



## Contribution to the knowledge of the family Caecidae: 16. Revision of the Caecidae of Easter Island (Chile) (Caenogastropoda: Rissoidae Gray J. E., 1847)

## Contribución al conocimiento de la familia Caecidae: 16. Revisión de los Caecidae de la Isla de Pascua (Chile) (Caenogastropoda: Rissoidae J. E. Gray, 1847)

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### ABSTRACT

With the exception of two species, members of the family Caecidae from Easter Island have been previously neglected. Based on type and additional material, a revision of the species known to date from Easter Is. is herein proposed, with the description of 5 new species: *Caecum rehderi* spec. nov., *C. heterochromum* spec. nov., *C. pascuanum* spec. nov., *C. rapanuiense* spec. nov., *C. campanulatum* spec. nov.

### RESUMEN

Con la excepción de dos especies, los miembros de la familia Caecidae de la Isla de Pascua han sido previamente desatendido. Basado en el tipo y en el material adicional, se propone aquí dentro, una revisión de las especies conocidas hasta la fecha de la Isla de Pascua, y incluye la descripción de 5 nuevas especies: *C. rehderi* esp. n., *C. heterochromum* esp. n., *C. pascuanum* esp. n., *C. rapanuiense* esp. n., *C. campanulatum* esp. n.

KEY WORDS: Mollusca, Caenogastropoda, Rissoidae, Caecidae, taxonomy, new species, Easter Island, Western Pacific.

PALABRAS CLAVE: Mollusca, Caenogastropoda, Rissoidae, Caecidae, taxonomía, nuevas especies, Isla de Pascua, Pacífico Occidental.

### INTRODUCTION

Easter Island (Fig. 1) is found in a totally isolated position approximately 3,500 Km from the coast of Chile. From a zoogeographical point of view, Easter Is. is in a very peculiar area within the eastern Indo-Pacific region, and to the point that, in 1965, Schilder proposed the Rapanuian province as a separate bioge-

graphical province from the Polynesian province. The submarine seascape features widely scattered corals affixed to the rugged volcanic substrate. The depauperate benthic community employs a variety of adaptive strategies for survival in an environment stressed by waves, currents and the absence of mineral nu-

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trients. Most of the corals and other bottom invertebrates are typical of the Indo-Pacific reefs, but reefs have not formed.

The circulation pattern, and especially the marked upwelling between the South Pacific and Mentor currents, contributes to the isolation of the area. In terms of marine ecosystems, this insularity has also produced a high degree of radiation in many groups, and particularly in the caenogastropods. Thus the fauna can essentially be described as typical Pacific fauna with a relatively high number of endemic species. The island's marine benthic fauna is generally characterised by a high degree of species diversity and a low abundance, and this is true for both hard and soft bottoms. The meiobenthic family Caecidae also follows this pattern.

The Caecidae of the Easter Island have been scarcely studied in the past, with the exception of the work of REHDER (1980). Past surveys have reported endemicity rates within the molluscan fauna ranging from 37% to 42% (REHDER, 1980, DiSALVO, RANDALL AND CEA, 1988, RAINES, 2002). Rehder also indicates that some species appear to have a dual relationship with certain species from Hawaii, as well as species from the Kermadec Islands. In preparation for his 1980 publication, Rehder reviewed all previous studies and expeditions. In addition to examining all the Easter Is. material in US museums, he also examined the full store of material housed in the Museo Nacional de Historia Natural in Santiago, Chile. In all, Rehder examined over 7,000 specimens, of which 3480 were collected during his trip to the island in 1974.

In the mid 1980's, DiSalvo and his team conducted a comprehensive survey of Easter Island's sublittoral marine environment. The authors of the present work had the good fortune of having access to examples of all the molluscan material collected during DiSalvo's investigation. Other than the few publications that we have been working on (OLIVER, 1915, SCHILDER, 1965, REHDER, 1980, DiSALVO *ET AL.*, 1988, RAINES, 2002) no other serious work on molluscs has

been completed during the last ten years. With regard to Caecidae, during the three trips to Easter Island, the authors of the present work collected more than 350 specimens of this family. Rehder mentions only two species: *Caecum* cf. *solitarium* Oliver, 1915, and *C. amydroglyptum* Rehder, 1980. In all other publications, which we have reviewed, Caecidae are listed simply as '*Caecum* species'. No other descriptions or illustrations were provided.

So we present herein a revision of the species known to date from Easter Is., based on type and additional material, with the description of five new species.

#### Abbreviations used:

- AMS: Australian Museum Sydney, Sydney (Australia)
- CM: Canterbury Museum, Christchurch (New Zealand)
- LACM: Natural History Museum of Los Angeles County, Los Angeles (U.S.A.)
- MNHN: Museum National d'Histoire Naturelle, Paris (France)
- MPR: Mauro Pizzini collection.
- NHML: Natural History Museum, London (U.K.)
- NMNZ: Museum of New Zealand Te Papa Tongarewa, Wellington (New Zealand)
- NSMT: National Science Museum, Tokyo (Japan)
- USNM: National Museum of Natural History, Washington D.C. (U.S.A.)
- WAM: Western Australian Museum, Perth (Australia)

#### Terminology:

- Abapical: towards the apices (of the septum)
- Adapical: opposite to the apices direction (of the septum)
- Aperture, apertural end: the round anterior opening of the shell.
- Apex, apical end: the smaller, narrower, closed posterior end of the tube.
- Cutting plane: the plane individuated by the edge of the shell at the apex (excluding septum and mucro).

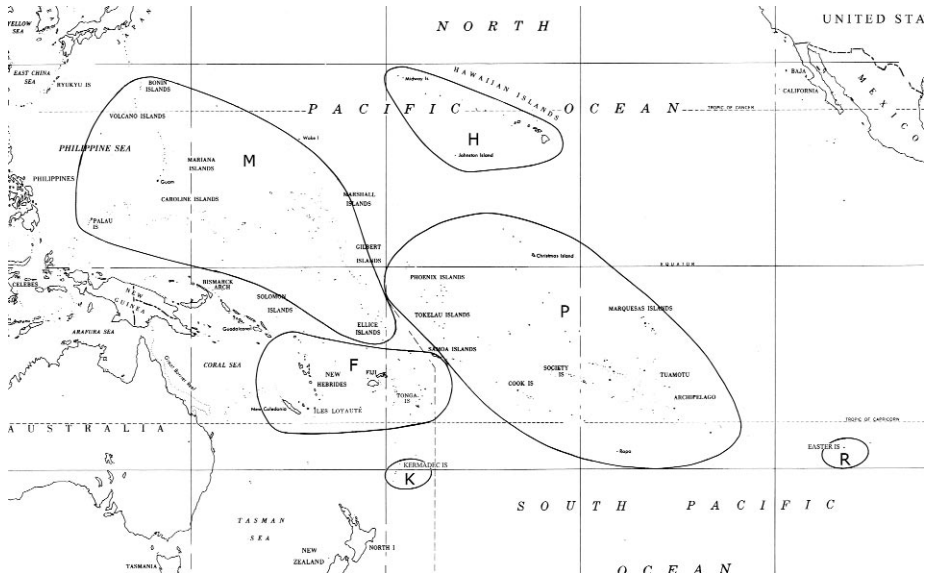


Figure 1. Biogeographical provinces within the tropical eastern Indo-Pacific as proposed by SCHILDER (1965), and as illustrated by REHDER (1980): Micronesian: M; Hawaiian: H; Fijian: F; Polynesian: P; Rapanuian: R; Kermadec Islands: K (added by the authors).

