

Invertebrates Identification Guide

for

ChesMMAP and NEAMAP
Diet Analysis Studies

Chesapeake Bay Multispecies Monitoring and Assessment Program
Northeast Area Monitoring and Assessment Program

This book is a compilation of identification resources for invertebrates found by the Virginia Institute of Marine Science (VIMS) Multispecies Research Group (MRG) in fish stomach samples. By no means is it a complete list of all possible prey types. It is simply what has been found in past ChesMMAAP and NEAMAP diet studies. Any photos or illustrations sourced outside of the MRG are numerically indicated in green next to the photo and referenced at the end of the document. A copy of this document is stored in both the ChesMMAAP and NEAMAP lab network drives in a folder called ID Guides, along with other useful identification keys, articles, documents, and photos. If you want to see a larger version of any of the images in this document you can open the original file for the photo by navigating to the appropriate subfolder within the Fisheries Gut Lab folder.

Other useful links for identification:

Isopods

<http://www.19thcenturyscience.org/HMSC/HMSC-Reports/Zool-33/htm/doc.html>

<http://www.19thcenturyscience.org/HMSC/HMSC-Reports/Zool-48/htm/doc.html>

Polychaetes

<http://web.vims.edu/bio/benthic/polychaete.html>

<http://www.19thcenturyscience.org/HMSC/HMSC-Reports/Zool-34/htm/doc.html>

Cephalopods

<http://www.19thcenturyscience.org/HMSC/HMSC-Reports/Zool-44/htm/doc.html>

Amphipods

<http://www.19thcenturyscience.org/HMSC/HMSC-Reports/Zool-67/htm/doc.html>

Molluscs

<http://www.oceanica.cofc.edu/shellguide/>

<http://www.jaxshells.org/slifex4.htm>

Bivalves

<http://www.jaxshells.org/atlanticb.htm>

Gastropods

<http://www.jaxshells.org/atlantic.htm>

Crustaceans

<http://www.jaxshells.org/slifex26.htm>

Echinoderms

<http://www.jaxshells.org/eich26.htm>

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Getting Started

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dead man's fingers (6)
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WORM-LIKE (page)

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BUGGY/CREEPY, CRAWLY (page)

amphipods (24-26)
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mysids (30)
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crab zoea/megalopa (38)
shrimp zoea (34)
insects (19)

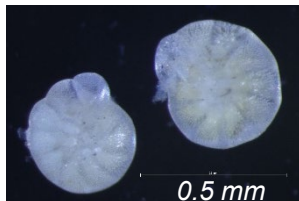
0994 no sample
 0995 unidentified species
 0629 unidentified worm

Phylum Protozoa

FORAMINIFERA

Class Granuloreticulosea

1090 unidentified foram



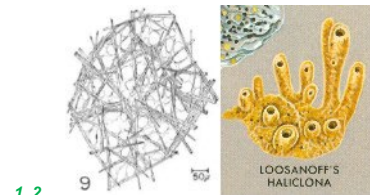
Very tiny spiral snail-like organisms

Phylum Porifera

SPONGES *very rarely encountered*

0548 unidentified sponge

0989 *Haliclona loosanoffi*



Phylum Cnidaria

JELLYFISHES

0900 unidentified jellyfish

HYDROIDS

Class Hydrozoa

Order Hydroida

0703 unidentified hydroids



Found as a single strand, broken up, or in clumps like in ChesMMA sheephead. These are the colonial organisms that clog up the ChesMMA net in summer, categorized as Habitat in FEED.

SEA ANEMONES

Class Anthozoa

Order Pennatulacea

0776 *Renilla reniformis*, sea pansy

Order Actiniaria

0643 unidentified sea anemones



sea pansy



Often found in winter flounder

Phylum Ctenophora

COMB JELLIES

0774 unidentified comb jelly

Phylum Nemata

NEMATODES

0901 unidentified nematode



Phylum Acanthocephala

SPINY-HEADED WORMS

1105 unidentified acanthocephalan



Most commonly in winter flounder and sometimes other species, parasitic

Phylum Ectoprocta

MARINE BRYOZOANS

Class Gymnolaemata

0689 unidentified marine bryozoans

0825 *Alcyonidium* spp.. dead man's fingers



Dead man's fingers - Alcyonidium spp. often found in sheepshead

Phylum Mollusca

0709 unidentified mollusc meat

5036 unidentified mollusc

If you find a hermit crab in a snail/drill shell, use the hermit crab code and note in the comments "in [snail/drill taxa] shell".

SNAILS, DRILLS, NUDIBRANCHS

Class Gastropoda

0884 unidentified snail or drill (aka unidentified gastropod)

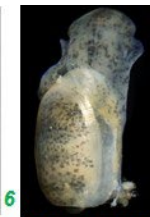
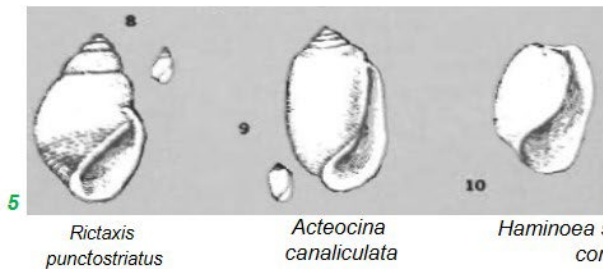
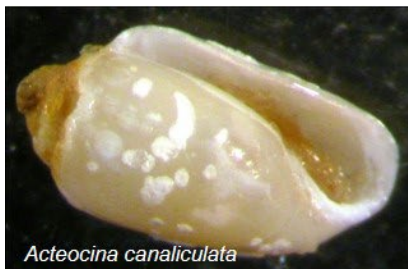
0855 unidentified nudibranch

0048 unidentified whelk

5028 *Acteocina canaliculata*, barrel bubble

0514 *Rictaxis punctostriatus*, pitted baby-bubble

0806 *Haminoea solitaria*, solitary bubble

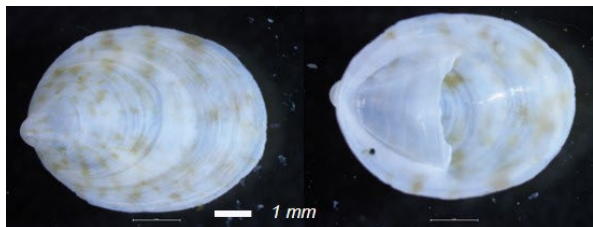


Haminoea solitaria – tiny black speckled snail commonly found without shell

1049 *Crepidula fornicata*, common Atlantic slipper shell

0881 *Crepidula* spp., slipper shells

0891 *Sinum perspectivum*, ear shell



Crepidula spp. Top (left), Bottom (right)



Sinum perspectivum

5027 *Anachis* spp., dove snails

5025 *Mitrella lunata*, lunar dove snail

0737 *Mitrella* spp., dove snails

0818 *Littorina* spp., periwinkles

0563 *Hydrobia* spp., seaweed snails

0838 *Urosalpinx cinerea*, Atlantic oyster drill

0538 *Melampus bidentatus*, eastern melampus



Anachis spp.



Mitrella lunata



Littorina spp.



Hydrobia spp.



Urosalpinx cinerea



Melampus bidentatus

Phylum Mollusca (Gastropods continued)

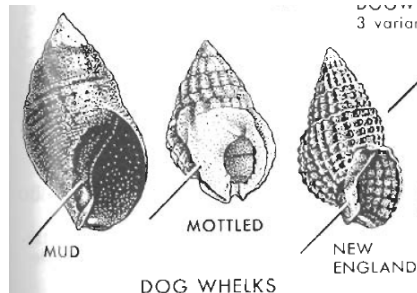
0742 *Nassarius trivittatus*, New England dog whelk - very common

0506 *Nassarius vibex*, mottled dog whelk

1083 *Nassarius* spp., unidentified whelk



Nassarius trivittatus



N. obsoletus

N. vibex

N. trivittatus

0800 *Polinices heros*, moon snail

0704 *Polinices duplicatus*, shark-eye moon snail

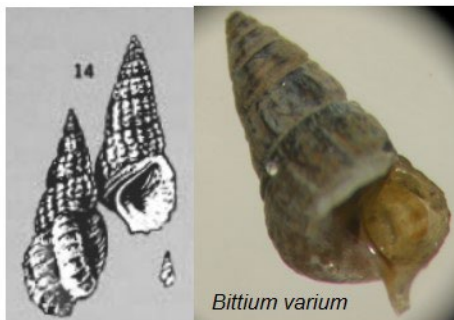
1059 unidentified moon snail

0984 *Bittium varium*, grass cerith

5015 *Turbonilla interrupta*, interrupted turbonilla

1021 *Turbonilla* spp., turbonillas

1158 *Epitonium rupicola*, lined wentletrap

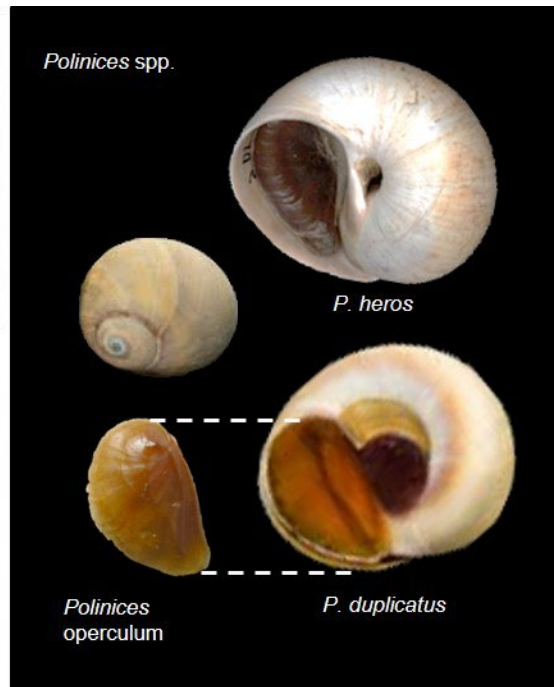


Bittium varium

Epitonium rupicola



Turbonilla interrupta



P. heros

Polinices operculum

P. duplicatus

CLAMS, MUSSELS, SCALLOPS, OYSTERS

Class Bivalvia

5039 unidentified clams

5003 unidentified clam siphon

0498 unidentified bivalve *this includes all clams, mussels, oysters*

Phylum Mollusca (Bivalves continued)

0790 unidentified jackknife/razor clams

Superfamily Solenoidea includes *Tagelus* and *Ensis*, most common razor clams crushed up in samples

0888 *Tagelus plebeius*, stout tagelus

0803 *Tagelus divisus*

1020 *Tagelus* spp., tagelus

0816 *Ensis directus*, Atlantic jackknife clam

0947 *Solen viridis*, green jackknife clam

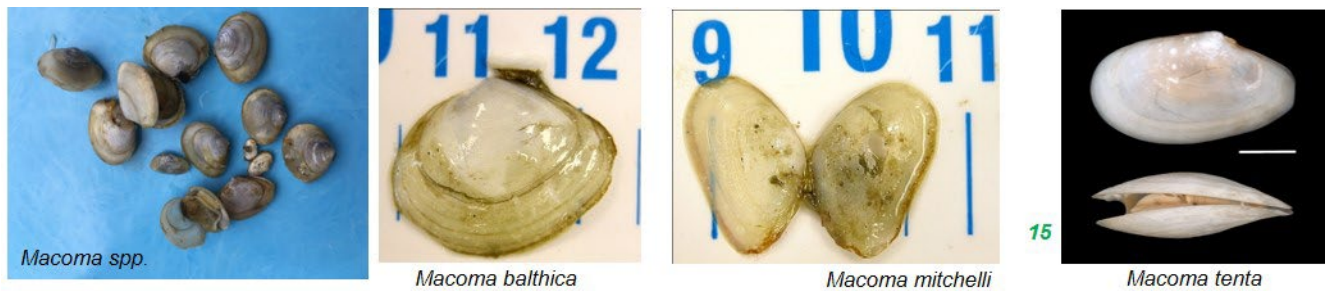


0820 *Macoma* spp., macoma clams

0583 *Macoma balthica*, baltic macoma

0964 *Macoma mitchelli*, Mitchell's macoma

0584 *Macoma tenta*, narrowed macoma



0801 *Mya arenaria*, soft shell clam

0882 *Mulinia lateralis*, dwarf surf clam has sharp distinct ridge



Mya arenaria (left) and *Macoma balthica* (right)

Phylum Mollusca (Bivalves continued)

1053 unidentified mussel may be smooth or ribbed, *iridescent inside*

0802 *Mytilus edulis*, blue mussel

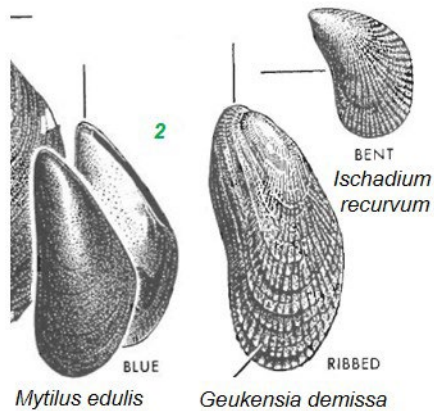
0842 *Ischadium recurvum*, bent mussel

5024 *Geukensia demissa*, Atlantic ribbed mussel

0826 *Anadara ovalis*, blood ark

0886 *Anadara transversa*, transverse ark

0558 *Anadara* spp., arks shells have bristly covering, often broken up



5013 *Gemma gemma*, amethyst gemclam

1063 *Nucula proxima*, Atlantic nutclam

1068 *Solemya velum*, Atlantic awningclam

0022 *Placopecten magellanicus*, sea scallop



0821 *Mercenaria mercenaria*, quahog

0941 *Corbicula fluminea*, Asian clam



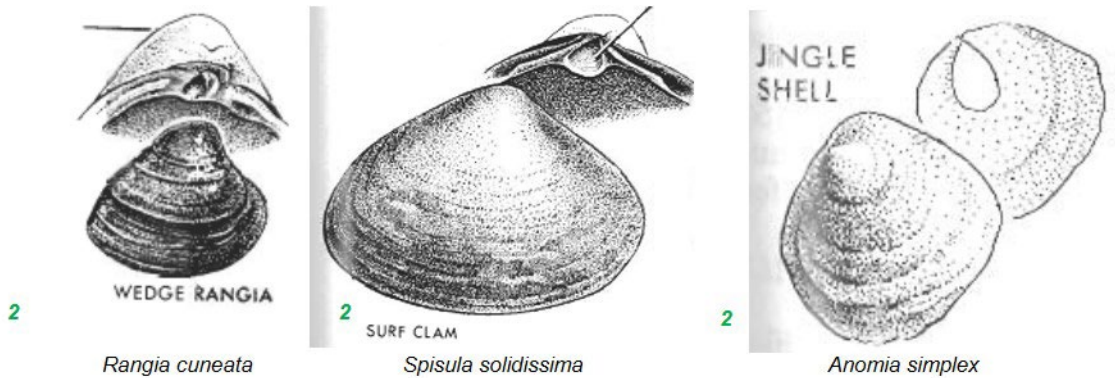
Mercenaria mercenaria juveniles have distinct concentric ridges

