

# Catalog of the juvenile clams and adult micro-clams of the lower Coos Bay estuary, Oregon

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Marine Resources Program  
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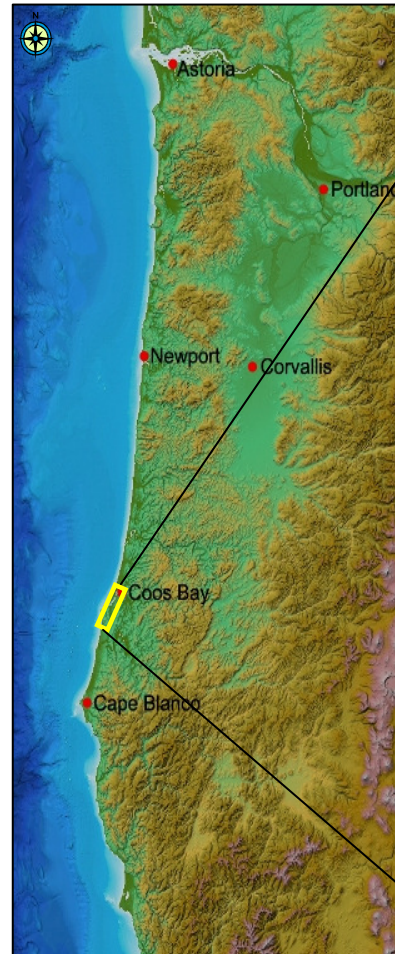
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# Background

- Recruitment study part of greater SEACOR survey of the 4 recreationally important bay clam species of Coos Bay, Oregon
- Clams collected from 3 regions of the lower Coos Bay estuary; Clam Island, Pigeon Point and South Slough
- Sampling occurred quarterly, between September 2008 and March 2009
- Sampling occurred on the intertidal mudflat between -0.5 to 1.0 m MLLW
- Sediment samples consecutively sieved with 4 mm then 1 mm mesh
- Sorted clams were preserved in 90% denatured ethanol
- Clams in this catalog include the 4 target species, and the most common species we found in our samples



# Steps in Making the Catalog

- First, photographs were taken of one or more individuals of the same group (i.e. species or family)
- Qualitative observations were then made of the external and internal characteristics of the clams
- These observations and the photographs were sent to Paul Valentich-Scott for verification and identification
- When positive identifications were made character descriptions were enriched by using the book, Bivalve seashells of western North America: marine bivalve mollusks from Arctic Alaska to Baja California
- Suggestions by P. Valentich-Scott, regarding identifying characteristics, were also added

# Using the Catalog

- Two sections exist in the catalog
  - The first section, *Identified Clams*, contains clams that have been identified with certainty to species
  - The second section, *Unidentified Clams*, includes clams identified to the lowest taxonomic level possible
- The clams (within each section) are not arranged in a particular order
- Each clam includes a page of external and internal characteristics used to identify it, as well as a page of photographs
- A numeric code is assigned to each external characteristic, and a letter code is assigned to each internal characteristic. Some characteristics do not have a corresponding photograph.
- Each photograph contains one or more codes, to highlight the characteristic featured in the photograph  
For example:

<p>Family, Mactridae</p> <p>External characteristics</p> <ol style="list-style-type: none"><li>1. Shell shape is elliptical</li><li>2. Small, vertical opisthogyrate umbone</li><li>3. Posterior edge slightly longer</li><li>4. Posterior end truncate</li><li>5. Slight gape at posterior end</li><li>6. Many closely spaced commarginal rings</li><li>7. Shell delicate, thin</li><li>8. Two specimens measured: 5.0, 7.2 mm</li></ol>	<p>Family, Mactridae</p> 	<p>To the left is an example of the code system. The first photograph (second box) shows the codes "1-4." The reader then refers back to the characteristics page to match the codes to specific characteristics, 1-4 are all displayed in the first photo. The other photograph with the code of "5," is an example of a "Slight gape at the posterior end".</p>
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- Some photographs contain arrows, which are used to emphasize the characteristic. White is the default color of codes and arrows; however, when more than one characteristic is highlighted within a photograph, yellow is used for that code and its matching arrow
- Some items on the characteristics page, are followed by a superscript 1 or 2. These refer to a citation, listed on the *Citations* page.

# Identified Clams

- This section contains clams that have been identified to species with certainty

## *Nutricula tantilla* (adult form)

### External characteristics

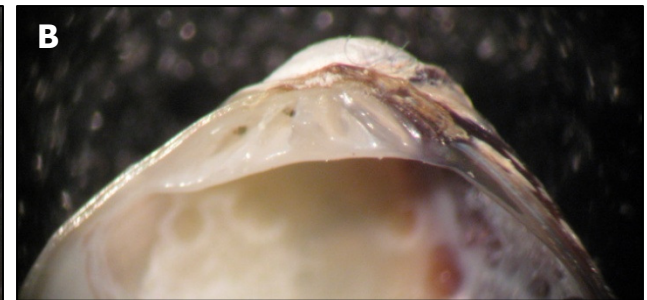
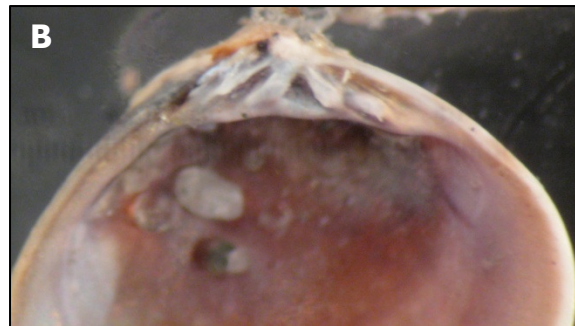
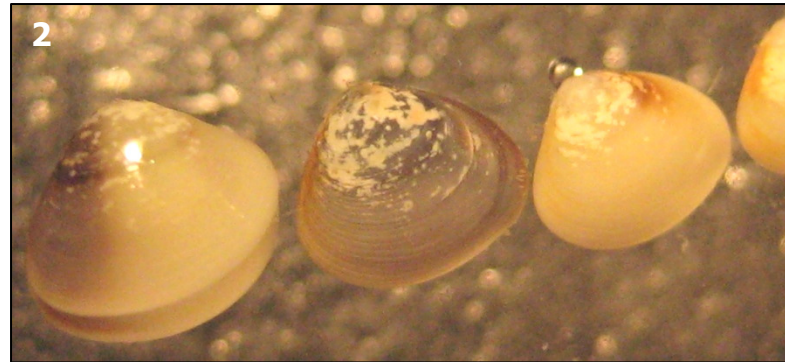
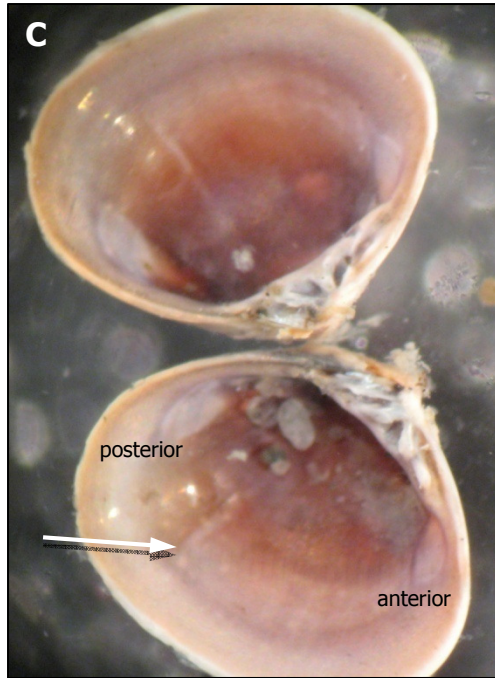
1. Shell shape is subovate to subtrigonal, <sup>1</sup> inflated
2. Shell coloration white with some degree of coloration (5-95%, pink, purple, brown); periostracum polished
3. Many closely spaced commarginal rings, with greater definition after "early prodissoconch"
4. Thick, robust valves
5. Ligament visible but sunken
6. Range of specimens measured: 2.35 – 4.1 mm
  - Length to 8 mm <sup>1</sup>

