

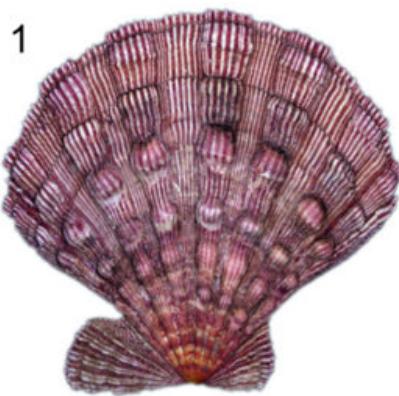


Bivalvia and Gastropoda of the Gulf of Mexico



Dr. Fabio Moretzsohn
Department of Life Sciences
Texas A&M University-Corpus Christi
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Molluscan Classes



1. Class Bivalvia
2. Class Gastropoda
3. Class Cephalopoda
4. Class Aplacophora*
 - Caudofoveata
 - Solenogastres
5. Class Monoplacophora*
6. Class Polyplacophora
7. Class Scaphopoda

* deep-sea and usually small

Phylum Mollusca Characteristics

- Bilaterally symmetrical; coelomate protostomes
- Unsegmented; coelom reduced
- Viscera concentrated dorsally (visceral mass)
- Body covered by a mantle and a calcareous shell (most)
- Radula (a rasping organ used for feeding)
- Complex metanephridia (kidneys)
- Trochophore larva (veliger larva in some)
- 2nd most diverse phylum, ~100,00 spp.
- **GoMx:** 2,455 spp: 1,742 spp. gastropods, 528 spp. bivalves, plus 185 spp. in four other classes

Class Bivalvia

- Shell typically consists of two hinged valves
- Shell valves close via adductor muscles
- Rudimentary head
- No radula
- Foot laterally compressed
- 1 pair of nephridia
- 1 pair of large bipectinate ctenidia within large MC
- Posterior edges of mantle often fused to form siphons



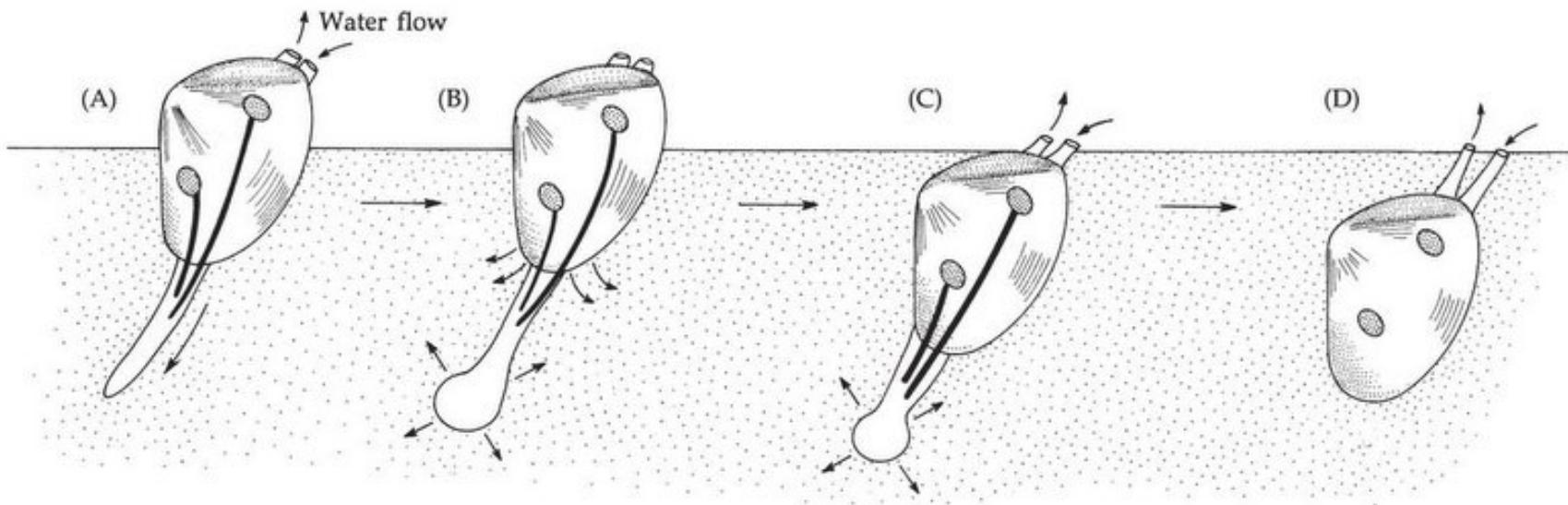
Mode of Living

- Most are **infaunal, filter-feeders**, e.g., *Mercenaria*
- **Sessile**: filter-feeder, e.g., *Crassostrea* oysters
- **Boring** (hard sediments, rocks): filter-feeders, e.g. *Lithophaga, Cucurbitula*
- **Wood boring**: feed on wood, family Teredinidae
- **Detritivore**: primitive condition; e.g., *Nucula*
- **Carnivores**: e.g., *Poromya*
- Associated with **chemosynthetic bacteria**, e.g. *Calyptogena, Kuphus*
- Association with **zooxanthellae**, e.g., *Tridacna*

