

## Four new species of *Condylocardiidae* from Cape Verde Islands

by Carmen SALAS and Emilio ROLÁN

**Abstract.** — Four new species of the family *Condylocardiidae* (*Bivalvia*) from Cape Verde Islands are described: *Condylocardia bravensis* n. sp., *Condylocardia tridacniformis* n. sp., *Condylocardia carditoides* n. sp. and *Condylocardia verdensis* n. sp. The four species are endemic to the archipelago and have been found in sand bottom with shell debris, from 1 to about 20 m depth. Incubating larvae have been observed in *C. bravensis*.

**Résumé.** — Quatre espèces nouvelles de la famille *Condylocardiidae* (*Bivalvia*) sont décrites des îles du Cap Vert: *Condylocardia bravensis* n. sp., *Condylocardia tridacniformis* n. sp., *Condylocardia carditoides* n. sp. et *Condylocardia verdensis* n. sp. Ces quatre espèces sont endémiques de l'archipel et ont été trouvées dans du sable coquillier, entre 1 et 20 m de profondeur. L'incubation des larves a été observée chez *C. bravensis*.

C. SALAS, Dept. Biología Animal, Facultad de Ciencias, Universidad de Málaga, E-29071 Málaga, Spain.  
E. ROLÁN, Cánovas del Castillo, 22-5<sup>o</sup>F, E-36202 Vigo (Pontevedra), Spain.

The family *Condylocardiidae* was defined by BERNARD (1897) to include very small to minute bivalves, believed to represent neotenic stages. Their protoconchs are rather large in relation to shell size, and the larvae are incubated in all species where development is known.

This family is mostly distributed in the Indopacific and Australian areas with many genera and species. There are also a few species in America (Panamic and Caribbean region). In the tropical West African area only two species of *Condylocardiidae* are referred to in the literature: *Carditopsis dartevellei* Nicklès, 1952 and *Cuna gambiensis* Nicklès, 1955; the former as a subfossil from the Marine Quaternary of Port-Gentil, Gabon. In the Cape Verde Islands, *Condylocardiidae* had not been found by the numerous expeditions carried out there (ROCHEBRUNE, 1881; COSEL, 1982a, 1982b).

Recently, four species of *Condylocardiidae*, all belonging to *Condylocardia*, have been found by the second author on the archipelago. They could not be identified with existing species and are described here as new.

### Abbreviations used in the text

BMNH : British Museum (Natural History), London, (now : Natural History Museum).  
MNHN : Muséum national d'Histoire naturelle, Paris.  
MNCN : Museo Nacional de Ciencias Naturales, Madrid.  
ICT : Instituto de Investigação Científica Tropical (Centro de Zoologia), Libon.

**Condylocardia bravensis** n. sp.

TYPE MATERIAL : Holotype MNHN (2.0 mm length × 1.8 mm high), living specimen. Paratypes : 4 shells in MNHN; 2 shells in MNCN; 2 shells in ICT and 2 shells in BMNH. All type material is from Brava (no precise locality).

TYPE LOCALITY : Brava, Cape Verde Islands.

DESCRIPTION

Shell from 1.8-2 mm long, oval-subtrigonal, slightly longer than high, rather inflated, thick and solid. Beaks opisthogyrate, posterior to the vertical midline. Surface with 8-10 broad, low, rounded radial ribs, the central ones (1 to 3) usually not reaching the protoconch rim. There are also very fine, close-set, regular concentric striae over the whole surface of the teleoconch. Lunule and escutcheon large and well defined. Protoconch prominent, saucer-shaped, with fine, irregular radial striae and marked rim. Periostracum very thin, dull, pale yellowish to nearly colourless, persistent mostly between the concentric striae. Inner margin weakly denticulate according to the exterior sculpture. Ligament entirely internal, in rounded and about central resilium.

Hinge broad, with spondyliiform hinge margin. Right valve with three cardinals; the two anteriors are divergent, joined proximally and reaching distally the lower margin of the cardinal area; the posterior cardinal is short and trigonal, not reaching the lower margin; one anterior and one posterior lateral, the anterior stronger. Left valve with three cardinals, the anterior prominent, oblique, not reaching the upper margin of the cardinal area and distally pointing to the lateral; second cardinal short and trigonal, not reaching the lower margin of the hinge; posterior cardinal elongate, pointing vertically; one anterior and one stronger posterior lateral.