### Internal characteristics

- A. Smooth shell margin
- B. Three cardinal teeth in each valve
- C. Shallow pallial sinus



*Nutricola tantilla* (adult form)



## *Rochefortia tumida* (adult form)

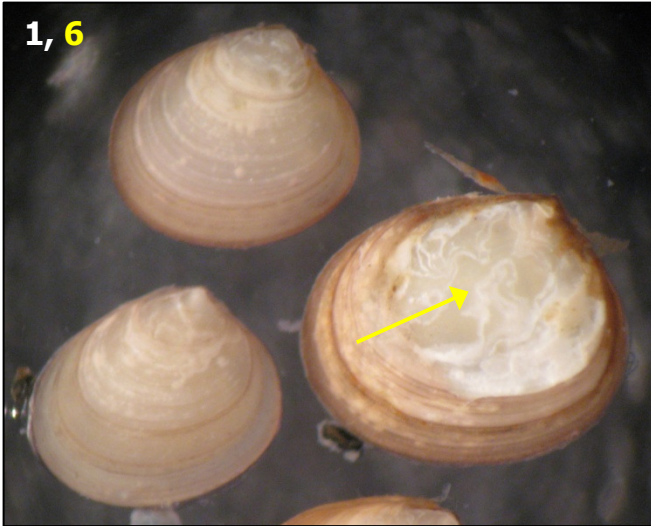
### External characteristics

1. Shell shape is subtrigonal to subquadrate <sup>1</sup>
2. Opisthogyrate umbone
3. Anterior edge of shell is longer than posterior edge
4. Many fine commarginal rings, with few darker rings
5. Shell thin, delicate
6. Periostracum easily eroded
7. Range of specimens measured: 1.9 – 2.9 mm
  - Length to 5 mm <sup>1</sup>

### Internal characteristics

- A. Smooth shell margin
- B. Two cardinal teeth in right valve, teeth absent in left valve <sup>1</sup>
- C. The hinge ligament is internal, found between the two teeth, on a resilifer <sup>2</sup>
- D. Pallial line entire (pallial sinus absent) <sup>2</sup>

*Rochefortia tumida* (adult form)



## *Saxidomus gigantea* (juvenile form)

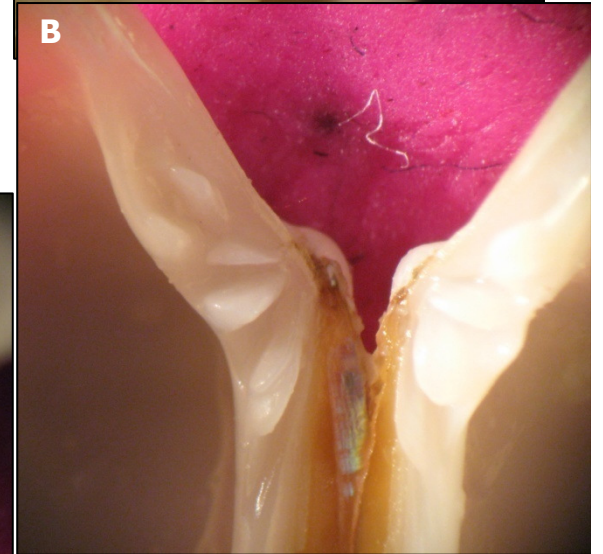
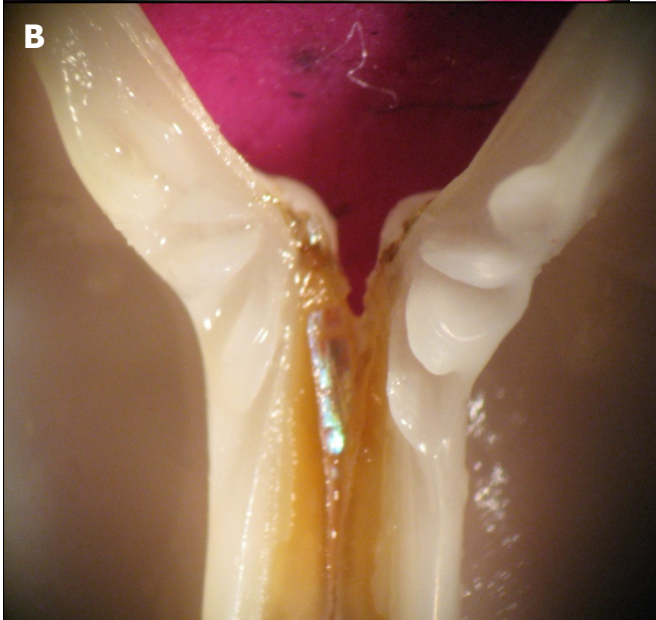
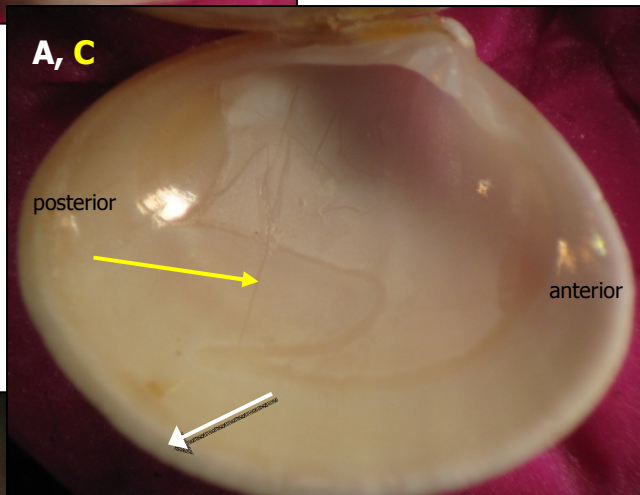
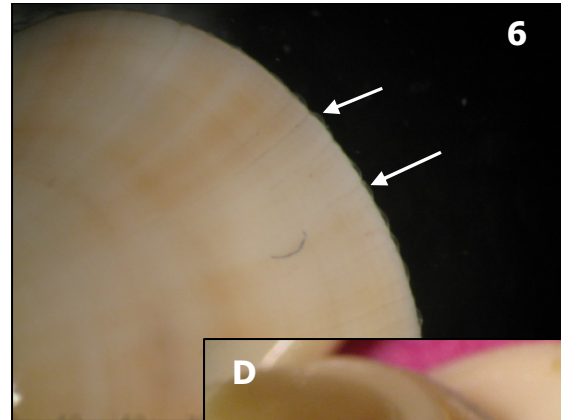
### External characteristics

