

**A new scaphopod, *Dentalium humboldti* n. sp.,
from the Concepción Methane Seep off Chile
(Mollusca: Scaphopoda).**

By

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Abstract: A new species of *Dentalium* s.l., *D. humboldti* n. sp., is described from the Concepción methane seep in the South Pacific off Chile.

Introduction: The scaphopod fauna of the southwest coast of the American continent is not very well known. After DALL (1890-1908) only few reports were published. Nowadays, it is possible to obtain shells from this region through helpful colleagues and specialized shell dealers, but the determination of these mostly poorly described species is troublesome for them and may result in quite understandable errors. In the last years we received a few shells from this area, which are obviously new to science. The newly explored Concepción methane seep near the Chilean coast turns out to have an unexpected richness in biodiversity (SELLANES, QUIROGA & NEIRA, 2008), including the scaphopoda.

Material: The investigated specimens were deposited in the scaphopod collections at the Haus der Natur - Cismar (HNC), Germany, at the Naturalis Biodiversity Center (RMNH) in Leiden, The Netherlands, and at the Natural History Museum Rotterdam (NMR), The Netherlands. The specimens derived from the HNC-collection of BERND SAHLMANN and from the Museu de Zoologia, Universidade de São Paulo, one additional specimen was provided from our friend ARIE FRANS DE JONG to the NMR. Originally most of the specimens investigated were dredged by the Chilean research vessel "Vidal Gormaz" on various cruises during the years 2006-2008. Further shells, most likely from commercial fishing boats, were obtained from several dealers under various species names. SEM photographs taken with the JEOL JSM-6480 at Naturalis Biodiversity Centre (Leiden, the Netherlands).

Type material:

Holotype: RMNH.5004009 (shell),

trawled at 846 m, Concepción Bay, central Chile, 73°43'36"W 32°22'10"S, RV AGOR-60 "VIDAL GORMAZ", taken by Agassiz trawl, on methane cold seep, September 3rd, 2006, length 39.2 mm, diameter at aperture 3.9 mm.

Paratype 1: RMNH.5004010 (ex MZSP 115244) (shell with animal),

off Concepción, 900 m, 2013, 73°43'W 36°21'S.

Paratype 2: HNC 82007 (shell)

off Concepción, Chile, trawled at 600 m by research ship in May 2008, length 36.0 mm, diameter at aperture 4.4 mm.

Paratype 3: HNC 82008 (shell)

off Concepción, Chile, trawled at 600 m by research ship in May 2008, length 31.1 mm, diameter at aperture 3.6 mm.

Paratype 4: NMR 9930-82954 (shell)

off Concepción, Chile, trawled at 600 m by research ship in May 2008, length 31.0 mm, diameter at aperture 3.7 mm.

Paratype 5: HNC 89241 - from the same lot as the holotype: trawled at 846 m, Concepción Bay, central Chile, 73°43'36"W 32°22'10"S, RV AGOR-60 "VIDAL GORMAZ", taken by Agassiz trawl, on methane cold seep, September 3rd, 2006.

The photographed radula is from Paratype 1, RMNH.5004010.

Locus typicus: Off Concepción, Concepción Province, Chile, 73°43'36"W 32°22'10"S, in a depth of 846 m.



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Explanations of Plate 25:

Fig. 1: *Dentalium humboldti* n. sp., trawled at 846 m, Concepción Bay, central Chile, 73°43'36"W 32°22'10"S, RV AGOR-60 "VIDAL GORMAZ", taken by Agassiz trawl, on methane cold seep, September 3rd, 2006. 39.2 mm, Holotype RMNH.5004009 (photos V. WIESE).



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Explanations of Plate 26:

Fig. 2: *Dentalium humboldti* n. sp., trawled at 846 m, Concepción Bay, central Chile, 73°43'36"W 32°22'10"S, RV AGOR-60 "VIDAL GORMAZ", taken by Agassiz trawl, on methane cold seep, September 3rd, 2006. 31.0 mm, Paratype 5, HNC 89241 (photos V. WIESE).