Phylum Mollusca (Bivalves continued)

0837 *Rangia cuneata*, wedge rangia - distinct wedge shape, common in catfish diet

0091 *Spisula solidissima*, Atlantic surf clam

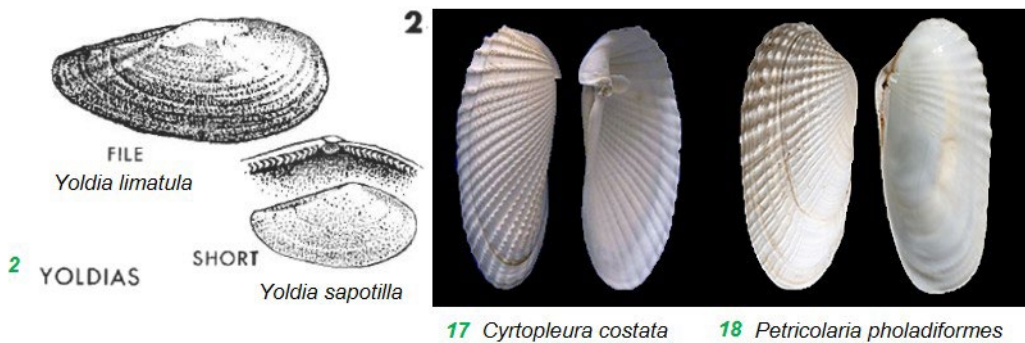
0809 *Anomia simplex*, common jingle



0836 *Yoldia* spp., yoldia clam inside of hinge shows distinct bumpy ridge

0805 *Cyrtopleura costata*, angel wing

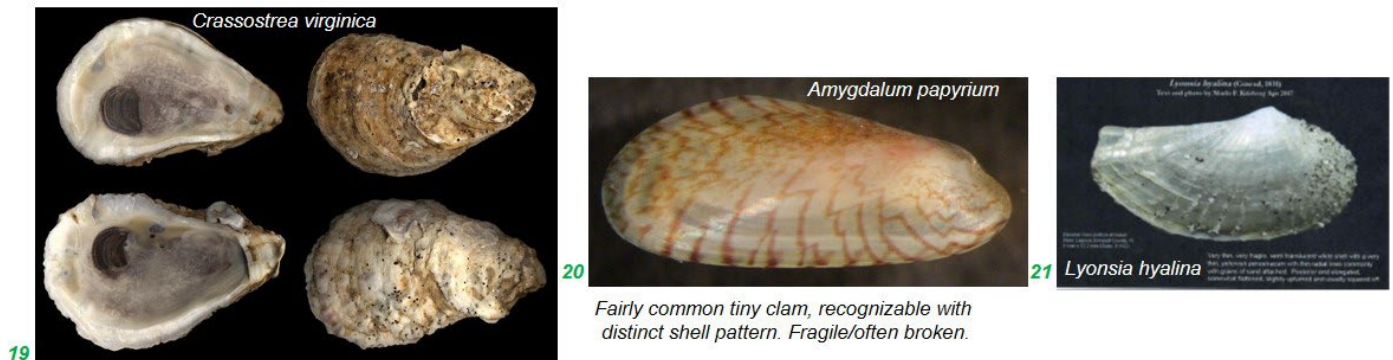
0885 *Petricolaria pholadiformes*, false angel wing



0819 *Crassostrea virginica*, common oyster

1065 *Amygdalum papyrium*, Atlantic papermussel

0804 *Lyonsia hyalina*, glassy lyonsia



Phylum Mollusca (continued)

SQUID, OCTOPUSES

Class Cephalopoda

0661 unidentified cephalopod

1110 unidentified squid

1028 *Doryteuthis pealeii*, longfin inshore squid vastly most common

0879 *Illex illecebrosus*, northern shortfin squid

0725 *Loliguncula brevis*, Atlantic brief squid

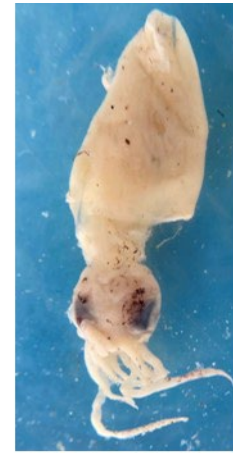
0854 *Octopus vulgaris*, common Atlantic shore octopus



longfin inshore squid
Doryteuthis pealeii

Atlantic brief squid
Loliguncula brevis

northern shortfin squid
Illex illecebrosus



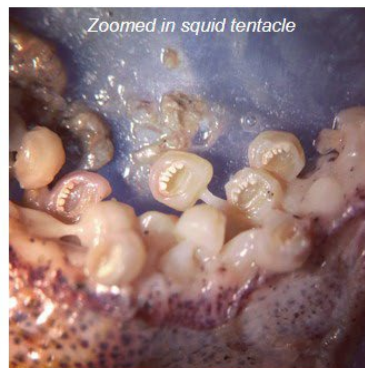
Doryteuthis pealeii



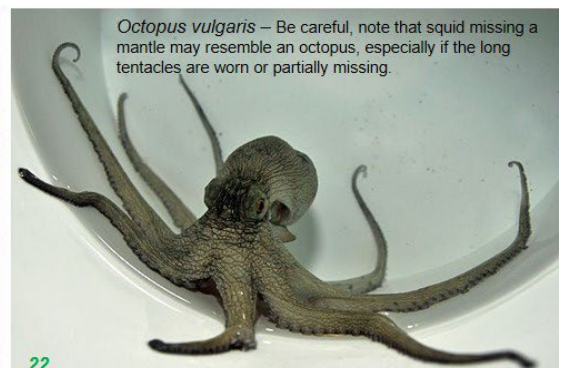
Loliguncula brevis



Doryteuthis pealeii, Longfin Inshore Squid Beak



Zoomed in squid tentacle



Octopus vulgaris – Be careful, note that squid missing a mantle may resemble an octopus, especially if the long tentacles are worn or partially missing.

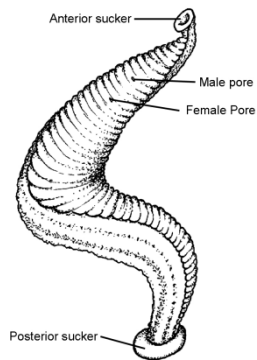
Phylum Annelida

LEECHES

Class Clitellata

Subclass Hirudinea

0883 unidentified leech



24

OLIGOCHAETES

Class Clitellata

Subclass Oligochaeta

0532 unidentified oligochaete



POLYCHAETES

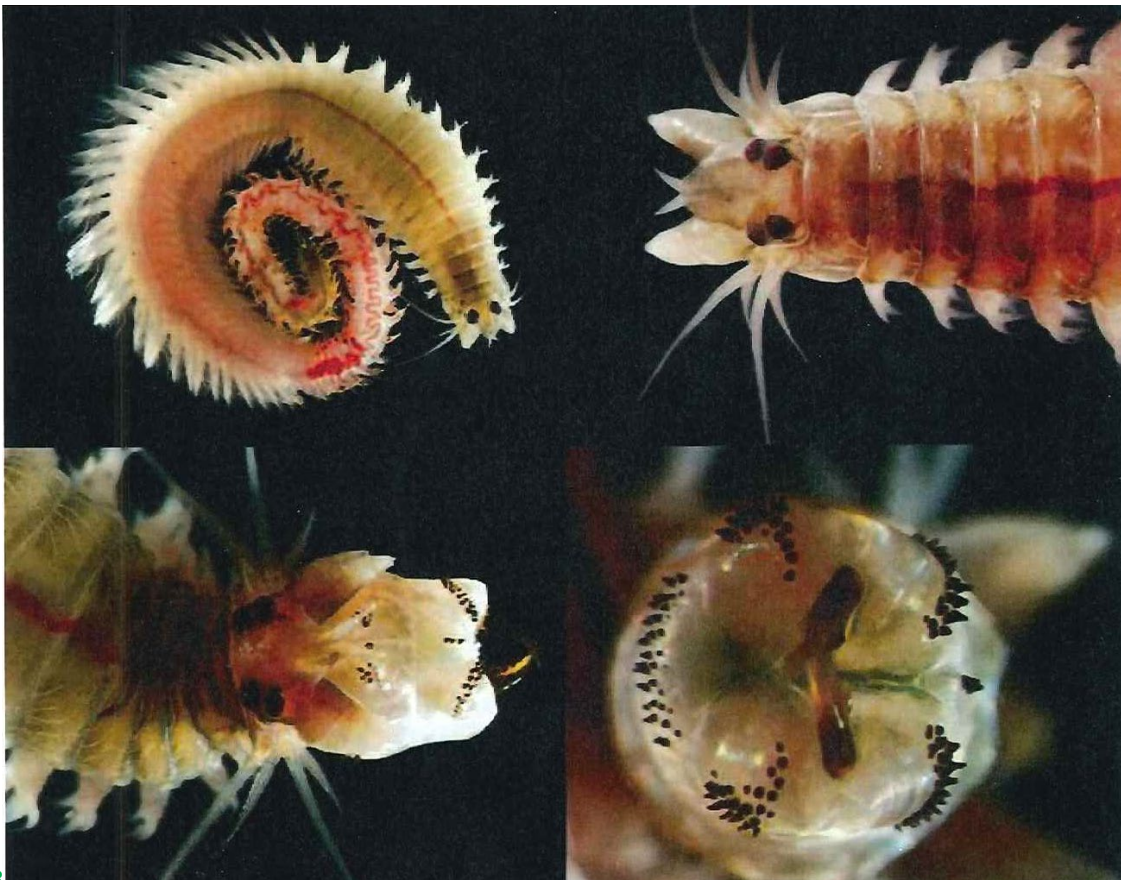
Class Polychaeta

0775 unidentified polychaete

0892 worm tubes

0510 Nereididae, clam worms

5010 Alitta succinea, clam worm



23

Alitta succinea

Phylum Annelida (polychaetes continued)

0645 *Aphrodita hastata*, sea mouse

1071 *Arabella iricolor*, opal worm



Aphrodita hastata,
found in black seabass stomachs



Arabella iricolor, iridescent smooth worm



0697 *Glycera* spp., blood worms^{3, 4}



26

Glycera spp., very common, largest polychaete found in stomachs, can be huge



27

Glycera spp., protruded mouthparts, 4 hook-like jaws

0682 *Drilonereis* spp.

1037 unidentified scale worm

1037 unidentified scale worm

1107 *Goniada maculata*, chevron worm

1111 *Diopatra cuprea*, fringed worm



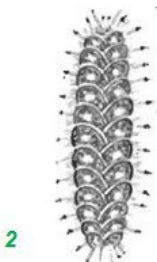
Drilonereis spp.



2

15-SCALED
WORMS

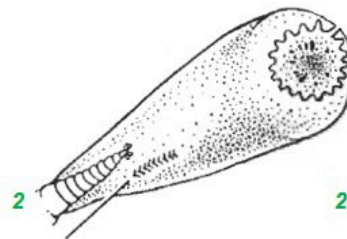
Harmothoe spp.



2

12-SCALED
WORMS

Lepidonotus spp.



2

Goniada maculata



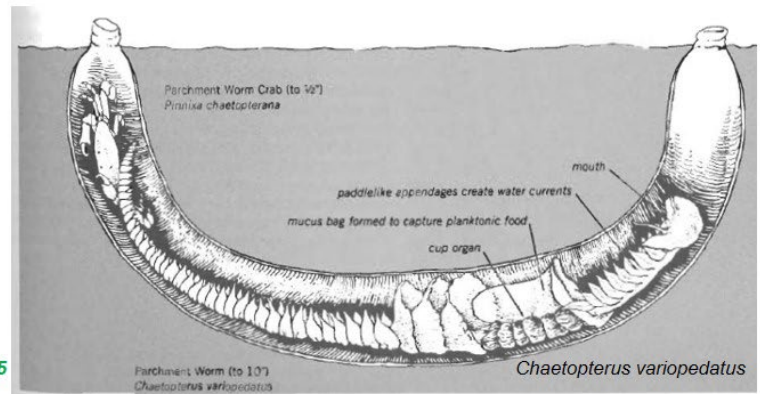
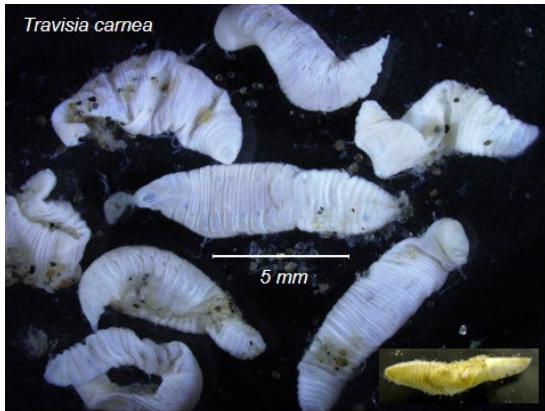
28

Diopatra cuprea

Phylum Annelida (polychaetes continued)