1. Shell shape, moderately even and rounded trigonal shape, slightly inflated
2. Prosogyrate umbone
3. Many closely spaced commarginal rings with faint radial lines, which can best be seen at the valve margin
4. Valves are thick and robust
5. Range of specimens measured: 6.35 – 12.71 mm
6. Scalloped "tuxedo" mantle visible when submerged.
7. Ligament is protruding and visible

### Internal characteristics

- A. Smooth shell margin
- B. Three cardinal teeth in each valve and 1 anterior lateral tooth<sup>2</sup>
- C. Deep pallial sinus
- D. Siphon beige, with brown spotted tip

*Saxidomus gigantea* (juvenile form)



## *Protothaca staminea* (juvenile form)

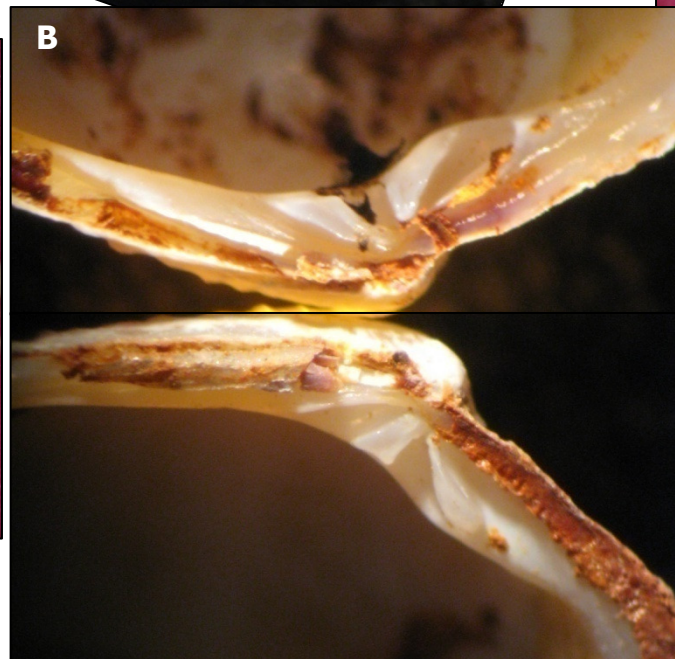
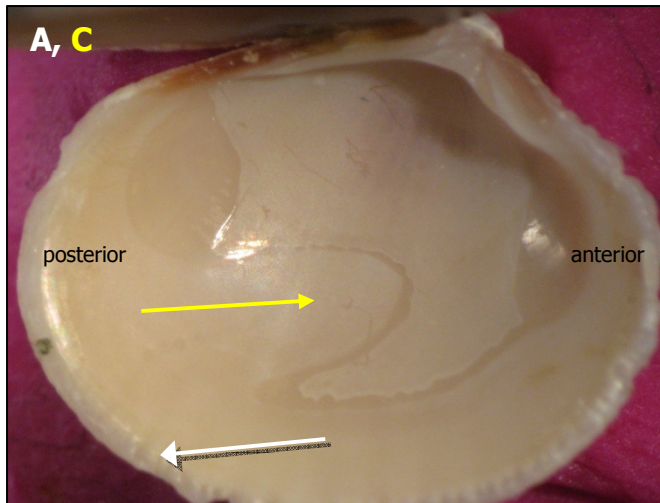
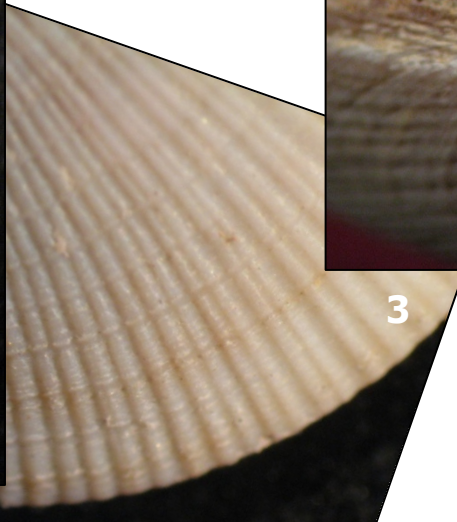
### External characteristics

1. Shell shape is subovate – subquadrata, inflated <sup>1</sup>
2. Prosogyrate umbone
3. Valves have cancellate rings, both commarginal and radial.
4. Range of specimens measured: 3.1 – 6.1 mm
5. Ligament is external and sunken
6. Obscure lunule

### Internal characteristics

- A. Finely crenulate shell margin <sup>1</sup>
- B. Three cardinal teeth
- C. Deep pallial sinus
- D. White siphon, with dense brown spotting on tip

*Protothaca staminea* (juvenile form)



