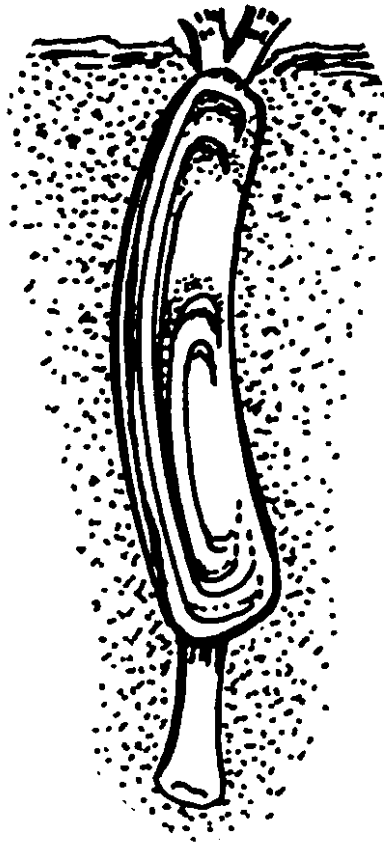
Northeastern Regional Aquaculture CENTER



~ Origin & Goals

Paul Rawson, Dale Leavitt, Dana Morse & Diane Murphy

MAINE Sea Grant Maine | Woods Hole Sea Grant | Cape Cod Cooperative Extension | Roger Williams University

Why are we interested in diversifying local shellfish culture opportunities?

- Oyster and quahog are the big TWO in northeast!
- What happens to your business if you should lose a crop due to disease or some other uncontrollable environmental change?
- What other options do we have?
  - Soft shell clam
  - Bay scallop
  - Surf clam
  - European oyster
  - Blue mussel

But….

- The more options we develop – the more opportunities we create to
  - sustain a viable business,
  - make a living, and
  - expand the aquaculture industry in the northeast!

History of Razor Clam Research in NE

- NRAC funded project (Burt & Leavitt) – Started in 2001
  - Goal
    - to provide an opportunity for the current shellfish culture industry to investigate, develop, and optimize the growout technology for a cultured razor clam
  - Specific objectives of the proposed work include:
    - arrange with the participating commercial hatchery to spawn and raise larval/juvenile razor clams to a one to two inch size for distribution within the project
    - solicit ideas for technology to achieve razor clam grow-out from an array of commercial shellfish growers
    - convene a committee of five individuals to select six shellfish growers for participation in the project
    - supply each of the six selected growers with razor clam seed and operating funds to construct and implement their concept of appropriate razor clam growout technology
    - task the industry participants to collect and relay the data to the Principal Investigator for compilation and analysis
    - identify sources and track economic data on razor clam markets within the region
    - analyze the data and project the overall benefits and limitations to the development of the razor clam as an alternate commercial aquaculture species in the northeast
- Will cover results in a minute

Current Razor Clam Project

- Proposal submitted by Rawson, Leavitt, Morse & Murphy in 2010 & funded by NRAC in 2011
  - Title: *Optimization of Hatchery & Culture Technology for Razor Clams*
- Goal:
  - Support the diversification of the shellfish culture industry in the NE
- Objectives:
  - Developing improved hatchery methods for the production of razor clam seed in order to provide commercial shellfish hatcheries with the means to produce a steady, reliable source of seed
  - Identifying improvements in grow-out technology for the culture of razor clams and increase the industry's interest in and acceptance of this alternative species.
  - Tracking the marketability of razor clams in regional and broader markets.
  - Communicating the progress and results of proposed work directly to industry partners and the industry at-large.

Razor Clam Roundtable

- We will convene two Razor Clam Roundtable meetings with shellfish growers, at which we will:
  - introduce as many growers to razor clam culture, as possible,
  - review results from the previous razor clam project,
  - discuss potential modifications to the grow-out protocols and technologies, and
  - establish linkages between industry participants and extension partners.

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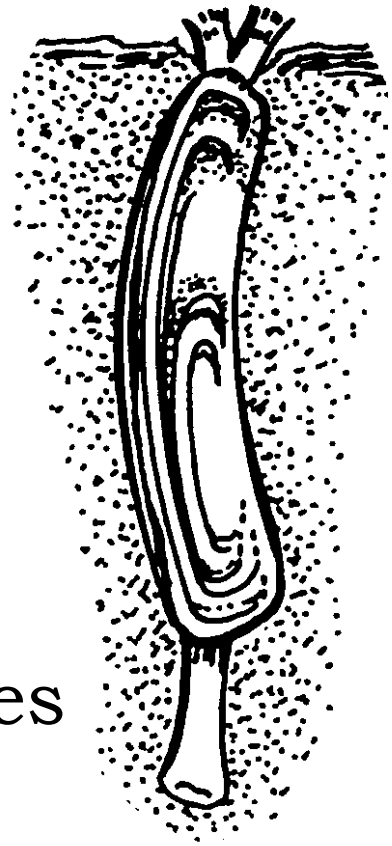