1103 *Travisia carnea*

0925 *Chaetopterus variopedatus*, parchment tube worm



0667 *Pectinaria gouldi*, trumpet worm

0785 Sabellidae, feather-duster worms

0798 Ampharetidae, spaghetti mouth worms



Pectinaria gouldi



Sabellidae



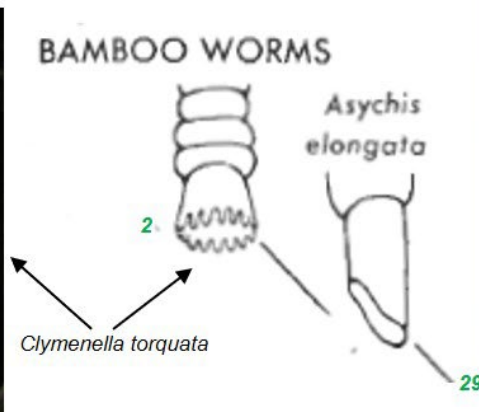
Ampharetidae

0764 *Pherusa affinis*, broomworm

0668 *Clymenella torquata*, bamboo worm

1036 *Asychis elongata*, bamboo worm

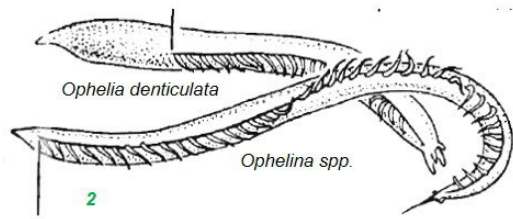
0731 Maldanidae, bamboo worms



Pherusa affinis

Phylum Annelida (polychaetes continued)

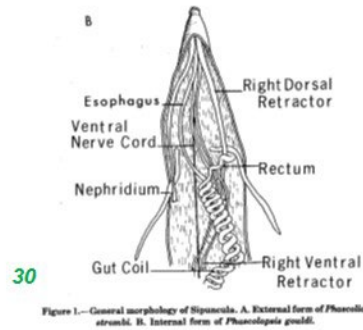
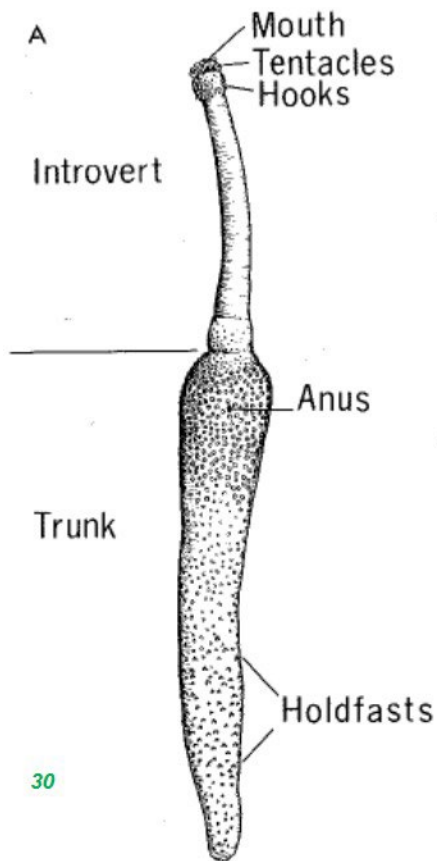
0754 *Ophelia denticulata* – has distinct striations on wrinkly body, legs sometimes red
1115 *Ophelina* spp



Phylum Sipuncula

PEANUT WORMS

1109 unidentified sipunculid – smooth, shiny, wrinkly, loose skin



Phylum Echiura

BURROW WORMS

1089 Echiura, burrow worms – bumpy, golden horns on head



Phylum Arthropoda

HORSESHOE CRABS

Class Merostomata

Order Xiphosura

Family Limulidae

0603 *Limulus polyphemus*

Pieces of horseshoe crab shell are very common and identified as dark and paper-like. Legs and claws are common, as well as the feathery book gills.



book gills



legs

31



3 mm juvenile

SPIDERS

Class Arachnida

Order Araneae

0531 unidentified spider



Phylum Arthropoda (continued)

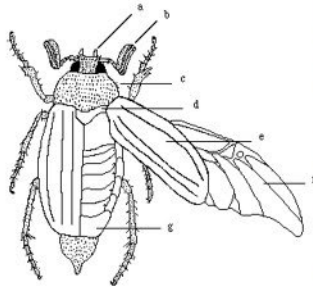
INSECTS

Class Insecta

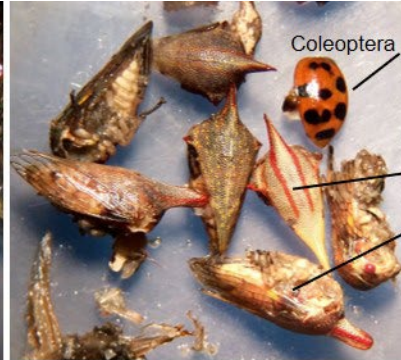
0505 unidentified insect

0898 Coleoptera, beetles (adult)

0913 Cicadellidae, leafhoppers



Coleoptera



Coleoptera

Cicadellidae

0571 Hymenoptera, wasps/bees/ants

0564 Tricoptera, caddisflies

1014 Ephemeroptera, mayflies



Cicadellidae



Hymenoptera



Tricoptera



Ephemeroptera



0512 Chironomidae, midge flies

1013 Chaoborus spp., phantom midges

0991 Formicidae, ants



Chironomidae larva



Chironomidae pupa



Chaoborus spp.



Formicidae

Phylum Arthropoda (Crustaceans)

CRUSTACEANS

Subphylum Crustacea

0673 unidentified crustaceans

1113 crustacean parts

0971 unidentified zooplankton could use this for a mix of copepods and larval crustaceans

CLADOCERANS – *Lower salinity zooplankton*

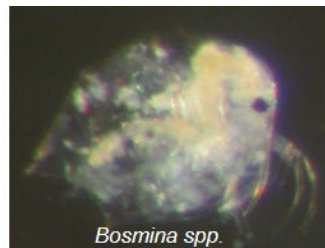
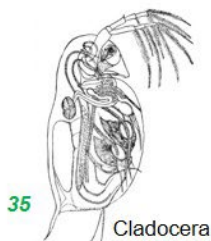
Class Branchiopoda

Order Diplostraca

1016 *Leptodora spp.*, cladocerans

0517 unidentified cladocerans

1015 *Bosmina spp.*, cladocerans



Phylum Arthropoda (Crustaceans continued)

COPEPODS

Class Maxillopoda

Subclass Copepoda

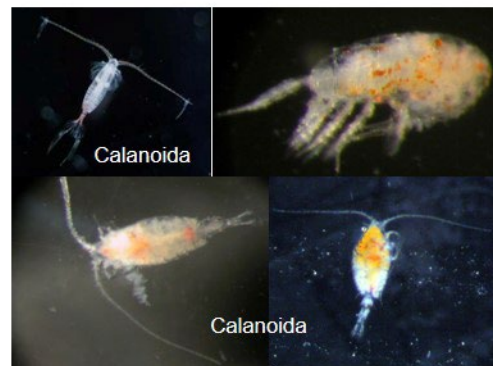
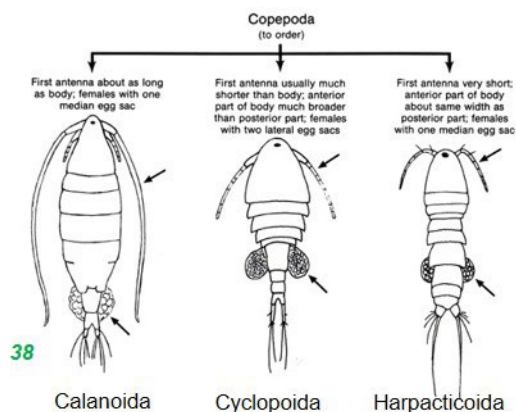
Orders Calanoida, Harpacticoida, Cyclopoida

5038 unidentified copepod

0518 calanoid copepod – *herring guts commonly full of them*

0509 harpacticoid copepod

0565 cyclopoid copepod



0952 *Lernaeenicus radiatus*, anchor worm parasite



Phylum Arthropoda (Crustaceans continued)

BARNACLES

Class Cirripedia

0808 sessile barnacles

0556 *Balanus eburneus*

0537 *Lepas anatifera*



Balanus spp.



Lepas anatifera

- Only about 1-2 mm long, barnacle larvae and ostracods look very similar.
- Both may have eyespots, but ostracods are more rounded and have long antennae.
- Barnacle larvae have pointy ends and may have frilly cirri exposed.



Barnacle cypris larvae
1163



Ostracod
0523

Phylum Arthropoda (Crustaceans continued)

MANTIS SHRIMP

Class Malacostraca

Order Stomatopoda

1094 unidentified mantis shrimps

0960 *Squilla* spp.

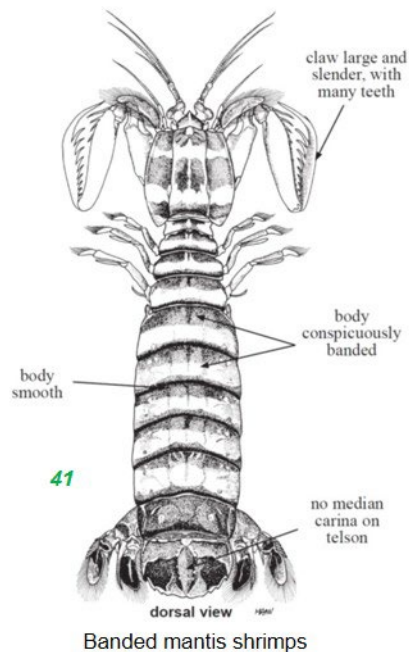
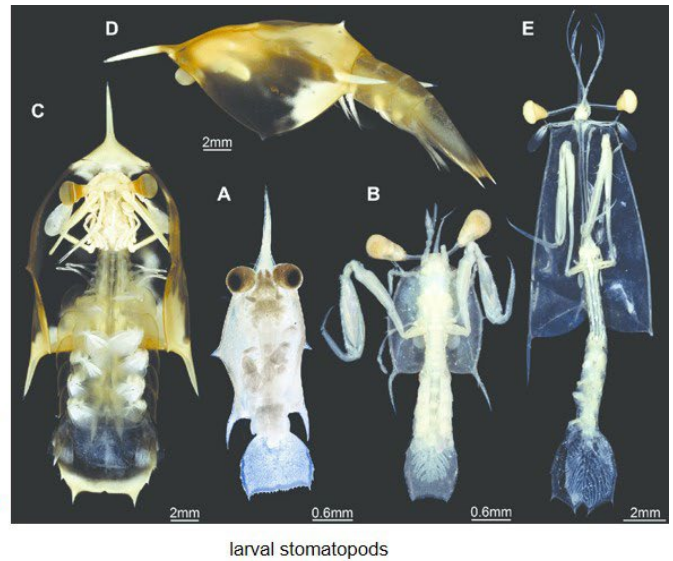
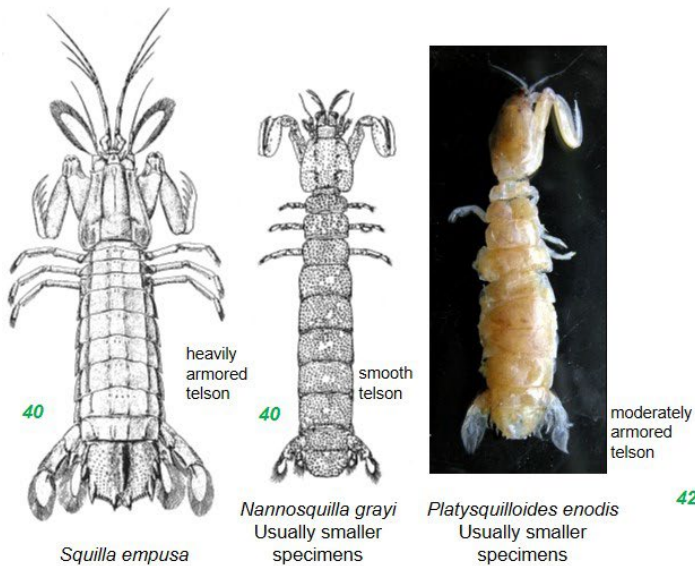
0621 *Squilla empusa* more on ChesMMA, but also on NEAMAP

1161 *Platysquilloides enodis* more on NEAMAP

1112 *Nannosquilla grayi* NEAMAP

1052 larval stomatopod

1207 *Lysiosquilla tredecimdentata*, lagoon mantis shrimp



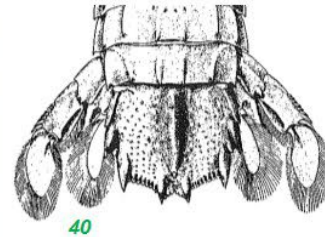
Lysiosquilla tredecimdentata

Phylum Arthropoda (Crustaceans continued)

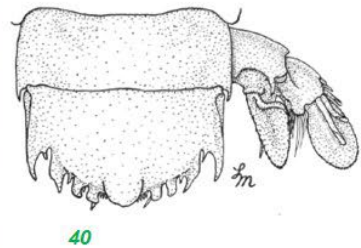
Mantis Shrimps (Stomatopods)



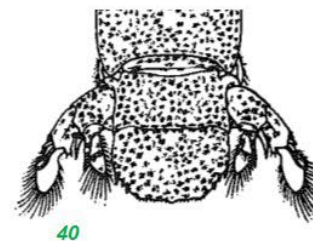
0621 *Squilla empusa*



1161 *Platysquilloides enodis*



1112 *Nannosquilla grayi*



Phylum Arthropoda (Crustaceans continued)

AMPHIPODS

Class Malacostraca
Order Amphipoda

There are many amphipods. Some common ones are pictured here, but we have identified others in our fish diets using *Shallow-Water Gammaridean Amphipoda of New England*, by E. L. Bousfield

0841 unidentified amphipod

0507 *Leptocheirus plumulosus*, common burrower amphipod

0636 *Ampelisca* spp., four-eyed amphipod – look for distinct 4 eyes or eye pigment exploded

0738 *Monoculodes edwardsi*, one-eyed amphipod – look for single pointy triangular eye on top of head



0694 *Gammarus* spp., scud – distinct bean-shaped eye and oval body

5019 *Gammarus mucronatus*, spined-back scud

0919 *Listriella clymenellae*



0671 *Corophium* spp., tube-builder amphipods, usually more solitary

5021 *Corophium lacustre*, slender tube-builder amphipod

0670 *Corophium crassicornes*



Phylum Arthropoda (amphipods continued)