Infaunal Habit



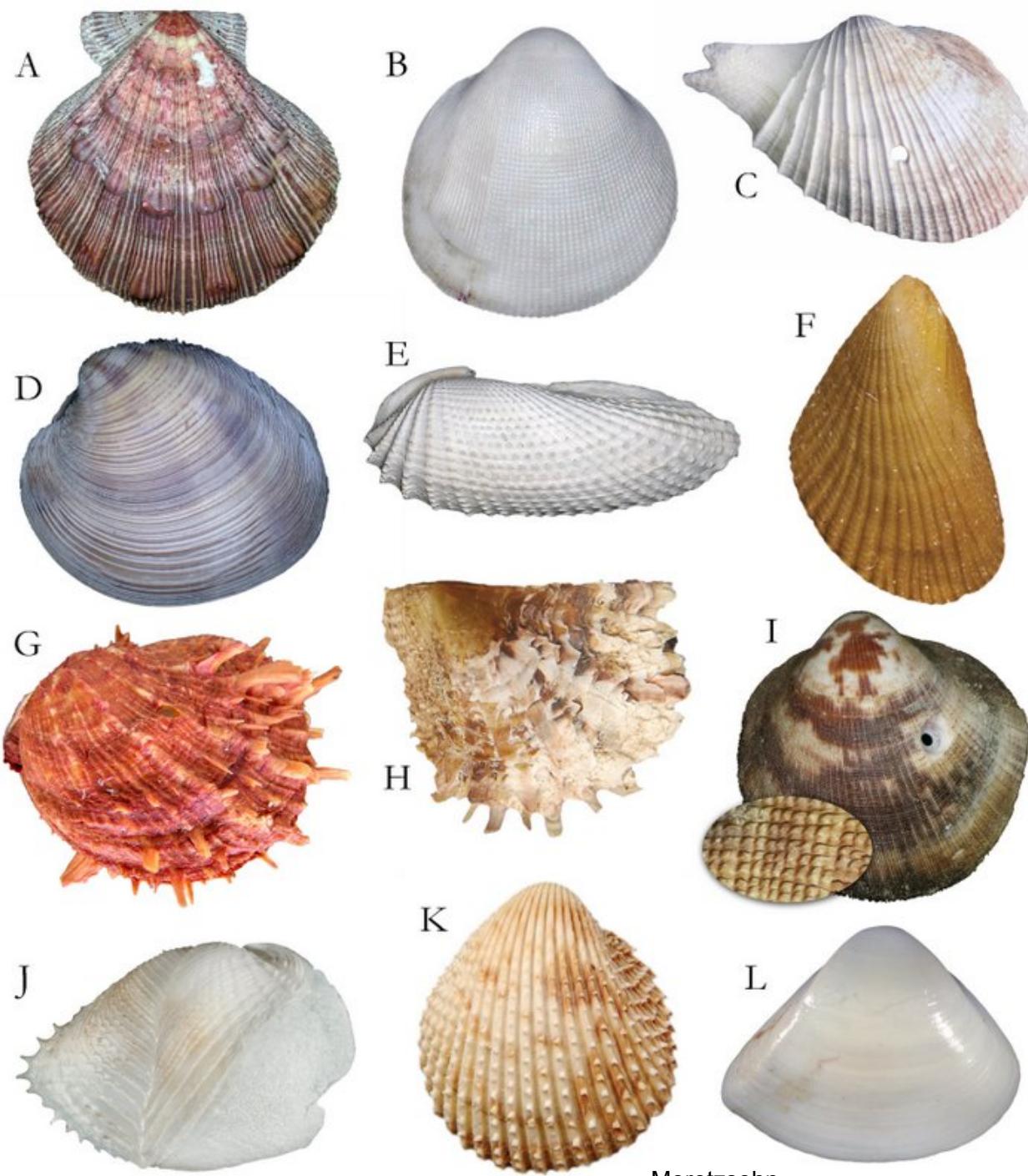
Sequence of Burrowing Events



Brusca et al. 2016

Video of *Donax* clams burrowing by Jace Tunnell
<https://youtu.be/6qtAyMeIYsQ>

Shell Sculpture

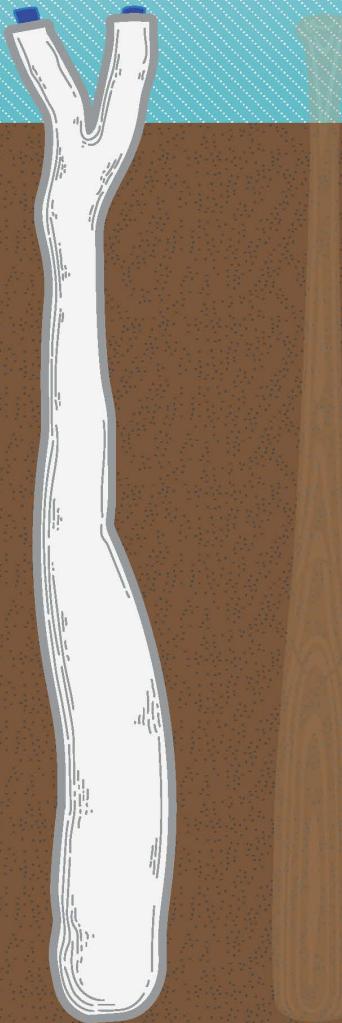


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- A. nodular radial ribs
- B. finely cancellated
- C. sharp radial ribs
- D. commarginal ridged
- E. beaded radial and
concentric ribs
- F. bifurcating radial ribs
- G. spinose
- H. platelike crenulations
- I. fine radial ribs with
furrowed periostracum
- J. irregular concentric and
horizontal threads
- K. radially ribbed
- L. smooth

Kuphus polythalamia, Giant Shipworm

The giant shipworm lives in a shell planted in the mud in shallow bays in the Phillipines.



THE AVERAGE GIANT SHIPWORM IS ABOUT THE SAME SIZE AS A BASEBALL BAT (3 FEET)

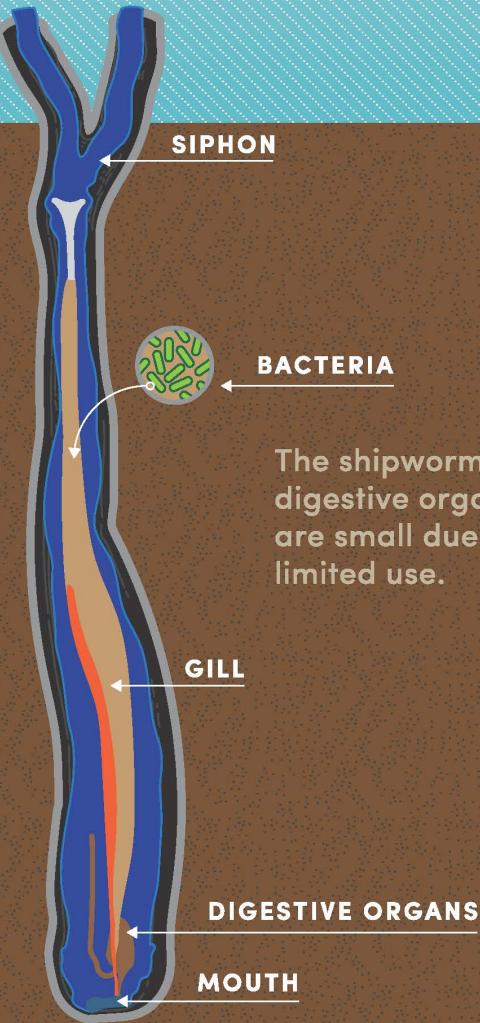


HEALTH
UNIVERSITY OF UTAH

Distel, D.L. et al. Wooden Steps to Chemoautotrophy for a Giant Bivalve.
Proc Natl Acad Sci USA, April 17, 2017

Bacteria live in the giant shipworm gills and produce food for the worm.

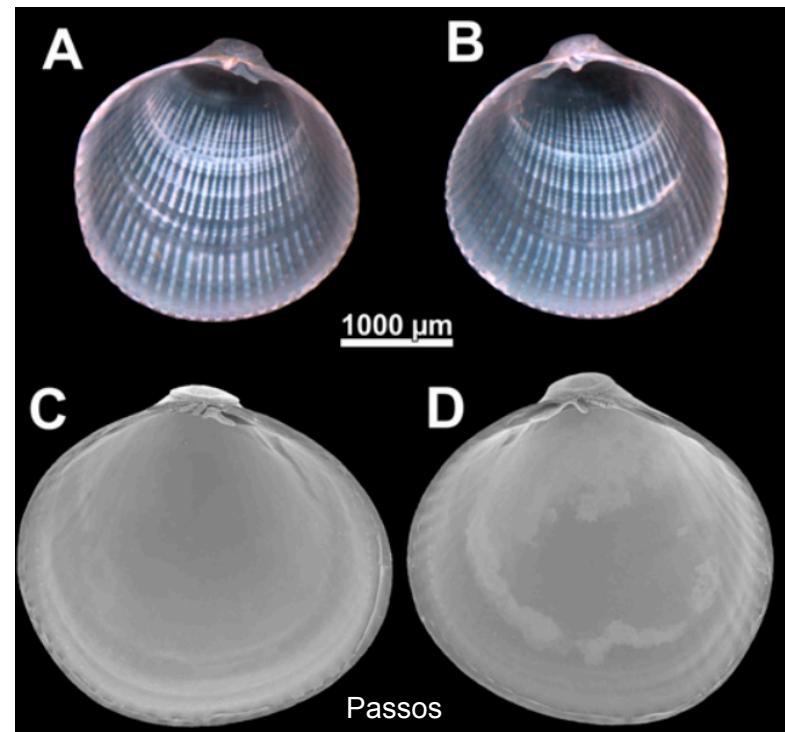
The shipworm's digestive organs are small due to limited use.