~ Life History & Current Fisheries

Paul Rawson, Dale Leavitt, Dana Morse & Diane Murphy

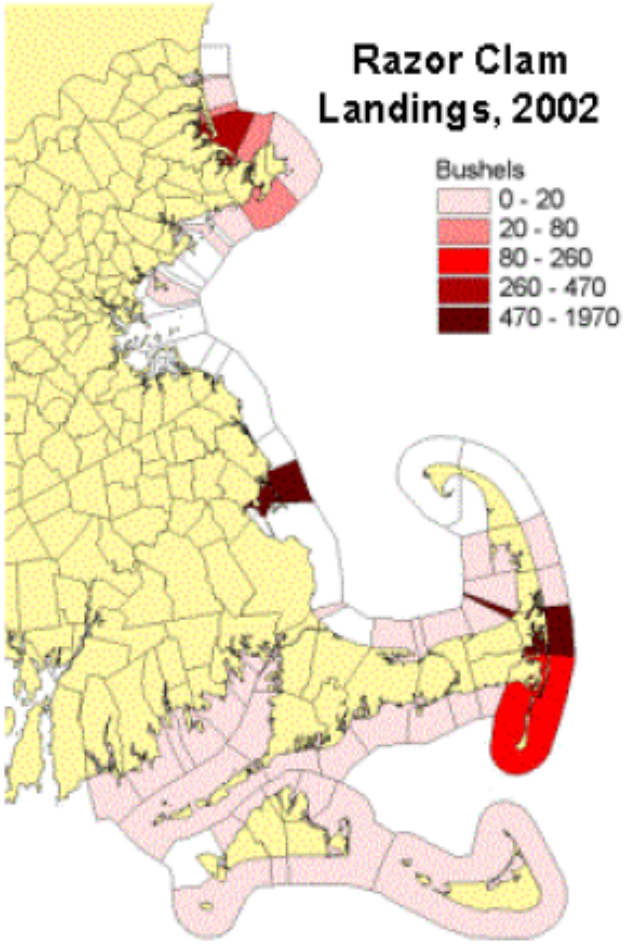
Maine Sea Grant | Woods Hole Sea Grant | Cape Cod Cooperative Extension | Roger Williams University

Razor clam fishery

- Harvesting methods
  - Spearing
  - Dry digging
  - Pumping
  - Method of choice for harvesting is "salting"

Razor clam fishery

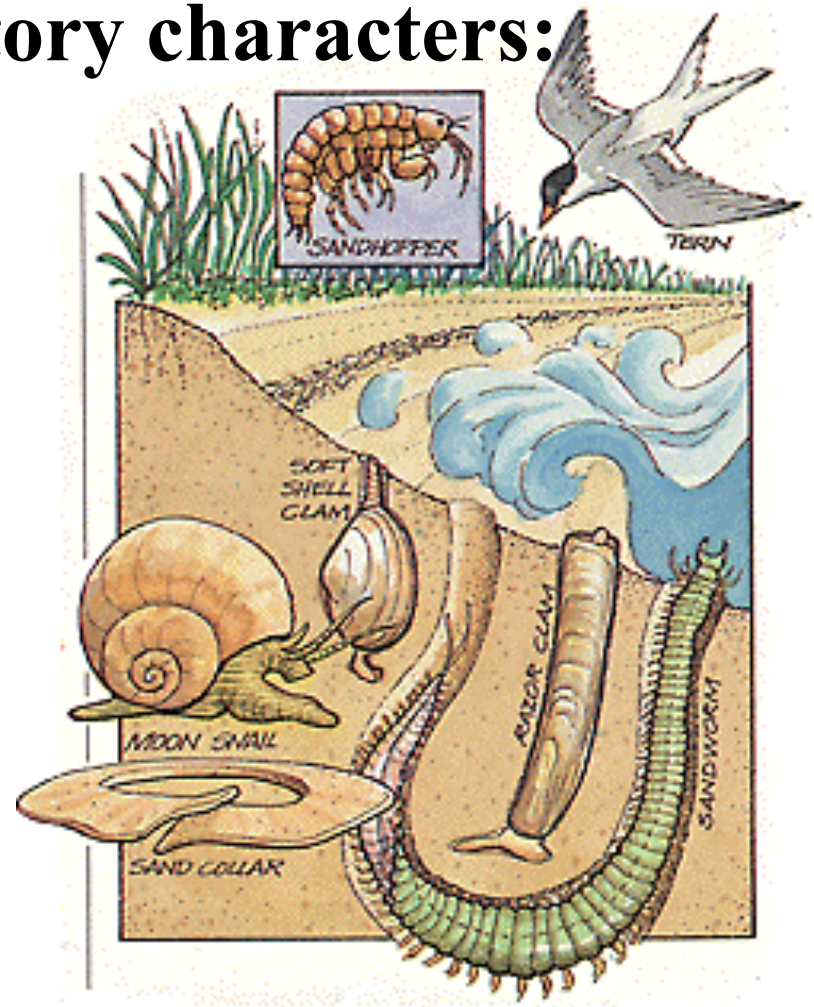
- Harvesting methods
  - Spearing
  - Dry digging
  - Pumping
  - Method of choice for harvesting is "salting"
- Small scale fishery on-going in MA
  - North Shore, Duxbury Bay & Cape Cod
- Landed value has approached $2.00/lb live wt.
  - At its best, that translates to between $0.25 to $0.40 per piece.



What about farming them?

