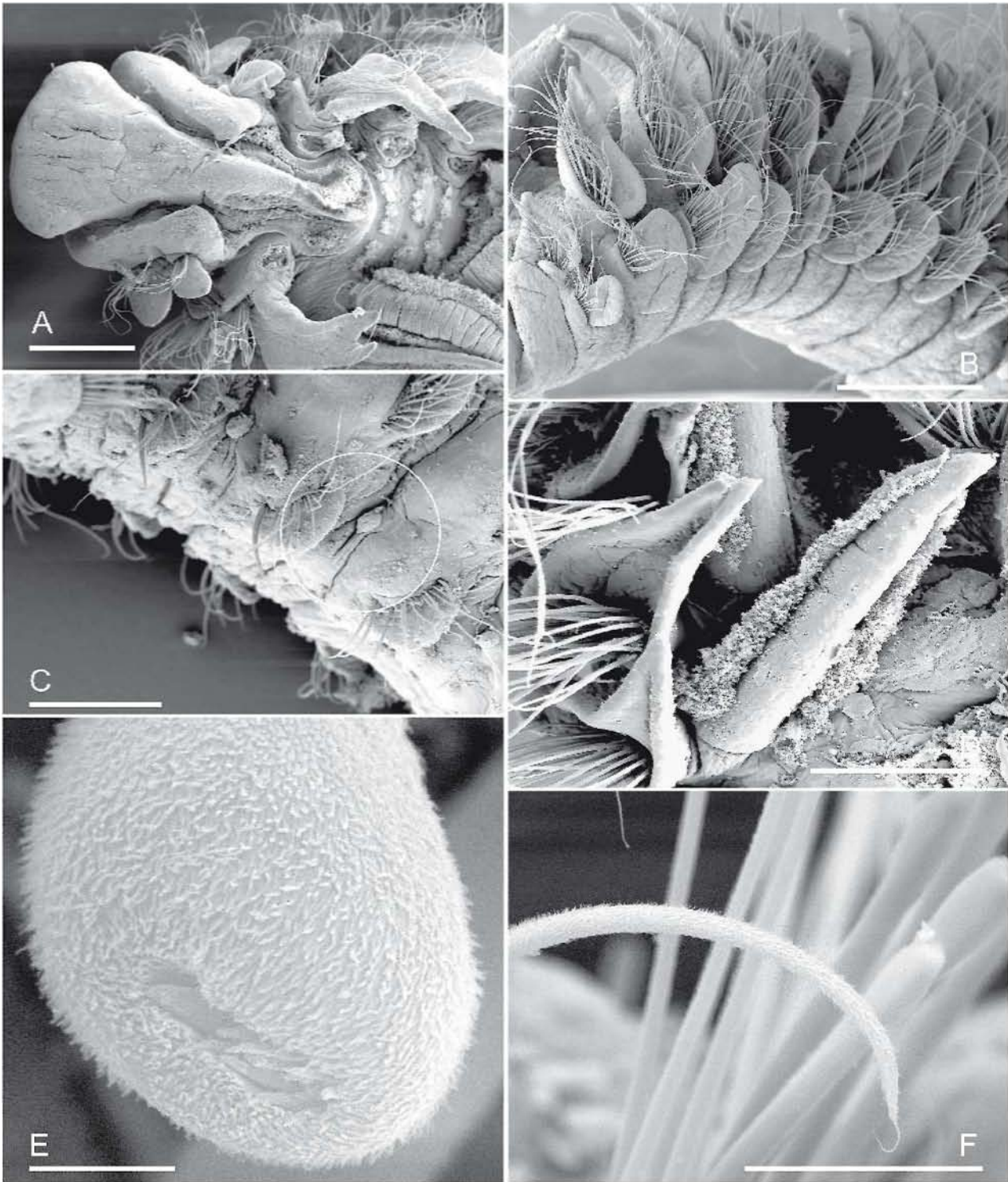
#### **Type locality**

Mid-Atlantic Ridge, 37°17'18"N, 32°16'29"W, 1690 metres («Tour Eiffel» site on the Lucky Strike vent field). Additional material comes from the Logatchev vent field («Irina» site 14°45'06"N, 44°58'41"W, 3047 metres) and from Rainbow vent field («Atos» site 36°13.76'N, 33°54.11'W, 2275 metres).