0579 *Erichthonius brasiliensis*

0722 Hyperiidæ, big-eyed amphipods

0534 *Microprotopus raneyi*



Hyperiidæ

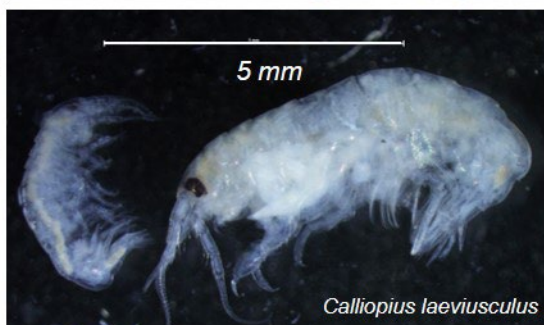


0659 *Casco bigelowi* – large solitary amphipod with prominent tusk under eye

1008 Haustoriidæ, digger amphipods

1012 *Amphiporeia virginiana* – schnoz nozzle

1206 *Calliopius laevisculus*

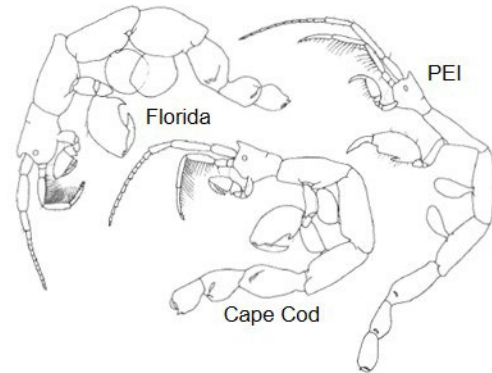


Phylum Arthropoda (amphipods continued)

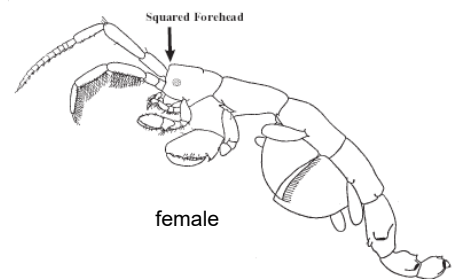
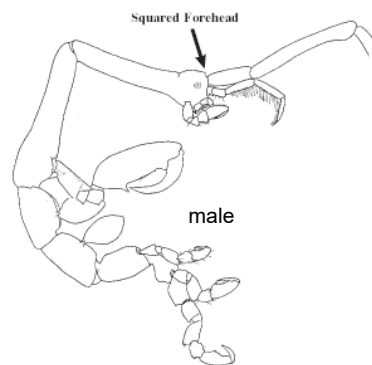
0658 unidentified skeleton shrimp

1009 *Caprella* spp.

0921 *Caprella penantis* (in ChesMMA samples) – distinct pointed forehead

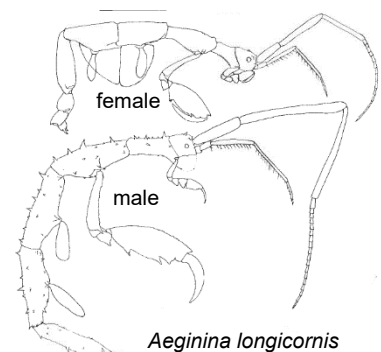
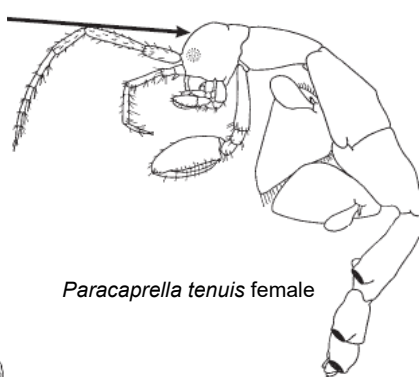
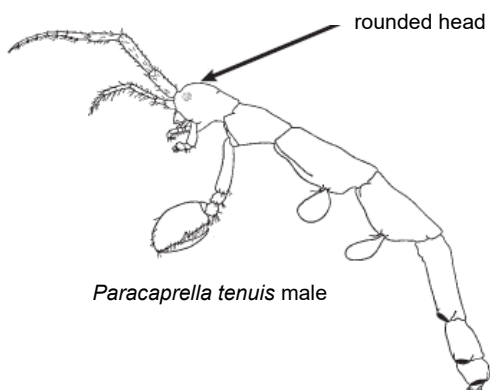


1106 *Caprella equilibria* (in NEAMAP samples) – squared forehead



0923 *Paracaprella tenuis*

0630 *Aeginina longicornis*



Phylum Arthropoda (Crustaceans continued)

CUMACEANS

Class Malacostraca

Order Cumacea

0674 unidentified cumacean

0676 Diastylidae



unidentified cumacean



Diastylidae



unidentified cumacean

ISOPODS

Class Malacostraca

Order Isopoda

0657 unidentified isopoda

0526 Chiridotea spp.

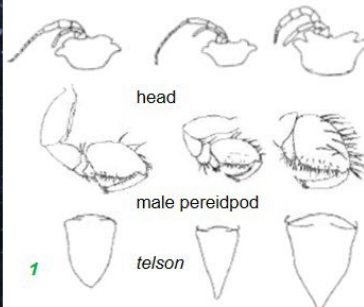
0570 Chiridotea almyra, sand isopod

0663 Chiridotea tuftsi

0582 Chiridotea coeca



Chiridotea almyra



C. almyra

C. tuftsi

C. coeca



Chiridotea almyra



Chiridotea tuftsi

0918 Edotia spp.

5020 Edotia triloba, mound back isopod

0685 Edotia montosa

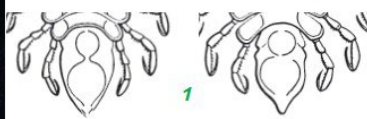
0684 Edotia acuta



Edotia triloba



Edotia triloba



E. triloba

E. montosa

E. acuta

Phylum Arthropoda (isopods continued)

1025 *Politolana concharum*

0508 *Ancinus depressus*

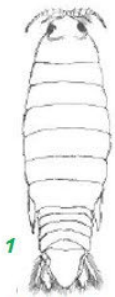
0559 *Sphaeroma quadridentatum*

0655 *Idotea balthica*, sea slater

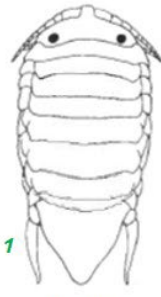
0513 *Cyathura polita*, slender isopod

0925 *Erichsonella attenuata*, seagrass isopod

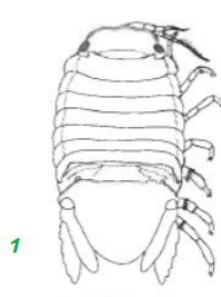
0981 *Synidotea laevidorsalis* – long antennae, ChesMMAP only



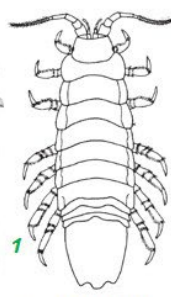
Politolana concharum



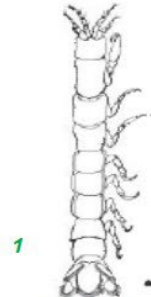
Ancinus depressus



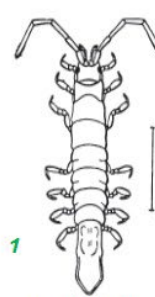
Sphaeroma quadridentatum



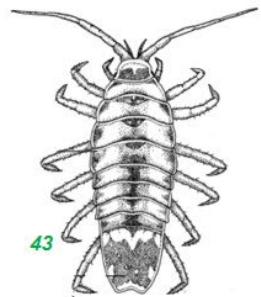
Idotea balthica



Cyathura polita



Erichsonella attenuata



Synidotea laevidorsalis



Phylum Arthropoda (isopods continued)

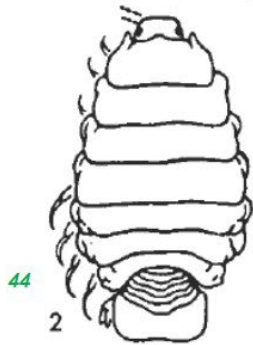
0929 Cymothoidae

0942 *Cymothoa* spp.

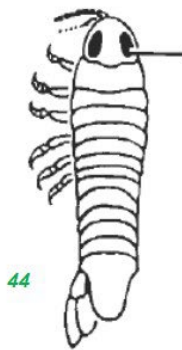
0683 *Livoneca redmanii*, fish lice/fish-gill isopod

0982 *Olencira praegustator*

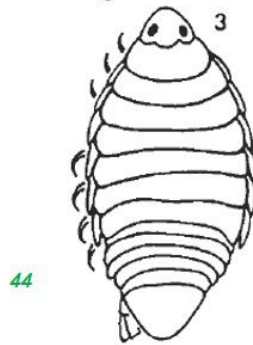
1022 *Nerocila acuminata*



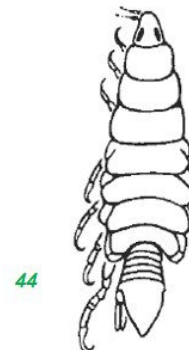
Cymothoa excisa



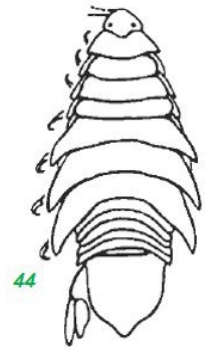
larval Cymothoidae



Livoneca redmani



Olencira praegustator



Nerocila acuminata



Cymothoa excisa

larval Cymothoidae

Livoneca redmani



Olencira praegustator –
NOT TO SCALE
These can be quite large

MAXILLOPODS

Class Maxillopoda

0959 *Argulus* spp., lazy fish lice



Phylum Arthropoda (crustaceans continued)

MYSIDS

Class Malacostraca

Order Mysida

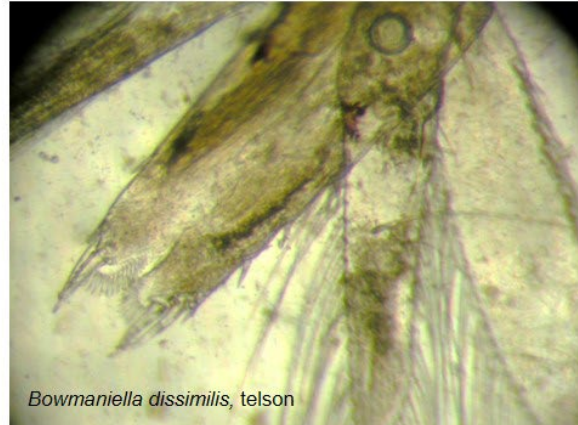
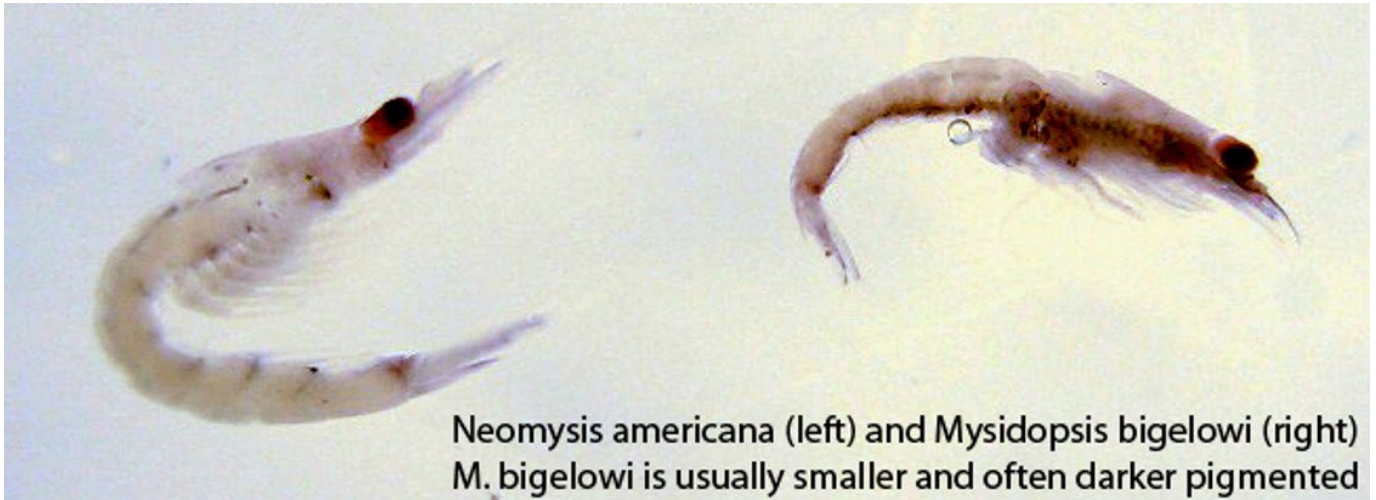
0574 unidentified mysid

0699 *Neomysis americana*

0740 *Americamysis (Mysidopsis) bigelowi*

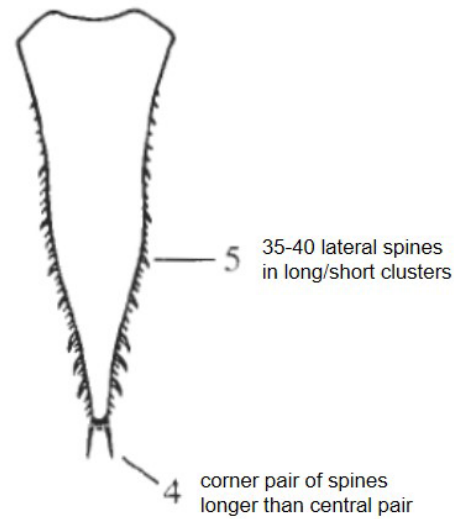
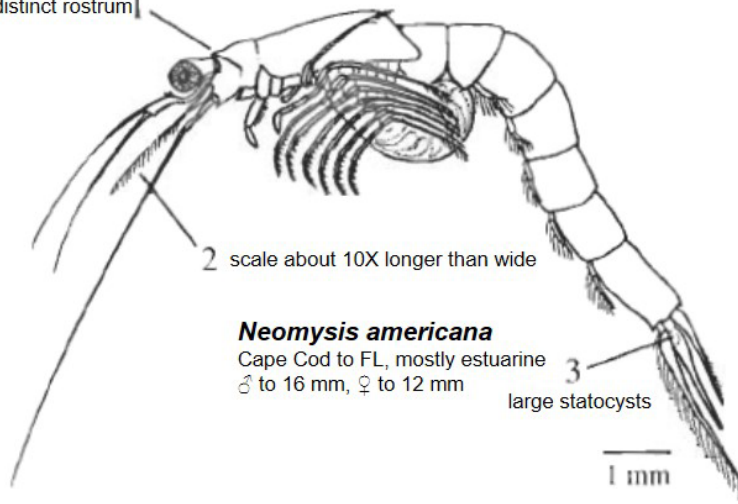
1175 *Bowmaniella* spp