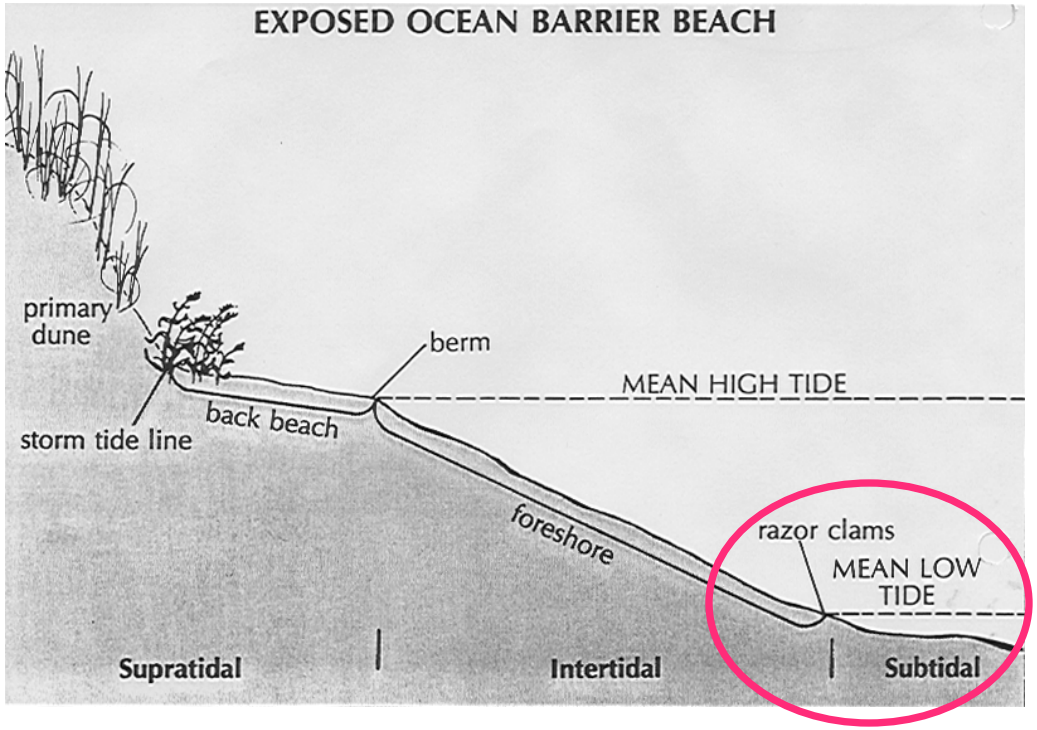
Need to consider – life history characters:

- Preferred habitat
- Population characteristics
- Food
- Growth
- Predation & Disease
- Behavior
- Markets



Razor Clam habitat

- low intertidal to subtidal
- fine to medium sand – can be muddy sand if without silt
- can live in unstable sand and tolerate dynamic areas
- Prefers areas with moderate water flow



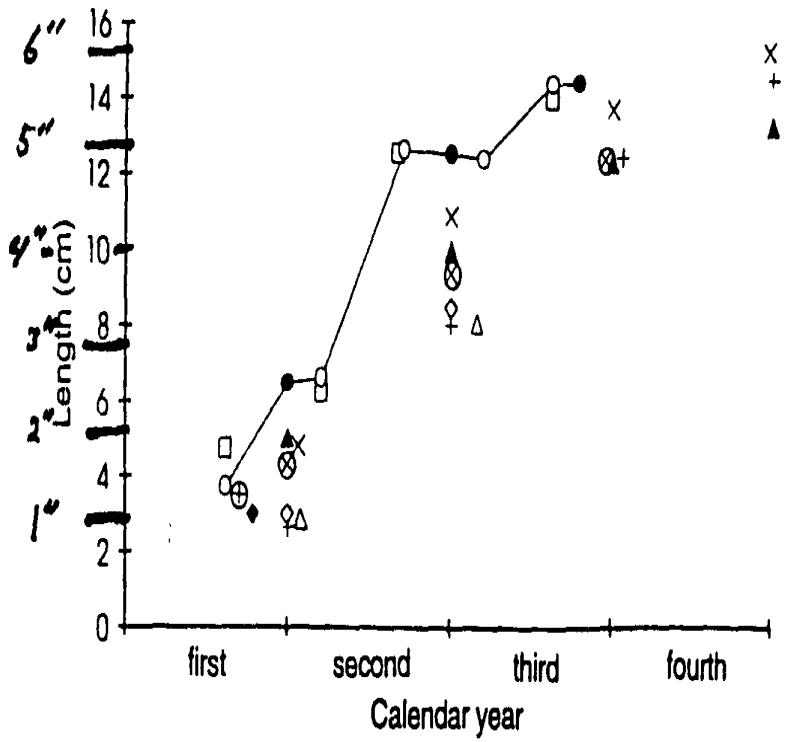
Population characteristics

Stocking densities:

- Luczak *et al.* (1993) observed recruitment of 30,000ind/m^2 that dropped to 10,000 within two weeks
- densities of juveniles recorded at 2,000/m^2 (~200/ft^2) in Chesapeake Bay
  - low over-winter survival
  - Final density of 4-6/m^2 (<1/ft^2)
- Planting densities of other razor clam species
  - *Solen marginatus* – 400/m^2 (37/ft^2)
  - *Ensis arcuatus* - 120/m^2 (11/ft^2)

Food & Growth

- Suspension feeder and doesn't seem to feed on detritus
- Growth – data derived from studies in the North Sea