## *Clinocardium nuttallii* (juvenile form)

### External characteristics

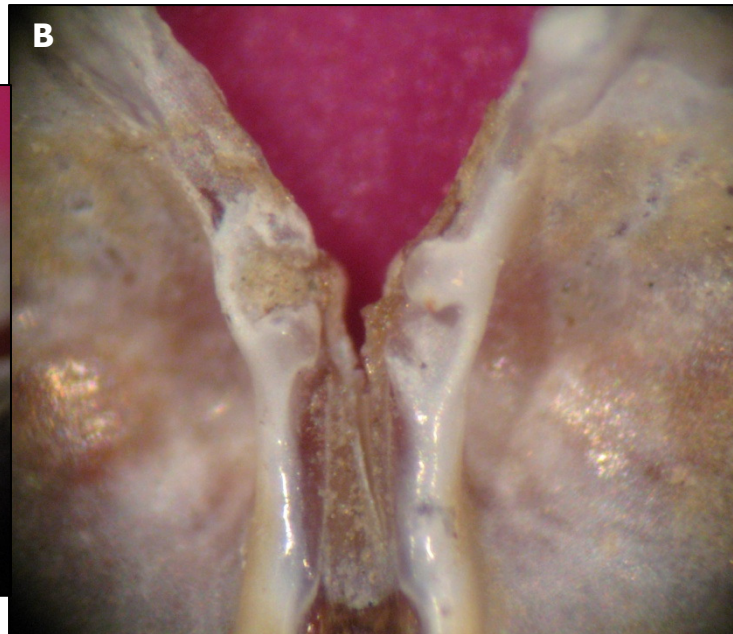
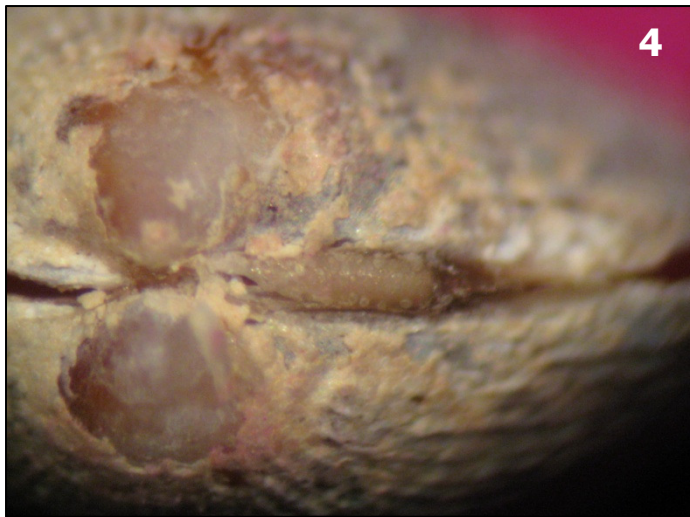
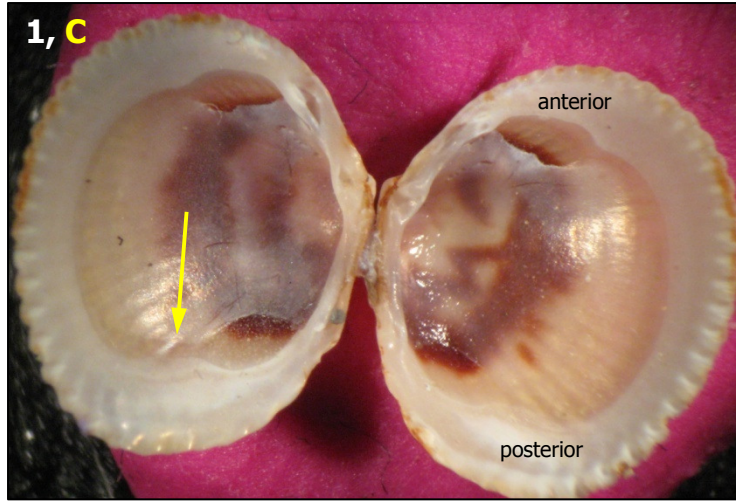
1. Shell shape equilateral in younger specimens <sup>1</sup>
2. Approximately 30 strong, rounded, radial ribs present, nodose where crossed by commarginal riblets <sup>1</sup>
3. Two specimens measured: 2.01, 6.2 mm
4. Ligament is protruding and visible

### Internal characteristics

- A. Crenulate shell margin
- B. Teeth prominent <sup>1</sup>
- C. Shallow pallial sinus



*Clinocardium nuttallii* (juvenile form)



## *Tresus capax* (juvenile form)

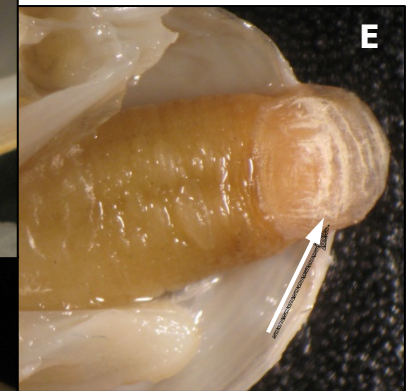
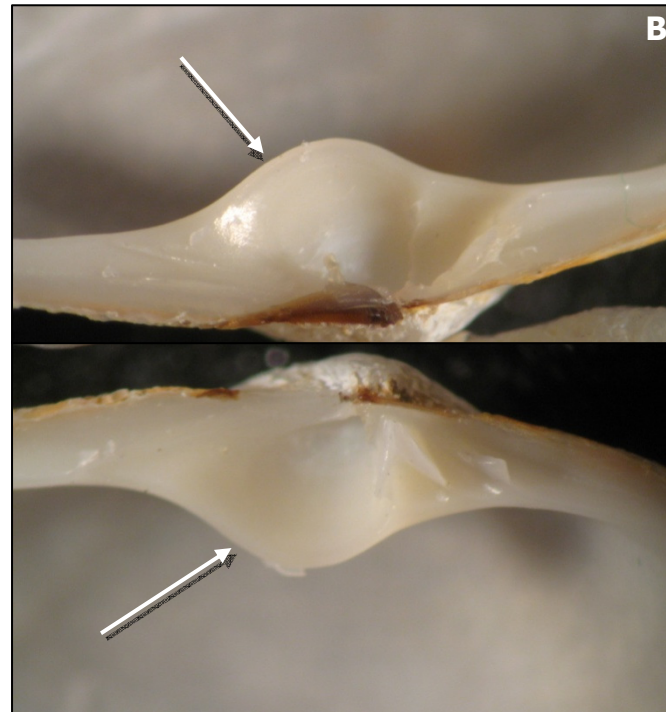
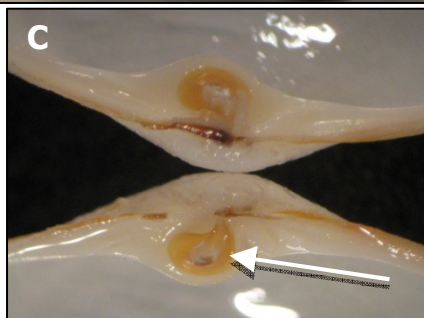
### External Characteristics

1. Shell shape is subovate, slightly inflated
2. Prosogyrate umbone
3. Posterior half of valve is longer than anterior end
4. Slight gape at posterior end
5. Many commarginal rings
6. Shell is thin and delicate

### Internal Characteristics

- A. Smooth shell margin
- B. Chondrophore present, ventral (vertical) orientation
- C. Ligament is internal, in the chondrophore
- D. Deep pallial sinus
- E. Proteinaceous flaps at tip of siphon

*Tresus capax* (juvenile form)



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# Unidentified Clams

- The identifications of these individuals were verified based on photographs, but could not be identified to species with certainty
- Each slide contains the lowest taxonomic identification possible
- For some clams the genus is fairly certain, but there may be more than one possibility for species