Figura 1. Las provincias biogeográficas dentro del Indo-Pacífico oriental tropical propuestas por SCHILDER (1965) e ilustradas por REHDER (1980): Micronesiana: M; Hawaiano: H; Fijiana: F; Polinesio: P; Rapanuian: R; Kermadec Islands: K (añadida por los autores).

Interspace: area between rings, with / without microsculpture.  
 Meiobenthic: referred to all interstitial molluscs living in sediment of varying granule size.  
 Microsculpture: usually visible at very high magnification or under SEM can be transverse, longitudinal or both.  
 Mucro: small to large prong projecting from the septum.

Rings, annular sculpture: transverse, raised sculpture (equivalent to the axial sculpture of the normally coiled gastropods).  
 Septum: closure of the shell at the apex, as it sheds earlier stages.  
 Shell(s): the shell, beached without gastropod.  
 Spm(s): live collected specimen(s), with soft parts and/or operculum(a).

## RESULTS

Superfamily RISSOOIDEA Gray J. E., 1847  
 Family CAECIDAE Gray J. E., 1850  
 Genus *Caecum* Fleming, 1813

Diagnosis (BANDEL, 1996): "The shell of the teleoconch is a small, slightly curved tube ornamented only with growth lines, numerous ring-like collabral lirae ad/or axial ribs. The posterior end of the tube is closed by a conical septum. The protoconch is trochospirally or planispirally coiled. Uncoiling of the shell begins after metamorphosis".

Type species (BANDEL, 1996): *Dentalium imperforatum* Kanmaker, 1798 (= *trachea* Montagu, 1803) from Europe, Mediterranean Sea and Atlantic to southern England.

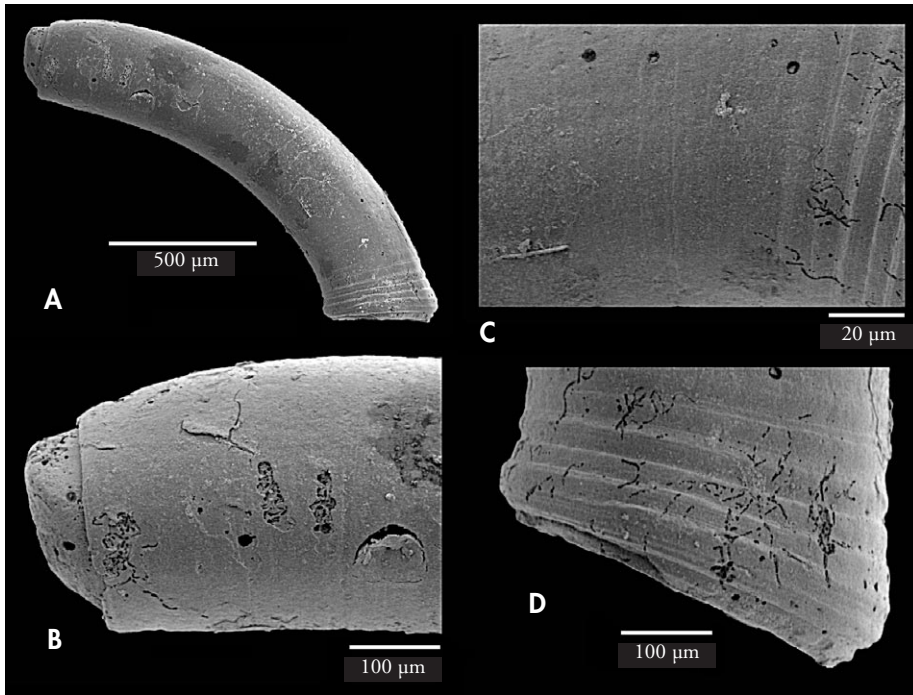


Figure 2. *Caecum rehderi* spec. nov. A: holotype LACM 3019, gold coated, length 2.08 mm; B: detail of septum; C: microsculpture; D: detail of aperture. SEM imaging by D. Geiger.

Figura 2. *Caecum rehderi* spec. nov. A: holotipo LACM 3019, metalizado en oro, longitud 2,08 mm; B: detalle del septo; C: microescultura; D: detalle de la abertura. Imágenes al MEB por D. Geiger.

### *Caecum rehderi* spec. nov. (Fig. 2)

*Caecum* cf. *solitarium*; Rehder, 1980: 31-32, pl. 5, fig. 11.

**Type material:** Holotype, LACM 3019; 1 paratype, LACM 3020; 1 paratype, USNM 756269; 1 paratype, MNHN.

**Material examined:** 1 specimen, Onetea, Hotuiti (length: 2.42 mm, USNM 756269) (Oct. 1974, leg. H. Rehder); 4 specimens, Punta Rosalia, east of Anakena (Apr. 1998, leg. B. Raines),

**Type locality:** In sand collected along the base of cliffs at 10-20m, off Punta Rosalia, east of Anakena, Easter Is., Chile. 27° 04' 18" S, 109° 19' 45" W.

**Description:** Shell small (holotype measures, length: 2.08 mm; width: 0.42 mm), tube-like, slender, gently arched, semi-translucent to opaque white. Tube seemingly smooth almost glassy, sub-cylindrical, with posterior end only slightly smaller than anterior end. Microsculpture nearly obsolete, with only fine annular growth lines sometimes present under magnification. Anterior end somewhat flared just above aperture

with incised annular rings. Aperture circular, but slightly constricted. Posterior end with tapered rim. Septum not retracted, subquadrangle lateral outline inclined with elevated edge slightly right of center when viewed frontally. Operculum and soft parts unknown.

**Original description of *C.* cf. *solitarium* Rehder, 1980:** "Diagnosis. Shell small, 2.4 to 2.7 mm in length, glassy, grayish-white to whitish, slender, gently

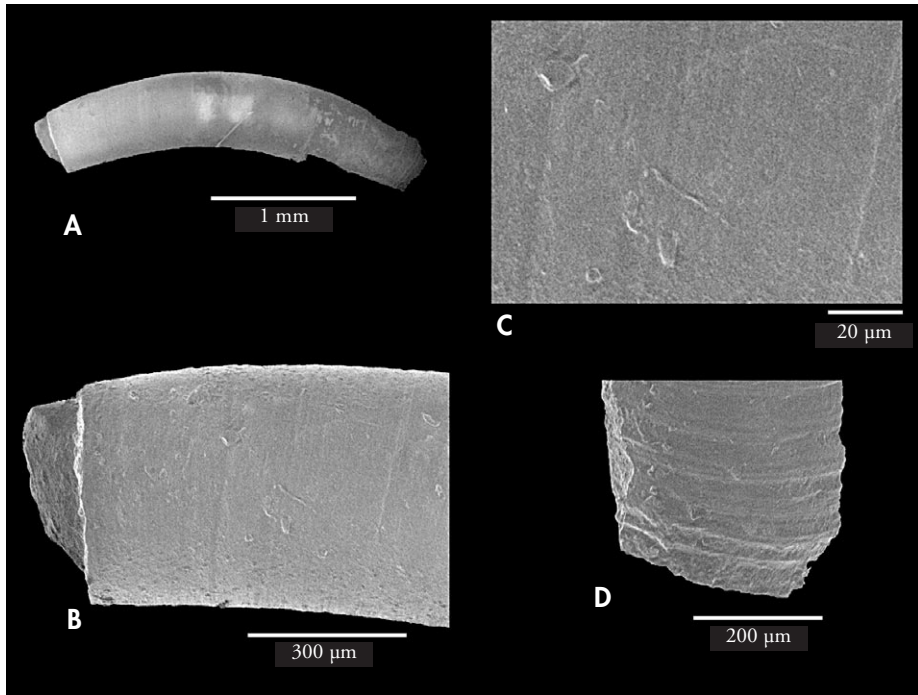


Figure 3. *Caecum* cf. *solitarium* Rehder (1980). A: USNM 756269, uncoated, length 2.42 mm; B: detail of septum; C: microsculpture; D: detail of aperture. SEM imaging by D. Geiger.