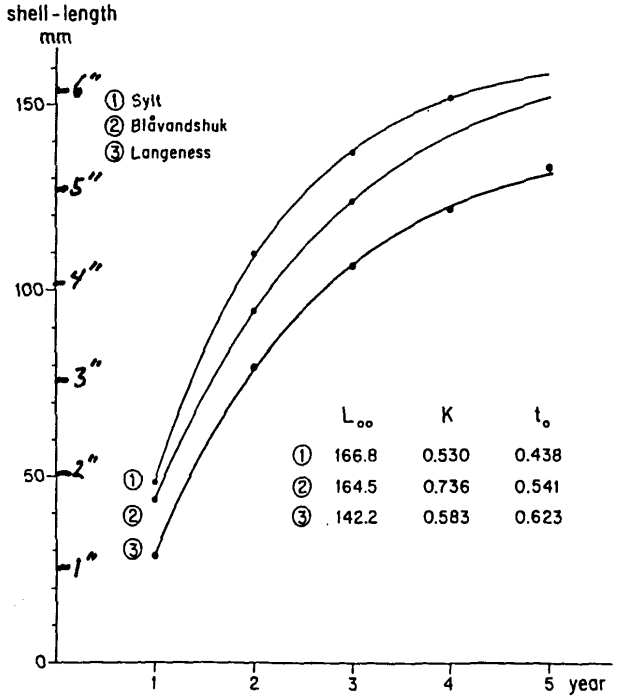


Fig. 1. Mean shell length of *Ensis directus* collected on tidal flats in the Wadden Sea near Langeness (F.R.G.), in February 1984 (all samples together). For comparison the Von Bertalanffy growth curves are also drawn for shells from the North Sea, off Sylt (1) and off Blåvandshuk (2) (Mühlenhardt-Siegel et al., 1983)

Predation

- There are a number of common bivalve predators that will eat razor clams if given the opportunity, including:

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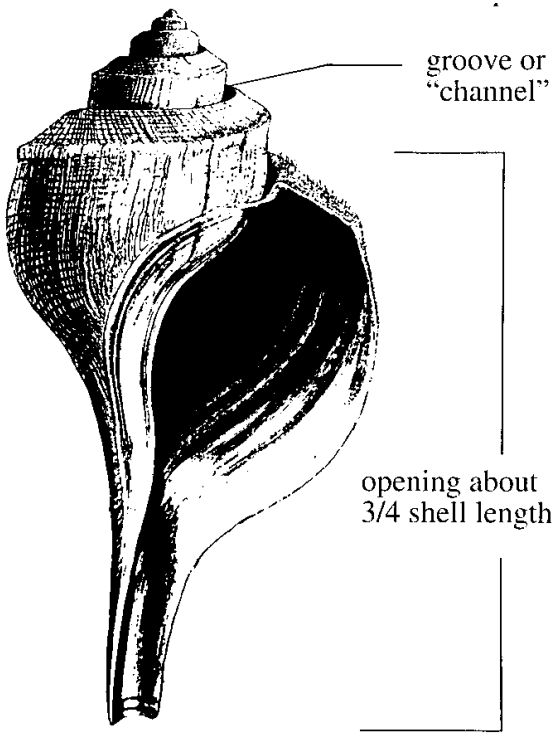

Fig.B. ***BUSYCOTYPUS CANALICULATUS*** ***(=Busycon c.)*****, CHANNELED WHELK:**

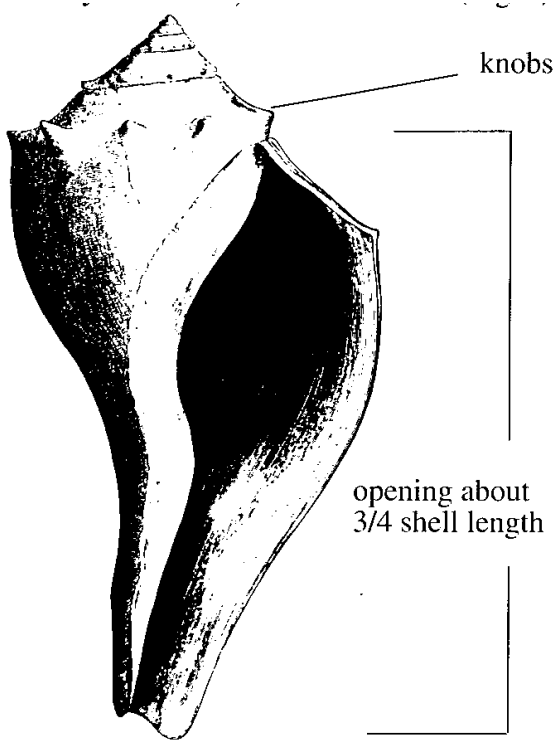

Fig.C. ***BUSYCON CARICA*****, KNOBBED WHELK**

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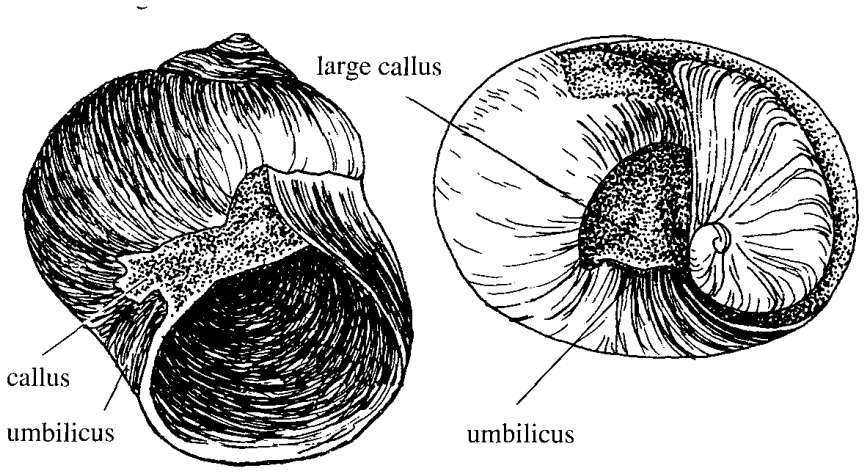

