SPIXIANA	29	3	225–227	München, 01. November 2006	ISSN 0341-8391

Laevipilina theresae, a new monoplacophoran species from Antarctica

(Mollusca)

Michael Schrödl

Schrödl, M. (2006): *Laevipilina theresae*, a new monoplacophoran species from Antarctica (Mollusca). – Spixiana **29/3:** 225-227

The monoplacophoran mollusc *Laevipilina theresae*, spec. nov. is described from a living specimen collected off Kapp Norwegia, Eastern Weddell Sea, at approx. 800 m depth. This is the third monoplacophoran species known from Antarctica. *Laevipilina theresae*, spec. nov. is unique in having its apex clearly surpassing the anterior shell margin and showing two concentric bulges around the base of the apex. The new species additionally differs from the sympatric *L. antarctica* Warén & Hain, 1992 due to its less depressed shell. Brown markings along the mantle and foot edges and in the mouth region indicate the presence of symbiotic bacteria as already known from *L. antarctica*.

Dr. Michael Schrödl, Zoologische Staatssammlung München, Münchhausenstr. 21, 81247 München, Germany; e-mail: schroedl@zi.biologie.uni-muenchen.de

Introduction

With a fossil record back to the Cambrian, Extant monoplacophorans are still amongst the most enigmatic and wanted molluscs. The 25 species known worldwide occur from approx. 200 m down to abyssal depths (see Warén & Hain 1992, Goud & Gittenberger 1993, Urgorri et al. 2005). Most records refer to empty shells or severely damaged specimens, only very few researchers were lucky enough to obtain and observe a living animal. In Antarctica, two species were previously known. *Micropilina arntzi* Warén & Hain, 1992 is a tiny species (approx. 1 mm) only known from the Lazarev Sea (Warén & Hain 1992). *Laevipilina antarctica* Warén & Hain, 1992 shows a much wider distribution on the Antarctic shelf and upper continental slope from the Lazarev Sea to the Eastern Weddell Sea (Warén & Hain 1992); a specimen recently found below 3000 m depth shows this species to be surprisingly eurybathic (Schrödl et al. 2006). During the EASIZ III expedition on RV "Polarstern", a completely intact, living *Laevipilina* specimen was sorted out from a bathyal sand sample. This specimen significantly differs from any other congener and is described as a new species herein.

Methods

During the ANT XVII-3 (EASIZ III) expedition on RV "Polarstern", any available sea bottom substrates such as boulders, stones, sand, and mud samples were carefully revised for monoplacophorans by the author. The single specimen (ZSM Moll 20050898) obtained was collected north off Kapp Norvegia, Antarctica, at Station PS67/138-1 (71°08.90'S 013° 12.80'W, 71°08.80'S 013°13.20'W), by an epibenthic sledge (EBS) at 765-840 m depth on sandy bottom, 11 April 2000. The entire EBS sand sample was sorted in a cooling container at 0 °C. The specimen was photographed and observed alive, then briefly relaxed in isotonic $MgCl_2$ solution, and fixed in glutaraldehyde. Finally, the specimen was embedded in Spurr's resin and serially sectioned, except for the periostracum which is preserved in ethanol 78 %.