#### **Description**

Largest complete specimen 39 mm long, 2.2 mm width at chaetiger 10, with 115 chaetigers. Holotype 17 mm long with 76 chaetigers. Colour in ethanol, green or brown. Prostomium broadly triangular with straight anterior margin, (Figs 3A, 4A) laterally tapering backwards into a caruncle reaching to posterior margin of chaetiger 4 (Figs 3A, 4A). Small occipital antenna present on the caruncle at level of chaetiger 1 (Figs 3A, 4A). Eyes absent. Nuchal organs arranged in two rows enclosing caruncle. Peristomium surrounding prostomium almost completely,

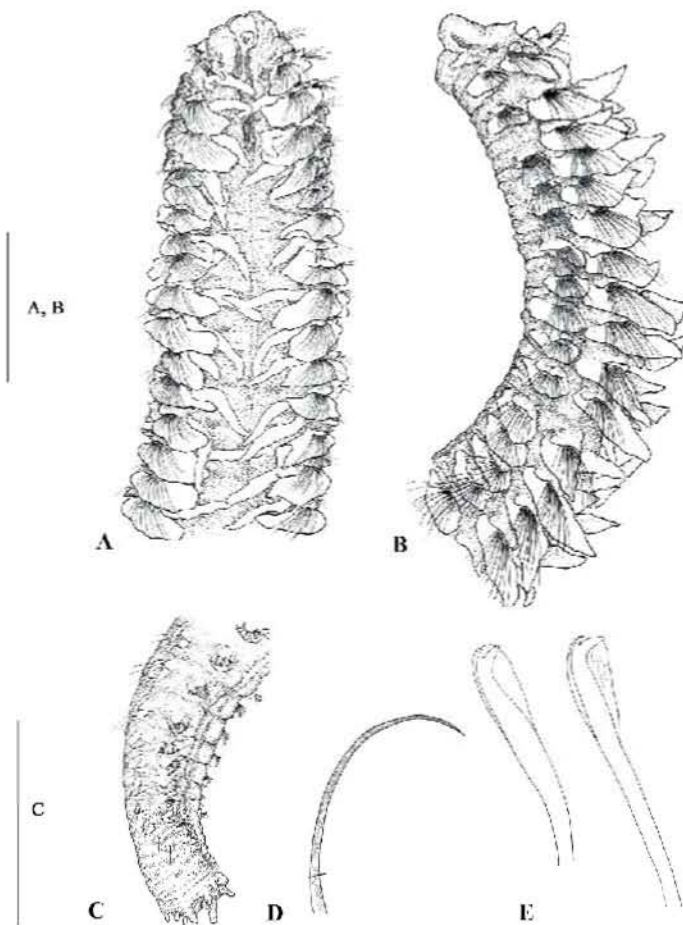




**Figure 2.** SEM photographs of *Prionospio unilamellata* sp. nov. from "Atos" P1 103/01. **A.** Prostomium, dorsal view. **B.** Anterior part, lateral view. **C.** Lateral view of interparapodial papillae on segment 19 (circle). **D.** Notopodial lamellae and branchiae of chaetiger 3. **E.** Distal part of notopodial hooded hook. **F.** Sabre chaeta. Scale bars A, B, D, F = 200  $\mu$ m; C = 100  $\mu$ m; E = 5  $\mu$ m.

**Figure 2.** Microphotographies MEB de *Prionospio unilamellata* sp. nov. en provenance de "Atos" P1 103/01. **A.** Prostomium en vue dorsale. **B.** Partie antérieure en vue latérale. **C.** Vue latérale de la papille inter-parapodiale du segment sétigère 19 (dans le cercle). **D.** Lamelle notopodiale et branchie du sétigère 3. **E.** Partie distale d'un crochet encapuchonné d'un notopode. **F.** Soie sabre. Echelles A, B, D, F = 200  $\mu$ m ; C = 100  $\mu$ m ; E = 5  $\mu$ m.





**Figure 3.** *Laonice asaccata* sp. nov. (Paratype USNM 1011983). **A.** Anterior end, dorsal view. **B.** Anterior end, lateral view. **C.** Posterior end, lateral view. **D.** Sabre chaeta from chaetiger 45. **E.** Neuropodial hooded hook from chaetiger 40. Scale bars A, B, C = 4 mm; D, E = 0.05 mm.