Fig.A. ***NEVERITA DUPLICATA (=Polinices d.),*** **SHARK EYE**

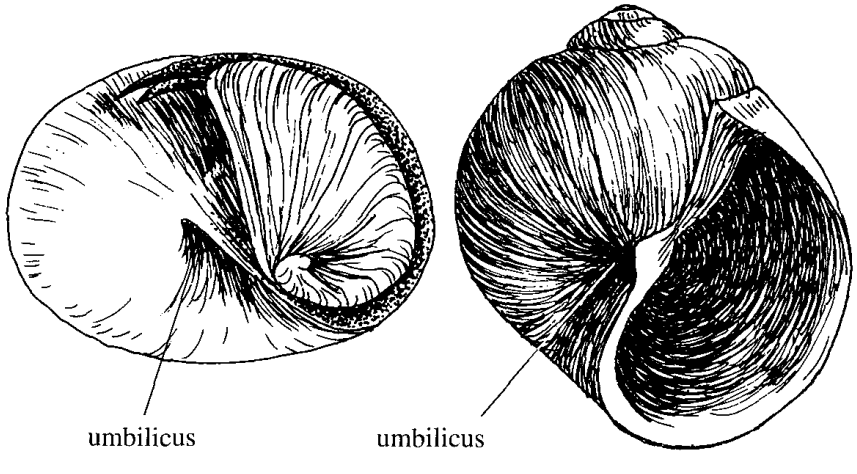

Fig.B. ***EUSPIRA HEROS (=Lunatia h., =Polinices h.),*** **NORTHERN MOONSNAIL**

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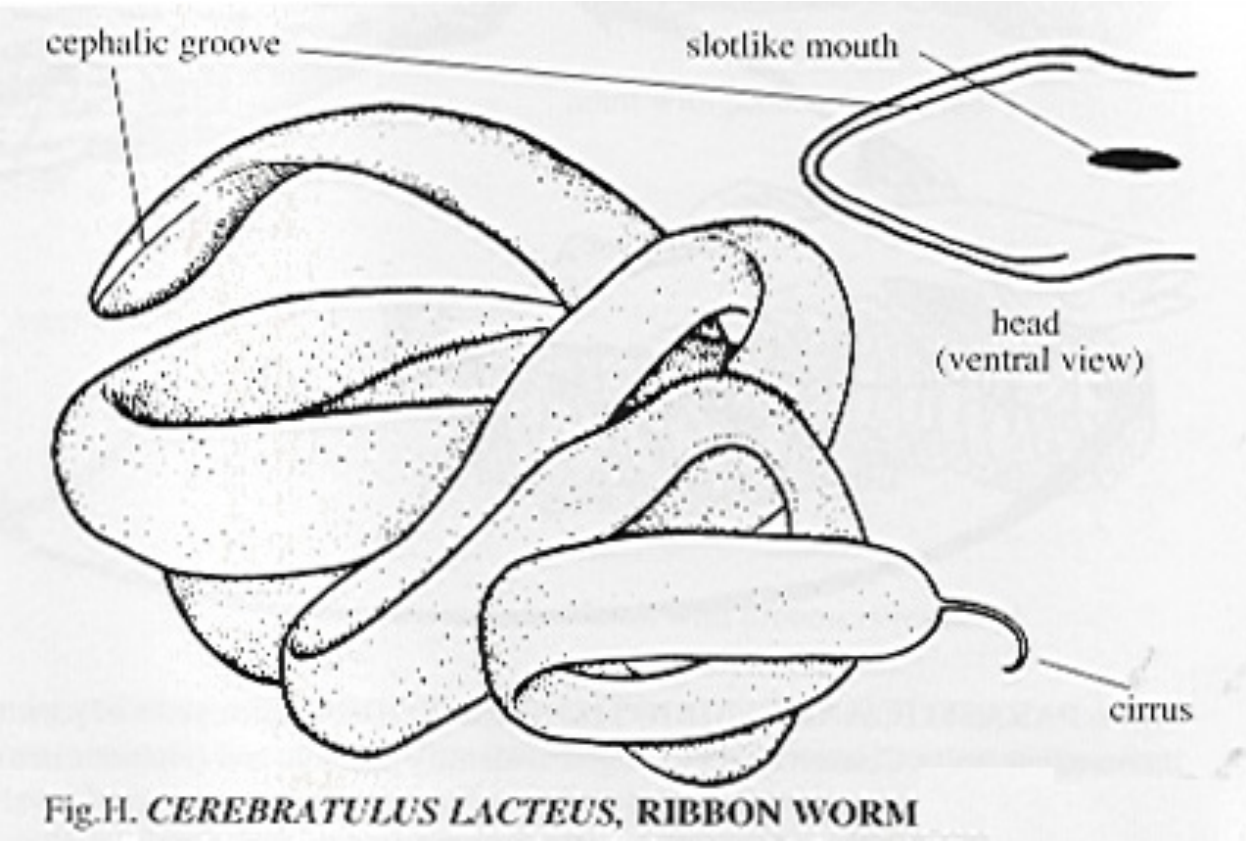

Fig.H. *CEREBRATULUS LACTEUS*, RIBBON WORM

Predation

- There are a number of common bivalve predators that will eat razor clams if given the opportunity, including:

