Zootaxa 561: 1–6 (2004)
www.mapress.com/zootaxa/

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

561

Ovalidota milleri, a new genus and species of bathyal sea cucumber from the Caribbean Sea (Echinodermata: Holothuroidea: Apodida)

DAVID L. PAWSON

National Museum of Natural History, Mail Stop MRC 163, Smithsonian Institution, Washington DC 20013-7012, USA

Abstract

Ovalidota milleri new genus, new species, is a chiridotid holothurian with an egg-shaped body, a broad oral field surrounded by 18–19 (?20) tentacles, and body wall ossicles in the form of typical *Chiridota* wheels gathered into papillae and also scattered among the papillae. It is known from two localities in the Caribbean, near St. Vincent and at Grand Cayman Island, in bathyal depths of 366-414 metres. The egg-shaped body of this new genus is unique in the Order Apodida. When more material becomes available for study, *Ovalidota milleri* may be referred to a new family.

Key words: *Ovalidota milleri*, Holothuroidea, Apodida, Bathyal, Caribbean

Introduction

The apodous holothurians are typically worm-like, cylindrical animals (Clark, 1908), moving sinuously by using body contractions aided by the tentacles. Although the approximately 215 species of apodids have been described from some unusual habitats (see Smirnov et al., 2000; Pawson & Vance, 2004), their body shape remains conservatively worm-like. In the course of a study of bathyal echinoderms in the Bahama Islands and Lesser Antilles using manned submersibles, a team of scientists (J. Miller, G. Hendler, P. Kier, D. Pawson) was able to photograph, videotape, and collect approximately 200 species of echinoderms from hard and soft substrates. When feasible, a suction device was used to collect soft sediments in hopes of finding young stages of known species, or small species not normally visible to the naked eye of the observer in a submersible.

We were astonished to find in one of these sediment samples a single specimen of a bizarre holothurian which, upon further study, turned out to be an apodous form (Order Apodida) equipped with typical *Chiridota*-type wheel ossicles in the body wall. The specimen was photographed in the laboratory (Figure 1), then set aside in the hope that further

Accepted by Z.-Q. Zhang: 30 Jun. 2004; published: 9 Jul. 2004

material would become available. It was not until the summer of 2003, some 14 years later, that a second record of this species, in the form of an *in situ* photograph, came to my attention. Regrettably, when the original specimen was re-examined, it was found that the wheels had corroded almost beyond recognition, their poor condition reflected in the illustrations provided here (Figure 2). It is fortunate that the remaining incomplete wheels provided barely enough detail to allow confirmation of the affinities of the specimen!

Order Apodida

Suborder Synaptina Smirnov, 1998

Family Chiridotidae Östergren, 1898

Diagnosis: Synaptina with 10, 12, or 18 peltato-digitate, pinnate, or bifurcate tentacles. Juveniles with bifurcate tentacles. Body wall ossicles wheels of chiridotid type and/or sigmoid hooks. Chiridotid type wheels with six spokes, numerous small denticles on inner side of rim, and a complex hub; on lower side of each spoke a branch leans against the lower end of the hub forming a "star' structure. Ossicles in tentacles usually rods with branched ends. (From Smirnov, 1998).

***Ovalidota* new genus**

Diagnosis: Body more or less egg-shaped, less than twice as long as wide. Mouth ventral, placed approximately one quarter of the body length from the anterior extremity. Oral field broad, approximately one third of body length, surrounded by 18–19 extensile tentacles. Wheel ossicles gathered into papillae, papillae scattered in radii and interradii, more numerous dorsally than ventrally; individual wheels scattered among papillae.

Type Species: *Ovalidota milleri* new species

Etymology: The genus-name is masculine, derived from Latin *ovalis*, egg-shaped and *doto*, endowed. It is a pleasure to name this species for the Reverend John Miller, a long-time friend and colleague, who planned and directed our submersible operations in the Caribbean in 1983–1989.