**Figure 3.** *Laonice asaccata* sp. nov. (Paratype USNM 1011983). **A.** Extrémité antérieure, vue dorsale. **B.** Extrémité antérieure, vue latérale. **C.** Extrémité postérieure, vue latérale. **D.** Soie sabre du sétigère 45. **E.** Crochets encapuchonnés neuropodiaux du sétigère 40. Echelles A, B, C = 4 mm ; D, E = 0,05 mm.

laterally forming prominent lateral wings, partly fused with chaetiger 1 (Figs 3A, 4A).

Postchaetal notopodial lamellae of chaetiger 1 reduced, triangular, with dorsal projection (Figs 3B, 4A). Lamellae on following chaetigers large, foliate, extending almost over dorsum (Figs 3A & B). Lamellae successively becoming smaller, on posteriormost chaetigers ventrally round with dorsal tip. Prechaetal lamellae small. Neuropodial lamellae on chaetiger 1 reduced, ventrally round, with dorsal projection (Fig. 3B, 4A). On subsequent chaetigers lamellae larger, dorsally and ventrally evenly projected. On posterior chaetigers lamellae becoming smaller and less projecting (Figs 3A & B). Interparapodial pouches absent.

Branchiae from chaetiger 2, present on about 30 chaetigers. Branchiae smooth, a little longer than notopodial lamellae, heavily ciliated laterally (Fig. 4A).

Chaetae of anterior chaetigers arranged in simple row, not particularly long, becoming longer and reduced in number on posterior chaetigers. Neuropodial hooded hooks from chaetiger 30-32 backwards. Hooks with one pair of upper teeth above main fang that is slightly grooved longitudinally (Figs 3E, 4C). Notopodial hooks absent. Sabre chaetae from chaetiger 20-23; chaetae long, thin, with a curved delicate tip (Figs 3D, 4B). Pygidium with 6-8 short cirri (Fig. 3C).

*Etymology:* *asaccata* is a Latin word and means "without pockets". It refers to the lack of interparapodial pouches.

*Distribution:*

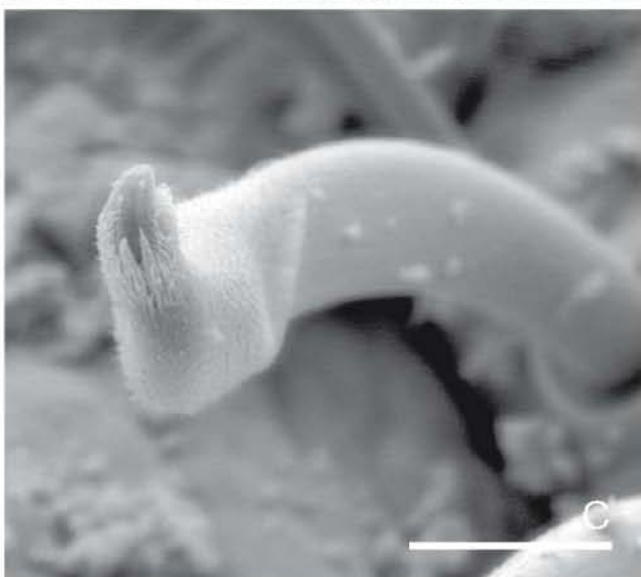
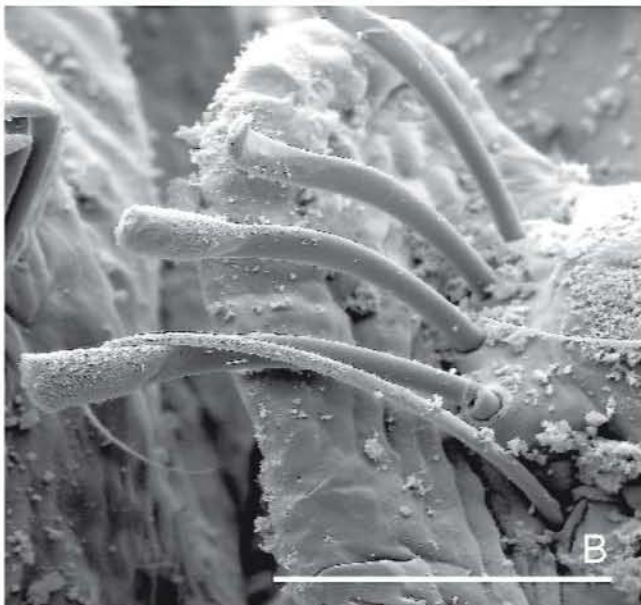
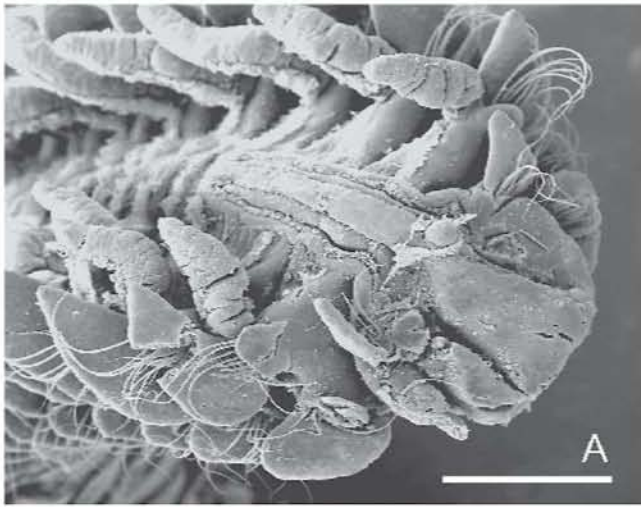
This species is not known outside the hydrothermal vent area of the Mid Atlantic Ridge system.