4000 *Bowmaniella dissimilis* confirm cleft telson under high magnification

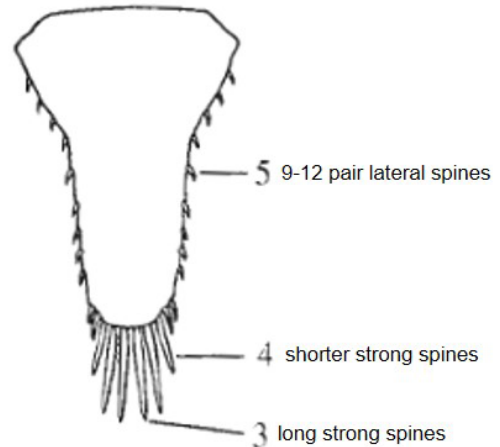
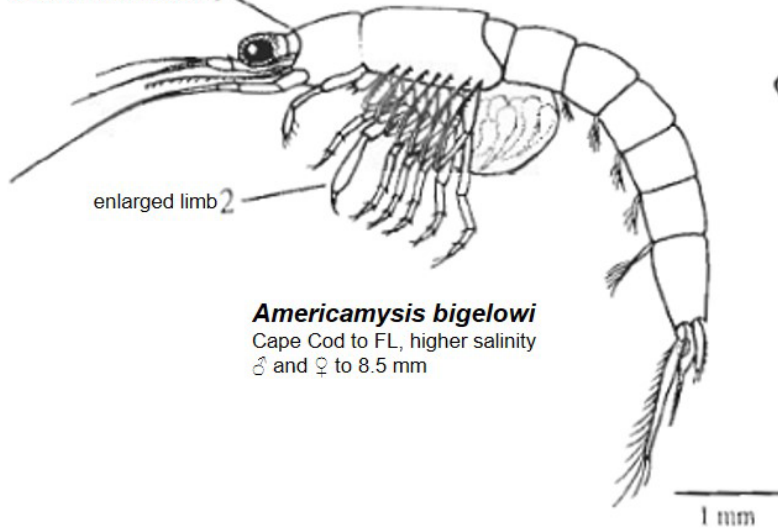


Phylum Arthropoda (mysids continued)

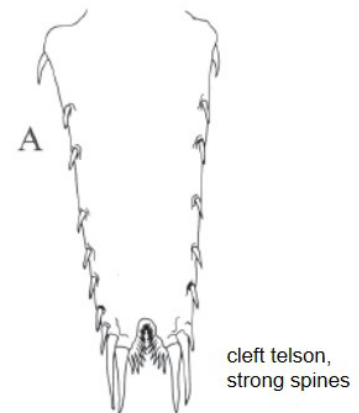
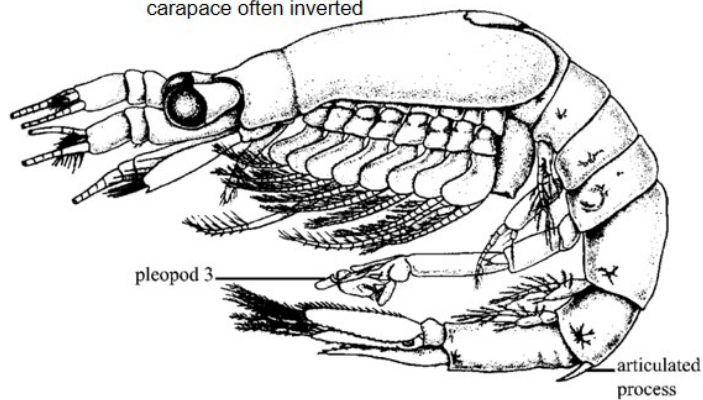
no distinct rostrum



short, pointed rostrum



carapace often inverted



All figures 45

Phylum Arthropoda (crustaceans continued)

TANAIDS

Class Malacostraca

Order Tanaidacea

0525 unidentified tanaid – lower salinity



OSTRACODS

Class Ostracoda

0523 unidentified ostracod



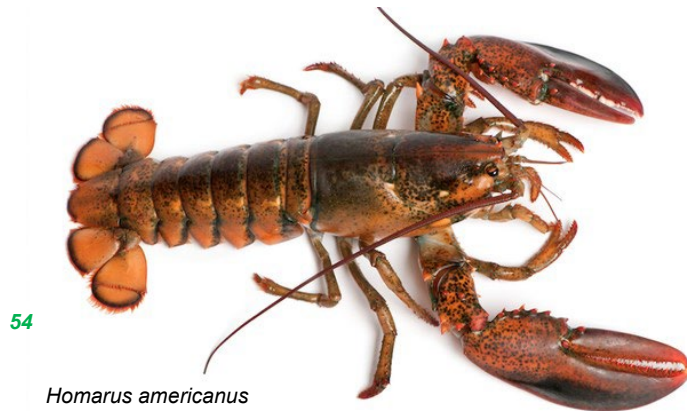
CRABS, SHRIMPS, LOBSTERS

Class Malacostraca

Order Decapoda

0675 unidentified decapod

0020 *Homarus americanus*, American lobster



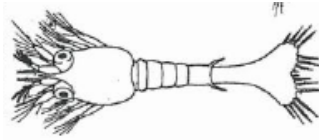
54

Homarus americanus

Phylum Arthropoda (decapods continued)

5001 unidentified shrimp

5011 unidentified shrimp zoea – look for paddle-shaped tail as shown below (not present in crab zoea)

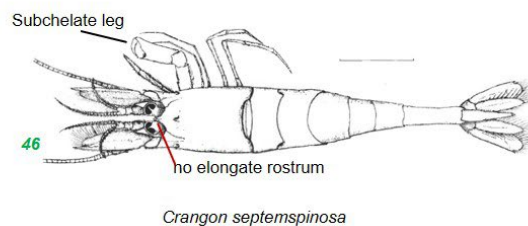
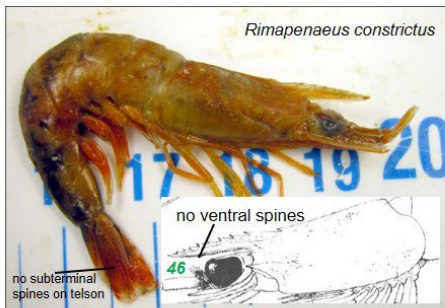


48

0595 *Rimapenaeus constrictus*, roughneck shrimp – no ventral spines on rostrum

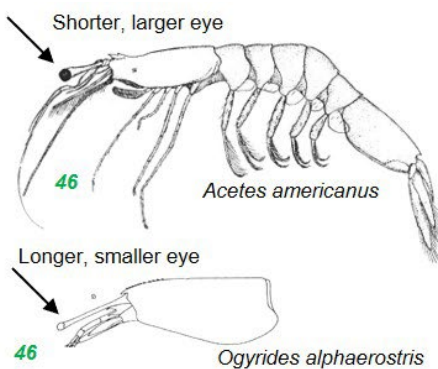
0604 *Crangon septemspinosa*, sand shrimp – no elongate rostrum, subchelate leg

0679 *Dichelopandalus leptocerus*, bristled longbeak – distinct swooping ventral spine on rostrum



0623 *Acetes* spp.

0573 *Ogyrides alphaerostris*, estuarine long-eyed shrimp

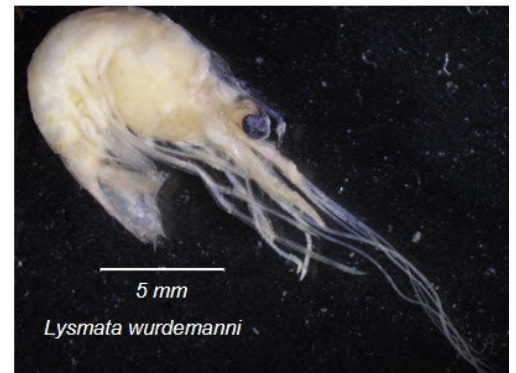
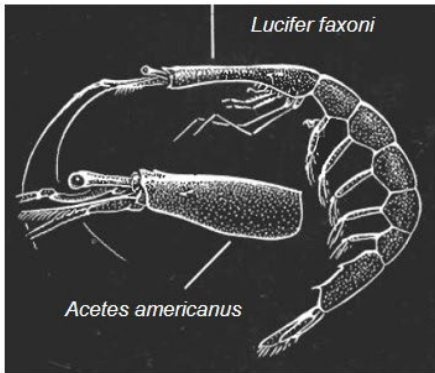


Phylum Arthropoda (shrimp continued)

0546 *Lucifer spp.*

0550 *Lucifer faxoni*

0827 *Lysmata wurdemanni*, peppermint shrimp or red cleaning shrimp⁶



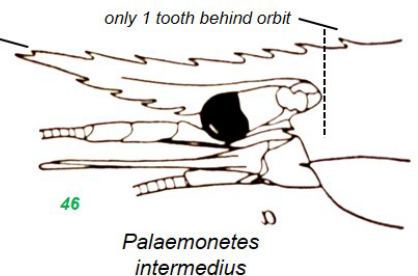
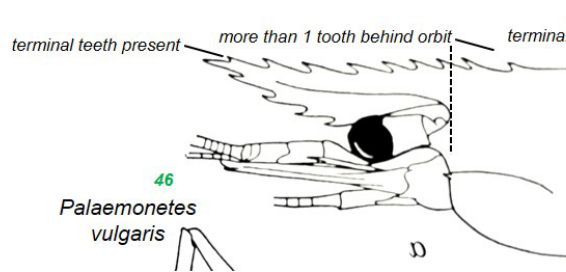
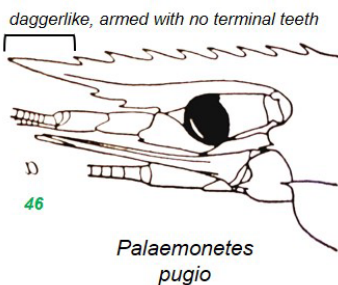
0620 *Palaemonetes spp.*, grass shrimp

1003 *Palaemonetes vulgaris*, common grass shrimp

1007 *Palaemonetes intermedius*, brackish grass shrimp

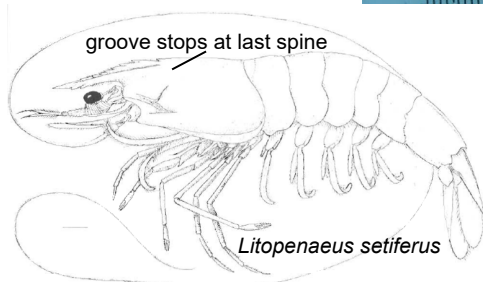
0569 *Palaemonetes pugio*, daggerblade grass shrimp

IMPORTANT: Palaemonetes are not common in our samples. Grass shrimp inhabit seagrass beds in shallower water, and may only be found in diets of fish foraging into these marginal habitats.

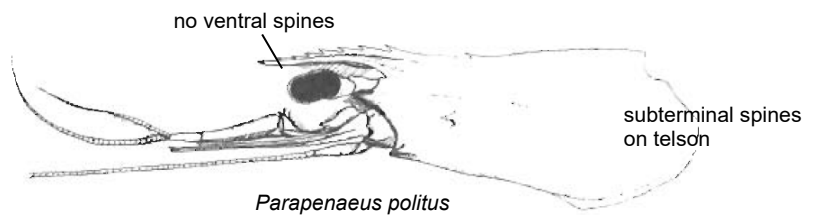


Phylum Arthropoda (shrimp continued)

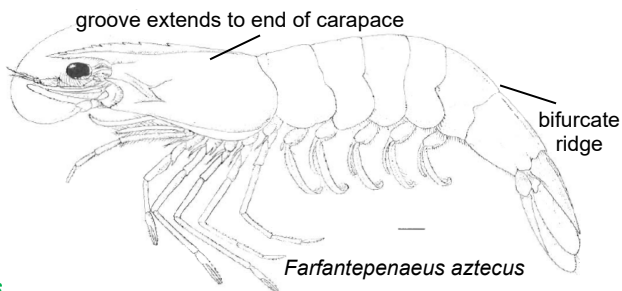
- 6220 Penaeidae, unidentified penaeid
 0597 *Litopenaeus setiferus*, white shrimp
 0596 *Farfantepenaeus duorarum*, pink shrimp
 0622 *Farfantepenaeus aztecus*, brown shrimp
 1034 *Parapenaeus politus*, rose shrimp



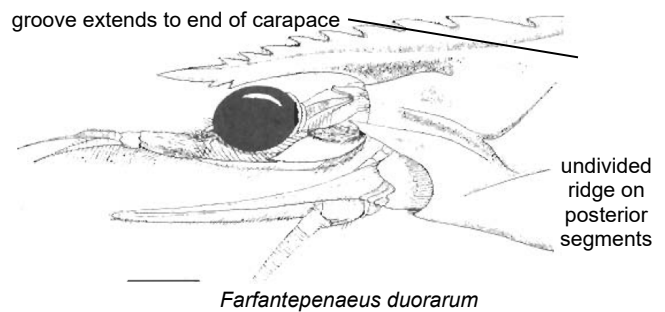
Litopenaeus setiferus



Parapenaeus politus

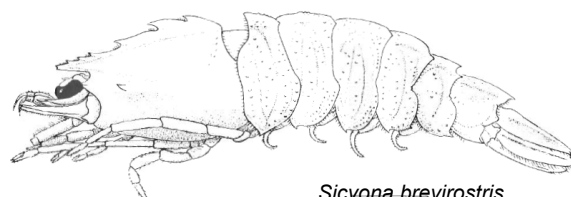


Farfantepenaeus aztecus



Farfantepenaeus duorarum

0844 *Sicyonia brevirostris*, rock shrimp



Sicyonia brevirostris

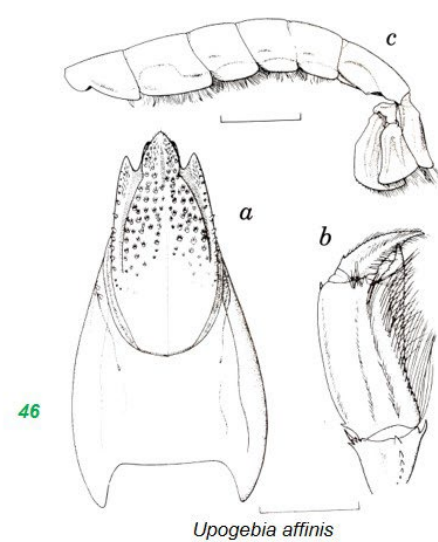
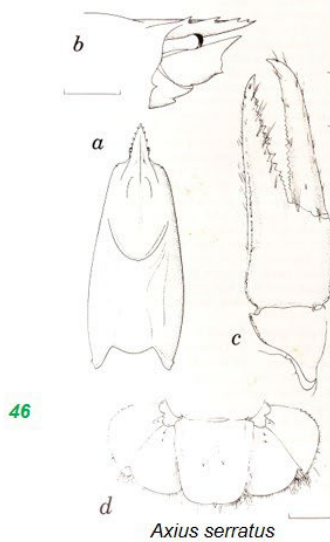
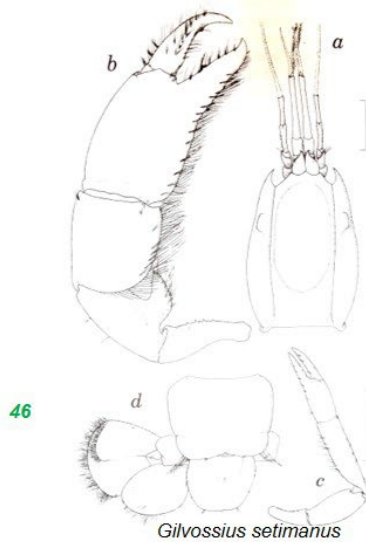
Phylum Arthropoda (shrimp continued)