Shell size range



Inoceramus stenstrupi, 1780 mm
Family Inoceramidae,
Cretaceous, Greenland



Cyamocardium domaneschii,
3 mm
Family Cyamiidae
Brazil

Crassostrea virginica, American oyster

Family Ostreidae

Habitat-forming (oyster reefs)



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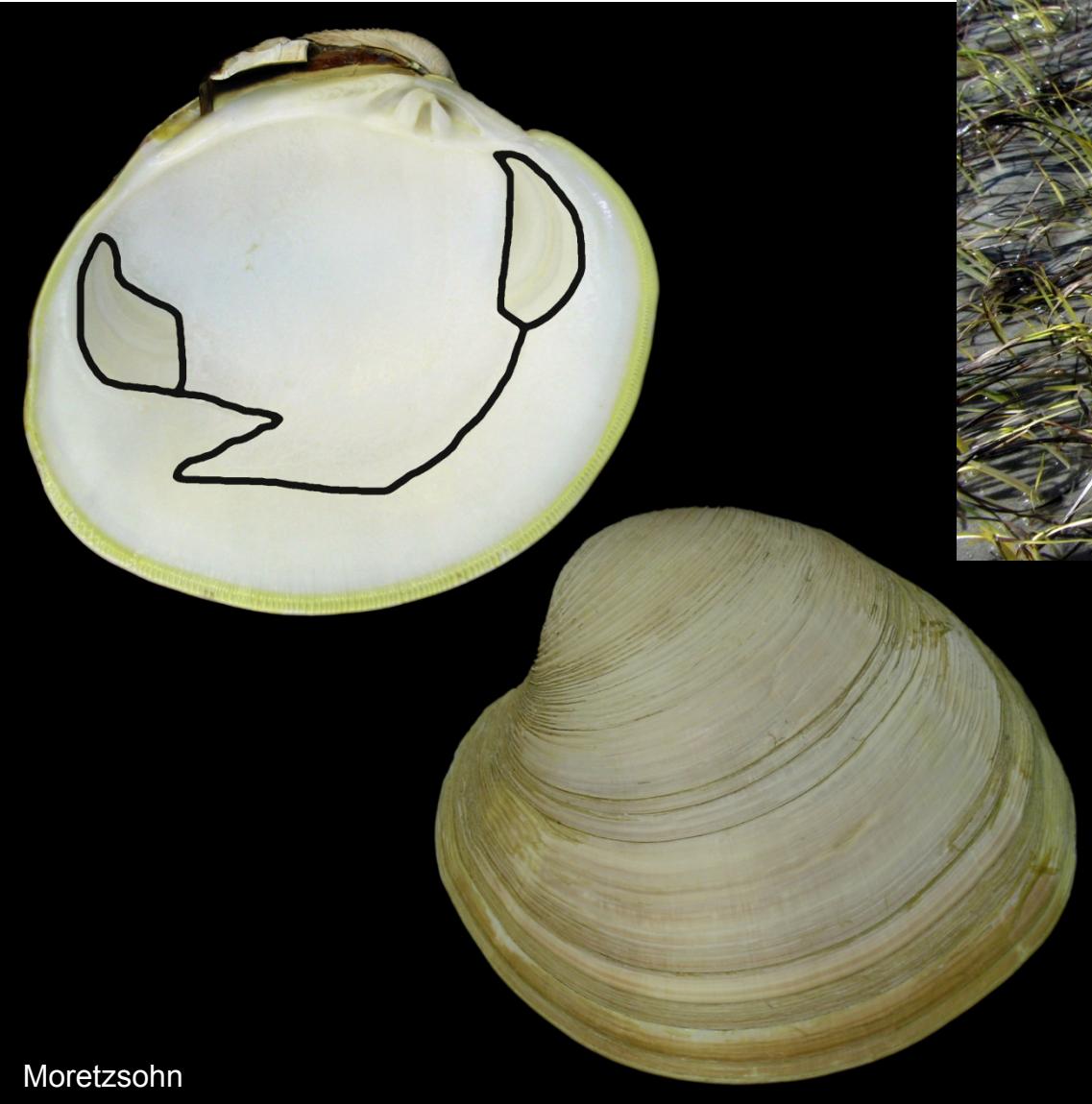
TAMUCC