*Remarks*

*Laonice asaccata* sp. nov. differs from other known *Laonice* species in lacking interparapodial pouches. It resembles *Laonice cirrata* (Sars, 1851) in peristomium enclosing prostomium, but differs in the length of nuchal organs, reaching chaetiger 4 in *P. asaccata* and chaetigers 28-30 in *P. cirrata*. In the length of nuchal organs it resembles most *Laonice magnacristata* Maciolek, 2000 with nuchal organ reaching chaetiger 2. These species differ however in the number of branchiae (30 in *L. asaccata* and 6 in *L. magnacristata*), in the hooded hooks that appear on chaetiger 30-32 backwards in *L. asaccata* and on chaetiger 18 in *L. magnacristata*, and in lateral pouches present in *L. magnacristata*.

The taxonomy of the genus *Laonice* has been confused during the last years, mainly due to unclear and overlapping characters used to separate species. Many authors have observed this and suggested new diagnostic characters (Blake & Kudenov, 1978; Sikorski et. al., 1988; Blake, 1996). Blake & Kudenov (1978) took into consideration the configuration of the caruncle, capillary chaetae, hooded hooks and parapodia. Sikorski et. al. (1988) considered some additional characters such as the form of the prostomium and the fusion of prostomium with peristomium. Blake (1996) used the form of nuchal organs, when he described a new species from the Santa Barbara basin. Maciolek (2000) summarized the taxonomic characters of 17 valid species of *Laonice*. Although the delineation of species has become more explicit, the question of whether *Laonice* represents a monophyletic group is still unanswered. A further





phylogenetic study of the genus together with other related genera is needed to clarify the status of *Laonice*.

*Laonice asaccata* is the first species of the genus described from hydrothermal vents areas.

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**Figure 4.** SEM photographs of *Laonice asaccata* sp. nov. from "Atos" PI 103/01. **A.** Anterior end, dorsal view. **B.** Neuropodial lamellae with hooded hooks and sabre chaeta (setigerous segment 34). **C.** Hooded hook showing pair of teeth over main fang (same segment). Scale bars: A = 200  $\mu$ m; B = 50  $\mu$ m; C = 5  $\mu$ m.

**Figure 4.** Microphotographies MEB de *Laonice asaccata* sp. nov. en provenance de "Atos" PI 103/01. **A.** Extrémité antérieure, vue dorsale. **B.** Lamelle neuropodiale avec crochets encapuchonnés et une soie sabre (segment sétigère 34). **C.** Un crochet encapuchonné dont la dent principale est surmontée d'une paire de dents (même segment). Echelles : A = 200  $\mu$ m ; B = 50  $\mu$ m ; C = 5  $\mu$ m.

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