1010 Thalassinidea, unidentified mud shrimps

0500 *Gilvossius setimanus*, short-browed mud shrimp – common, tear-shaped eyes

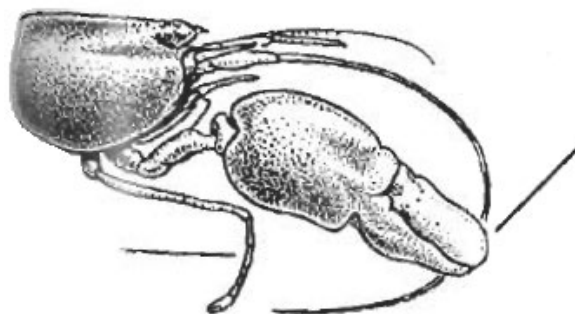
0653 *Axius serratus*, burrowing shrimp common, flat smooth rostrum, long scissorlike claw

0590 *Upogebia affinis*, flat-browed mud shrimp – less common, flat bumpy rostrum



1058 Alpheidae, unidentified snapping shrimps

0591 *Alpheus heterochaelis*, big-clawed snapping shrimp



Alpheus heterochaelis

2

Phylum Arthropoda (crabs)

5035 unidentified crab

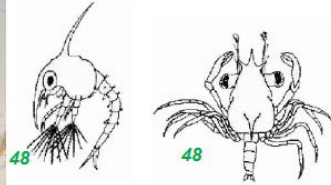
5012 crab parts

0973 unidentified crab zoea

1054 unidentified crab megalopa



crab zoea



crab zoea

crab megalopa



crab megalopae

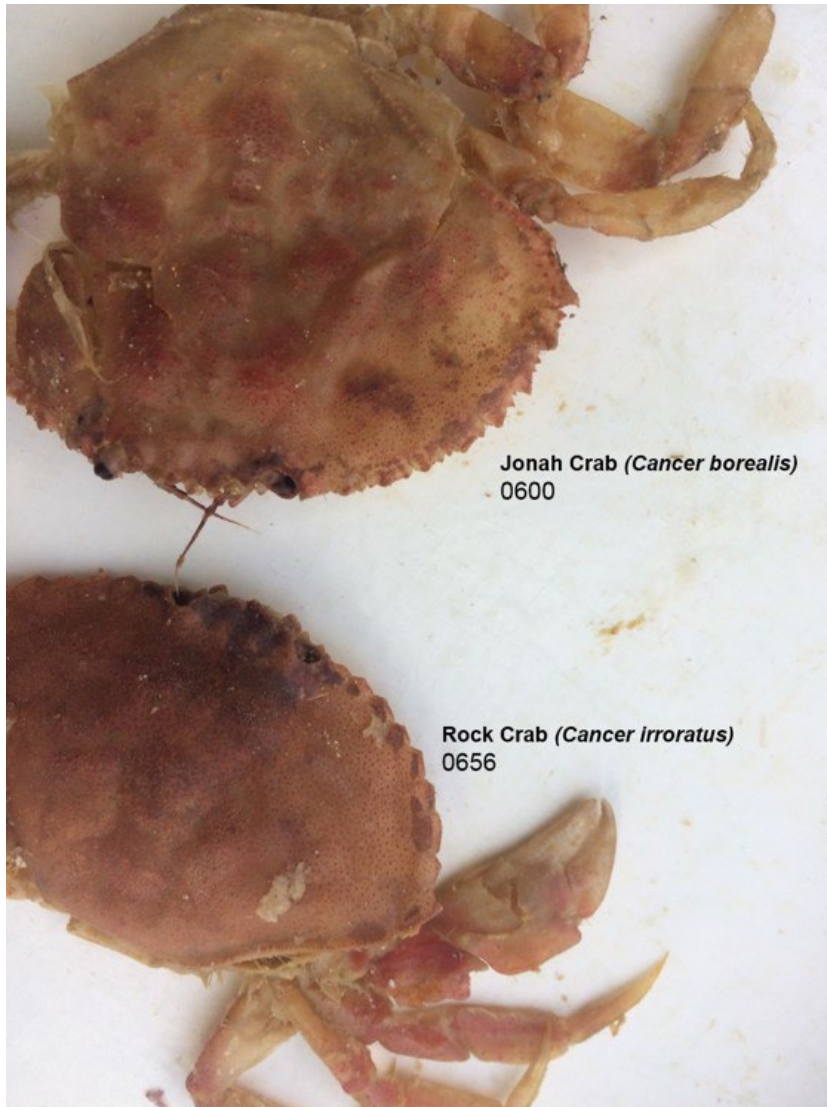


crab megalopa

5016 *Cancer* spp.

0656 *Cancer irroratus*, Atlantic rock crab – smooth serrations on margin of carapace, see pic below

0600 *Cancer borealis*, Jonah crab - jagged serrations on margin of carapace, see pic below



Jonah Crab (*Cancer borealis*)
0600

Rock Crab (*Cancer irroratus*)
0656



Jonah Crab internal organs

Phylum Arthropoda (crabs continued)



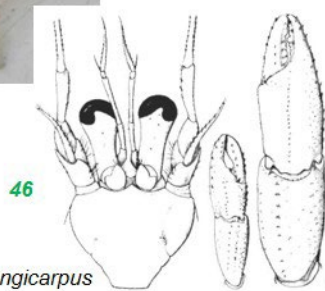
0917 unidentified hermit crab

0758 *Pagurus* spp.

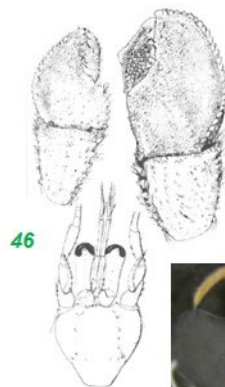
7581 *Pagurus longicarpus*, long-clawed hermit crab – very common

7582 *Pagurus pollicaris*, flat-clawed hermit crab – very common, larger

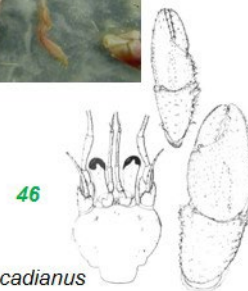
0617 *Pagurus acadianus*, acadian hermit crab – not common, very distinct red band on claw



P. longicarpus



P. pollicaris



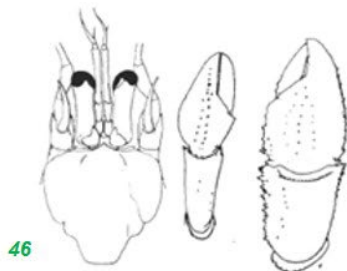
P. acadianus

There are many hermit crabs in our region. They are even more diverse south of Cape Hatteras. Pictured above are the most common species identified in our fish diets. Pictured below are species known to inhabit our sampling range, but we haven't yet commonly identified them.

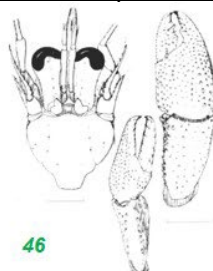


0757 *Pagurus arcuatus*, hairy hermit crab -

0618 *Pagurus annulipes*, banded hermit crab



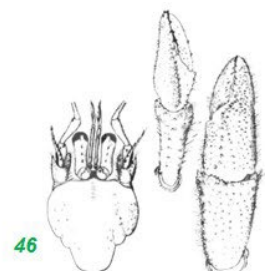
P. arcuatus



P. politus



P. annulipes



P. pubescens

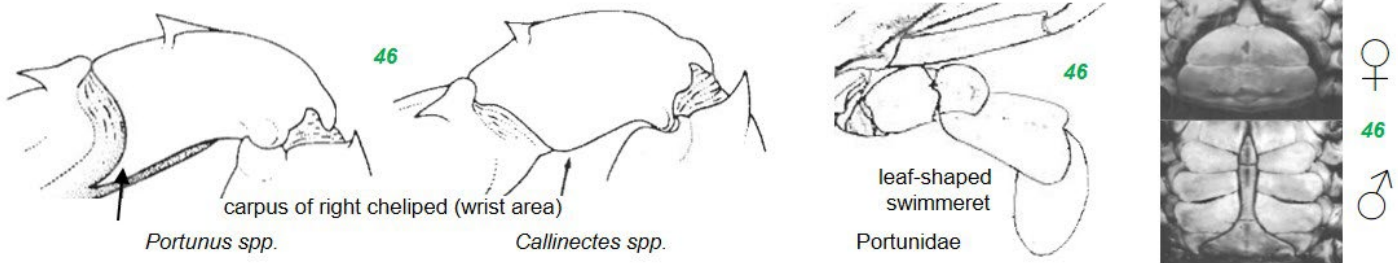
Phylum Arthropoda (crabs continued)

0839 Portunidae, swimming crabs – distinguished by their leaf-shaped swimmeret

0578 *Portunus* spp.

0861 *Callinectes* spp.

1095 *Ovalipes* spp.



0614 *Callinectes sapidus*, blue crab (sex unknown)

6141 *Callinectes sapidus*, blue crab (male)

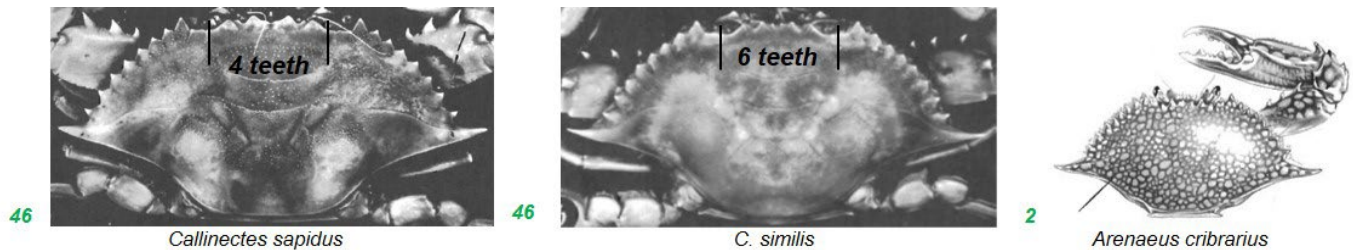
6142 *Callinectes sapidus*, blue crab (juvenile female)

6143 *Callinectes sapidus*, (adult female)

0835 *Callinectes similis*, lesser blue crab – not common but known to be in our range

0545 *Callinectes sapidus*, blue crab (megalopa)

0848 *Arenaeus cribrarius*, speckled crab – not common but known to be in our range



0612 Ovalipes ocellatus, lady crab

0611 *Ovalipes stephensoni*, course-hand lady crab – range south of VA

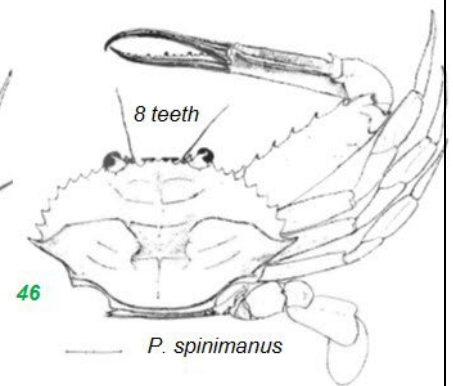
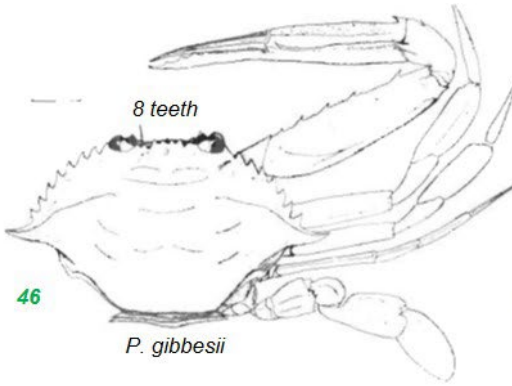
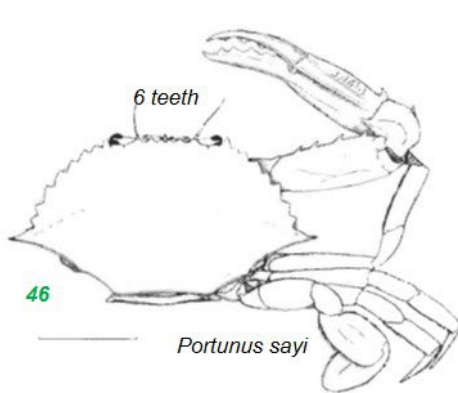


Phylum Arthropoda (crabs continued)