Mulinia lateralis, Dwarf surf clam

Family Mactridae



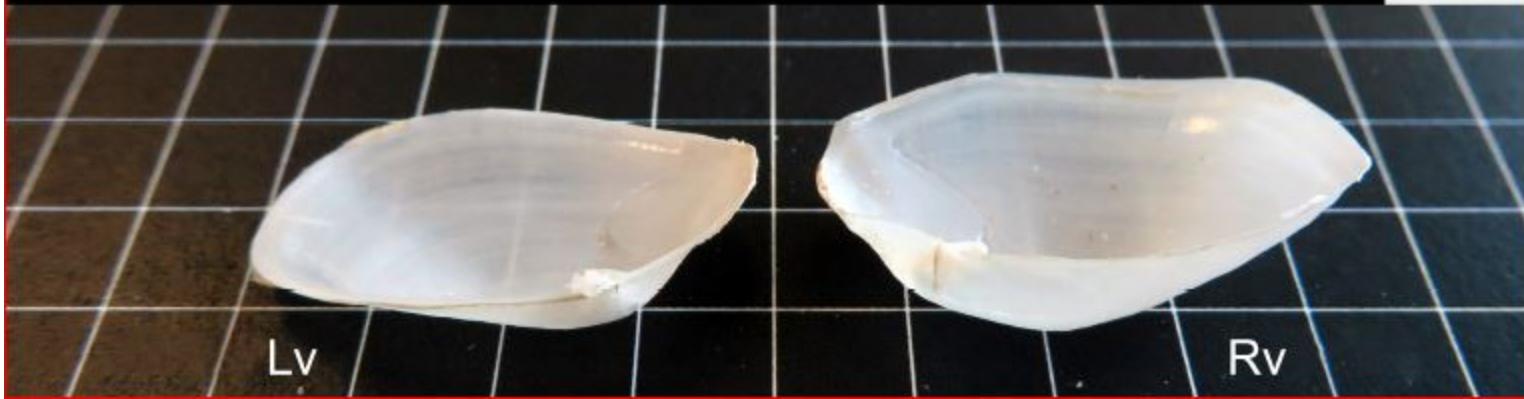
Mercenaria texana, Texas quahog



Family Veneridae

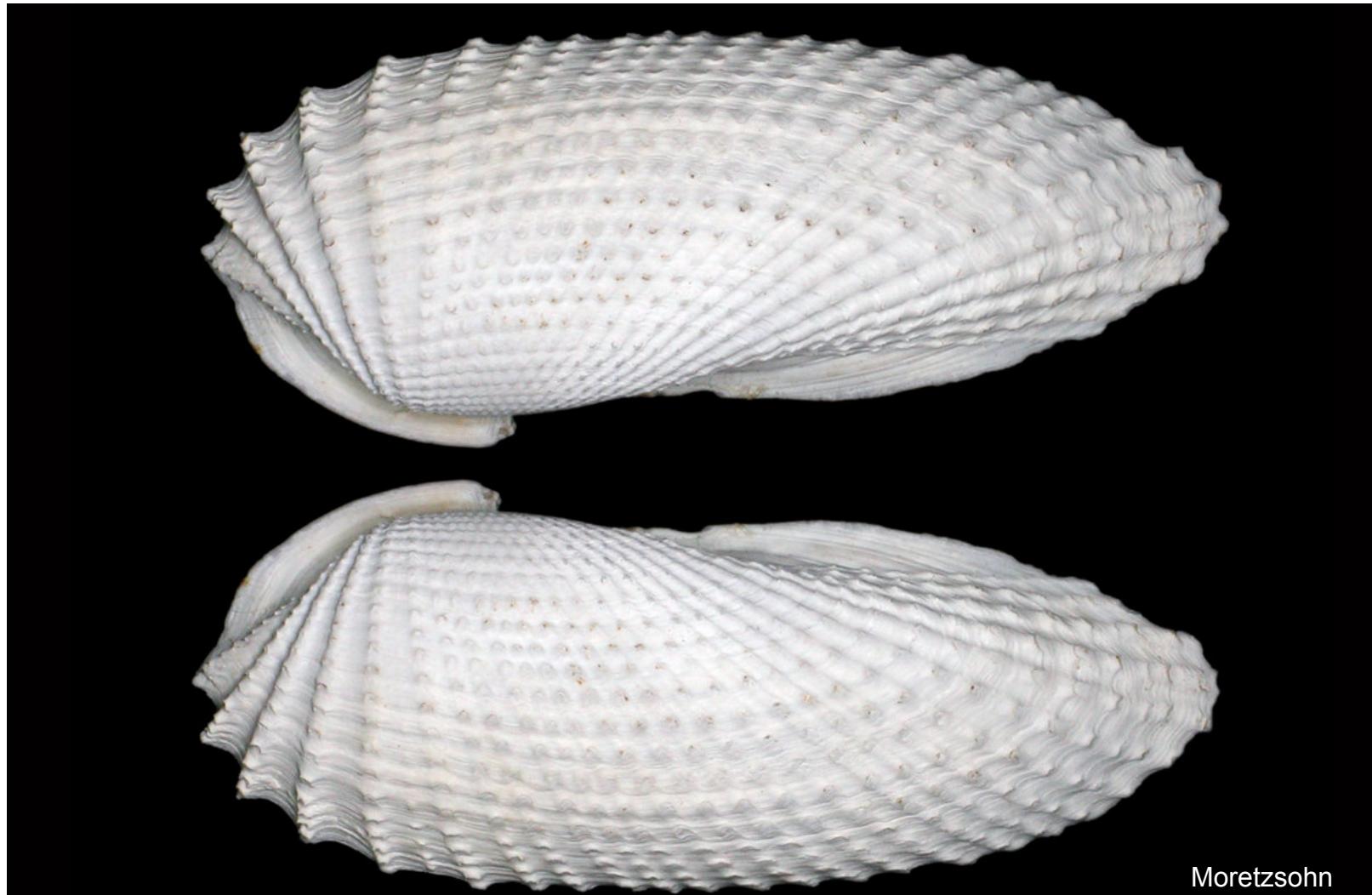
Periploma margaritaceum, Unequal Spoonclam

Family Periplomatidae



Cyrtopleura costata, Angelwing

Family Pholadidae



Dinocardium robustum, Giant Atlantic cockle

Family Cardiidae



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Nucula sp., new species

Family Nuculidae



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New species of deep-sea clam from the Gulf of Mexico (1,097 to 3,685 m)

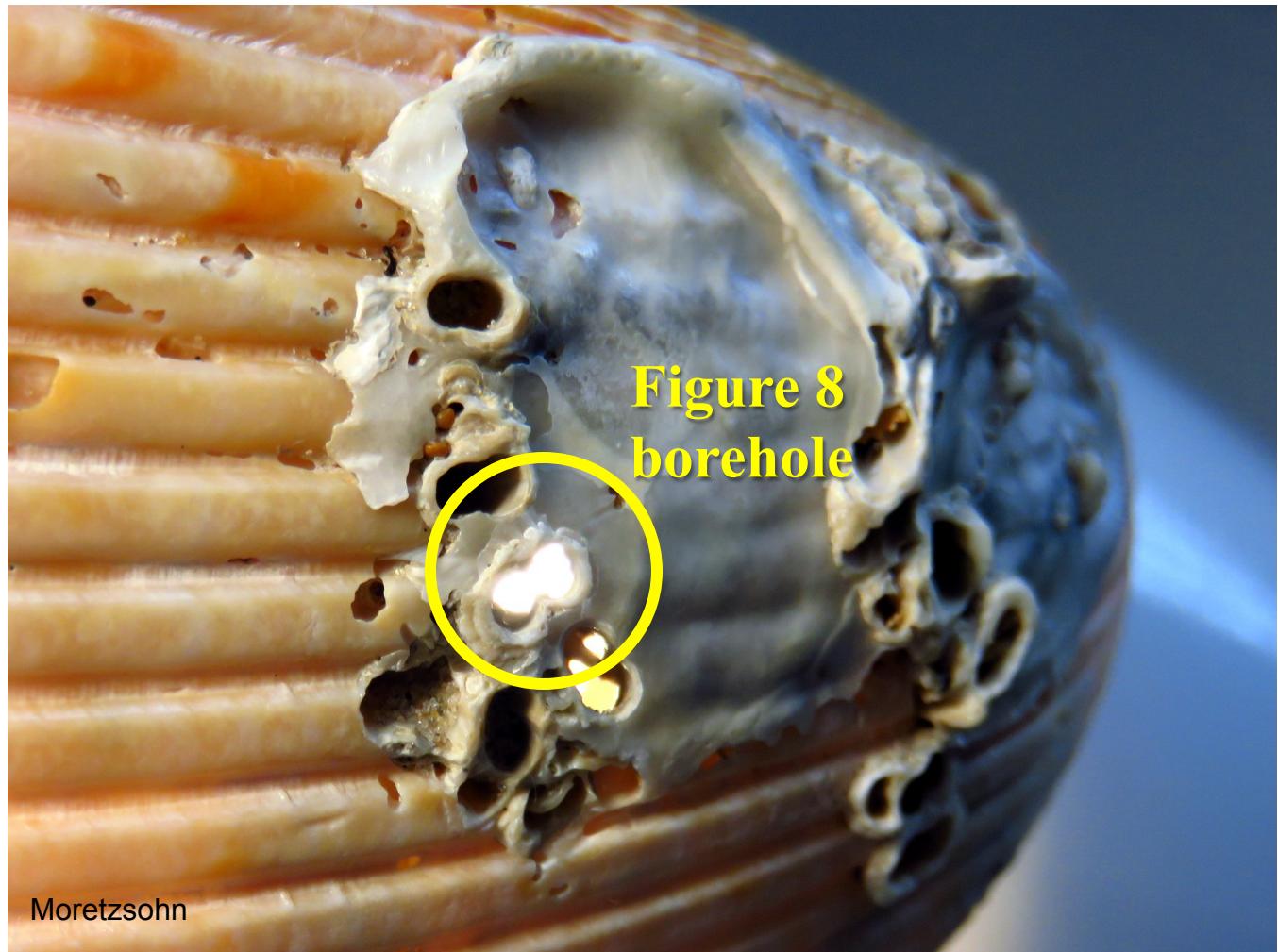
Collected by Dr. B. James (1976)