*Figura 3.* *Caecum* cf. *solitarium* Rehder (1980). A: USNM 756269, no metalizado, longitud 2,42 mm; B: detalle del septo; C: microescultura; D: detalle de la abertura. Imágenes al MEB por D. Geiger.

curved, diameter at posterior end only slightly smaller than at anterior end, where the aperture is slightly constricted and somewhat opaque above the aperture; the sculpture consists of fine, rather crowded, subopaque (worn?) annular riblets that gradually and slightly increase in strength toward the aperture; septum exserted, subquadrate with a slightly convex surface inclined from an elevated edge at the right dorsal sector to the edge of the posterior rim of the shell at the left ventral sector.

Range. Kermadec Islands (and Easter Island?).

Material. 1 specimen from sta E-27A, USNM 756269.

Measurements (mm). USNM 756269: length, 2.42; diameter at anterior end, 0.4".

*Discussion:* Rehder reported a caecid from Easter Island, which he tentatively

identified as *Caecum* cf. *solitarium* Oliver, 1915. However, it seems that Rehder unfortunately overlooked several key characteristics within Oliver's description. The first being the septum of *C. solitarium*, which OLIVER (1915) described as "...hemispherical, making an abrupt shoulder at the junction of the shell"; even the septum of Rehder's specimen (Fig. 3) could be associated to a tale typology. Oliver also mentions, that the sculpture of *C. solitarium* consists of simple growth lines, while Rehder refers to the sculpture as consisting of subopaque (worn?) annular riblets that gradually and slightly increase in strength toward the aperture. Other main difference between *C. solitarium* Oliver, 1915 and *C. solitarium* sensu Rehder is that the first has a nearly uniform diameter, while the second shows the diameter at posterior end only slightly smaller than at ante-

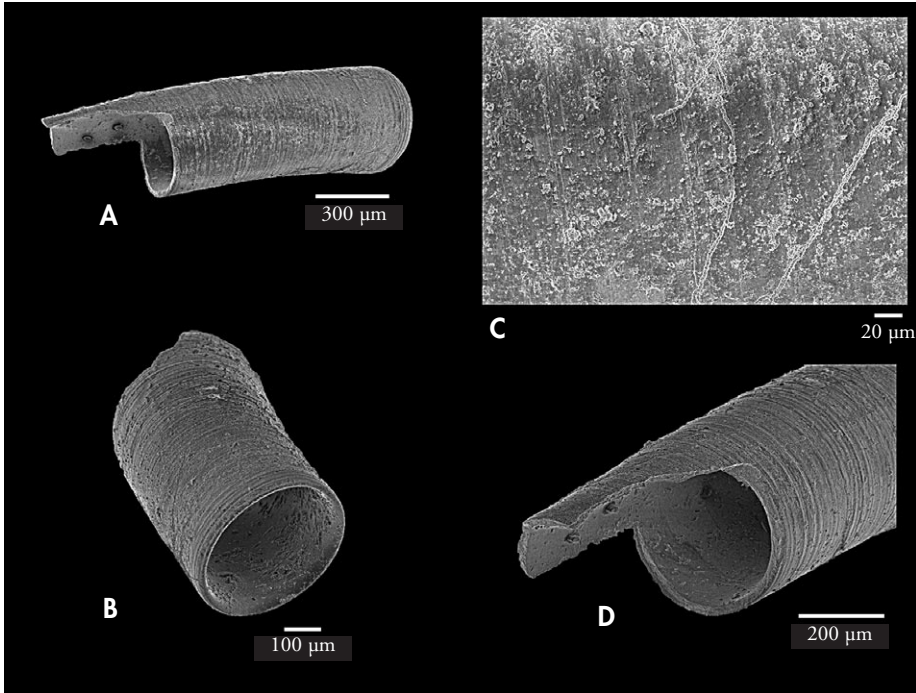


Figure 4. *Caecum solitarium* Oliver, 1915. A: Holotype CM M2867, uncoated, length 1.68 mm; B: detail of aperture; C: microsculpture; D: detail of posterior. SEM imaging by N. Andrews.  
Figura 4. *Caecum solitarium* Oliver, 1915. A: Holotipo CM M2867, no metalizado, longitud 1,68 mm; B: detalle de la abertura; C: microescultura; D: detalle trasero. Imágenes al MEB por N. Andrews.

rior end. Furthermore, it appears Rehder did not examine Oliver's type material, because if he would have done, he would have noted that the two specimens have significantly different anterior ends (Figs. 3D, 4B), and that the holotype of *C. solitarium* is badly broken and lacks the entire posterior end (Fig. 4). The damage to the holotype is old and worn, and possibly occurred in situ suggesting that Oliver may have chosen an imperfect specimen as the type and actually described another in his description. (Scofield, 2002, pers. communication). Rehder's specimen is, however, consistent with *C. rehderi*, and therefore, has been designated as the paratype. Although Rehder broke the anterior end of his specimen while measuring it, all the pieces were available for examination. The specimens which we found, actually showed a series of

small rings along the entire tube; and apart from the relativity of the term's significance, we hold that the difference between our specimens and those described by the two authors falls within the species' range of variability, in light, above all else, of the high degree of adaptation of the local molluscs to the island's distinguishing geo-climatic conditions. It is known that a number of species of Caecidae (i.e. *C. lightfootae* Pizzini, Nofroni and Oliverio, 1994), though they have the same general shape (septum, tube and aperture), could show a very wide range of variability in terms of the type of sculpture.

*Remarks:* *Caecum rehderi* seems to be an unusually fragile species. Of the five known specimens, Rehder chipped the aperture of his specimen (USNM 756269) while measuring it, the holotype has a small longitudinal crack toward

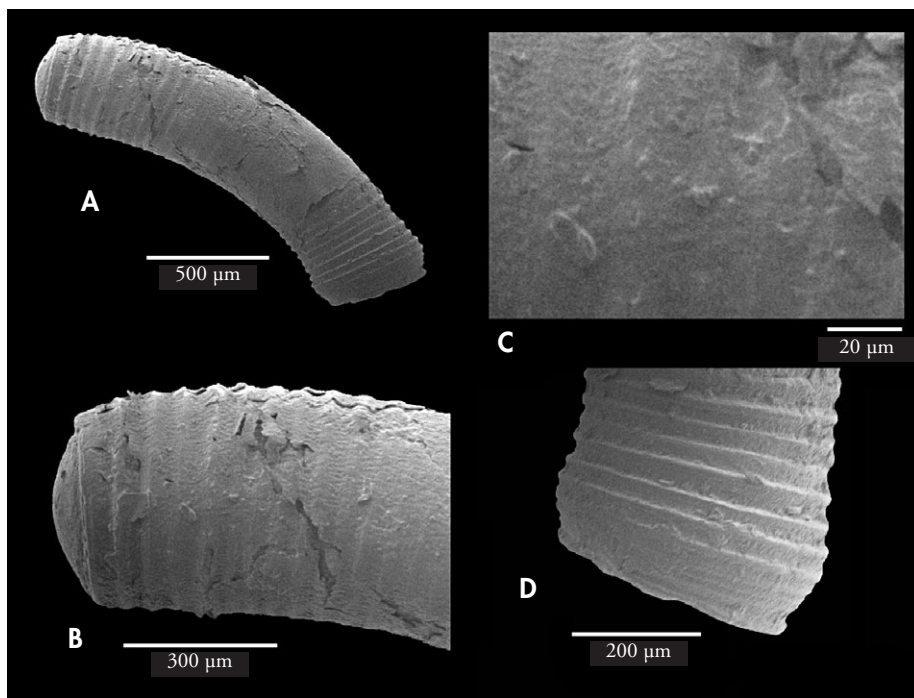


Figure 5. *Caecum amydroglyptum* Rehder, 1980. A: holotype USNM 757977, uncoated, length 1.67 mm; B: detail of septum; C: microsculpture; D: detail of aperture. SEM imaging by D. Geiger.