Distribution and biotope: On or near the Concepción Methane Seep (CMS) in depths between 600 and 900 m. According to current knowledge of *D. humboldti* n. sp. a specimen from 380 m (HNC 89242) is also provisionally assigned to this species.

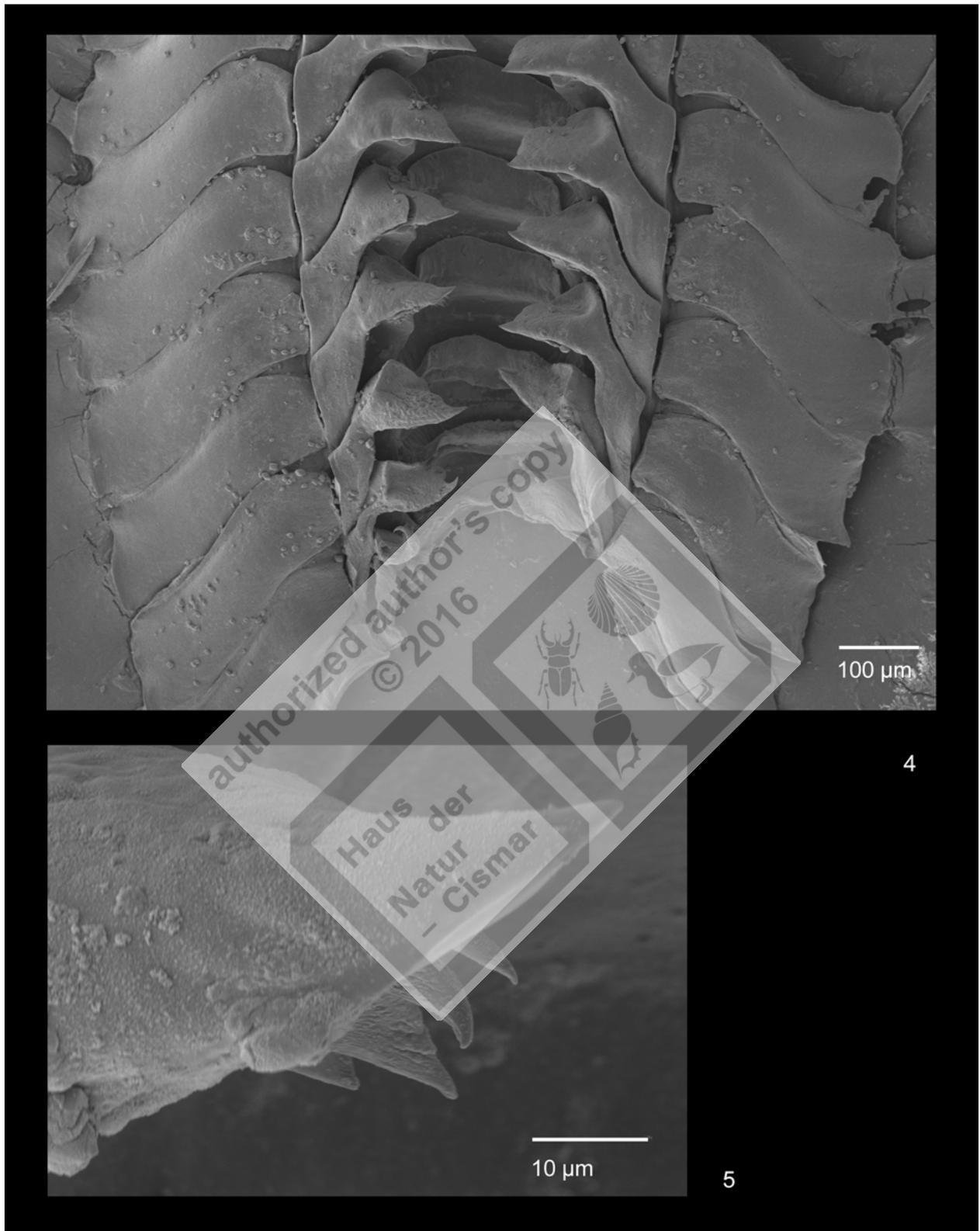
Diagnosis: Shell a little curved in the posterior part, otherwise nearly straight, diameter not much enlarged towards aperture. Some parts of the shell often heavily and deeply eroded down to the inner core of the tube, only at some parts the thick, more chalky outer layer with the ribs preserved. Color whitish to ebony, brownred and black encrusted, especially near the mouth. About 20-24 flat ribs at the middle of the shell, near the mouth nearly smooth, but extension of the ribs still visible. Interstices flat. Aperture circular, not crenulated, sometimes somewhat compressed. Apex with 10 to 12, normally 11 strong ribs, if preserved. Apex region sometimes completely eroded, with small ventral notch or simple. Measurements: length up to 41.2 mm, diameter at aperture up to 4.4 mm.