Recent Discovery – Unknown Organism



W. Botts

Family Gastrochaenidae



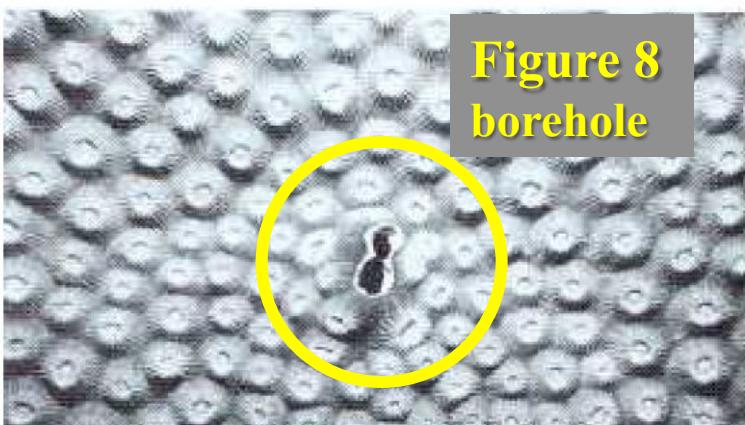


Figure 8
borehole

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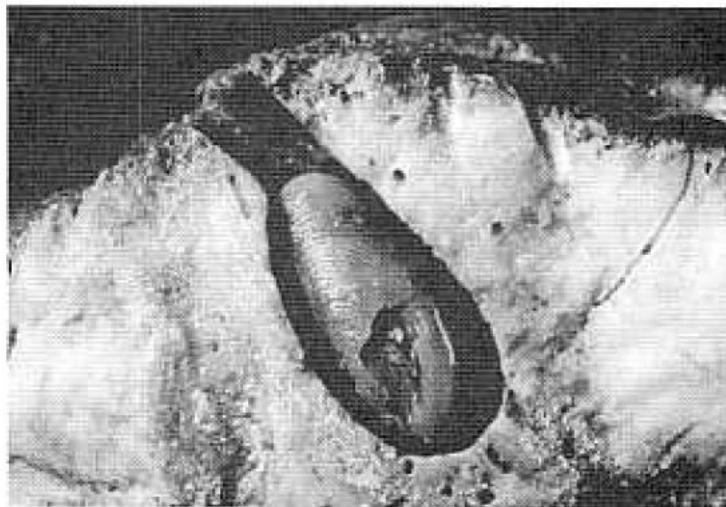


Fig. 3. *Gastrochaena cuneiformis* in its borehole in limestone, split open in a para-sagittal plane. Note the position of the shell in relation to the borehole and the grooves carved in the rock for the siphons. Shell length was 21.2 mm. Photo by F. Moretzsohn.

shell shape, and there was no calcareous lining on the borehole walls. The valves are whitish, rounded-elongated, with growth lines crossed by fine ribs. The posterior margin has calcareous depositions which form radiating, spiny ribs. Maximum shell length was 13.8 mm.

Family HIATELLIDAE

7) *Hiatella orientalis* (Yokoyama)—Plate I.G

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from the Red Sea by Soliman (1969), and from Thailand by Nielsen (1976, 1986). Based also on our results, we can say with certainty that this species is a **dead coral-borer**. Regarding the mode of boring, however, the opinions of authors are diverse. Purchon (1968) affirmed that rock-boring by *Botula* is solely by abrasion of the soft rocks by the shells. Most authors (Yonge, 1955; Soliman, 1969; Morton, 1983) agree that boring in *Botula* is mechanical, although Nielsen (1976, 1986) believes that it is at least partially chemical, due to the restricted possibilities for movements in the borehole.

2) *Lithophaga teres*: This species is widely accepted as a **dead coral-borer**, although Wilson (1979), Tsuchiya et al (1986) and Kurozumi et al, (1989) attested that it can also be found in dead parts of living corals such as *Porites* and *Favia*. In this study, we found *L.teres* only in limestone. Regarding the mode of boring, Purchon (1968) stated



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Cucurbitula sp., Family Gastrochaenidae