## Family, Mactridae

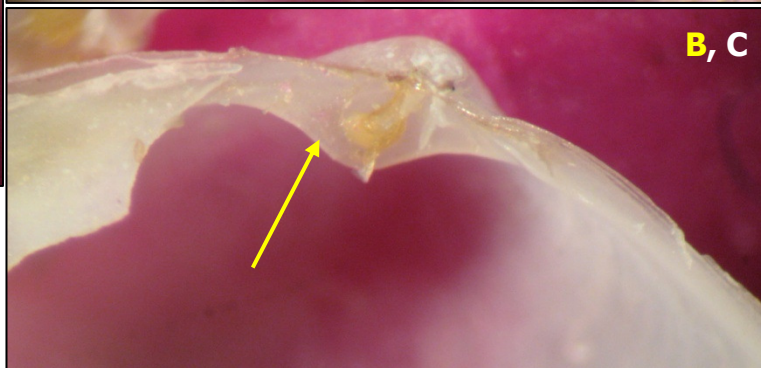
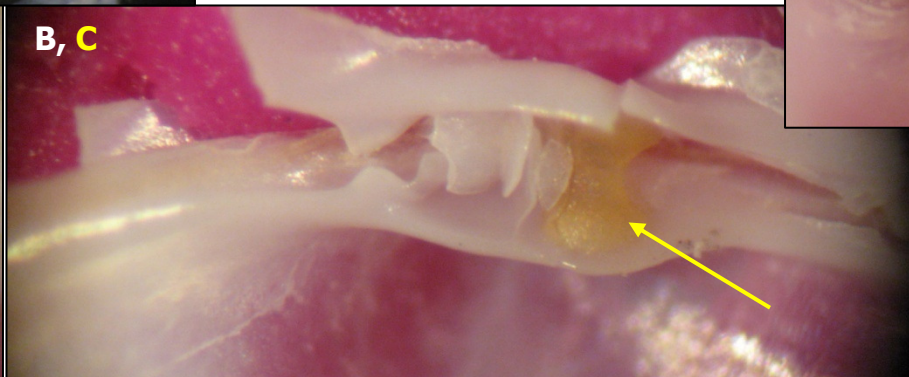
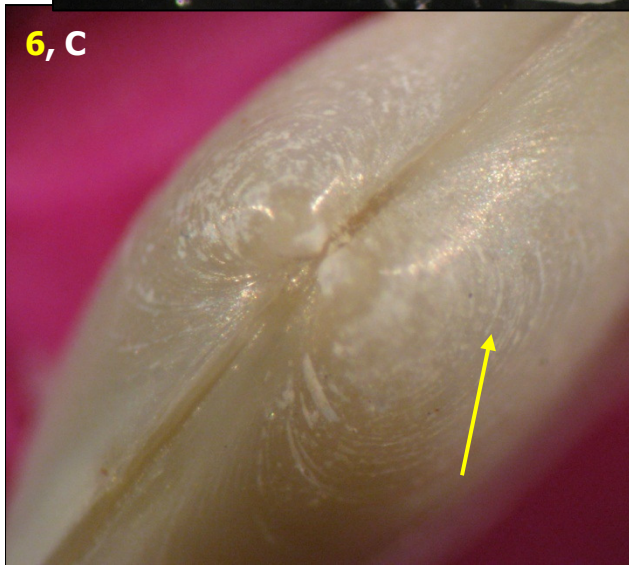
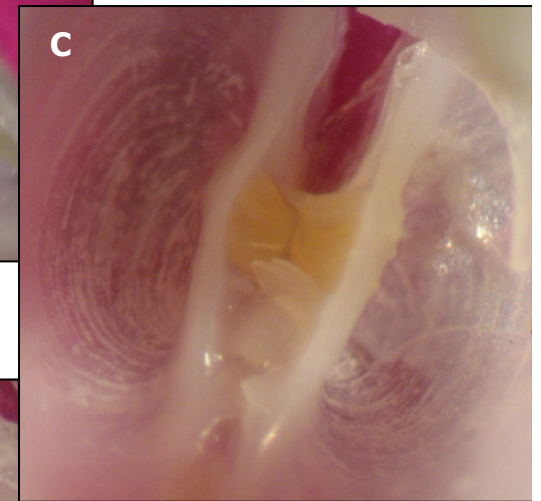
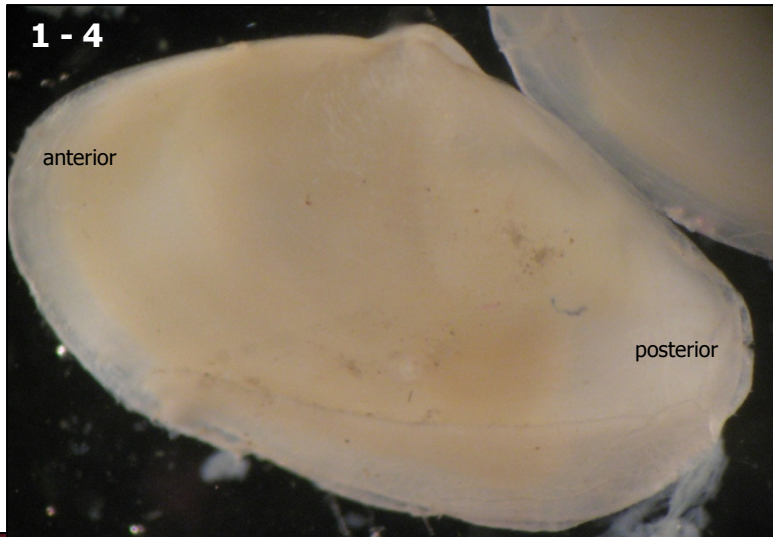
### External characteristics

1. Shell shape is elliptical
2. Small, vertical opisthogyrate umbone
3. Posterior edge slightly longer
4. Posterior end truncate
5. Slight gape at posterior end
6. Many closely spaced commarginal rings
7. Shell delicate, thin
8. Two specimens measured: 5.0, 7.2 mm

### Internal characteristics

- A. Smooth shell margin
- B. Chondrophore present, ventral (vertical) orientation
- C. Ligament is internal, in the chondrophore <sup>2</sup>