Etymology: The species is named in honour of ALEXANDER VON HUMBOLDT, the famous explorer of the South American fauna and flora.

Comparison and remarks: These most times heavily and deeply eroded shells do not show similarities with other known scaphopods of this area. The combination of about 20 distinctive and robust ribs at the apex and a nearly smooth, redbrown tinted aperture is unique, the apertural features sometimes resembling *Pictodentalium vernedei* (HANLEY 1860) from Taiwan. *Dentalium agassizi* PILSBRY & SHARP (1897) is known to occur from California to the Galapagos Islands from depths of 400 m down to 2,322 m. Its ribs are finer and no extensive erosion is recorded for this species. Also the ribs of the until now unfigured *Fissidentalium peruvianum* (DALL 1908) (pl. 28, fig. 5) are finer and the species is more than twice as large as *D. humboldti* n. sp. Specimens of the wellknown deep-water species *Fissidentalium megathyris* (DALL 1890) (pl. 28, fig. 6) differ in their stout, horn-like shape, higher rib count and thinner shell. No deep erosion is reported for these species. *Fissidentalium erosum* SHIMEK & MORENO (1996) has a similar stout shell as *F. megathyris*, but with a typical vivid pattern of superficial erosion. Findings of presumed *D. humboldti* n. sp. may date back to RV “Sonne” cruises in 2001 (HEBBELN et al, 2001) and later regional explorations. They were recorded as *Fissidentalium* spec., *D. majorinum*, or *F. megathyris*. We have not yet checked the material but most probably *D. humboldti* n. sp. is represented. The scaphopod species of the Hawaiian Archipelago were recently pictured in SEVERN (2011). There is no species shown that would fit to the new species described herein. On his page 488, plate 224, fig.7 a big stout shell is assigned to *Fissidentalium complexum*, but that particular shell seems to be quite different from the also figured type of *F. complexum* and looks to us more related to *Fissidentalium megathyris*. *F. megathyris* is widely distributed from N-California to Chile at depths from 1,200 m down to 3,200 m, there are specimens most probably also belonging to this species which come from depths down to 6,200 m in the Panama Basin. It seems to be a variable species regarding its shape. At this time we feel unable to prove a distinct generic classification for our new species. We therefore decided to assign it to *Dentalium sensu lato* until further evidence.



Fig. 3: *Dentalium humboldti* n. sp., anterior view (aperture width 3.4 mm) and preserved animal (anterior diameter 1.7 mm) of Paratype 1, RMNH.5004010 (photos: V. WIESE)



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Explanations of Plate 27:

Figs. 4-5: *Dentalium humboldti* n. sp., radula and detail of primary cusp with small denticles. Radula extracted from Paratype 1, RMNH.5004010 (SEM-photo: Naturalis/A.-F. HIEMSTRA)



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Explanations of Plate 28:

- Fig. 6: *Fissidentalium peruvianum* (DALL 1908), syntype (USNM 110667, photo courtesy J. HARASEWYCH)
- Fig. 7: *Fissidentalium megathyris* (DALL 1890), syntype (LACM 1816, photos courtesy L. T. GROVES).