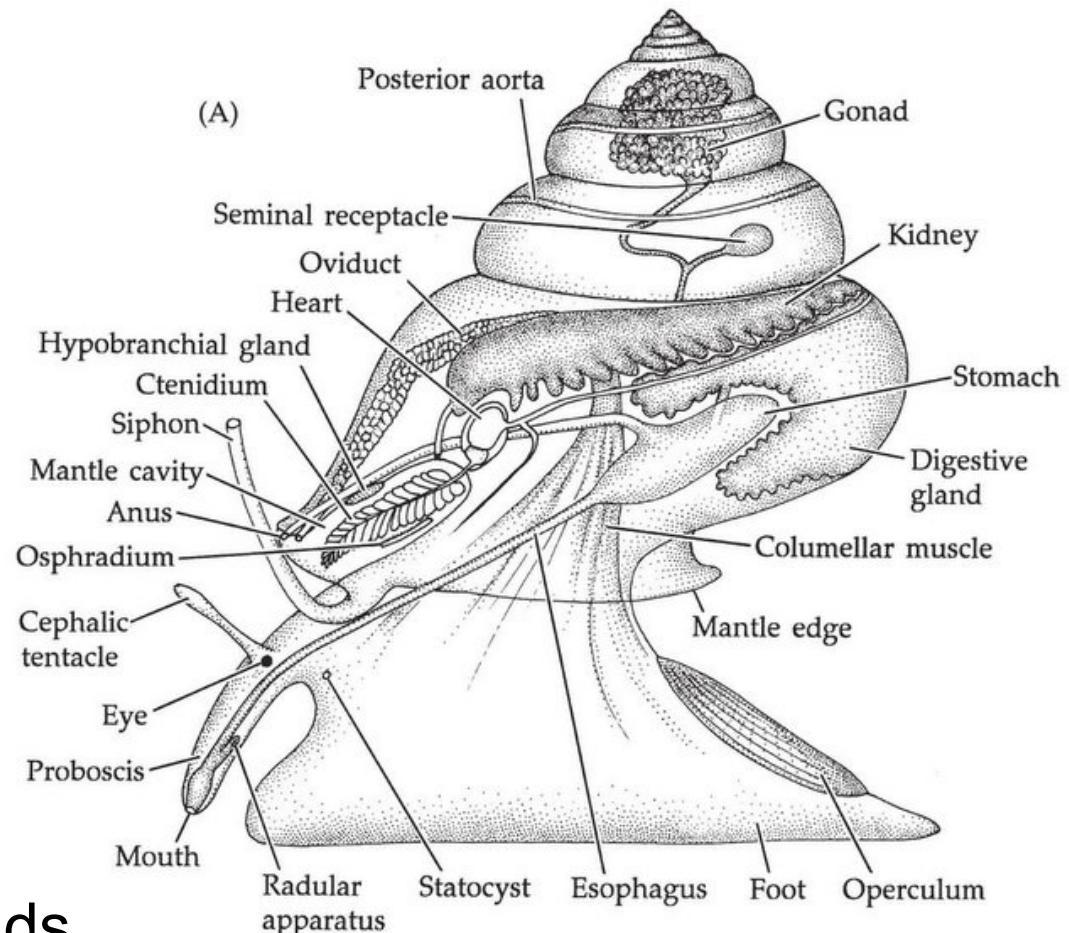


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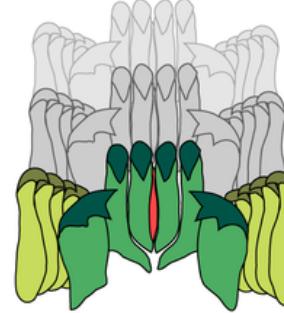
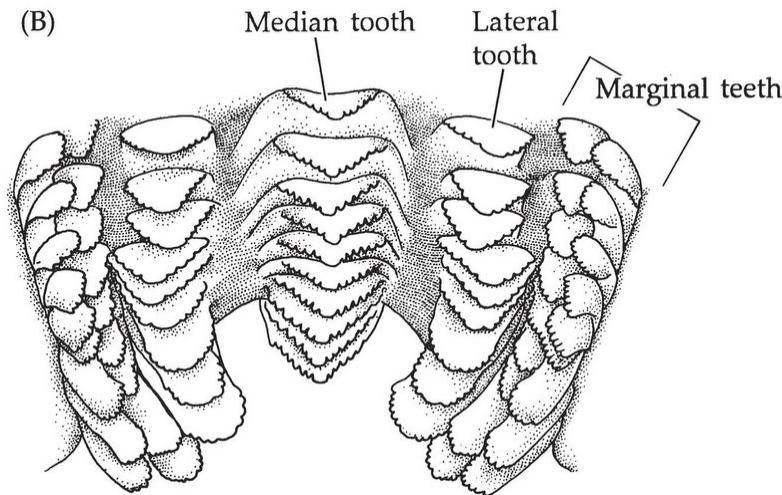
Lv = 14.58 mm

Gastropod Bauplan: Anatomy

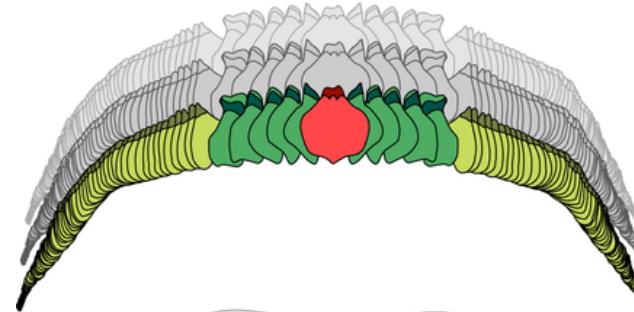
- Head-foot
- Visceral Mass
- Mantle cavity
- Pallial complex
 - Ctenidia
 - Osphradia
 - Hypobranchial glands
 - Digestive, excretory & reproductive openings



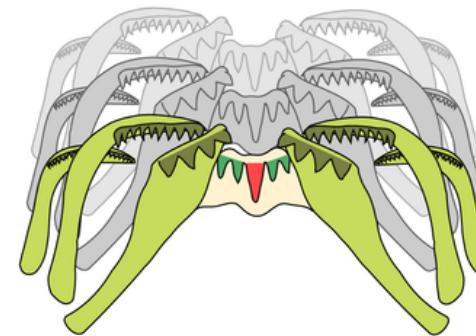
Radula



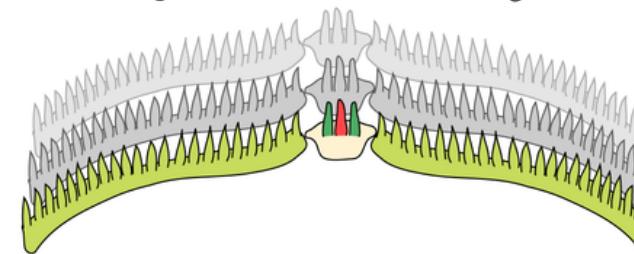
docoglossan
(stereoglossan)