Two suboval adductor muscle scars, about equal in size, beneath the distal part of lateral teeth. Pallial line entire.

Outside dull whitish to cream, inside white.

DISTRIBUTION : Known from Brava, São Tiago and Sal.

MATERIAL EXAMINED : **Brava** : The type material; 6 other lots (3 from Furna, 8 m, 3 without precision) with 61 specimens and shells and 22 valves. **Ilha do Sal** : 2 lots (1 from Mordeira and 1 without precision) with 9 shells and 2 valves. **São Tiago** : 2 lots (1 from Praia Baixa and 1 without precision) with 36 shells and 7 valves.

BIOTOPE : In sand with shell debris, in shallow water (5-8 m), not common.

DERIVATIO NOMINIS : The species is named after the island of Brava.

REMARKS

Five larvae in protoconch stage were found inside one specimen confirming that this species is incubatory. In *C. digueti* Lamy, 1916 from Baja California (specimens examined in

MNHN), which shows a superficial resemblance, all ribs (about 10) develop from the rim of the protoconch.

**Condylocardia tridacniformis** n. sp.

TYPE MATERIAL : Holotype MNHN (1.7 mm length × 1.3 mm high), living specimen. Paratypes : 2 shells in MNHN from Boavista (Sal Rei, 6m); 2 shells in MNCN from Sal.

TYPE LOCALITY : Sal Rei, Boavista, Cape Verde Islands; in sand from 6 m depth.

DESCRIPTION

Shell very small, from 2.0-2.9 mm long, longer than high, thick and solid, very inflated, resembling a minute *Tridacna*. Outline oval-subtrigonal (young specimens) to somewhat rostrate posteriorly (adult specimens), the right valve always more rostrate. Beaks slightly opisthogyrate, about in the middle in juvenile specimens, in adults in front of the vertical midline. Surface with 9 widely spaced, strong and very prominent radial ribs which are crossed by concentric striae, forming small knobs and incisions on the radial ribs, especially on the marginal part of the valves. Lunule and escutcheon large, broad and deep, but with ill-defined edges. Protoconch small but prominent, with well-defined rim. Periostracum very thin, pale yellowish to colourless, persistent only near the margins. Inner margin strongly denticulate according to the external ribs. Ligament entirely internal, resilium somewhat rounded.

Hinge broad, with spondyliiform hinge margin. Right valve with three cardinals; the two anteriors are divergent, joined proximally and reaching distally the lower margin of the cardinal area; posterior cardinal short and trigonal, not reaching the lower margin; one anterior and one posterior lateral, the anterior much stronger. Left valve with three cardinals, the anterior prominent, oblique, hardly reaching proximally the upper margin of the cardinal area and distally pointing to the lateral; the second cardinal short and trigonal, not reaching the lower margin; the posterior cardinal large and prominent, pointing vertically; one anterior and one much stronger posterior lateral.

Two subtrapezoidal adductor muscle scars, about equal in size, beneath the distal part of the lateral teeth. Pallial line entire.

Outside cream, pale brownish on the posterior third of the valve. Inside white, with external colouration showing through.

DISTRIBUTION : Known from São Tiago, Boavista, Sal and São Vicente.

MATERIAL EXAMINED : **Boavista** : the type material and 11 other lots (3 from Baía Teodora, 5-6 m; 4 from Derrubado, 2-3 m; 3 from Sal Rei, 6 m and 1 without precision) with 25 specimens and shells and 54 valves. **Ilha do Sal** : 2 paratypes; 4 other lots (2 from Mordeira, 3-5 m; 1 from R. Junco, 1 m and 1 without precision) with 21 specimens and shells and 18 valves. **São Tiago** : 4 lots (2 from Tarrafal, 2-3 m; 1 from Praia Baixa 3 m and 2 without precision) with 21 specimens and shells and 38 valves. **São Vicente** : 1 lot (Porto Mindelo 20 m) with 1 shell and 1 valve.

BIOTOPE : In sand with shell debris, from 1 to about 20 m, not uncommon.

DERIVATIO NOMINIS : The species name reflects the similarity in outline to a minute *Tridacna*.