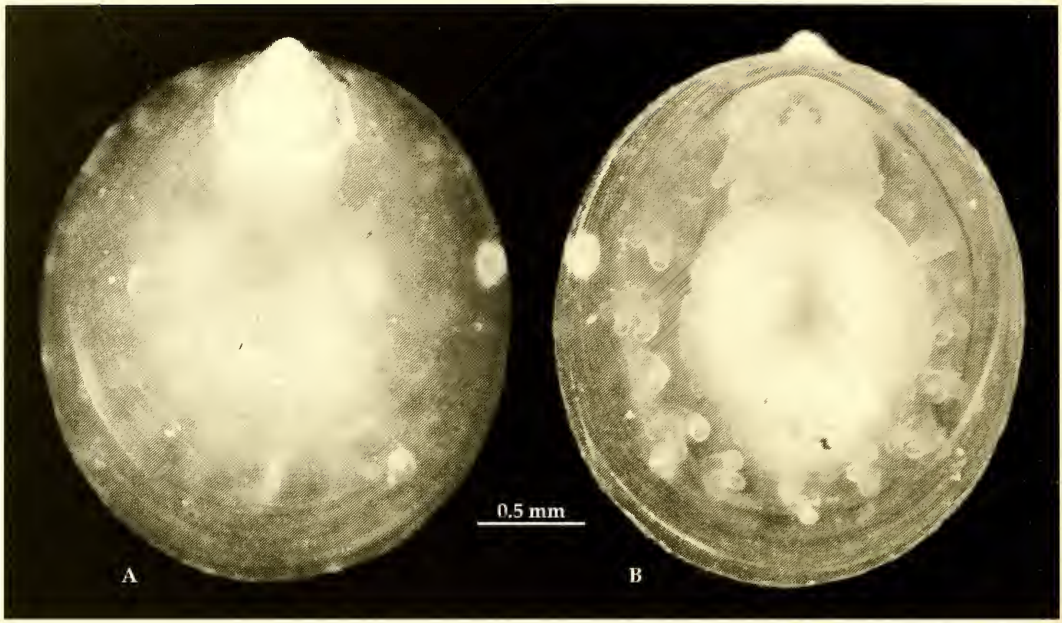

Fig. 1. *Laevipilina theresae*, spec. nov., living holotype. **A.** Dorsal view. Note the apex (at the top) surpassing the shell margin, and the diagnostic two concentric swellings separating the apex from the rest of the shell. **B.** Ventral view. Note the nearly circular sucker-like foot, the 5 pairs of gills serially arranged along the circumpedal mantle cavity, the elongate velar lobes (at the top), and the postoral tentacles in between velum and foot, having just a few short and inconspicuous projections.

Laevipilina theresae, spec. nov.
Fig. 1

Monoplacophora sp. Sirenko & Schrödl, 2001: 86.
Laevipilina sp. Schrödl, Linse & Schwabe, in review.

Holotype: Zoologische Staatssammlung München (periostracum: ZSM Moll. 20050898; plus series of histological and ultrastructural sections), collected by Michael Schrödl, 11 April 2000, from a sand sample obtained north of Kapp Norvegia, Antarctica, at 765-840 m depth.

Description

The living animal (Fig. 1) had a transparent shell and a whitish to slightly pinkish translucent body. Two pairs of dorsal pouches with brown dots were shining through the shell as were 8 pairs of shell muscles (Fig. 1A). In ventral view (Fig. 1B), the "head area", the foot edge and sides and the mantle edge was brownish, the anterior mantle edge was darker red-brown. Brown coloration referred to more or less densely arranged, minute brown dots.

The mouth area is very similar to that of *L. antarctica* as described by Warén & Hain (1992): velar lobes are elongated and nearly reach the anterior foot margin. The inconspicuous anterior lip is separated from the velum by a narrow groove. The posterior lip is a transverse swelling in its anterior part; swollen ridges project posterolaterally bearing just a few (up to 5) short and blunt postoral tentacles on each side. The foot is circular to slightly oval and sucker-like. There are 5 pairs of similar-sized gills with 3 digits arranged ventrolaterally along the circumpedal mantle cavity (Fig. 1B). The anus opens ventroterminally as a simple hole.

The shell is limpet-like depressed and fragile. Dimensions are: 2.5 mm length, 2.1 mm width, and 1 mm height. The apex is dorsally rounded, anteriorly directed, and surpasses the anterior shell margin. The base of the apex bears two concentric, whitish bulges. The shell slope is slightly convex, with a depression at the base of the apex. The aperture is nearly oval, only slightly narrower anteriorly. The shell edge is sharp. The shell surface is smooth except for showing fine concentric growth marks. The periostracum is net-like sculptured, with fine radial ridges crossed by concentric growth marks; dimensions and proportions of spaces vary considerably.

Etymology. *Laevipilina theresae*, spec. nov. is named after my daughter Theresa who had to let go her dad to sea for three months.