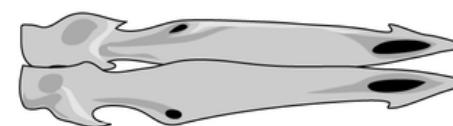
rhipidoglossan



taenioglossan



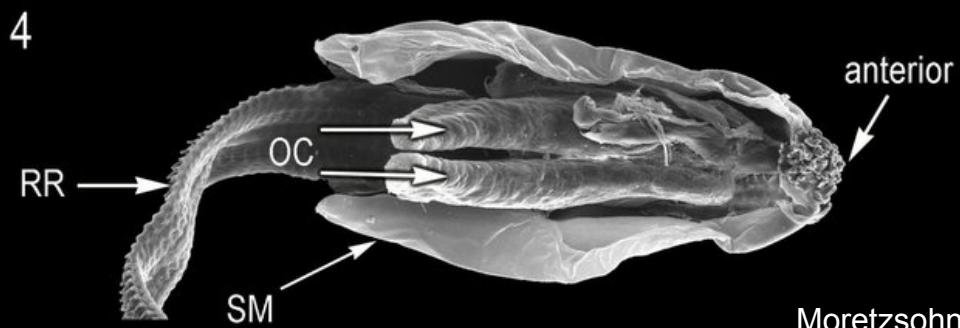
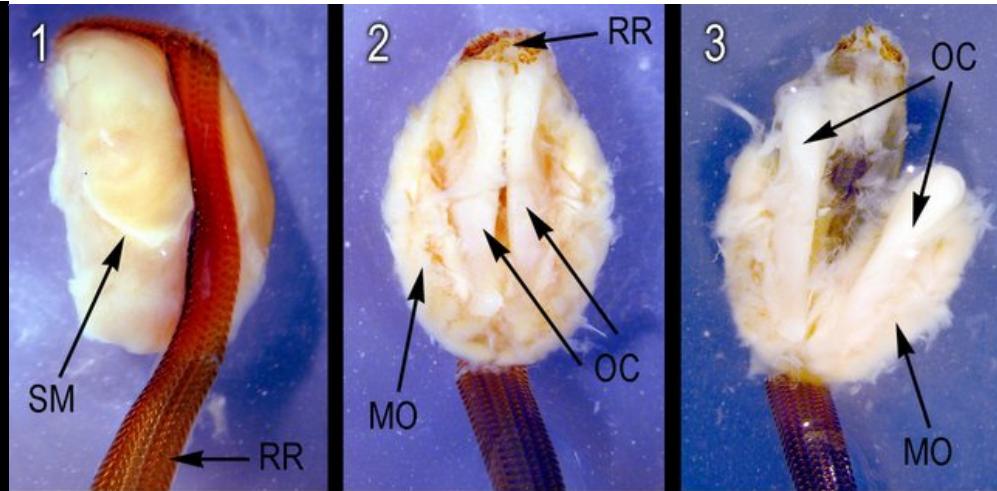
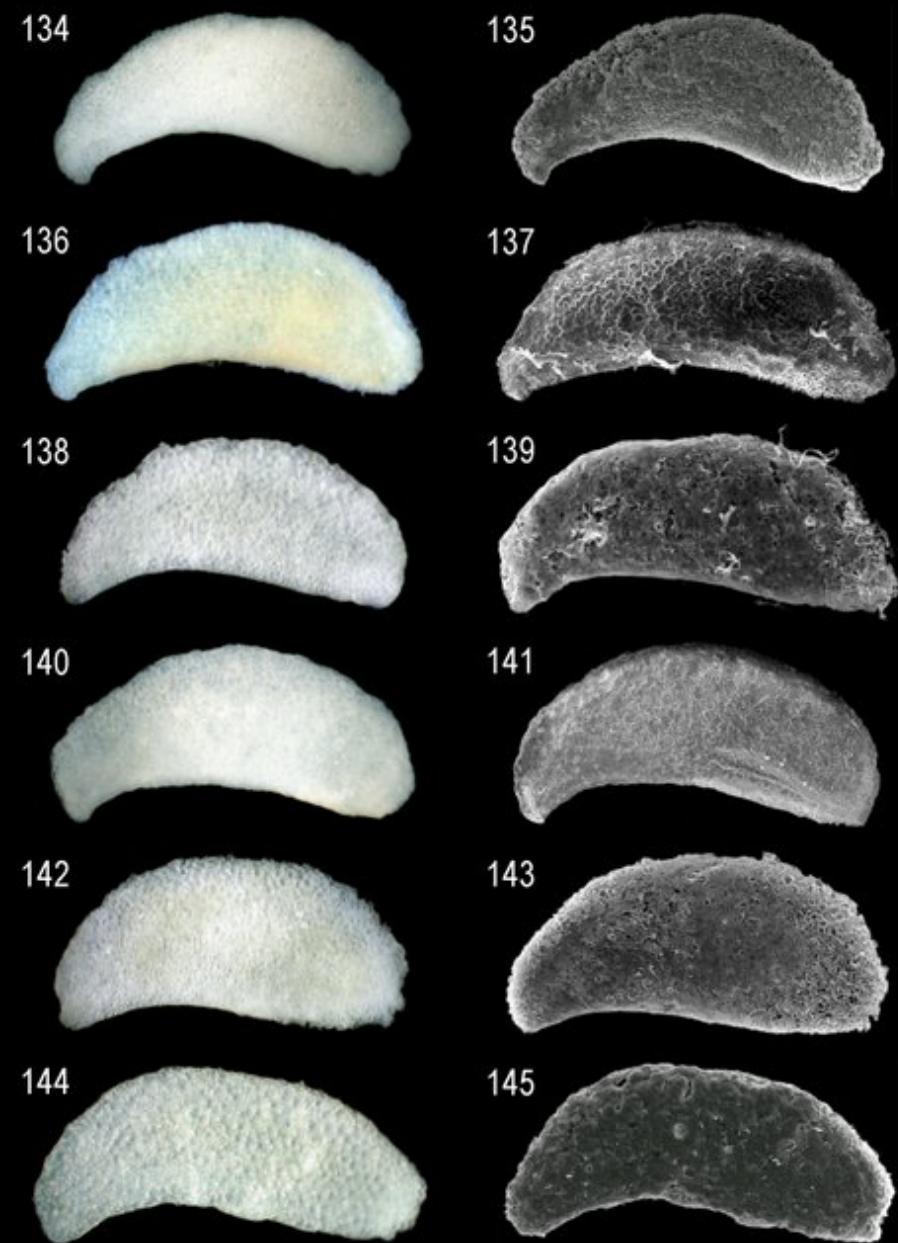
stenoglossan
(rachiglossan)



toxoglossan

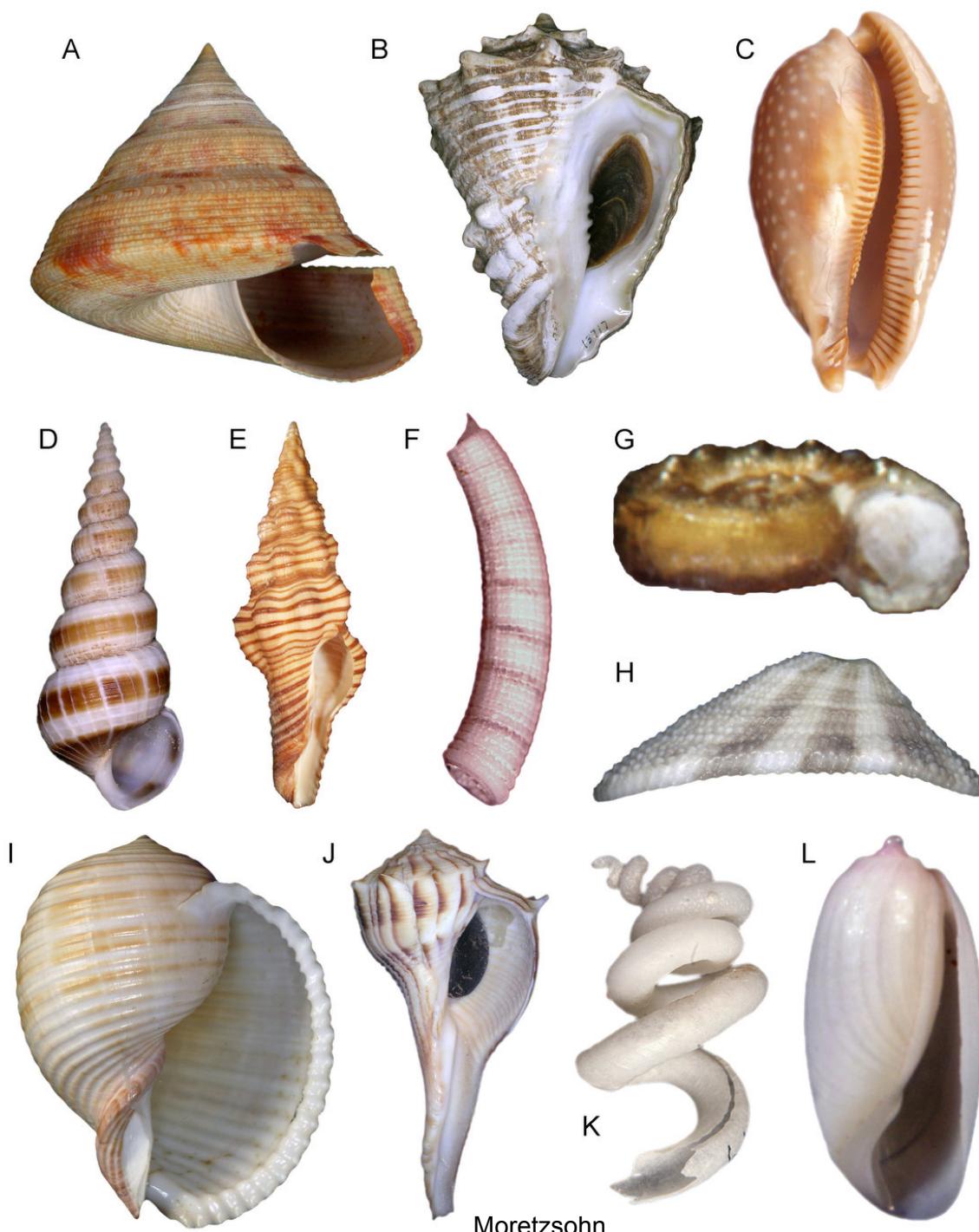
Odontophore

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- Cartilage that supports the radula
- Study of Cypraeidae odontophore
- Promise as novel taxonomic character