0875 *Portunus sayi*, sargassum swimming crab – 6 teeth between eyes

0607 *Portunus gibbesii*, iridescent swimming crab – 8 teeth between eyes

0608 *Portunus spinimanus*, blotched swimming crab – 8 teeth between eyes



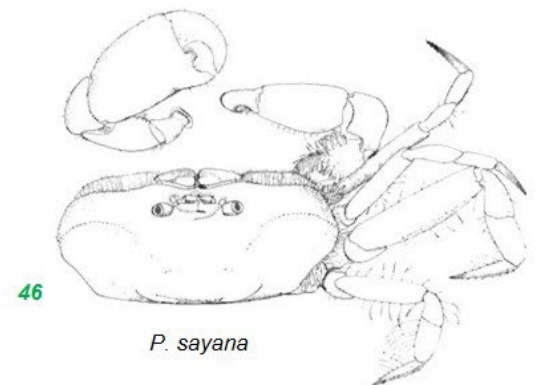
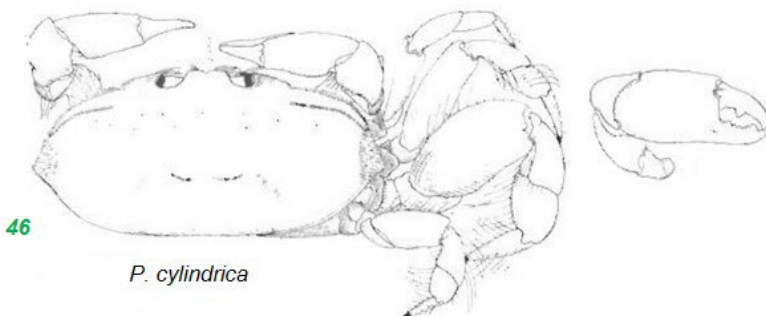
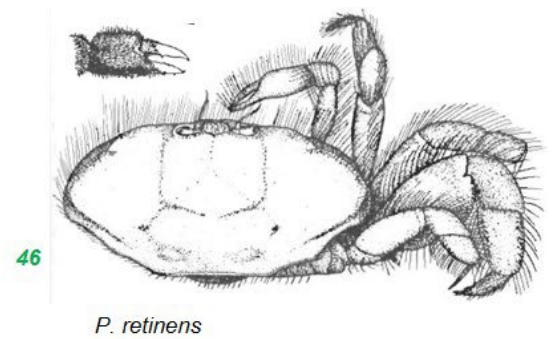
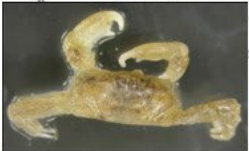
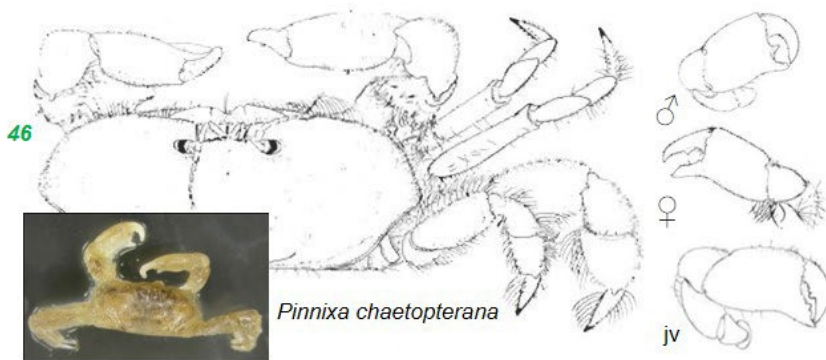
0833 *Pinnixa spp.*, unidentified pea crab – very tiny crabs

0547 *Pinnixa chaetoptera*, parchment worm tube crab – chunky walking legs, males and juveniles have hooked claw

5018 *Pinnixa retinens*, pea crab

5023 *Pinnixa cylindrica*, pea crab

0927 *Pinnixa sayana*, pea crab – narrow walking legs, hooked claw



Phylum Arthropoda (crabs continued)

1043 unidentified mole crabs – *slightly iridescent sheen on shell*

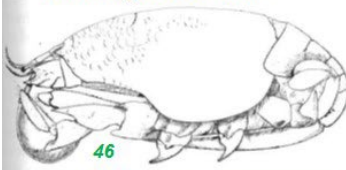
0864 *Emerita talpoida*, Atlantic sand crab

0624 *Euceramus praelongus*, olivepit porcelain crab – common, distinctly bright red and iridescent

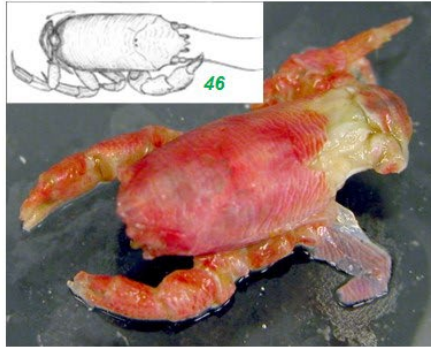
0625 *Lepidopa websteri*, square-eyed mole crab

1080 *Albunea paretii*, beach mole crab

Emerita talpoida side view



E. talpoida dorsal view



Euceramus praelongus



Lepidopa websteri



Albunea paretii

0594 Panopeidae, unidentified mud crabs

5943 *Rhithropanopeus harrissii*, white-fingered mud crab – *less saline habitats*

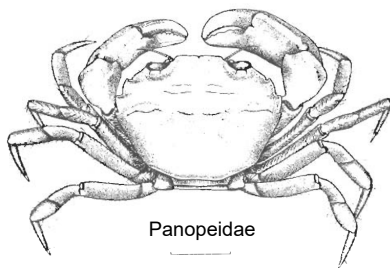
5942 *Panopeus herbstii*, Atlantic mud crab

0552 *Hexapanopeus angustifrons*, smooth mud crab – most common

5944 *Dyspanopeus sayi*, Say's mud crab

5941 *Eurypanopeus depressus*, flat-back mud crab

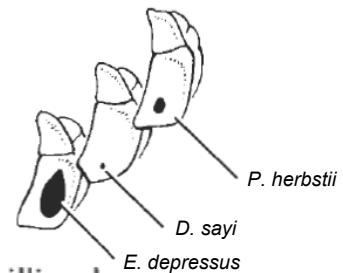
2



Panopeidae



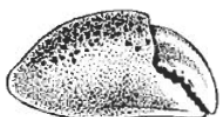
3rd maxilliped



P. herbstii

D. sayi

E. depressus



Rhithropanopeus harrissii



Panopeus herbstii



Hexapanopeus angustifrons



Dyspanopeus sayi



Eurypanopeus depressus



H. angustifrons



H. angustifrons

Phylum Arthropoda (crabs continued)

Purse Crabs

Persephona mediterranea, while named based on an erroneous type-locality, is known to occur in our area.

According to our Crabs, Shrimps, and Lobsters book, there is some confusion about subspecies and synonymy of *Persephona punctata*.

0870 *Persephona mediterranea*, mottled purse crab

0849 *Persephona punctata*, purse crab

0601 *Polyonyx gibbesi*, eastern tube crab – tiny crab with distinct backwards-looking claw

0873 *Porcellana sayana*, spotted porcelain crab

0609 *Porcellana sigsbeiana*, porcelain crab



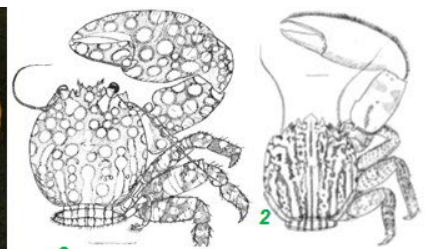
Persephona mediterranea



Persephona punctata



Polyonyx gibbesi

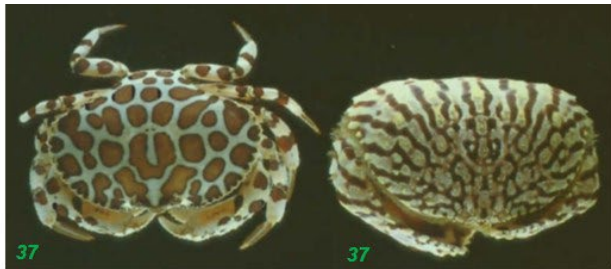


Porcellana sayana

Porcellana sigsbeiana

1079 *Calappa flammea*, flame box crab – aka shame-faced crab

0865 *Hepatus epheliticus*, calico box crab



Hepatus epheliticus



Calappa flammea



C. flammea juvenile



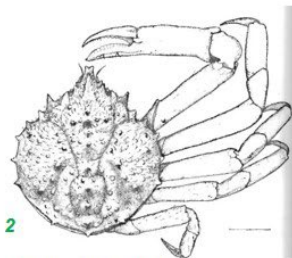
C. flammea adult claw

5026 *Libinia* spp., unidentified spider crab – the two species are hard to distinguish, especially juveniles

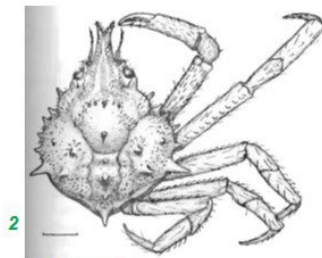
0605 *Libinia emarginata*, common spider crab (9 spines)

0593 *Libinia dubia*, six-spine spider crab

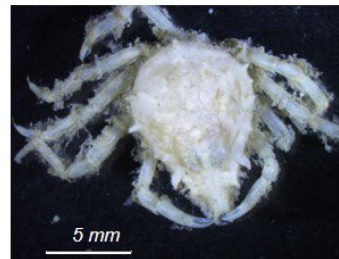
1174 *Hyas coarctatus*, Arctic lyre crab – not common



Libinia emarginata



Libinia dubia



Libinia dubia



Hyas coarctatus

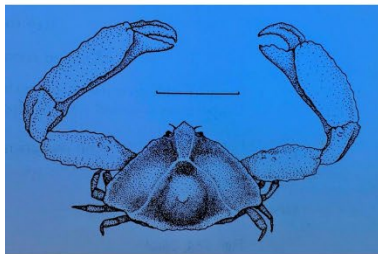
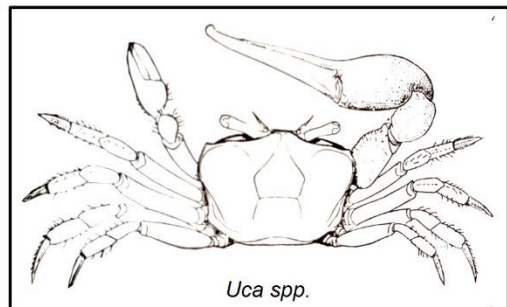
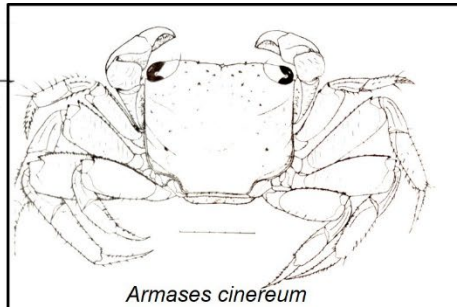
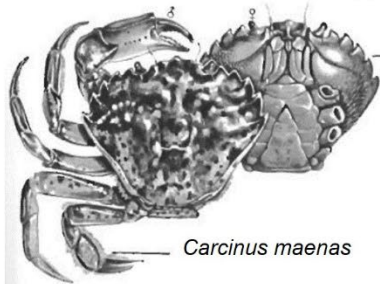
Phylum Arthropoda (crabs continued)

0626 *Carcinus maenas*, green crab – not common

1027 *Armases cinereum*, square-back marsh crab – not common

0966 *Uca* spp., fiddler crabs – not common

1064 *Heterocrypta granulata*, chip crab—not common



Phylum Echinodermata

0496 unidentified echinoderm

SEA STARS

Class Asteroidea

0650 *Asteriidae*

0651 unidentified sea star

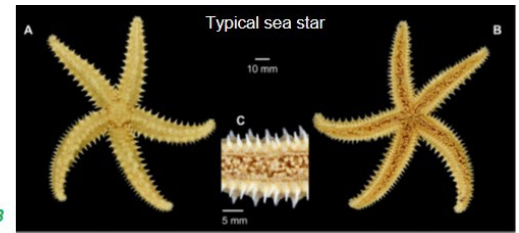
SEA URCHINS, SAND DOLLARS

Class Echinoidea

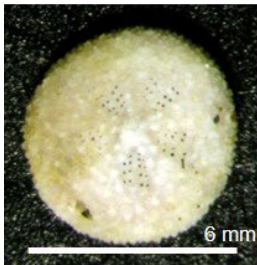
0702 *Echinarachnius parma*, sand dollar

0847 *Mellita quinquiesperforata*, keyhole urchin

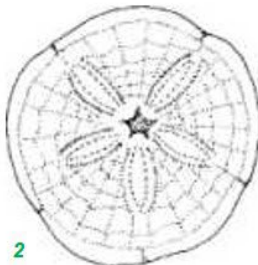
0840 *Arbacia punctulata*, purple sea urchin



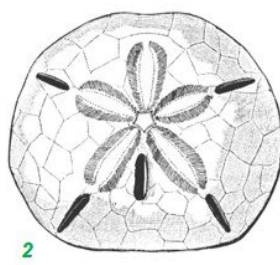
53



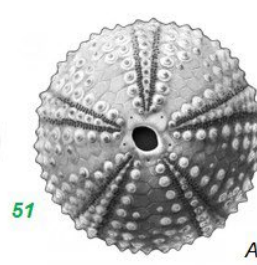
Echinarachnius parma



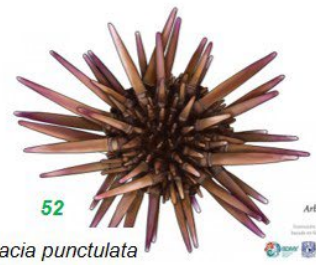
E. parma



Mellita quinquiesperforata



51



Arbacia punctulata

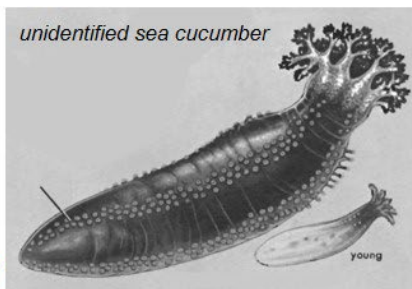
Arbacia punctulata
[Lamarck, 1799]
Illustration of the Purple Sea Urchin
National Science Foundation
National Center for Marine Education

SEA CUCUMBERS

Class Holothuroidea

0828 unidentified sea cucumbers

1129 *Caudina arenata*, rat-tailed cucumber



2



Rat-tailed cucumber

BRITTLE STARS

Class Ophiuroidea

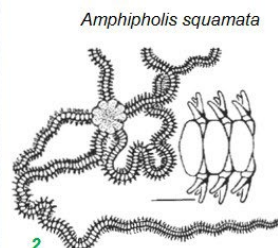
0755 **unidentified brittle stars** – common prey in bottom feeders, rarely found whole, arms look like polychaetes, but are crunchy. Not usually identifiable to species.