# Family, Mactridae



## *Macoma balthica* (pink form, juvenile form)

### External characteristics

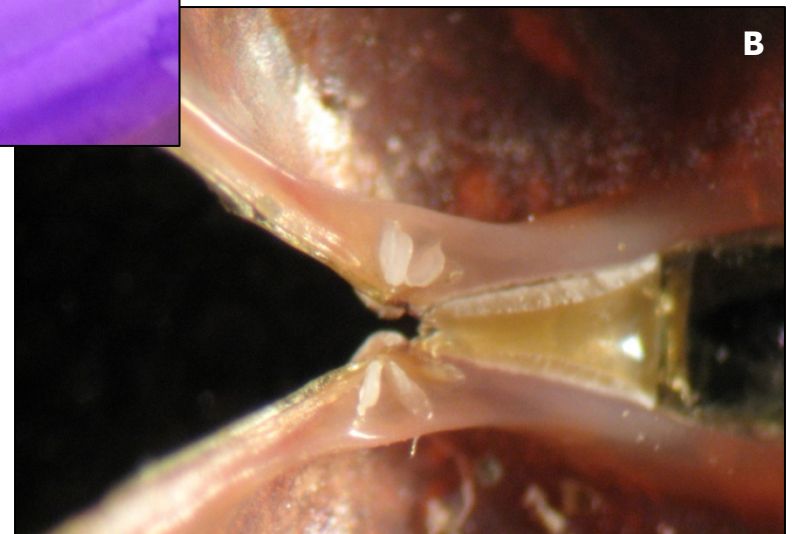
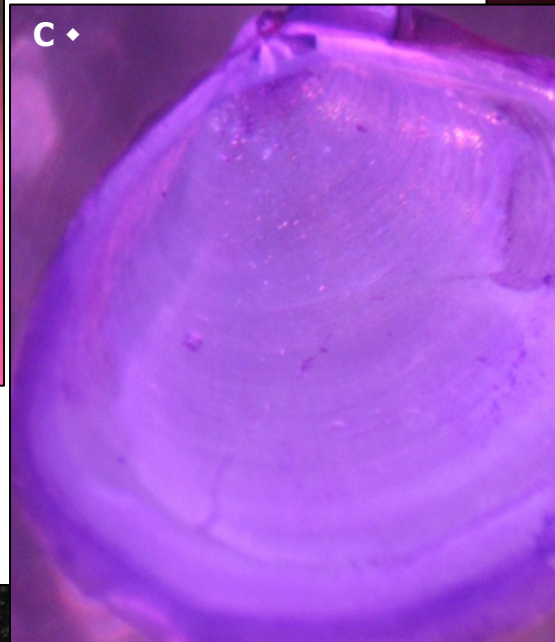
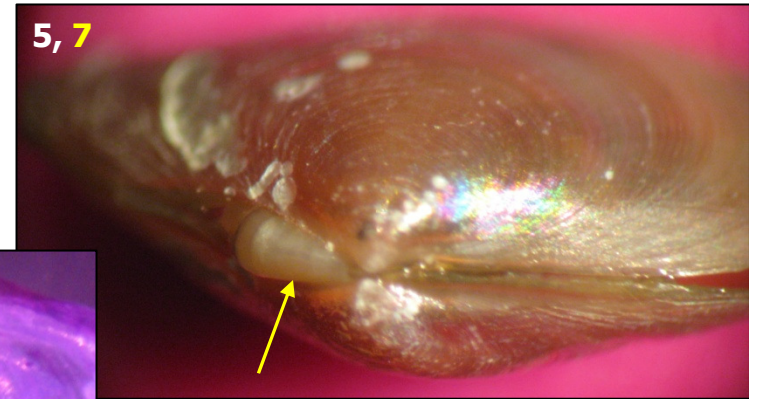
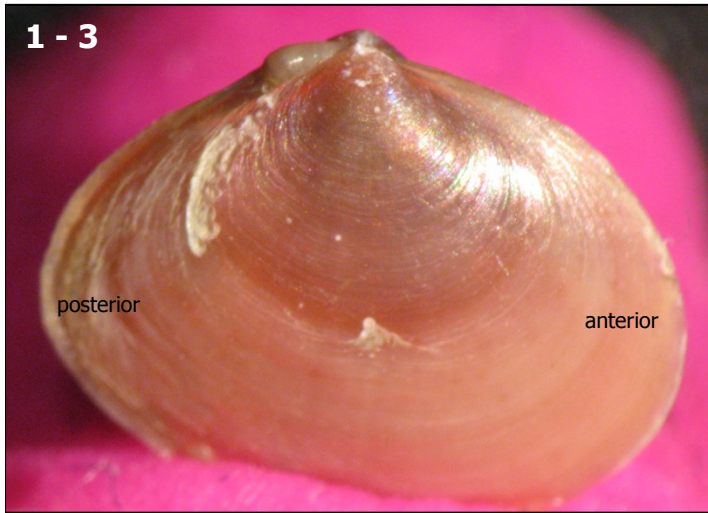
1. Shell shape: anterior is fatter than posterior end, which has slight point
2. Slightly prosogyrate umbone
3. Many fine commarginal rings
4. Shell is thin, translucent and pink
5. Periostracum has iridescent quality
6. Range of specimens measured: 2.8 – 6.8 mm
7. Parivincular ligament; ligament is fatter anteriorly

### Internal characteristics

- A. Smooth shell margin
- B. Two cardinal teeth in each valve <sup>2</sup>
- C. Deep pallial sinus



*Macoma balthica* (pink form, juvenile form)



♦ Purple coloration due to crystal violet dye.

## *Macoma balthica* (white form, juvenile form)

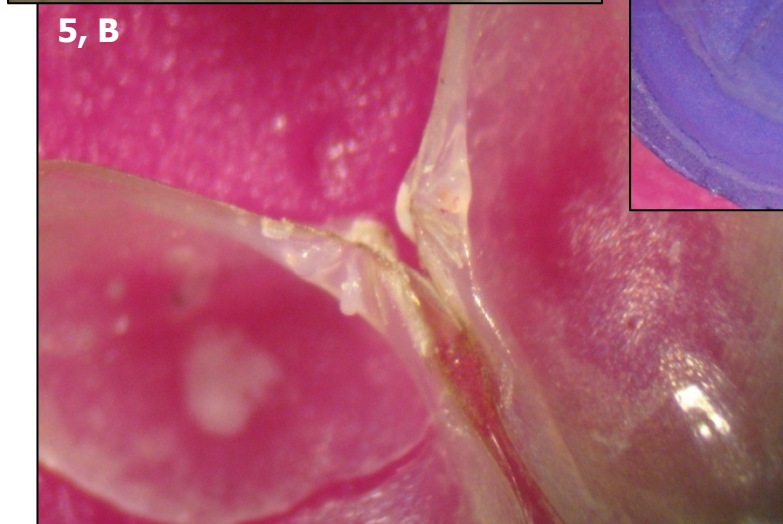
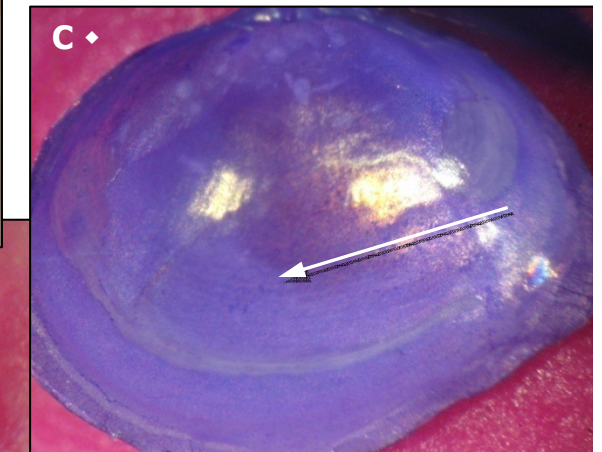
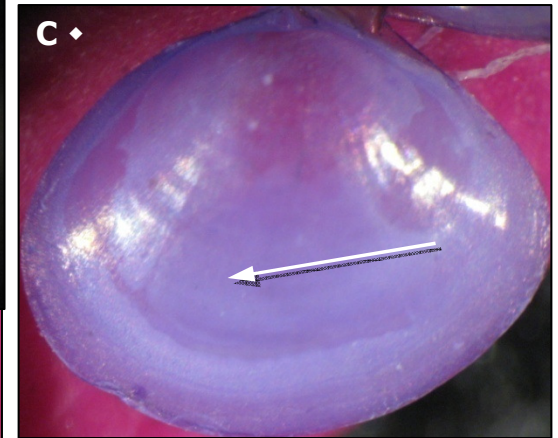
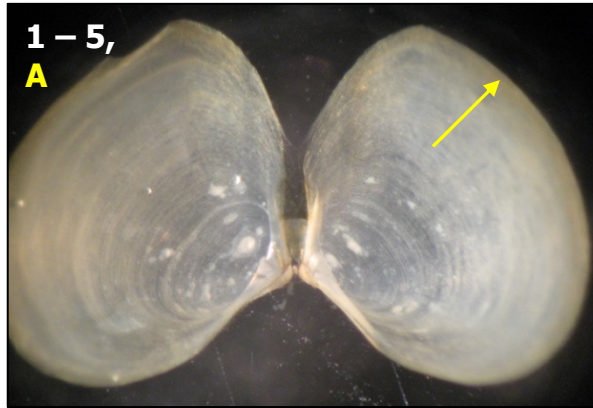
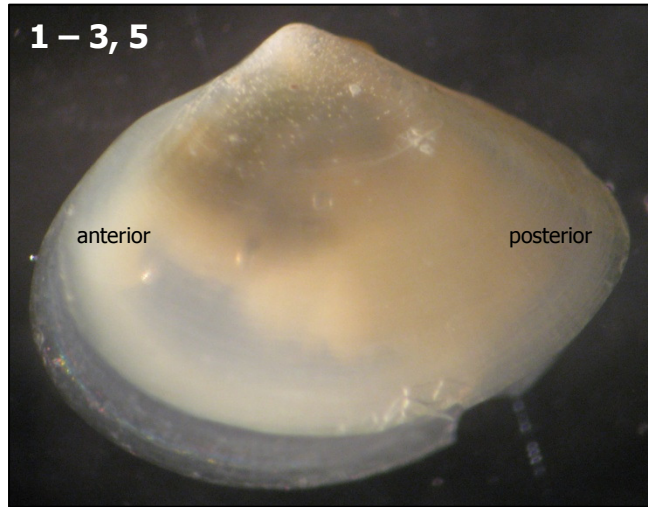
### External Characteristics