Additional material figured:

Fissidentalium peruvianum (DALL 1908) (pl. 28, fig. 6), Off Peru, Albatross stn 4656, 6°55'S, 83°34'W, 2222 fms [4055 m].

Lectotype (fide KABAT 1996), Smithsonian National Museum of Natural History, USNM 110667.

Fissidentalium megathyris (DALL 1880) (pl. 28, fig. 7), 1485 m, Islas Galápagos, leg. U. S. Fish Commission. Syntype, Los Angeles County Museum, LACM 1816.

Radula: The overall appearance of the radula is typical for *Dentalium*. The rachidian teeth are broad, quite curved in section and contain a solid ridge in the middle. The surface is smooth, but become more wrinkled towards the contact area of the lateral teeth. The solid laterals are dumbbell shaped with a head with one sharp primary cusp where at least some of them are bearing three to four denticles on the internal face (Plate 27, fig. 5), the secondary cusp is more rounded like a protuberance. The marginal teeth are broad and of sigmoidal shape.

Conclusions: The scaphopod fauna of the southwest coast of America is poorly known. Scattered findings from Chile, Peru, Easter Island and Hawaii mostly date back to DALL's fundamental reports. KABAT (1996) summarized the location of the types of the "Albatross" historical explorations. The wide central Pacific area is represented by a single paper of REHDER & LADD (1996). The ongoing international commercial explorations of the deep sea floor e.g. for manganese nodules may reveal additional material. The scarceness of experts for the scaphopods that will be found there, especially Cadulids and other very small Gadilid species without much distinguishing shell morphology, will hinder quick results.

Up to now only sparse information on scaphopods associated with cold seeps either off California (LEVIN et al. 2008) or off Chile (e.g. HEBBELN et al. 2001, SELLANES & KRYLOVA 2005, SELLANES, QUIROGA & NEIRA 2008) was published.

The analysis of the scaphopod shells housed in our collections shows that even under the existing circumstances of limited supply and rare resources new scaphopod species are to be detected. Our databases and our collection of scaphopod literature (SAHLMANN 2011) will be further enlarged and updated and workshops specialized on scaphopod molluscs (SAHLMANN et al. 2013; VAN DER BEEK 2014, 2015) are well established.

Acknowledgments: We wish to thank Prof. Dr. LUIZ RICARDO LOPES DE SIMONE (Museu de Zoologia, Universidade de São Paulo) and especially Prof. Dr. GUILLERMO GUZMÁN (Departamento Ciencias del Mar, Universidad Arturo Prat, Iquique, Chile) for sending additional material preserved in alcohol to us.

Photos of the shells and the animal were taken and processed by Dr. VOLLRATH WIESE at "Haus der Natur" in Cismar, whose skills in preparing pictures we gratefully acknowledge. The picture of the holotype (USNM 110667) of *Fissidentalium peruvianum* (DALL 1908) was kindly provided by Prof. Dr. JERRY HARASEWYCH and is printed here for the first time. LINDSEY T. GROVES of the Natural History Museum of the Los Angeles County kindly allowed us to publish the type photographs of a syntype (LACM 1816) of *Fissidentalium megathyris* (DALL 1890).

Thanks to Naturalis Biodiversity Centre for facilitating the SEM photographs, special thanks to JEROEN GOUD for preparing the radula for the SEM and AUKE-FLORIAN HIEMSTRA for taking the SEM photographs.

We are especially thankful to our friend ARIE FRANS DE JONG, Rotterdam, for his longtime cooperation in scaphopods and for making available a *Dentalium humboldti* n. sp. from his collection for our study and depositing it in the Natural History Museum Rotterdam.

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