#### REMARKS

This species is in outline, size and rib number close to *C. hippopus* (Mörch, 1861) from the Pacific coast of Costa Rica and Panama, however, in *C. tridacniformis*, the radial ribs bear small knobs and incisions, whereas in *C. hippopus* they are less sculptured (according to the illustrations in KEEN, 1971), the antero-dorsal corner of *C. hippopus* is more attenuated than that of *C. tridacniformis*.

#### **Condylocardia carditoides** n. sp.

TYPE MATERIAL : Holotype MNHN (1.4 mm length × 1.2 mm high), living specimen. Paratypes : 1 shell in MNCN from São Vicente; 2 shells in MNHN from São Tiago.

TYPE LOCALITY : Regona, Sal, Cape Verde Islands; 5 m, in sand.

#### DESCRIPTION

Shell minute, 1.0-1.8 mm long, oval-subtrigonal, longer than high, inflated, thick and solid. Beaks slightly opisthogyrate and slightly behind the vertical midline. Surface with 11 to 14 strong, rounded, radial ribs bearing more or less prominent knobs or scales. Interspaces narrow but clear, with very fine, concentric lamellae. Lunule and escutcheon large and broad, delimited by the first or last radial rib. Protoconch rounded, quite large, rim present but not very prominent. Periostracum very thin, nearly colourless and persistent only in the interspaces between the radial ribs on the marginal part of the valves. Inner margin strongly denticulate according to the exterior ribs. Internal ligament small, resilium rounded.

Hinge rather narrow, with spondyliiform hinge margin. Right valve with two cardinals; the anterior large, prominent, reaching distally the lower margin of the cardinal area and pointing to the lateral; the posterior cardinal very small, short and trigonal, not reaching the lower margin; one anterior and one posterior lateral, the anterior somewhat stronger. Left valve with two cardinals, the anterior very small, short and trigonal, not reaching the lower margin of the cardinal area; the posterior large and prominent, reaching distally the lower margin of the cardinal area and pointing to the lateral; one anterior and one somewhat stronger posterior lateral.

Two suboval adductor muscle scars of about equal size beneath the distal part of the lateral teeth. Pallial line entire.

Outside dirty whitish, with white protoconch. Inside white.

DISTRIBUTION : Found in São Vicente, São Tiago and Sal.

MATERIAL EXAMINED : **São Vicente** : 6 lots (Porto Mindelo, 8-25 m) with 2 shells (1 of paratype) and 21 valves. **Ilha do Sal** : 1 lot (Regona, 5 m) with 1 specimen (holotype) and 1 valve; 1 lot from R. Junco, with 1 valve and 1 lot without precision, with 2 valves. **São Tiago** : 1 lot without precision, with 1 shell (paratype) and 4 valves.

BIOTOPE : In mixed sand with shell debris, from 1 to 20 m, not common.

DERIVATIO NOMINIS : The name reflects the external resembling of the new species with a juvenile *Cardita* or *Carditopsis*.

#### REMARKS

*Condylocardia floridensis* (Pilsbry and Olsson, 1946) from the Caribbean is very similar, but differs in having narrower tubercles on the ribs. The single stronger cardinal tooth in *C. carditoides* is considered equivalent to the two divergent cardinals in the other species described herein. This species appears to be the most extremely neotenic of the Cape Verde Islands Condylocardiidae.

#### *Condylocardia verdensis* n. sp.

TYPE MATERIAL : Holotype MNHN (1.2 mm length × 1.1 mm high), living specimen. Paratypes : 3 shells in MNHN; 1 shell in MNCN, all from Ilha do Sal.

TYPE LOCALITY : Regona, Sal, Cape Verde Islands; 5 m, in sand.

#### DESCRIPTION

Shell minute, 1.0-1.4 mm long, subtrigonal, slightly longer than high, inflated, thick and solid. Beaks slightly behind the vertical midline. Surface with 8-11 broad, rounded, rather low, radial ribs with narrow interspaces and with dense, narrow, slightly irregular, concentric lamellae which cover the whole surface of the teleoconch and which cross the radial ribs in slight constrictions. Lunule and escutcheon large, with ill-defined delimitations, formed by the first and last radial rib. Protoconch very large in relation to the adult valve, prominent and acute, with dense, weak, somewhat irregular radial ribs, some bifurcating. Rim well defined. Periostracum extremely thin and colourless. Inner margin broadly denticulate according to the external ribs. Internal ligament small, resilium rounded.