Remarks: This genus may require referral to a separate family within the Order Apodida. A richer material will permit examination of internal anatomy. The extraordinary body shape alone tends to separate this new genus from all others in the Order. In the meantime, the possession of "typical" chiridotid wheel ossicles argues for inclusion of the genus in the Family Chiridotidae, Subfamily Chiridotinae, as defined by Smirnov (1998).

Ovalidota milleri **new species**
Figures 1–2

Diagnosis: Body approximately 22 mm long. Body wall translucent, color in life greyish-white to light violet; in alcohol light brown.

Material Examined: HOLOTYPE, Catalogue No. HBOM 071:00505, Harbor Branch Oceanographic Museum, 5600 U.S. 1 North, Fort Pierce, Florida 34946. R/V Seward Johnson, Johnson-Sea-Link II Dive 1747, York Bay, off York Point, St. Vincent, Lesser Antilles, 13°07.2'N, 61°16.8'W, 25 April 1989 , 413.9 meters, 1 specimen, collected along with sediment by a suction device. Total length 21.5 mm. Collected by J. E. Miller.

Other material: Photograph (Figure 1, top) of live specimen *in situ* on wall at Grand Cayman Island, depth 1,200 feet. Photograph taken from a manned submersible by Gary Montemayor. Total length approximately 22 mm (calculated by comparison of size of wheel papillae with those of Holotype).

Description: Holotype in poor condition, flattened, elongate oval, 21.5 mm long, 12.5 mm wide at widest point, near anterior end (width:length = 1:1.72). Recently-dead Holotype, when photographed (Figure 1, bottom left, bottom right), with same body proportions. Photograph of live specimen at Grand Cayman (Figure 1, top) shows that body is more or less egg-shaped, approximately twice as long as wide. Dorsal surface strongly arched; shape of ventral surface unknown, probably arched also. Mouth, ventral, lying approximately 5.5 mm from anterior end of body, in life facing substratum. Oral field extensive, circular, approximately 7 mm in diameter, bounded by 18 or 19 large tentacles, each approximately 2.3 mm in diameter when retracted. In live specimen, extensile tentacles approximately 5.5 mm long, transparent and cylindrical when extended into the substrate in the feeding mode. Tentacles appear to have terminal discs bearing a fringe of digits (Figure 1, bottom left); their detailed morphology cannot be determined. Anus terminal.

Body wall translucent, color light violet in the laboratory, grayish in life. Radial muscle and intestine visible through body wall. Conspicuous on body wall are numerous wheel papillae ranging up to approximately 1.1mm in diameter, each consisting of loosely aggregated heaps of wheel ossicles. Individual wheels also scattered in body wall between papillae. Wheel papillae scattered in radii and interradii, more numerous dorsally than laterally or ventrally. Largest papillae in anterodorsal region of body. Internal anatomy not examined. A substantial calcareous ring is present, visible through the body wall (Figure 1); the intestine appears to describe the typical loop in its path from mouth to anus.