1. Shell shape is subovate to subtrigonal, posterior end has slight point
2. Posterior edge is longer
3. Slightly prosogyrate umbone
4. Many fine, closely spaced commarginal rings
5. Shell thin, transparent and white (although internal soft tissue gives animal a green coloration)
6. Iridescent periostracum
7. Range of specimens measured: 2.27 – 3.88 mm
8. Parivincular ligament; ligament is fatter anteriorly

### Internal Characteristics

- A. Smooth shell margin
- B. Two cardinal teeth in each valve <sup>2</sup>
- C. Deep pallial sinus

*Macoma balthica* (white form, juvenile form)



♦ Purple coloration due to crystal violet dye.

*Macoma expansa* or *M. balthica*\*

External Characteristics

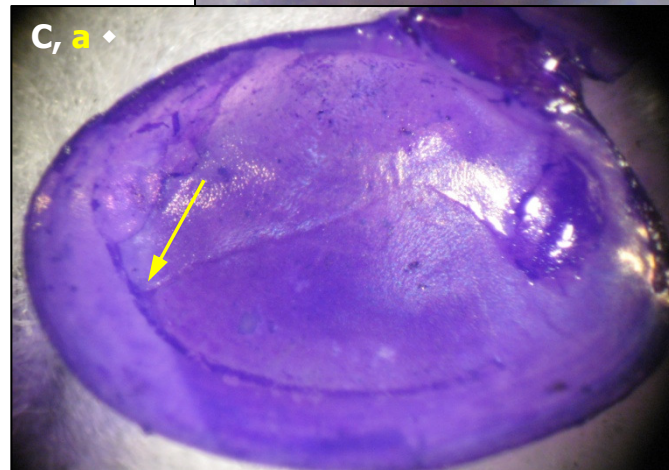
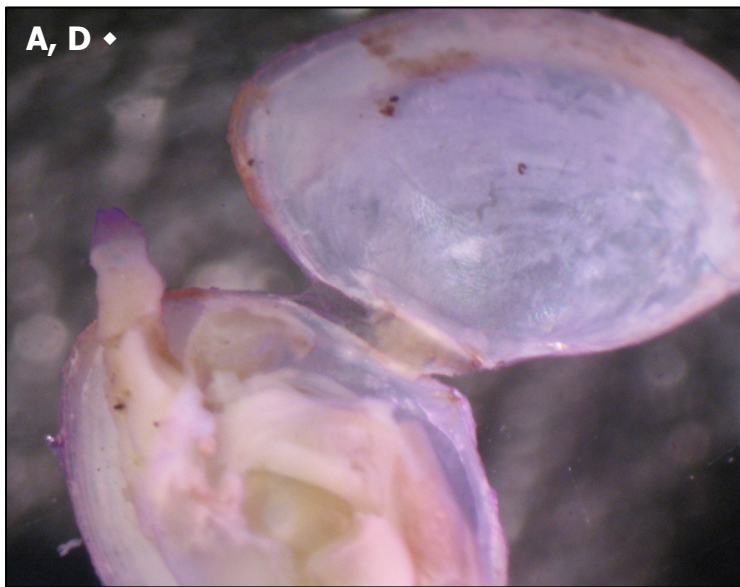
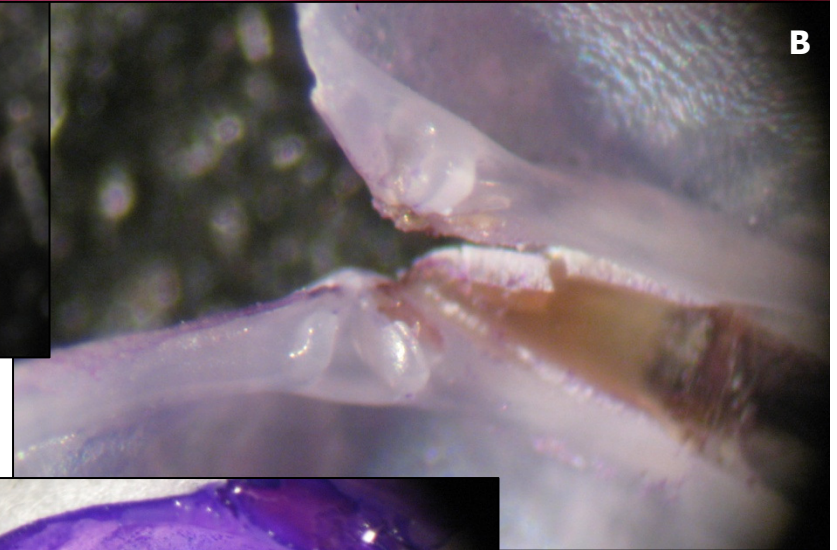
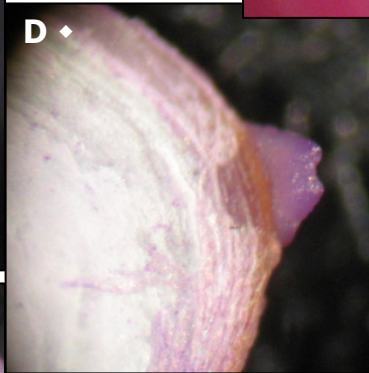
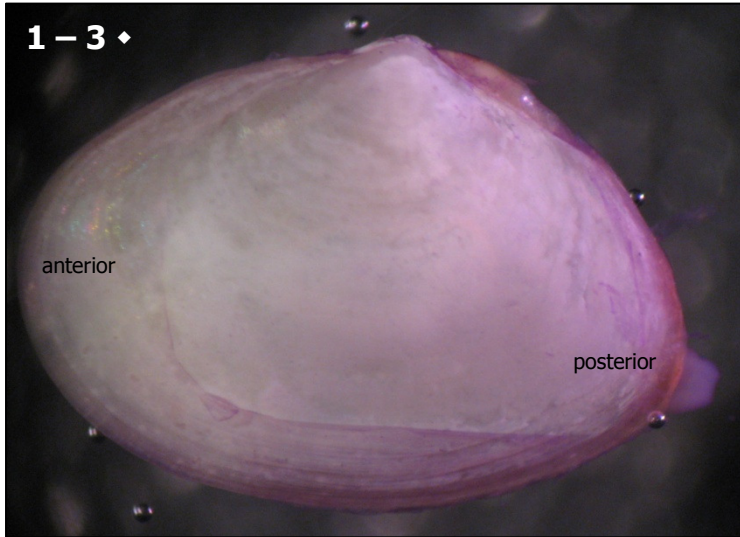
1. Shell shape is subovate
2. Anterior edge slightly longer
3. Orthogyrate umbone
4. Specimen measured: 4.1 mm
5. Parivincular ligament; ligament is fatter anteriorly