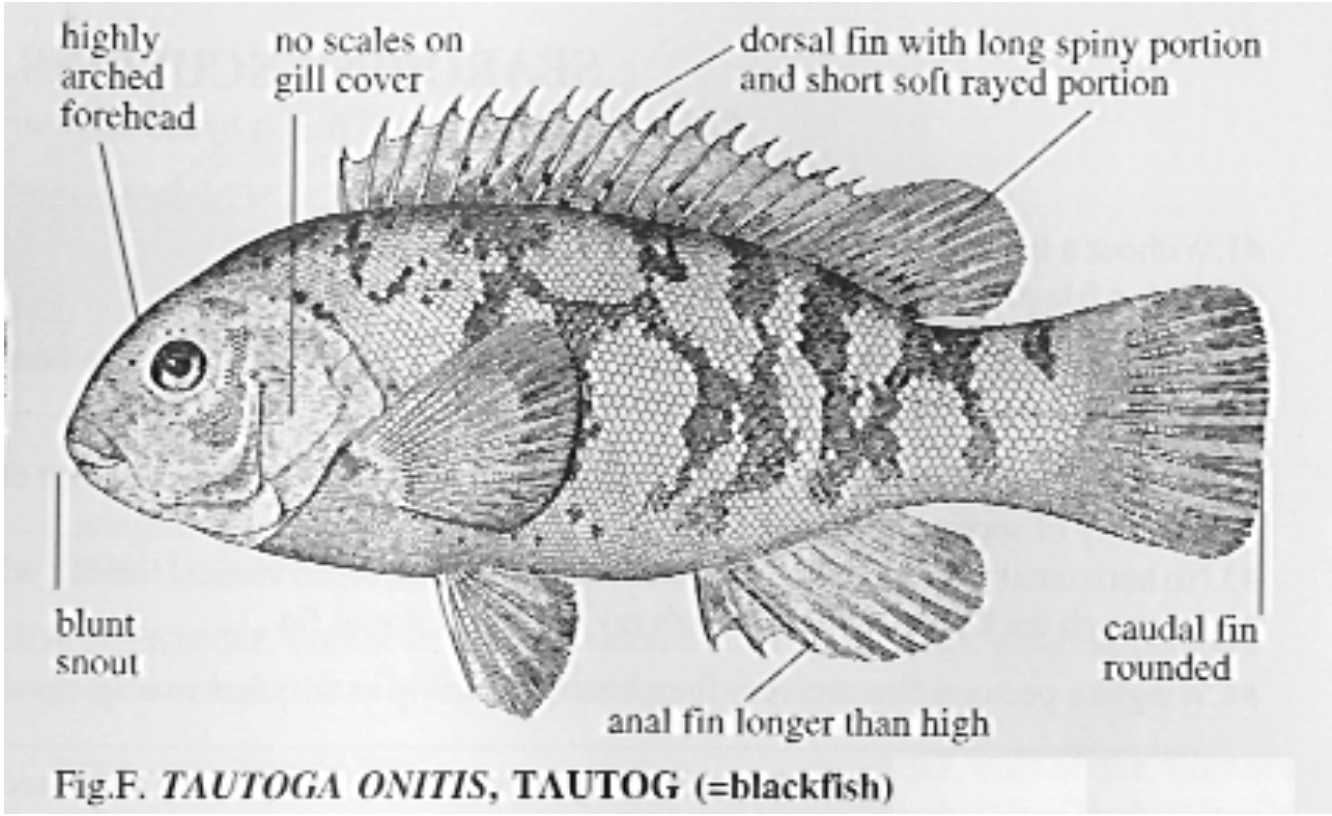

Fig.F. *TAUTOGA ONITIS*, **TAUTOG (=blackfish)**

Predation

- There are a number of common bivalve predators that will eat razor clams if given the opportunity, including:

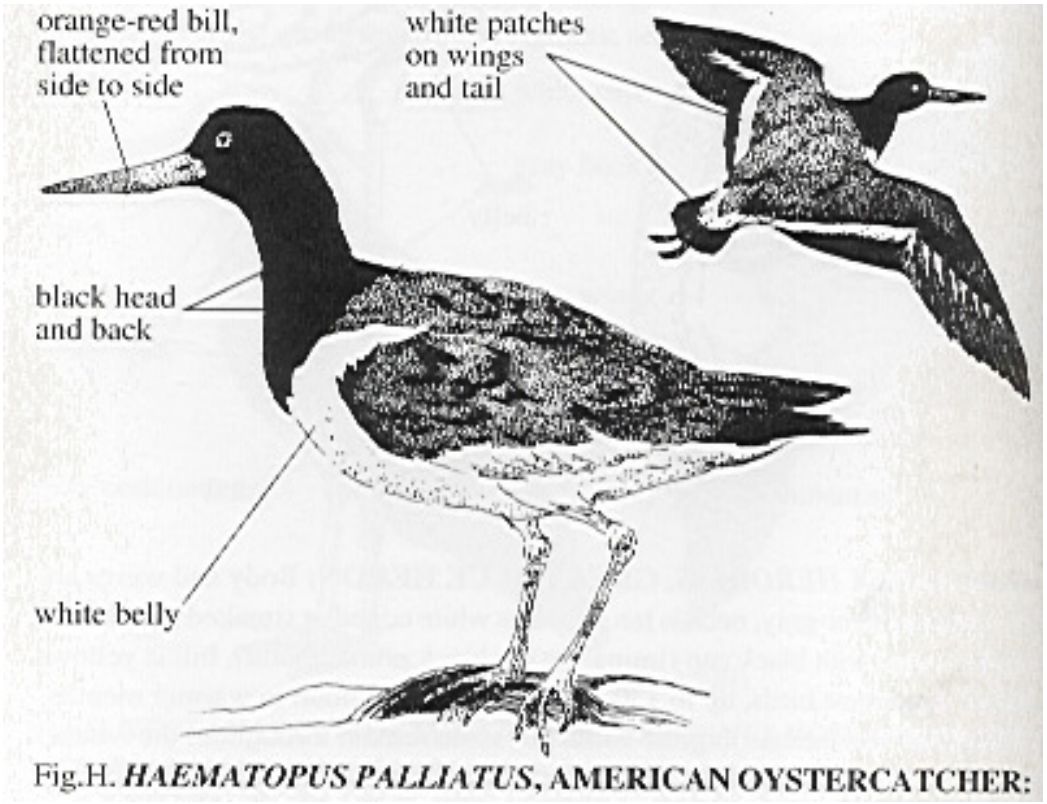

Fig.H. *HAEMATOPUS PALLIATUS*, AMERICAN OYSTERCATCHER:

Disease

No observed diseases in western Atlantic, but…

- West coast razor clam (*Siliqua spp.*) populations devastated by NIX
- In Holland in 1994, researchers observed a huge crash of the *Ensis directus* population without an explanation, no pathology done!

Behavior

Razor clams are very unique bivalves with respect to their mobility.

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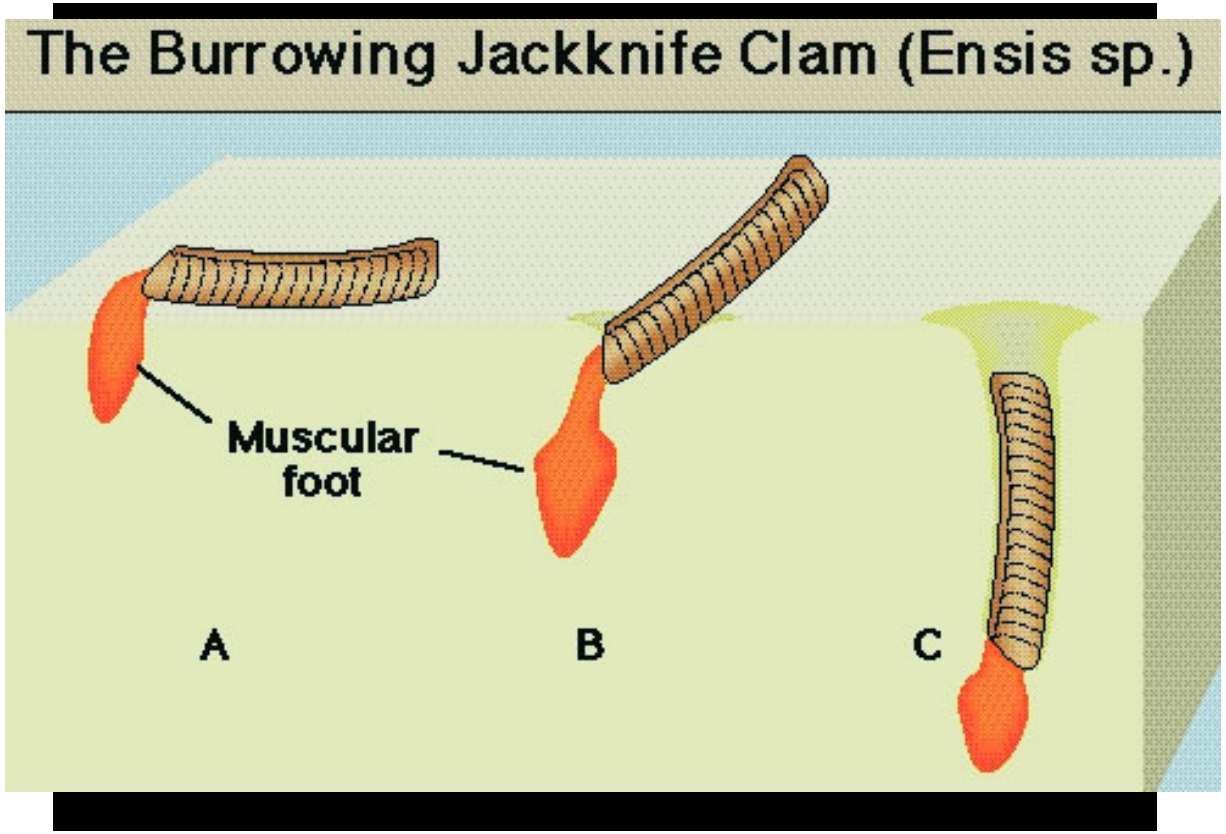
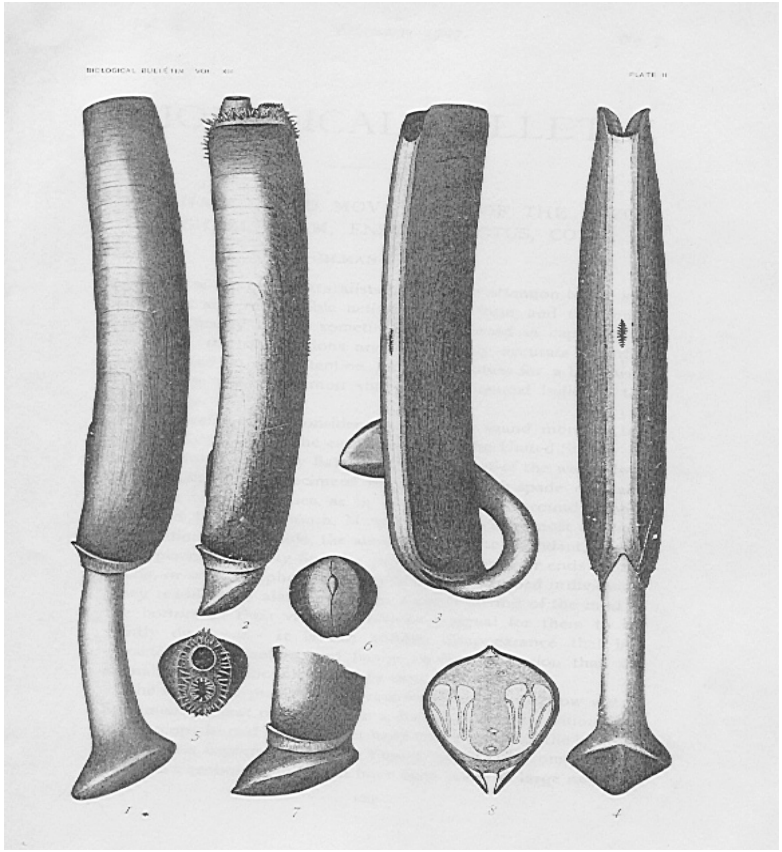
- They dig!