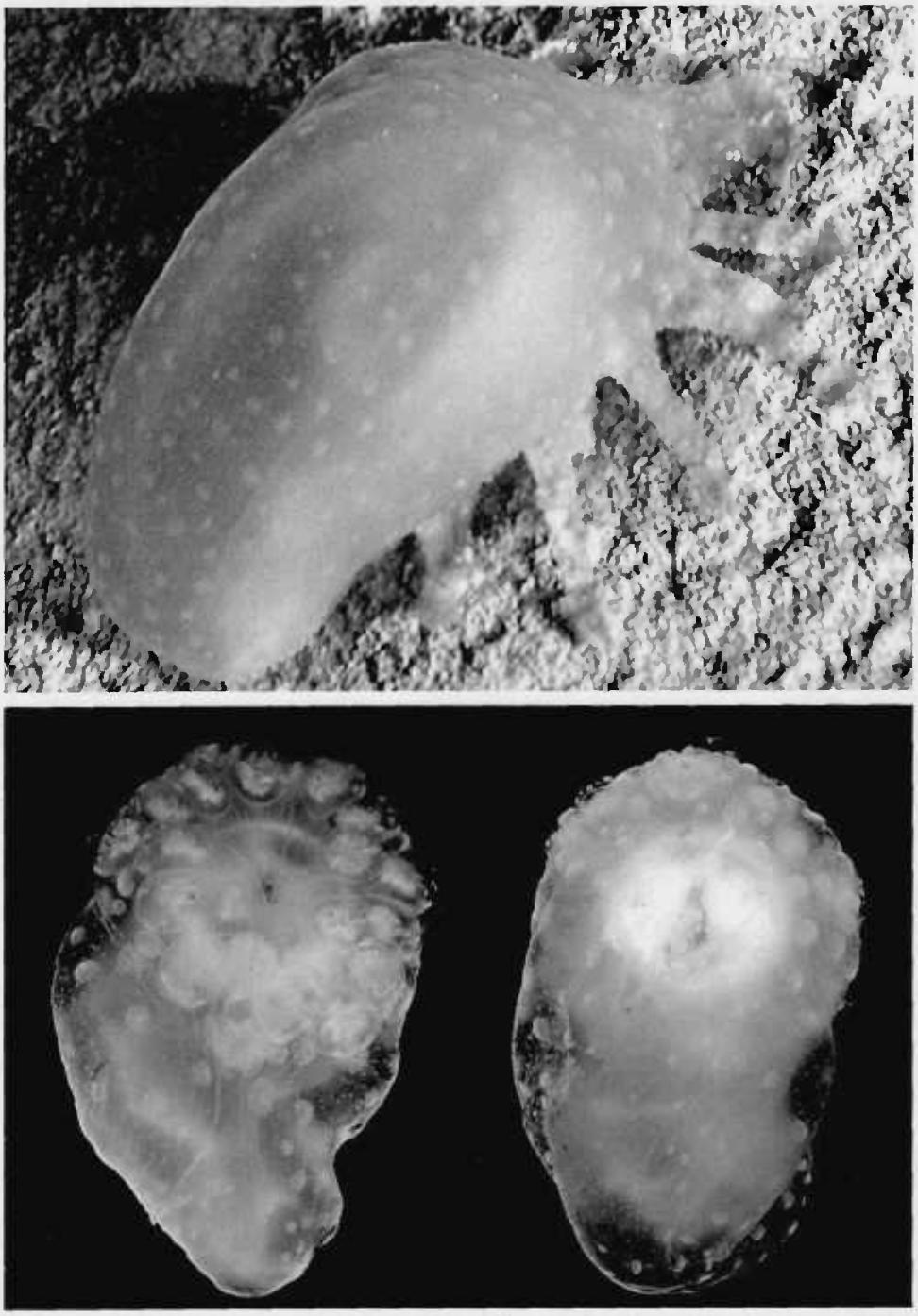

FIGURE 1. *Ovalidota milleri* new genus, new species. Top, live specimen, *in situ*, on The Wall at Grand Cayman Island, depth 1,500 feet. Photograph: Paul Montemayor. Lower left, Holotype, total length 22 mm, ventral view. Photograph: J.E. Miller. Lower right, Holotype, dorsal view. Photograph J.E. Miller.

Body wall ossicles exclusively wheels (Figure 2), scattered in the body wall and gathered into heaps in wheel papillae. Wheels severely corroded, apparently due to slightly acid nature of preservative. Wheels apparently typically chiridotid, with six spokes (Figure 2A) and with a central "star" pattern as described by Smirnov (1998). Rim of wheel with typical chiridotid teeth (Figure 2B, 2C); fragment of wheel with remains of teeth on rim allows estimate of approximately 150 teeth per average wheel. Wheel diameter range 211–267μm, standard deviation — n-1 is 18.70 (n=10, mean 237μm). Tentacles with smooth rods with few lateral projections and slightly branched ends; average length of rods 100μm.