Internal Characteristics

- A. Smooth shell margin
- B. Two cardinal teeth in each valve <sup>2</sup>
- C. Moderate - deep pallial sinus <sup>1</sup>, respective of the species
  - a. Pallial sinus not detached from pallial line
- D. Fused siphons

\* Due to the variability found in *M. balthica*, this individual could not be confirmed as *M. expansa*, with confidence.

*Macoma expansa* or *M. balthica*



♦ Purple coloration on valves and soft body is from crystal violet dye.

*Macoma petalum* or *M. balthica*\* (white form; juvenile form)

External characteristics

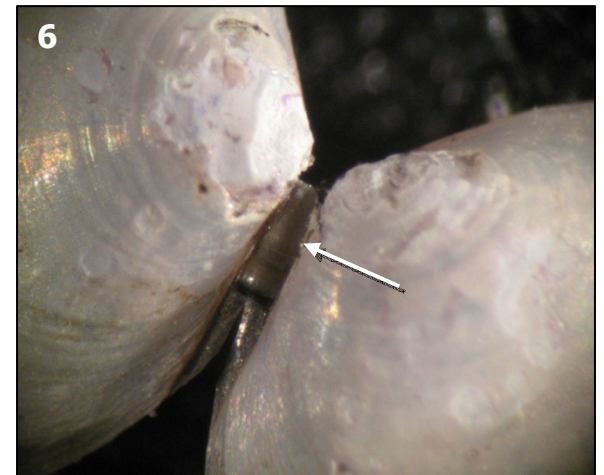
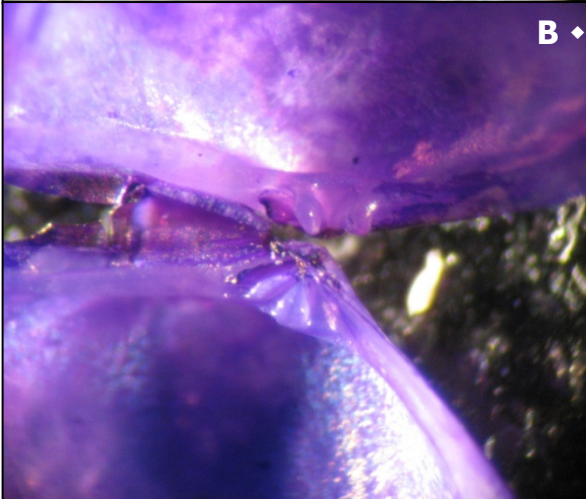
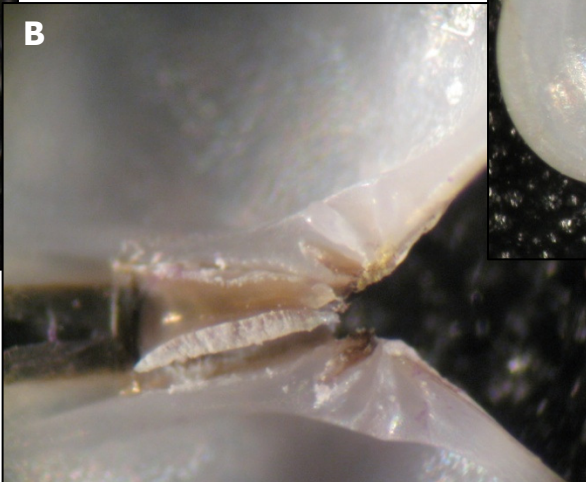
1. Shell shape is subovate; anterior end more rounded, posterior end with a slight point
2. Orthogyrate umbone
3. Many fine commarginal rings
4. Periostracum has iridescent quality
5. Range of specimens measured: 3.05 – 3.95 mm
6. Parivincular ligament; ligament is fatter anteriorly

Internal characteristics

- A. Smooth shell margin
- B. Two cardinal teeth in each valve <sup>2</sup>
- C. Deep pallial sinus in both valves, conjoined with pallial line for most of length <sup>2</sup>

\* Due to the variability found in *M. balthica*, this individual could not be confirmed as *M. petalum*, with confidence.

*Macoma petalum*; *M. balthica* (white form; juvenile form)



♦ Purple coloration due to crystal violet dye.

# Glossary of Terms <sup>1</sup>

cancellate rings: sculpture of intersecting radial and concentric ribs.

cardinal teeth: teeth directly below and radiating from the umbo.

chondrophore: spoon-shaped resilifer, often projecting from the hinge plate, containing a resilium.

commarginal rings: (formerly, concentric rings), follow direction of shell margin.

crenulate: with regular notches or corrugations, especially along ridges or shell edges.

inflated: strongly convex.

ligament: elastic proteinaceous structure linking the shell valves.

lateral teeth: hinge teeth not directly under and radiating from beaks.

lunule: subcircular to heart-shaped depression in front of umbones, usually with different sculpture and set off by marginal ridge or furrow.

nodose ribs: sculpture of tubercles or nodes.

opisthogyrate: with beaks pointing posteriorly.

pallial line: scar on valve interior from attachment of marginal pallial muscles.

pallial sinus: posterior embayment formed in pallial line to accommodate the siphonal retractor muscles.

parivincular: elongate external ligament situated posterior to umbones.

periostracum: outer proteinaceous layer of the shell.

prodissoconch: larval shell, frequently retained on the tip of the umbones.

prosogyrate: umbones pointing anteriorly.

radiating ribs: sculpture of ribs extending away from umbone.

resilifer: recess on or beneath the hinge plate to receive the resilium (internal portion of the ligament).

sub-: ---- combining form meaning nearly (e.g., subovate).

umbo: (plural, umbones) projecting, most curved region of the valve, including the beaks.



# Citations

1. Coan, E. V., P. Valentich Scott, and F. R. Bernard. 2000. *Bivalve seashells of western North America: marine bivalve mollusks from Arctic Alaska to Baja California*. Santa Barbara Museum of Natural History, Santa Barbara, California, Vol. 2, 764 pp.
2. Valentich-Scott, P. (pers. comm., 2009)

# Acknowledgements

- Paul Valentich-Scott
- Alix Laferriere
- Stacy Galleher
- Meghan Massaua
- Scott Groth
- Erin Cooper
- Beth Sosik



For more information please visit our website:

<http://www.dfw.state.or.us/MRP/shellfish/Seacor/index.asp>