Shell Shapes



- A. Turbinate
- B. Conic
- C. Ovate
- D. Turriculate
- E. Fusiform
- F. Tubular
- G. Discoid
- H. Cap
- I. Globular
- J. Pyriform
- K. Irregular
- L. Cylindrical

Ammonicera minortalis, Miniscule Ammonicera

Family Omalogyridae



Barrera



Triplofusus gigantea, Florida Horse Conch

Family Melongenidae



Busycon pulleyi, Lightning Whelk (Texas State Shell)

Family Busyconidae



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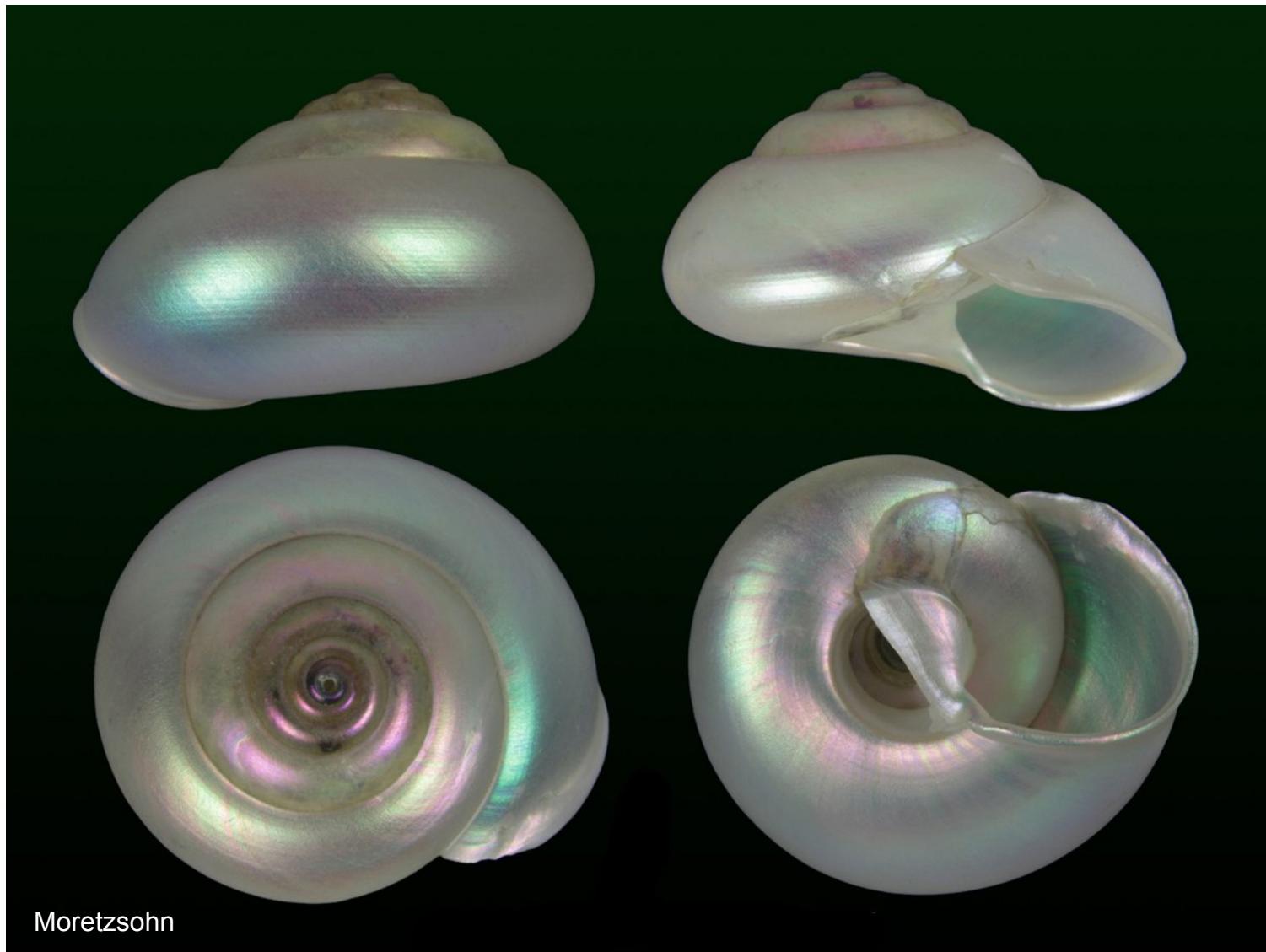
Strombus gigas, Queen Conch

Family Strombidae



Gaza superba, Superb Gaza

Family Trochidae



Seila adamsii, Adam's Miniature Cerith

Family Cerithiopsidae



Cosmotriphora melanura, White Atlantic Triphora

Family Triphoridae



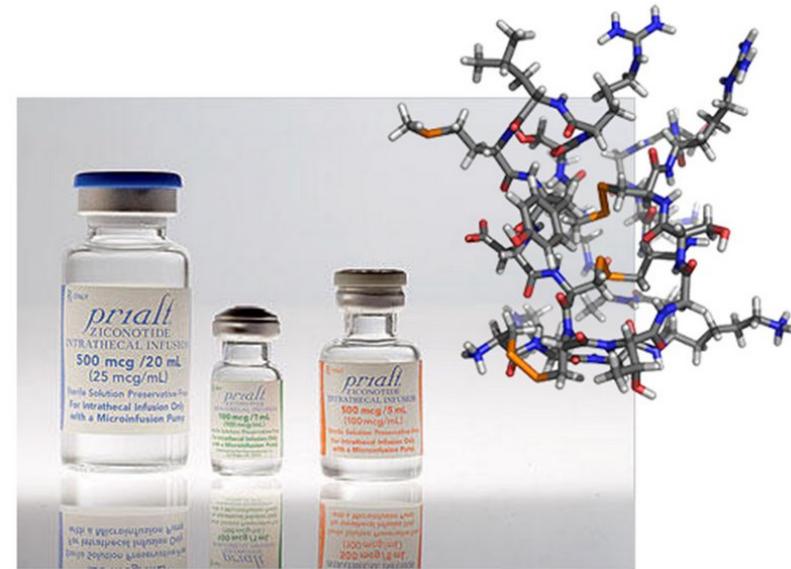
Conus ermineus, Agate Cone

Family Conidae



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Conotoxin Research



- **Family Conidae**, about 700 spp.
- Cone snails are venomous and prey on polychaetes, mollusks and fishes
- Some 100 spp. are piscivores
- Each species has cocktail of venoms

- **Prialt:** first FDA-approved drug from conotoxin
- Powerful pain-killer
- Ca^{2+} channel blocker
- Newly discovered: insulin from *Conus*

Encyclopedia of Texas Seashells

Identification, Ecology, Distribution & History



By John W. Tunnell Jr.
Jean Andrews
Noe C. Barrera
& Fabio Moretzsohn

2010

Texas Seashells

A FIELD GUIDE



JOHN W. TUNNELL JR.,
NOE C. BARRERA,
and FABIO MORETZSOHN

2014

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