Hinge broad, with spondyliiform hinge margin. Right valve with three cardinals; the two anteriors fused proximally to form a hook and reaching distally the lower margin of the cardinal area; posterior cardinal short and trigonal, not reaching the lower margin; one anterior and one posterior lateral, the anterior stronger. Left valve with three cardinals, the anterior prominent, oblique, proximally hardly reaching the upper margin of the cardinal area and distally pointing to the lateral; second cardinal short and trigonal, not reaching the lower margin; posterior cardinal large and prominent, pointing almost vertically; one anterior and one stronger posterior lateral.

Two subtrigonal adductor muscle scars of about equal size, beneath the distal part of the lateral teeth. Pallial line entire.

Outside white, white with brownish umbonal region or entirely brown to reddish brown. Inside white to brownish.

DISTRIBUTION : Known from São Vicente, Sal, Sta. Luzia, São Tiago and Boavista.

MATERIAL EXAMINED : **Ilha do Sal** : The holotype, 4 other shells and 4 other valves from the same lot; 4 lots (2 from Mordeira, 1 from R. Junco and 1 without precision) with 6 shells (2 for paratypes) and 3 valves. **Boavista** : 6 lots (3 from Derrubado, 2-3 m; 1 from Sal Rei; 1 from Palmeira and 1 without

precision) with 6 shells and 9 valves. **São Tiago** : 2 lots with 4 shells and 1 valve. **Santa Luzia** : 1 lot (Praia Francisa, 1 m) with 1 shell and 1 valve. **São Vicente** : 2 lots (Porto Mindelo) with 7 shells and 7 valves.

**BIOTOPE** : In sand, in 1-20 m, not common.

**DERIVATIO NOMINIS** : The name refers to the Cape Verde Islands, where this species is endemic.

#### REMARKS

This species is close to *C. bravensis*, however, it is smaller, shorter, and all ribs develop from the rim of the protoconch. *C. digueti* Lamy, 1916 (Baja California) is larger, with a colourless shell and a less prominent protoconch. *Carditella smithi* Dall, 1896, from Bermuda, — most probably also a *Condylocardia* — has more ribs (10-13) and a less pronounced protoconch rim (cf. figure in WALLER, 1973 : fig. 18).

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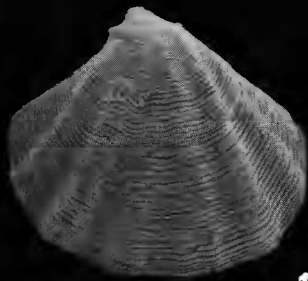
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FIG. 1-8. — *Condylocardia bravenis* n. sp. (all MNHN)

- 1 — Paratype, exterior of right valve, Island of Brava (actual length 1.7 mm).
  - 2 — Holotype, exterior of left valve (actual length 2.0 mm).
  - 3 — Paratype, interior of right valve (actual length 1.8 mm).
  - 4 — Paratype, interior of left valve (actual length 2.0 mm).
  - 5 — Protoconch.
  - 6 — Incubating larval shell, Baia de Furna, Brava (actual length 0.33 mm).
  - 7 — Cardinal area of right valve fig. 3.
  - 8 — Cardinal area of left valve fig. 4.
- (All scale bars are 100 $\mu$ m.)