Behavior

Razor clams are very unique bivalves with respect to their mobility.

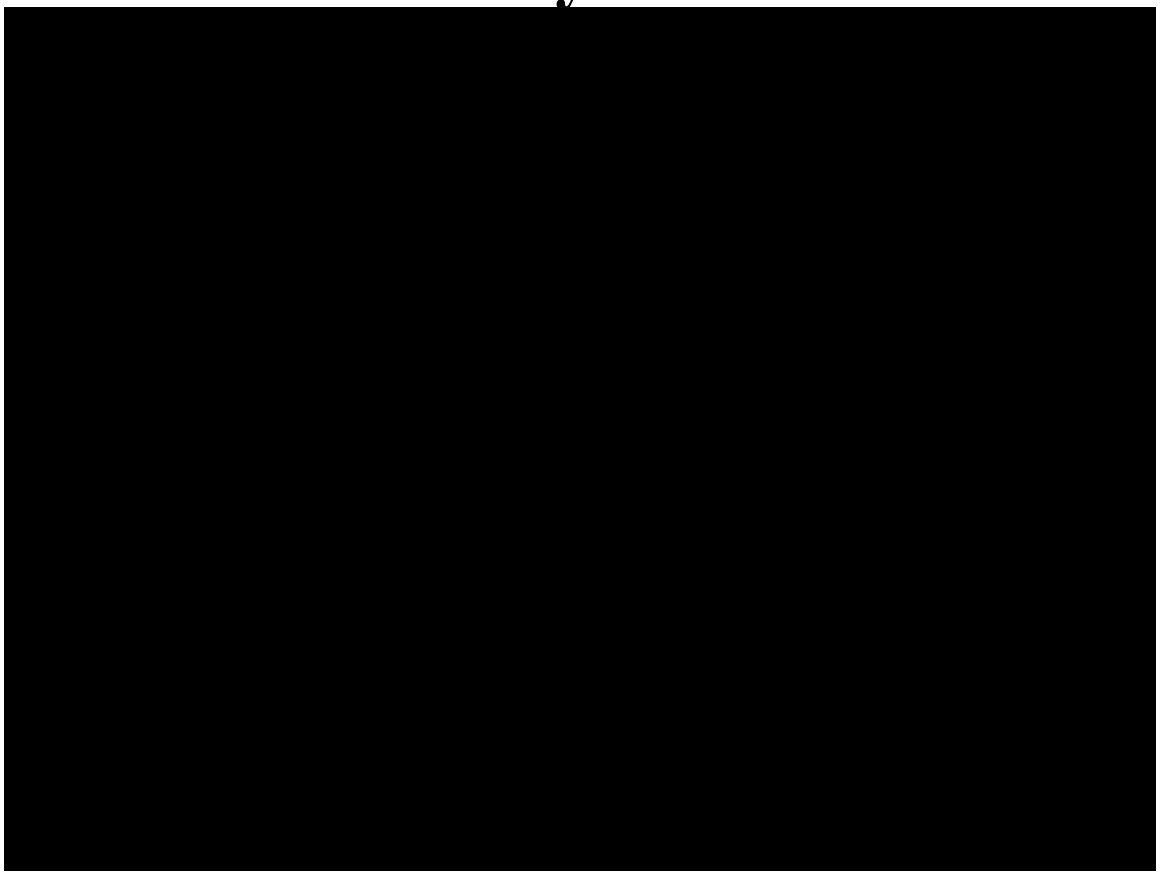
- They dig
- They move on the surface!



Behavior

Razor clams are very unique bivalves with respect to their mobility.

- They dig
- They move on the surface
- They swim!



What about farming them?

Need to consider the market:

- Demand for wild product has been steady but low
- One New York buyer said he can move 1,200 lbs daily
  - But, he needs consistent supply to develop market
- In 2001, I identified six buyers between Cape Cod and New York in a phone survey
- Two markets identified
  - Live market
  - Processor market

What about farming them?

Live market (Fulton Fish Market):

- Consumers
  - Formerly (Hoboken) Italian
  - Now primarily (New York) Asian
- Product must be high quality – i.e. not sluggish (winter)
- Size acceptability
  - Buyer 1 - minimum 3 inches; not the largest
  - Buyer 2 – minimum 6 inches; only the largest
  - European market is 75 mm (3 in)

What about farming them?

Processor market:

- Shuck (and grind?) clam for processed product
- Processors prefer largest sizes
- Couldn't find anyone to discuss this market
  – does it exist now?