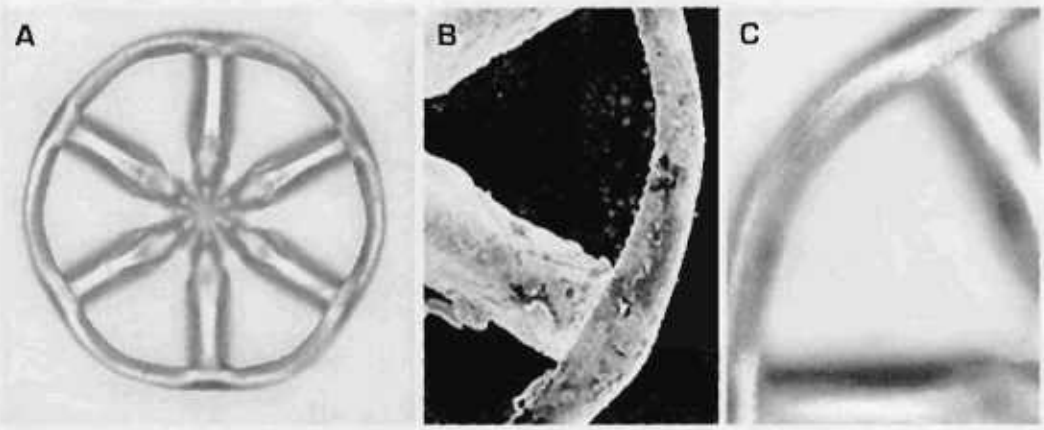

FIGURE 2. *Ovalidota milleri* new genus, new species. A. Wheel ossicle, somewhat corroded. B. Scanning electrom microscope image of portion of corroded wheel ossicle, showing remains of teeth on inner margin of rim. C. Photograph of portion of corroded wheel ossicle. Note evidence of teeth where spokes meet the wheel rim.

Ecological notes: The Holotype was collected along with soft sediments, and the photographed specimen from Grand Cayman was apparently feeding on a soft substratum. The ventrally-directed mouth appears to equip the animal for obligate feeding on the substratum, rather than feeding on a mixture of detrital and suspended material that seems to be an option for other deep-sea chiridotids (Pawson & Vance, 2004; Smirnov et al., 2000).

Remarks: The color of this species may be variable and, because the animal is translucent, the color *in situ* may also reflect the nature of the substrate to a considerable extent. In terms of general appearance, number of spokes, central "star" pattern, the wheels of this species appear to be typically chiridotid. The wheels are distinctive in being very large, and in having numerous teeth on the rim, but these characteristics fall within the range of variation in the Chiridotidae (Clark, 1908).

Acknowledgments

Dr. Chris Pomory of the University of West Florida kindly sent me the beautiful *in situ* photograph of *Ovalidota milleri*, and obtained permission from the submersible pilot and photographer, Paul Montemayor, for me to publish the photograph. The studio photographs of *Ovalidota milleri* were taken by John E. Miller. I thank Doris J. Vance for invaluable research assistance, and Molly K. Ryan for final preparation of the illustrations. This is Contribution No. 593 of the Smithsonian Marine Station at Fort Pierce.

Literature cited

Clark, H.L. (1908) The apodous holothurians. *Smithsonian Contributions to Knowledge*, 35, 1–231.

Pawson, D.L. & Vance D.J. (2004) *Chiridota heheva* new species, from Western Atlantic deep-sea cold seeps and anthropogenic habitats (Echinodermata: Holothuroidea:Apodida). *Zootaxa* 534, 1–12.

Smirnov, A.V. (1998) On the classification of the apodid holothurians. Mooi, R. & Telford, M. (Eds.) *Echinoderms*. A.A. Balkema, San Francisco, Rotterdam, pp. 517–522.

Smirnov, A.V., Gebruk A.V., Galkin, S.V. & Shank, T. (2000) New species of holothurian (Echinodermata: Holothuroidea) from hydrothermal vent habitats. *Journal of the Marine Biological Association of the United Kingdom*, 80, 321–328.