Figura 5. *Caecum amydroglyptum* Rehder, 1980. A: holotipo USNM 757977, no metalizado, longitud 1,67 mm; B: detalle del septo; C: microescultura; D: detalle de la abertura. Imágenes al MEB por D. Geiger.

the aperture end, the other paratype has a chip in the aperture, and the junior author completely crushed another specimen while examining it.

*Geographical distribution:* Oliver described *Caecum solitarium* only from

the Kermadec Islands, while Rehder tentatively indicated the species as being from Easter Is. In our opinion, according to the present knowledge, *C. solitarium* is restricted to the Kermadec Is.

### *Caecum amydroglyptum* Rehder, 1980 (Figs. 5, 6)

*Caecum amydroglyptum*; Rehder, 1980: 32, pl. 5, fig. 12.

**Type material:** Holotype, USNM 757977; 1 paratype, USNM 757978

**Material examined:** Original types. Holotype, USNM 757977; paratype, USNM 757978, (Oct. 1974, leg. H. Rehder). 132 specimens in sand collected along the base of cliffs at 10-20m, off Punta Rosalia, east of Anakena, 27° 04' 18" S, 109° 19' 45" W (Apr. 1998, leg. B. Raines).

**Voucher material:** 4 specimens were deposited in each of the following institutions: LACM; USNM 1018792; MNHN; NHML; NMNZ M.273207; NSMT Mo 73562; AMS C.205278; WAM S13783, and 6 specimens (3 adults/3 juveniles), MPR. 13 shells, beach of Anakena Bay, on the northern coast of Easter Is., picked up among the rocky bottom on the west side of the bay at low tide, among communities of Dictyotales, with *Galaxaura obtusata*. (12-1-1995, leg. E. Rolán), MPR.

**Type locality:** Station E-27A, Onetea, Hotuiti: in patch of sand above high tide level.

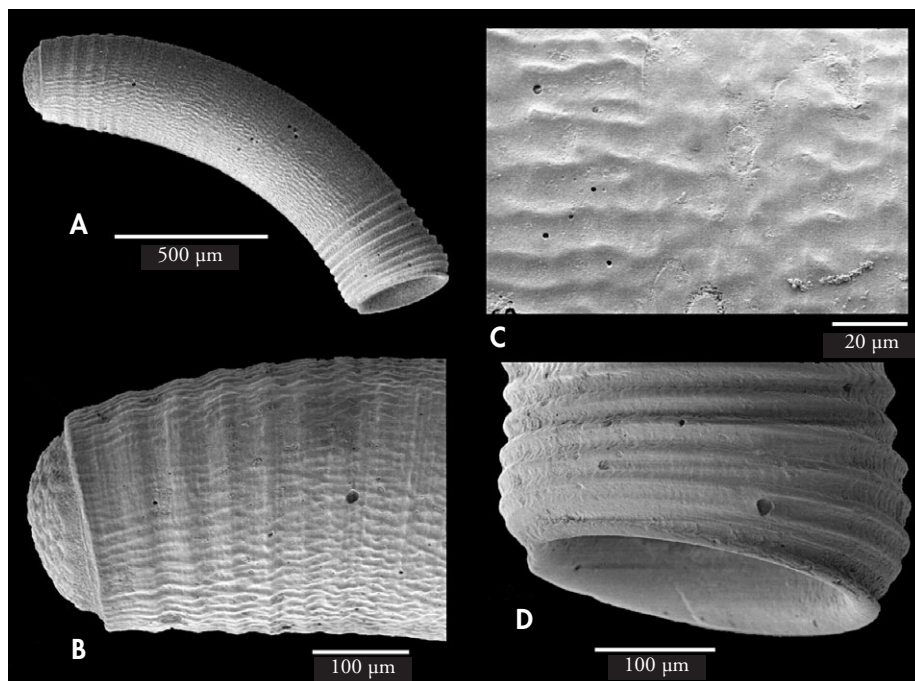


Figure 6. *Caecum amydroglyptum* Rehder, 1980. A: Voucher specimen LACM, gold coated, length 1.53 mm; B: detail of septum; C: microsculpture; D: detail of aperture. SEM imaging by D. Geiger.

Figura 6. *Caecum amydroglyptum* Rehder, 1980. A: El espécimen del vale LACM, metalizado en oro, longitud 1,53 mm; B: detalle del septo; C: microescultura; D: detalle de la abertura. Imágenes al MEB por D. Geiger.

*Original description:* "Shell small, from 1.3 to 1.7 mm in length, curved, rather evenly cylindrical with the anterior end in fully grown specimens slightly swollen above the aperture; glassy grayish white to light orange yellow in color; sculpture consists of rather strong, somewhat distantly spaced annular ribs that become more or less obscure in the middle part of the shell, with microscopic, longitudinal wavy striae that are obscure at the anterior and posterior ends; septum, low, dome-shaped."

*Additional description:* Shell small (mean length: 1.7 mm; width: min. 0.3 mm, max 0.4 mm), curved, colour grayish white. The tube is perfectly cylindrical, except near the aperture, and its sculpture consists of about 36-40 rings, with some in the middle part of

the shell being less raised and changing their shape, until they resemble very fine growth lines. Microsculpture formed by longitudinal worm-like striae visible at enlargement of at least 180x. Septum dome-shaped, slightly raised over the cutting plane. Aperture consisting of a large protuberance crossed by slightly raised rings. Operculum and soft parts unknown.

*Remarks:* We agree totally with Rehder's conclusions; because we have "...been unable to identify this species with any published taxon" from either the Indo-Pacific Provinces, the Panamic Prov. or the Chilean Prov. We have found only one species that resembles *C. amydroglyptum*, which is *C. vertebrae* Hedley, 1899, from Funafuti Is. It is quite similar to *amydroglyptum* in terms of the sculpture of the tube, longitudinal