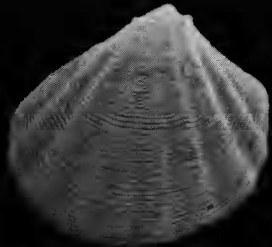




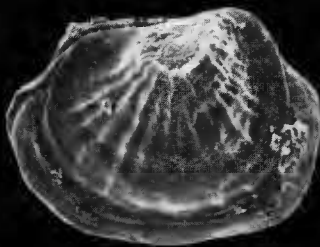
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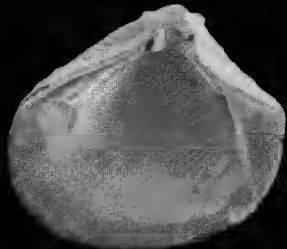
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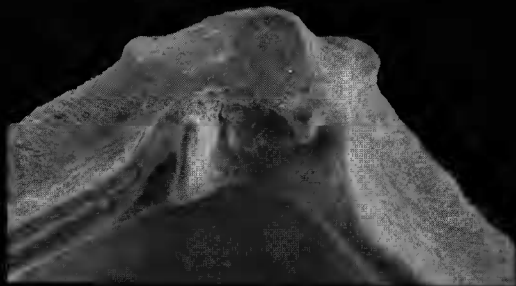
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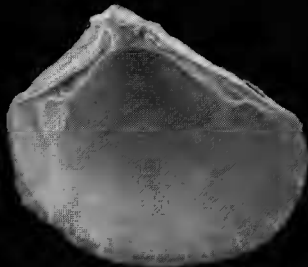
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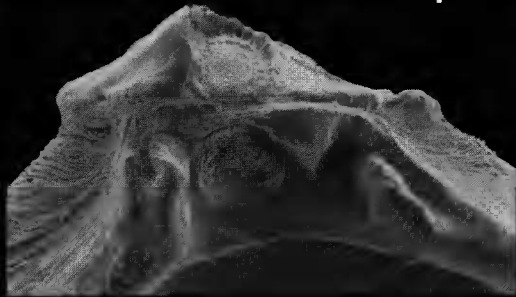
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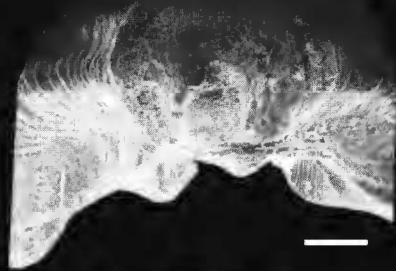
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FIG. 9-16. — *Condylocardia tridacniformis* n. sp. (all MNHN)

- 9 — Holotype, exterior of right valve. Sal Rei, Boavista (actual length 1.7 mm).
  - 10 — Holotype, exterior of left valve.
  - 11 — Paratype, interior of right valve (actual length 1.4 mm).
  - 12 — Paratype, interior of left valve (actual length 1.5 mm).
  - 13 — Protoconch.
  - 14 — Cardinal area of a left valve.
  - 15 — Cardinal area of right valve fig. 11.
  - 16 — Cardinal area of left valve fig. 12.
- (All scale bars are 100  $\mu$ m.)



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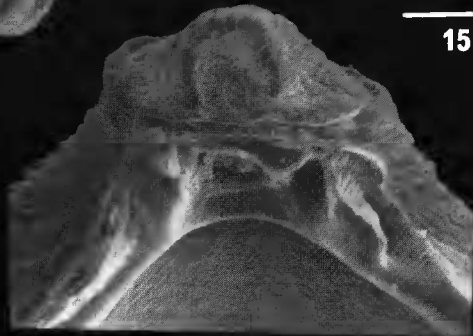
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FIG. 17-24. — *Condylocardia carditoides* n. sp. (all MNHN)

- 17 — Holotype, exterior of left valve. Regona, Sal (actual length 1.7 mm).
  - 18 — Paratype, exterior of left valve. São Tiago (actual length 1.4 mm).
  - 19 — Paratype, interior of right valve. São Tiago (actual length 1.4 mm).
  - 20 — Paratype, interior of left valve. São Tiago (actual length 1.5 mm).
  - 21 — Protoconch of specimen fig. 18.
  - 22 — Hinge of right valve fig. 19.
  - 23 — Hinge of left valve fig. 20.
  - 24 — Cardinal area of right valve fig. 19.
- (All scale bars are 100  $\mu$ m.)