Remarks

Previously, four *Laevipilina* species were considered to be valid (Urgorri et al. 2005); all are characterized by their small sizes (2-3 mm) and their (nearly) smooth and fragile, moderately elevated shells. The soft parts of the specimen examined herein closely resemble previous descriptions of *Laevipilina antarctica* by Warén & Hain (1992) and Schaefer & Haszprunar (1996), especially with regard to the poorly developed postoral tentacles and the presence of 5 pairs of gills. Its shell, however, with a height/length relation of 0.4 is less depressed than that of the holotype of *L. antarctica* (0.24) and those of other recently collected and measured specimens of *L. antarctica* (0.29-0.32; see Schrödl et al. 2006). The apex of *L. antarctica* is rather stout ("globular") and does not project the anterior shell border (Warén & Hain 1992, Schrödl et al. 2006), while being more pointed and clearly surpassing anteriorly in *L. theresae*, spec. nov. The only congener with similar shell proportions (see comparison by Urgorri et al. 2005) and a (slightly) projecting apex is *L. rolani* Warén & Bouchet, 1990, from off northwestern Spain; however, this species clearly differs in having 15-20 digitiform postoral tentacles (see Warén & Bouchet 1990). A second, somewhat damaged specimen assigned to *L. rolani* by Urgorri & Troncoso (1994), however, has an apex that does not surpass the anterior shell margin and no postoral tentacles could be detected. *Laevipilina theresae* differs from any known congeners due to the presence of two unique concentric swellings at the base of the apex.

Interestingly, *L. theresae* shows the same brown dots in the head region and along the foot and mantle edges (but not on the gills) as documented for living *L. antarctica* (see Warén & Hain 1992: fig. 19) and still present (but faded) in a preserved abyssal specimen (Schrödl et al. 2006). In *L. antarctica*, such brown dots appear to correspond with symbiotic bacteria associated to the microvillar border and aggregated into special epidermal bacteriocytes described by Haszprunar et al. (1995). Thus, the presence of bacteria can be presumed for *L. theresae* as well, and will be substantiated by ultrastructural study in the future. Revealing the exact function of such symbiotic bacteria and confirming their potential occurrence in further *Laevipilina* species with dark spots along the mantle margin, e.g. *L. rolani* and *L. cachuchensis* Urgorri, García-Álvarez & Luque, 2005, might significantly contribute to understand the ecology of still "living fossil" monoplacophorans.

Acknowledgements

My gratitude goes to Wolf Arntz (AWI) for letting me participate at the EASIZ III "autumn" expedition to Antarctica. Anne-Nina Loerz (NIWA) did a great job driving the EBS under heavy storm condition. Thanks to Jens Bohn (ZSM) and Ole Ziemer for help and mental support during sorting innumerable sand samples. Gerhard Haszprunar (ZSM) is especially thanked for directing my attention to these fascinating animals and for reading the typescript.

References

Goud, J. & E. Gittenberger 1993. *Rokopella brummeri* sp. nov., a new monoplacophoran species from the mid-Atlantic Ridge in the northern Atlantic Ocean (Monoplacophora, Neopilinidae). – Basteria **57**: 71-78

Haszprunar, G., Schaefer, K., Warén, A. & S. Hain 1995. Bacterial symbionts in the epidermis of an Antarctic neopilinid limpet (Mollusca, Monoplacophora). – Phil. Trans. R. Soc. Lond. B **347**: 181-185

Schaefer, K. & G. Haszprunar 1996. Anatomy of *Laevipilina antarctica*, a monoplacophoran limpet (Mollusca) from Antarctic waters. – Acta Zool. (Stockholm) **77**: 295-314

Schrödl, M., Linse, K. & E. Schwabe 2006. Geographical and bathymetrical distribution, with first abyssal record of *Laevipilina antarctica*. – Polar Biol. **29**: 721-727

Sirenko, B. I. & M. Schrödl 2001. Mollusc biodiversity and ecology. – Ber. Polarforsch. Meeresforsch. **402**: 85-95

Urgorri, V., García-Álvarez, O. & Á. Luque 2005. *Laevipilina cachuchensis*, a new neopilinid (Mollusca: Tryblidia) from off North Spain. – J. Moll. Stud. **71**: 59-66

Warén, A. & P. Bouchet 1990. *Laevipilina rolani*, a new monoplacophoran from off Southwestern Europe. – J. Moll. Stud. **56**: 449-453

–– & S. Hain 1992. *Laevipilina antarctica* and *Micropilina arntzi*, two new monoplacophorans from the Antarctic. – Veliger **35**: 165-176