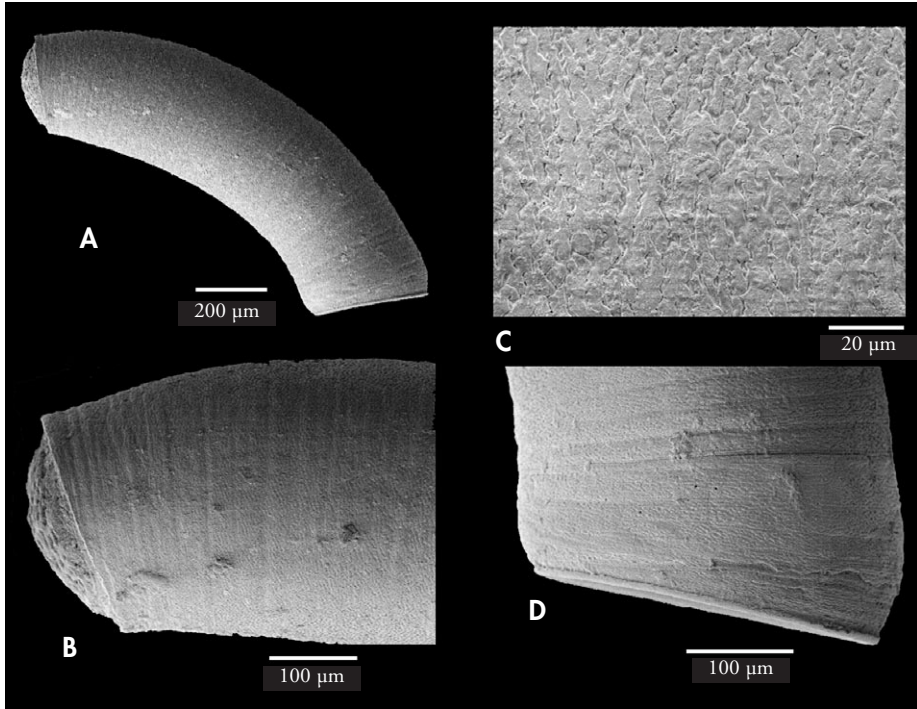


Figure 7. *Caecum heterochromum* spec. nov. A: holotype LACM 3021, gold coated, length 1.42 mm; B: detail of septum; C: microsculpture; D: detail of aperture. SEM imaging by D. Geiger.  
 Figura 7. *Caecum heterochromum* spec. nov. A: holotipo LACM 3021, metalizado en oro, longitud 1,42 mm; B: detalle del septo; C: microescultura; D: detalle de la abertura. Imágenes al MEB por D. Geiger.

microsculpture and septum, but Rehder's species shows a much greater swelling of the tube above the apertural end, which is crossed by small sculptured rings, while the adapical part of *vertebrale* has almost the same diameter of the tube. In addition, *C. amydroglyptum* presents, along the entire length of

the tube, a very strong microsculpture consisting of worm-like, longitudinal striae, covering also the top of the rings, while that of *vertebrale* is an indistinct microsculpture not surely comparable to a real striation (pers. observ.).

*Geographical distribution:* This species would appear to be limited to Easter Is.

### *Caecum heterochromum* spec. nov. (Figs. 7, 8)

**Type material:** Holotype, LACM 3021; 6 paratypes, LACM 3022; 6 Paratypes, USNM 1018789; 6 Paratypes, MNHN; 6 Paratypes, NHML; 6 Paratypes, NMNZ M.273205; 6 Paratypes, NSMT Mo 73560; 6 Paratypes, AMS C.205275; 6 Paratypes, WAM S13780; 9 Paratypes, MPR.

**Material examined:** 168 specimens: off Hanga Nui; and 8 specimens off the western coastline near Tahai (Dec. 2000, leg. B. Raines). 39 shells, beach of Anakena Bay, on the northern coast of Easter Is., picked up among the rocky bottom on the west side of the bay at low tide, among communities of Dictyotales, with *Galaxaura obtusata*. (12-1-1995, leg. E. Rolán) MPR.

**Voucher material:** 39 shells, beach of Anakena Bay, on the northern coast of Easter Is., picked up among the rocky bottom on the west side of the bay at low tide, among communities of Dictyotales, with *Galaxaura obtusata*. (12-1-1995, leg. E. Rolán) MPR.

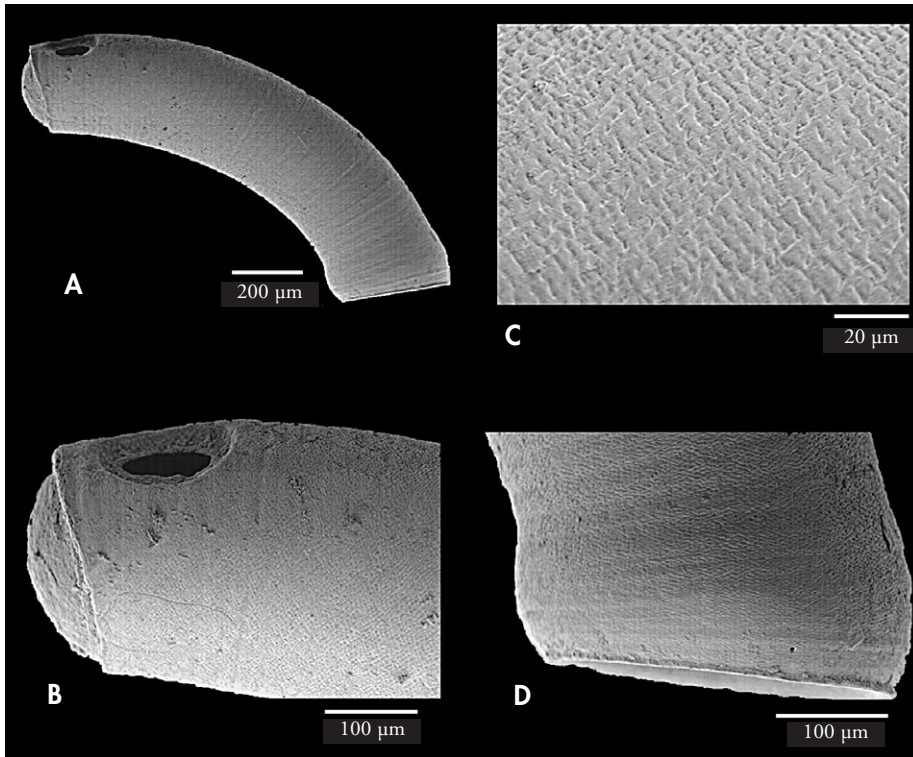


Figure 8. *Caecum heterochromum* spec. nov. A: paratype from lot LACM 3022, gold coated, length 1.53 mm; B: detail of septum; C: microsculpture; D: detail of aperture. SEM imaging by D. Geiger. *Figura 8. Caecum heterochromum spec. nov. A: paratipo de la porción LACM 3022, metalizado en oro, longitud 1,53 mm; B: detalle del septo; C: microescultura; D: detalle de la abertura. Imágenes al MEB por D. Geiger.*

**Type locality:** In sand collected along the base of cliffs at 20m off Hanga Nui, Easter Is., Chile. 27° 07' 46" S, 109° 16' 35" W.

**Derivation of the name:** From the greek ετερος: other and χρωμα: colour.

**Description:** Shell small (mean length: 1.6 mm; mean width: 0.4 mm) with the tube subcylindrical in shape in the abapical part and cylindrical up to the vicinity of the aperture (Fig. 8), where there is a slight swelling, followed by a narrowing of the tube; the aperture is perfectly circular, simple and rimmed by a very slight flaring towards the outside. The septum is dome-shaped and slightly raised over the cutting plane. Its sculpture is extremely variable, ranging from specimens with approximately 50 small raised rings that are separated by interstices of corre-

sponding breadth and depth, particularly in the upper portion of the tube and near the aperture, to others that lack any type of sculpture; these two extreme represent the limits of the species' range of variability, given that they were found in intermediate specimens whose rings are barely visible. The microsculpture also presents a wide range of variability, with some specimens not showing any trace of microsculpture, while the surface of other specimens, at an enlargement of 30x, presents a microsculpture consisting of a large number of very fine, worm-like striae