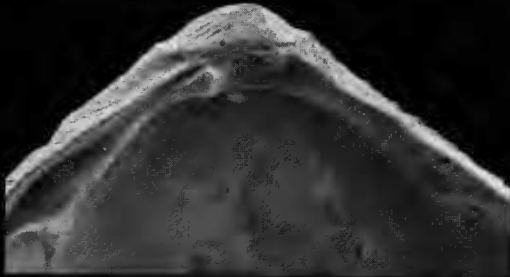
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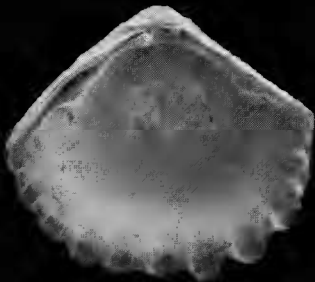
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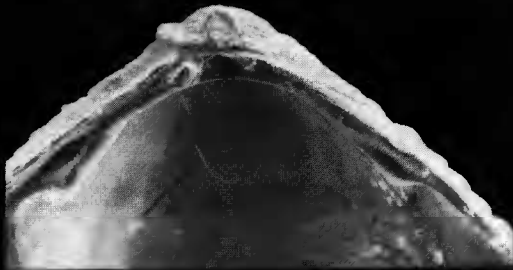
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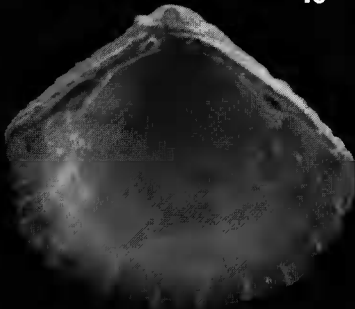
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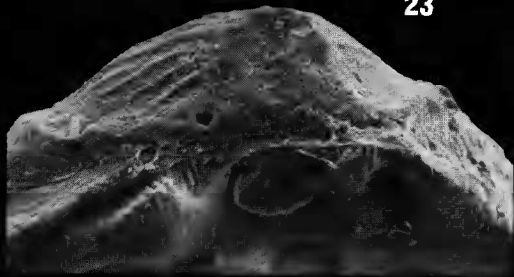
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FIG. 25-32. — *Condylocardia verdensis* n. sp. (all MNHN)

- 25 — Holotype, exterior of left valve. Regona, Sal (actual length 1.2 mm).
- 26 — Paratype, exterior of left valve. Sal (actual length 1.2 mm).
- 27 — Paratype, interior of right valve (actual length 1.3 mm).
- 28 — Paratype, interior of left valve (actual length 1.3 mm).
- 29 — Protoconch of a left valve.
- 30 — Cardinal area of a right valve.
- 31 — Cardinal area of a left valve.
- 32 — Cardinal area of left valve fig. 28.  
(All scale bars are 100  $\mu$ m.)



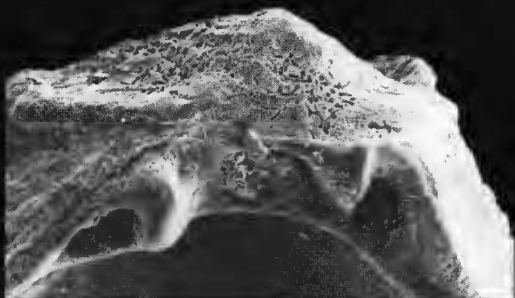
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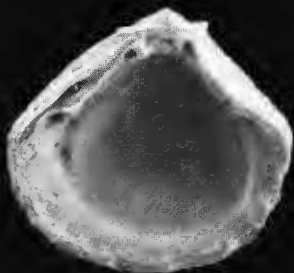
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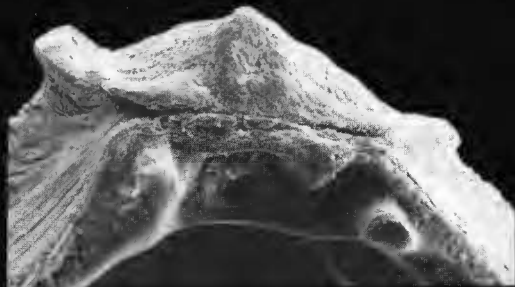
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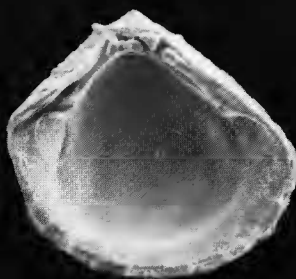
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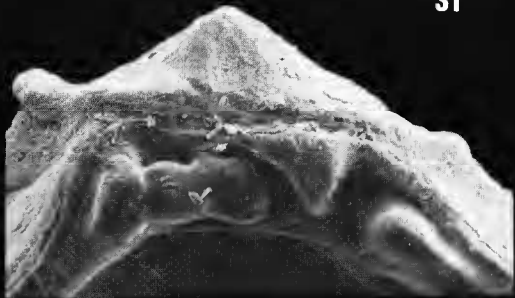
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