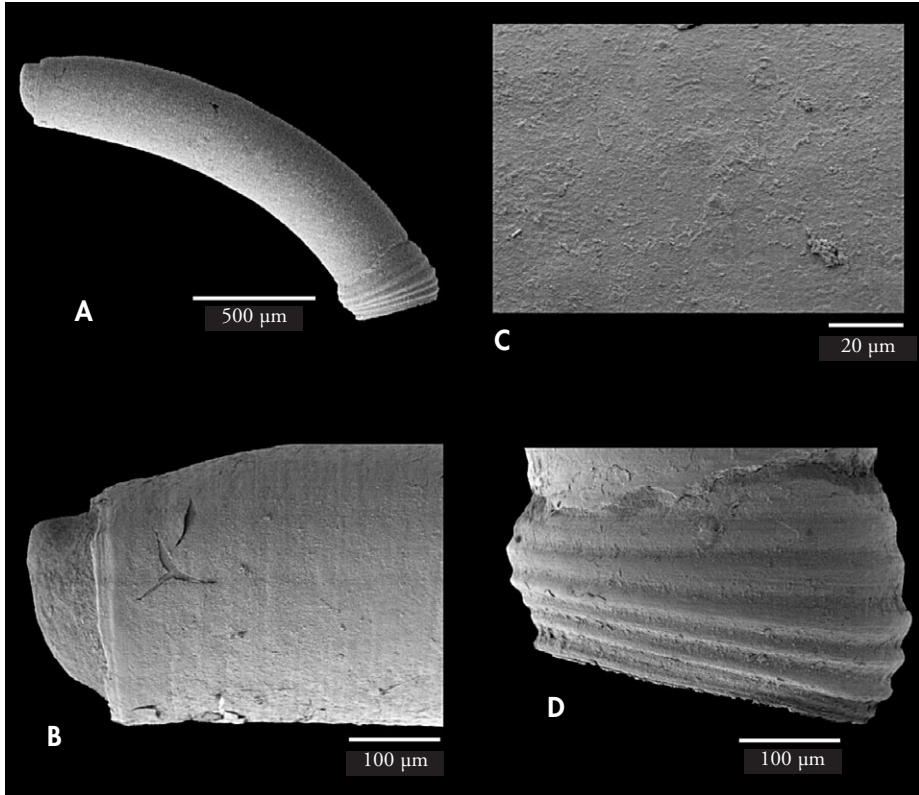


Figure 9. *Caecum pascuanum* spec. nov. A: holotype LACM 3023, gold coated, length 1.64 mm; B: detail of septum; C: microsculpture; D: detail of aperture. SEM imaging by D. Geiger.

*Figura 9. Caecum pascuanum spec. nov. A: holotipo LACM 3023, metalizado en oro, longitud 1,64 mm; B: detalle del septo; C: microescultura; D: detalle de la abertura. Imágenes al MEB por D. Geiger.*

that follow its axial direction, while others have a rough surface. *C. heterochromum* has an extremely variable colouring and pattern; white, cream-coloured shell with a pattern consisting of brown, zigzagging lines running almost parallel in a horizontal direction (axial). There are also some specimens showing a brown irregular stripe in the middle portion of the shell. The colouring is again a creamy white, with an irregular vertical design consisting of unequal spots. Operculum corneous, light brown; its external side consists of a smooth central nucleus and 5-6 concentric rings that run from this nucleus up to the external border. Soft parts unknown.

*Remarks:* *Caecum heterochromum*, despite the limited nature of the name, it is, in absolute terms, the most variable of the species to be found on Easter Is. In fact, its range of variability involves not only its colouring and patterns, but also major morphological characteristics, such as microsculpture and sculpture. Nevertheless, the silhouette, the form of the septum and that of the tube, as well as the apertural end, which, when taken as a whole, constitute the general form, are a constant that we consider to be a distinguishing characteristics of this species.

*Geographical distribution:* The species is currently noted only in relation to Easter Is.

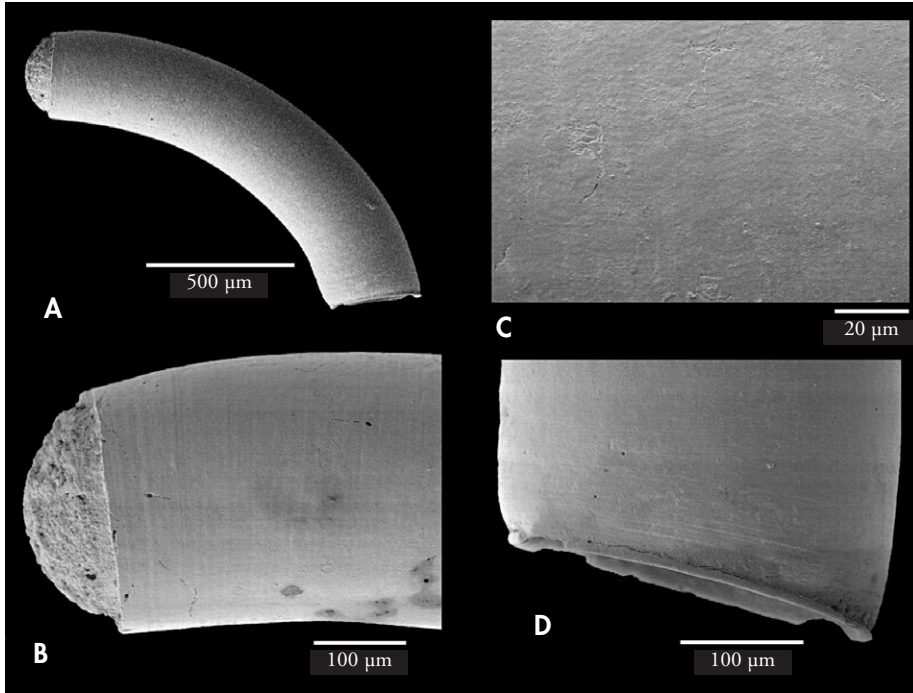


Figure 10. *Caecum rapanuiense* spec. nov. A: holotype LACM 3025, gold coated, length 1.58 mm; B: detail of septum; C: microsculpture; D: detail of aperture. SEM imaging by D. Geiger.

Figura 10. *Caecum rapanuiense* spec. nov. A: holotipo LACM 3025, metalizado en oro, longitud 1,58 mm; B: detalle del septo; C: microescultura; D: detalle de la abertura. Imágenes al MEB por D. Geiger.

### *Caecum pascuanum* spec. nov. (Fig. 9)

**Type material:** Holotype, LACM 3023; 2 paratypes, LACM 3024; 1 paratype, USNM 1018790; 1 paratype, MNHN; 1 paratype, NHML; 1 paratype, AMS C.205276; 1 paratype, WAM S13781; 1 paratype, MPR.

**Material examined:** 9 specimens, Hanga-Teo on the northern coastline (Dec. 2000, *leg.* B. Raines).

**Type locality:** In silty mud collected at 15m in cave off Hanga-Teo on the northern coast, Easter Is., Chile, 27° 03' 37" S, 109° 21' 58" W.

**Derivation of the name:** The name of this new species comes from a latinized adjective formed from the Spanish name of the island, "Isla de Pascua".

**Description:** Shell small (holotype measures, length: 1.96 mm; width: 0.36 mm), gently curved. The tube, evenly cylindrical for almost its entire length, presents a slightly smaller diameter only in the abapical part. Towards the adapical part, the tube widens visibly in a large varix crossed by 5-6 rings that are sizable but raised to various degrees, being separated by interspaces that also vary in terms of their depth and width. The

septum protrudes to a significant extent over the cutting plane with an unguiform micro, visible to a greater or lesser extent and oriented towards the dorsal side of the tube. Frequently visible on the cutting plane are residues of what may be a temporary septum (PIZZINI, NOFRONI AND OLIVERIO, 1998). Even under intensive enlargement, no microsculptures are visible. Circular aperture. Operculum and soft parts unknown.

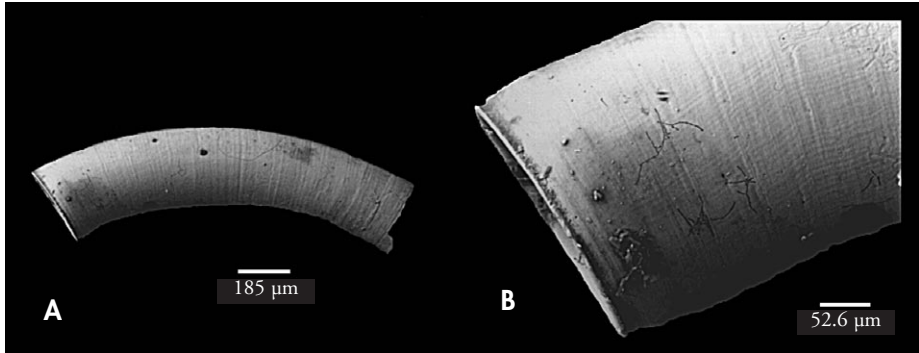


Figure 11. *Caecum crystallinum* Folin, 1879. A: holotype NHML 1887.2.9.2363; B: detail of aperture. SEM imaging by K. Way.

Figura 11. *Caecum crystallinum* Folin, 1879. A: holotipo NHML 1887.2.9.2363; B: detalle de la abertura. Imágenes al MEB por K. Way.

**Remarks:** *Caecum pascuanum* presents numerous morphological analogies with *C. rehderi*, including the shape of the tube and the septum, though it is set apart by a large varix crossed by rings, which is completely absent in the other. In fact, this varix, though it can be accentuated to a greater or lesser extent

- for that matter, consistently within the range of variability - is always present and would appear to represent the distinguishing morphological characteristics of this species.

**Geographical distribution:** The species is currently known only in its typical location.

### *Caecum rapanuiense* spec. nov. (Fig. 10)

**Type material:** Holotype, LACM 3025; 2 paratypes, LACM 3026; 1 paratype, USNM 1018791; 1 paratype, MNHN; 1 paratype, NHML; 1 paratype, NMNZ M.273206; 1 paratype, NSMT Mo 73561; 1 paratype, AMS C.205277; 1 paratype, WAM S13782; 1 paratype, MPR.

**Material examined:** 12 specimens, off the western coastline near Tahai (Dec. 2000, leg. B. Raines).

**Type locality:** Dredged at 30m in fine sand off the western coastline near Tahai, Easter Is., Chile, 27° 07' 20" S, 109° 26' 30" W.

**Derivation of the name:** This species takes its title from the ancient name for Easter Is., which was Rapa Nui.

**Description:** Shell small (dimensions of the spm no. 3 from Easter Is., length: 1.5 mm; width: 0.35 mm), slightly curved. Tube completely smooth showing only a microsculpture consisting of very weakly defined growth lines. Septum dome-shaped, with the mucro reduced to a small pedunculum, resembling a squashed ball, found on the exterior and oriented to the right. Aperture simple, with no varix and only slight swelling; further on the swelling tends to contract, with a slightly reflected lip. Growth stage and soft parts unknown.

**Remarks:** Following an initial examination, we tentatively classified this species as *C. crystallinum* Folin, 1879, despite the absence of the mucro in the original type (Fig. 11), but it is straighter, and the texture of the shell is different, exhibiting under the microscope fine longitudinal striations (Fig. 11B), while *C. rapanuiense* shows only very fine growth lines (Fig. 10C). It also resembles *C. glabriforme* Carpenter, 1857, but this species has fairly strong microsculpture and a large well developed septum. In terms

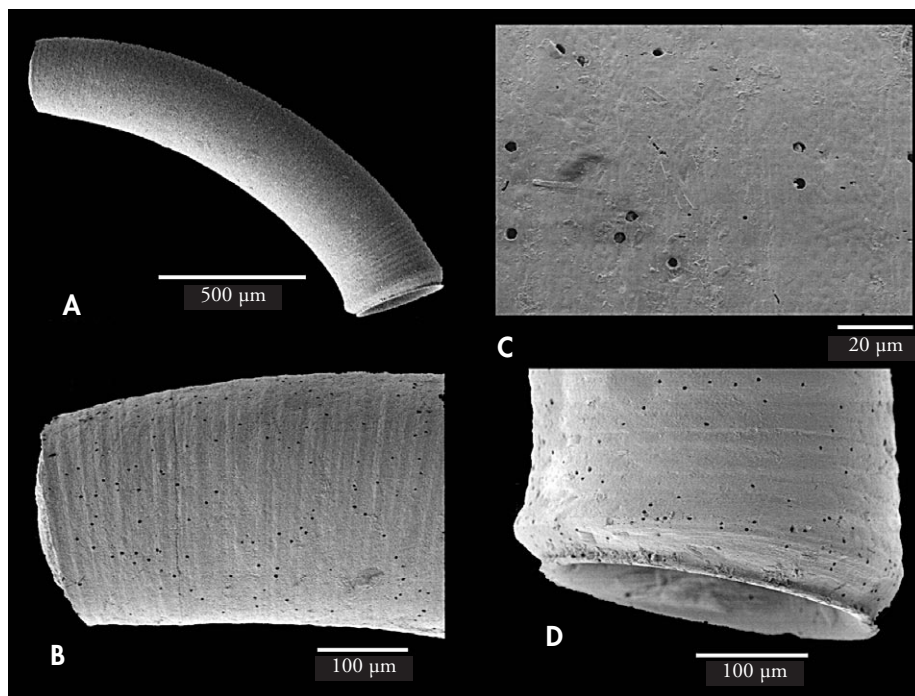


Figure 12. *Caecum campanulatum* spec. nov. A: holotype LACM 3027, gold coated, length 1.96 mm; B: detail of septum; C: microsculpture; D: detail of aperture. SEM imaging by D. Geiger.

Figura 12. *Caecum campanulatum* spec. nov. A: holotipo LACM 3027, metalizado en oro, longitud 1,96 mm; B: detalle del septo; C: microescultura; D: detalle de la abertura. Imágenes al MEB por D. Geiger.

of the general shape of the tube and septum, it resembles *C. neocaledonicum* Folin, 1868, but the latter shows some raised rings in the abapical part of the tube near the aperture (PIZZINI, 1998),

while our species is completely smooth.

*Geographical distribution:* *Caecum rapanuiense* is actually known only from Easter Is., the type locality.

### *Caecum campanulatum* spec. nov. (Fig. 12)

**Type material:** Holotype, LACM 3027; 1 paratype, LACM 3028; 1 paratype, USNM 1019067.

**Material examined:** 6 specimens, off Hanga Nui (Dec. 2000, leg. B. Raines); 2 specimens, Punta Rosalia, east of Anakena (Apr. 1998, leg. B. Raines).

**Type locality:** In sand collected along the base of cliffs at 20m, off Hanga Nui, Easter Is., Chile, 27° 07' 46" S, 109° 16' 35" W.

**Derivation of the name:** The name of the new species comes from the latinized adjective *campanulatus*, which refers to the bell-shaped form of the apertural end.

*Description:* Shell small (holotype's dimensions, length: 1.64 mm; width: 0.31 mm). Tube slightly arched, slender, with it's abapical part only slightly smaller than adapical. The tube widens

slightly near the apertural end, with a silhouette that closely resembles that of a bell, quickly narrowing itself once again and ending in a sharp edge. The microsculpture is quite obsolete and

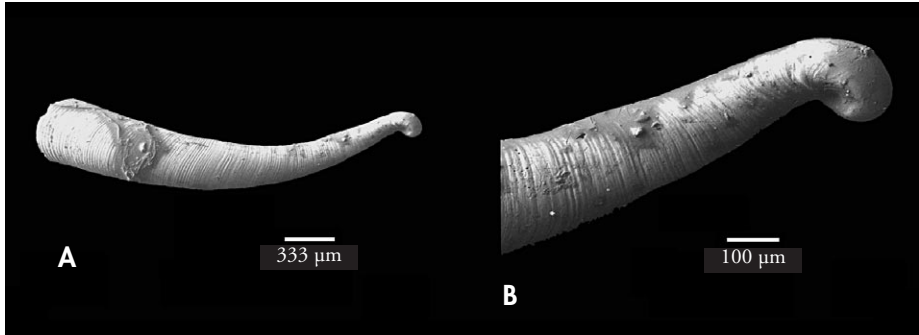


Figure 13. *Strebloceras subannulatum* Folin, 1879. A: syntype NHML 1887.2.9.2308-2310, length 3.0 mm; B: detail of septum. SEM imaging by K. Way.

Figura 13. *Strebloceras subannulatum* Folin, 1879. A: sintipo NHML 1887.2.9.2308-2310, longitud 3,0 mm; B: detalle del septo. Imágenes al MEB por K. Way.

scarcely visible, even under intensive optical enlargement, while the sculpture would appear to consist of rings, which are also barely observable, though they are more visible near the aperture. The septum is dome-shaped and scarcely raised over the cutting plane. The aperture is circular. Colour translucent, with faint axial brown wavy lines. Operculum and soft parts unknown.

*Remarks:* *Caecum campanulatum* shows some similarities with *Caecum amydroglyptum* about the general shape

of the tube and the mucro, but the latter has a longitudinal microsculpture covering all the tube, while the first one presents only a microsculpture consisting of a scarcely visible growth striation.

Besides the species closely resembles another new sp. currently being studied (PIZZINI AND NOFRONI, submitted). Endemic to the Fiji Is., it is also present in other Indian-Pacific zones.

*Geographical distribution:* *Caecum campanulatum* is currently known only on Easter Is., its typical location.

Superfamily RISSOIDEA Gray J. E., 1847

Family CAECIDAE Gray J. E., 1850

Genus *Strebloceras* Carpenter, 1859 [1858]

Diagnosis (BANDEL, 1996): "The protoconch is trochospirally coiled, and the teleoconch is uncoiled forming a slightly curving tube with slowly increasing diameter. Protoconch and teleoconch remain together during the whole life-time".

Type species (BANDEL, 1996): According to COSSMANN (1896) *Caecum edwardsii* Deshayes, 1864 [Oligocene of France]; according to GOUGEROT AND LE RENARD (1981), *Strebloceras lituus* Deshayes, 1861.

*Strebloceras subannulatum* Folin, 1879 [not *Caecum (Brochina) subannulatum* Folin, 1870 (Mediterranean Sea)] (Figs. 13, 14)

**Type material:** 2 syntypes, NHML 1887.2.9.2308-2310.

**Material examined:** Original types, 2 syntypes NHML 1887.2.9.2308-2310; 23 specimens, Punta Rosalia, east of Anakena (Apr. 1998, leg. B. Raines).

**Voucher material:** 2 specimens were deposited in each of the following institutions: LACM; USNM 1018793; MNHN; NHML; NMNZ M.273208; NSMT Mo 73563; AMS C.205279; WAM

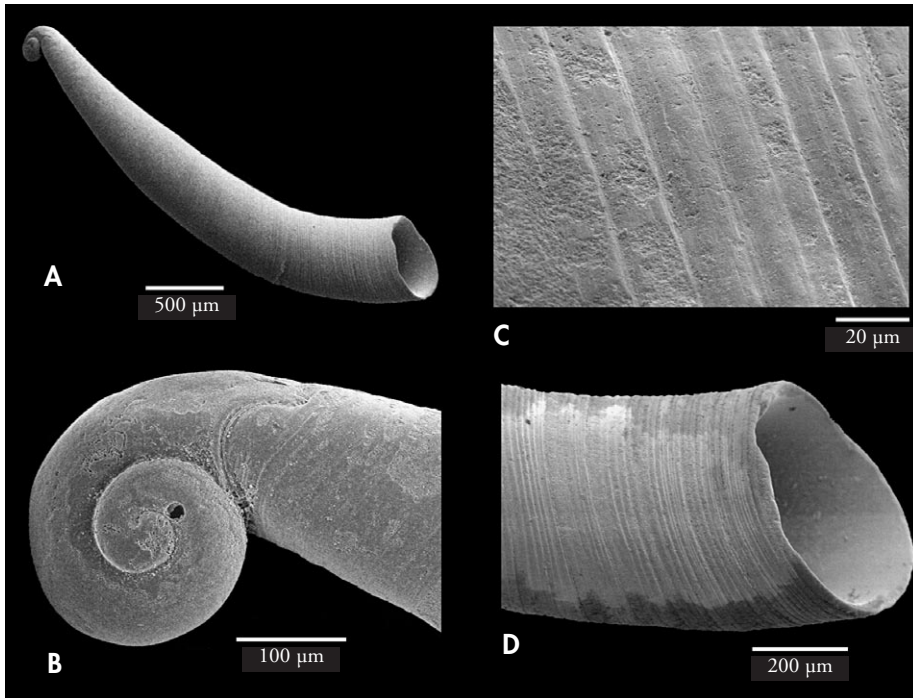


Figure 14. *Strebloceras subannulatum* Folin, 1879. A: Voucher specimen LACM, gold coated, length 3.3 mm; B: detail of septum; C: microsculpture; D: detail of aperture. SEM imaging by D. Geiger. *Figura 14. Strebloceras subannulatum* Folin, 1879. A: voucher espécimen LACM, metalizado en oro, longitud 3,3 mm; B: detalle del septo; C: microscultura; D: detalle de la abertura. Imágenes al MEB por D. Geiger.

S13784; and MPR. 4 shells, beach of Anakena Bay, N. of Easter Is.: almost exposed coast, picked up among rocky bottom on the west side of the bay, among communities of Dictyotales, with *Galaxaura obtusata*. (12-1-1995, leg. E. Rolán) MPR.

**Type locality:** Reefs of Honolulu, 40 fms (73m).

*Original description:* "Minute, double-curved head, vitreous, diaphanous and clear; oblique nucleus of spirals; anfractibus duobus: postea testa tubularia, latitudine acrescens, curvam duplicem sequens, transversim subannulata, annulis latis, minutissime expressis, subcutis, late separatis: oblique aperture. Long.: 3 mm; lat.: 0 mm 5" (FOLIN, 1879).

*Additional description:* Shell small (average length: 3.5 mm; min. diam. 0.18 mm, max diam. 0.7 mm), whitish; larval shell (diam. of the last whorl about 0.23 mm) is slightly trochospiral, consisting of roughly 2 and a half whorls. The tube is separated from the protoconch by an incision which, when seen in side-view,

is horseshoe shaped (Fig. 14B); the tube has a double curve that forms itself on two different levels and is crossed by a microsculpture whose abapical portion consists of fine, sinuous growth striations that gradually transform themselves, as they grow, into fairly clear-cut, visible rings on the adapical portion of the tube. The aperture is perfectly circular, with an almost sharp, oblique edge. The operculum and the soft parts are unknown.

*Geographical distribution:* Described from Honolulu, its distribution has now extended to the Easter Is. as well.

*Remarks:* The specimens found on Easter Is. are wholly identical to the specimens of



the typical series (Figs. 13, 14) and to the specimens from Hawaii (MPR), despite the fact that the tube of the former is slightly

wider than that of the latter; the length is also greater, but this is due to the fact that the specimens in question are adult.

## CONCLUSIONS

As a result of the present comprehensive review and revision of Easter Is. Caecidae, we discovered an unusual anomaly regarding the family's endemicity rate. Unlike other regions, where the rate is fairly low among this family, over 71% of the known caecid species are endemic to the island. This is the highest rate ever observed within any region.

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