0920 *Amphioplus abdita*

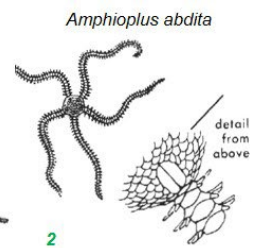
0652 *Amphipholis squamata*



Typical brittle star in stomach contents



2



2

Phylum Chordata

SEA SQUIRTS

Class Ascidiacea

0648 unidentified sessile tunicates



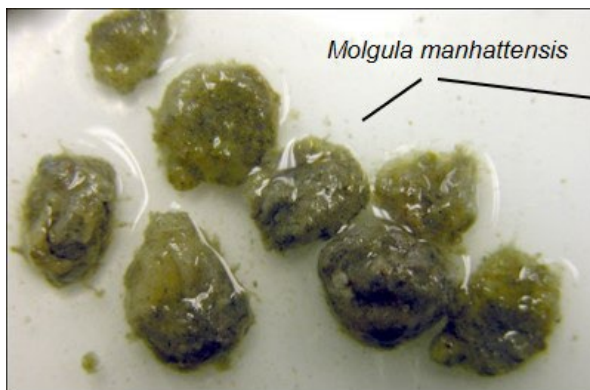
tunicate encrusting eelgrass

Order Pleurogona

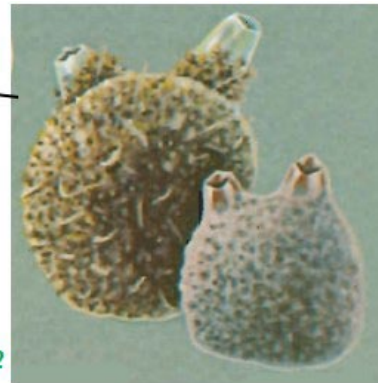
Family Molgulidae

5007 *Molgula manhattensis*

0824 *Molgula* spp.



Molgula manhattensis



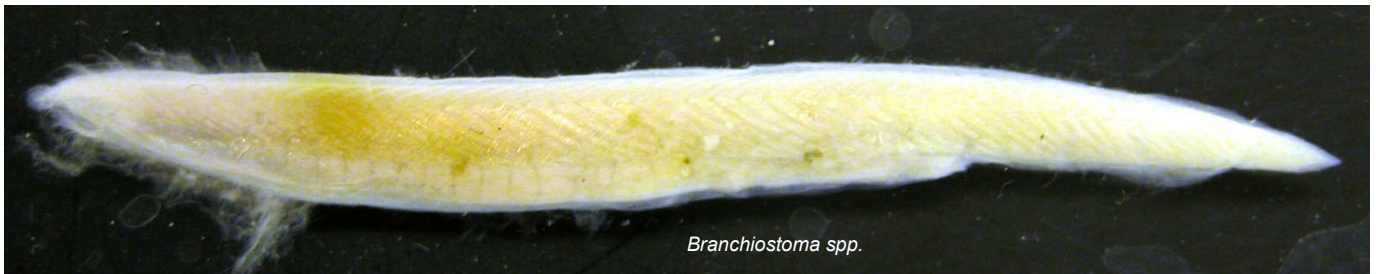
LANCELETS

Class Cephalochordata

Order Amphioxiformes

Family Branchiostomatidae

0495 *Branchiostoma* spp., lancelets – common, worm-like



Branchiostoma spp.

Miscellaneous Materials

0708 unidentified material
0895 trash
0542 plastic trash
0554 cigarette butt
0930 fishing lure
5005 detritus



ANIMAL MATTER

0016 bait (scrap)
0705 shell
0970 eggs
1046 feather
5032 animal tubes
5033 unidentified meat
0892 worm tubes

PLANT MATTER

0504 wood
5006 vegetation
0478 macro algae
0503 red algae
0580 leaf
0957 plant seed
0965 diatoms
1002 unidentified seagrass
5029 *Zostera marina*
5030 corn

MINERAL MATTER

0585 mud
0706 sand tubes
0894 coal
5004 gravel
5037 sand
5031 rock

Plastics

We are frequently asked if we find a lot of trash or plastic in our fish stomachs.

Fortunately, finding artificial materials such as plastic, monofilament and other trash is rare.

PHOTO CREDITS OUTSIDE OF MRG

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PHOTO CREDITS OUTSIDE OF MRG (CONTINUED)

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0671	amphipod (Corophium spp.)	<i>Corophium spp.</i>
0694	amphipod (Gammarus spp.)	<i>Gammarus spp.</i>
0841	amphipod, unidentified	<i>Amphipoda spp.</i>
0643	Anemones	<i>Anemones</i>
5032	animal tubes	<i>animal tubes</i>
0558	ark clams	<i>Anadara</i>
0037	atlantic menhaden	<i>Brevortia tyrannus</i>
0816	Atlantic razor clam	<i>Ensis directus</i>
0656	Atlantic rock crab	<i>Cancer irroratus</i>
0103	bay anchovy	<i>Anchoa mitchilli</i>
0697	bloodworm	<i>Glycera spp.</i>
0802	Blue mussel	<i>Mytilus edulis</i>
0755	brittle stars	<i>Ophiuroidea</i>
0764	Broomworm	<i>Pherusa affinis</i>
1089	burrow worms	<i>Echiura spp.</i>
0653	burrowing mud shrimp	<i>Axius serratus</i>
		<i>Peprilus</i>
0004	butterfish	<i>triacanthus</i>
0518	Calanoid copepod	<i>Calanoida</i>
	cancer crab, unidentified (rock or Jonah)	<i>Cancer spp.</i>
5016	Clam worm	<i>Nereis spp.</i>
5039	clam, unidentified	<i>Bivalvia</i>
	codlings (spotted and red hake)	<i>Urophycis spp.</i>
0053	common anchovies	<i>Anchoa spp.</i>
0399	common burrower	<i>Leptocheirus plumulosus</i>
0507	amphipod	<i>crab megalopa</i>
1054	crab megalopa	<i>crab zoea</i>
0973	crab zoea	<i>Decapoda</i>
5035	crab, unidentified	
	croaker/drum, unidentified	<i>Sciaenidae</i>
0963	crustacean parts	<i>crustacean parts</i>
1113	crustacean, unidentified	<i>Crustacea</i>
0673	Dwarf surf clam	<i>Mulinia lateralis</i>
0882	Fingers	<i>Alcyonidium spp.</i>
0825	fish scales	<i>fish scales</i>
0529	fish, unidentified	<i>Actinopterygii</i>
5000	flat-clawed hermit crab	<i>Pagurus pollicaris</i>
7582	four-eyed amphipods	<i>Ampelisca spp.</i>
0636	grass shrimp	<i>Palaemonetes spp.</i>
0620	hermit crabs, unidentified	<i>Pagurus spp.</i>
0758	hydroids	<i>Cnidaria</i>
0703		<i>Politolana concharum</i>
	isopod	<i>Travisia carnea</i>
1025	isopod, unidentified	<i>Isopoda spp.</i>
1103	jackknife (razor) clams	<i>Solenoidaea spp.</i>
0657	Jonah crab	<i>Cancer borealis</i>
0790		<i>Branchiostoma spp.</i>
0600	Lancelets	<i>larval fish</i>
0495	larval fish	<i>Pagurus longicarpus</i>
1092	long-clawed hermit crab	<i>Ogyrides</i>
7581	long-eyed shrimp	<i>alphaerostis</i>
0573	Longfin inshore squid	<i>Loligo pealeii</i>
1028	Macoma clams	<i>Macoma spp.</i>
0820	macroalgae	<i>macroalgae</i>
0478	mantis shrimp	<i>Squilla empusa</i>
0621		

1161	Mantis shrimp	<i>Platysquilloides enodis</i>
	mantis shrimp, most common ChesMMA	<i>Squilla empusa</i>
0621	mantis shrimp, small gray one	<i>Nannosquilla grayi</i>
1112	mollusc meat	<i>mollusca</i>
0709	Mound-back isopod	<i>Edotia triloba</i>
5020	mud crabs, unidentified	<i>xanthidae</i>
0594	mud shrimps, unidentified	<i>mud shrimps</i>
1010		<i>Neomysis americana</i>
0699	Mysid	<i>Mysidopsis bigelowi</i>
0740	Mysid	<i>Mysidae</i>
0574	mysids, unidentified	<i>Nassarius trivittatus</i>
	New England dog whelk	<i>Polyonyx gibbessi</i>
0742	oyster pea crab	<i>Euceramus praelongus</i>
0601	parasitic isopod, the long one	<i>Pinnixa spp</i>
0624	pea crabs	<i>Sipuncula</i>
0833	peanut worm	<i>Ophelia denticulata</i>
1109		
	polychaete	<i>Polychaeta</i>
0754	polychaete, unidentified	<i>Portunus spp.</i>
0775	Portunus spp.	<i>Caudina arenata</i>
0578	rat-tailed cucumber	<i>Monoculodes edwardsi</i>
1109		<i>Geukensia demissa</i>
	red-eyed amphipod	<i>Rimapeneus constrictus</i>
0738	Ribbed mussel	<i>Echinarachnius parma</i>
0823		<i>Chiridotea almyra</i>
	roughneck shrimp	<i>Ammodytes spp.</i>
0595		<i>Crangon septemspinosa</i>
0702	sand dollar	<i>Molgula spp.</i>
0570	Sand isopod	<i>Gilvossium setimanus</i>
0491	sand lances	<i>Acetes</i>
0604	sand shrimp	<i>Dichelopandalus leptocerus</i>
0824	sea squirts (Molgula)	<i>shrimp zoea</i>
	short-browed mud shrimp	<i>Decapoda</i>
0500	shrimp	<i>Caprellidae spp.</i>
0623	shrimp with swoopy rostrum	<i>Caprella penantis</i>
0679	shrimp zoea	<i>Caprella equilibria</i>
5011	shrimp, unidentified	<i>Cyathura polita</i>
5001	skeleton shrimp	<i>Etropus microstomus</i>
0658	skeleton shrimp	<i>Hexapanopius angustifrons</i>
0921	skeleton shrimp	<i>Haminoea solitaria</i>
1106	Slender isopod	<i>Libinia spp.</i>
0513		<i>Anchoa hepsetus</i>
	smallmouth flounder	<i>Pectinaria gouldi</i>
0236		<i>unidentified material</i>
	smooth mud crab	<i>vegetation</i>
0552	solitary bubble	<i>worm</i>
0806	spider crabs, unidentified	<i>zooplankton</i>
5026	unidentified	
0102	striped anchovy	
0667	trumpet worm	
	Unid. Material	
0708	vegetation	
5006	worm, unidentified (not polychaete)	
0629	zooplankton	
0971		

0623	shrimp	<i>Acetes</i>
5000	fish, unidentified	<i>Actinopterygii</i>
0825	Fingers	<i>Alcyonidium spp.</i>
0491	sand lances	<i>Ammodytes spp.</i>
0636	four-eyed amphipods	<i>Ampelisca spp.</i>
0841	amphipod, unidentified	<i>Amphipoda spp.</i>
0558	ark clams	<i>Anadara</i>
0102	striped anchovy	<i>Anchoa hepsetus</i>
0103	bay anchovy	<i>Anchoa mitchilli</i>
0399	common anchovies	<i>Anchoa spp.</i>
0643	Anemones	<i>Anemones</i>
5032	animal tubes	<i>animal tubes</i>
0653	burrowing mud shrimp	<i>Axius serratus</i>
5039	clam, unidentified	<i>Bivalvia</i>
0495	Lancelets	<i>Branchiostoma spp.</i>
0037	atlantic menhaden	<i>Brevortia tyrannus</i>
0518	Calanoid copepod	<i>Calanoida</i>
0600	Jonah crab	<i>Cancer borealis</i>
0656	Atlantic rock crab	<i>Cancer irroratus</i>
	cancer crab, unidentified (rock or	
5016	Jonah)	<i>Cancer spp.</i>
1106	skeleton shrimp	<i>Caprella equilibria</i>
0921	skeleton shrimp	<i>Caprella penantis</i>
0658	skeleton shrimp	<i>Caprellidae spp.</i>
1109	rat-tailed cucumber	<i>Caudina arenata</i>
0570	Sand isopod	<i>Chiridotea almyra</i>
0703	hydroids	<i>Cnidaria</i>
0671	amphipod (Corophium spp.)	<i>Corophium spp.</i>
1054	crab megalopa	<i>crab megalopa</i>
0973	crab zoea	<i>crab zoea</i>
		<i>Crangon</i>
0604	sand shrimp	<i>septomspinosa</i>
1113	crustacean parts	<i>crustacean parts</i>
	crustacean, unidentified	<i>Crustacea</i>
0673	Slender isopod	<i>Cyathura polita</i>
5035	crab, unidentified	<i>Decapoda</i>
5001	shrimp, unidentified	<i>Decapoda</i>
	shrimp with swoopy rostrum	<i>Dichelopandalus leptocerus</i>
0679		<i>Echinarachnius parma</i>
0702	sand dollar	
1089	burrow worms	<i>Echiura spp.</i>
5020	Mound-back isopod	<i>Edotia triloba</i>
0816	Atlantic razor clam	<i>Ensis directus</i>
		<i>Etropus microstomus</i>
0236	smallmouth flounder	
	parasitic isopod, the long one	<i>Euceramus praelongus</i>
0624	fish scales	<i>fish scales</i>
0529		
	amphipod (Gammarus spp.)	<i>Gammarus spp.</i>
0694	Ribbed mussel	<i>Geukensia demissa</i>
0823	short-browed mud shrimp	<i>Gilvossium setimanus</i>
0500	bloodworm	<i>Glycera spp.</i>
0697	solitary bubble	<i>Haminoea solitaria</i>
0806		<i>Hexapanopius angustifrons</i>
0552	smooth mud crab	
0657	isopod, unidentified	<i>Isopoda spp.</i>
1092	larval fish	<i>larval fish</i>
	common burrower	<i>Leptocheirus plumulosus</i>
0507	amphipod	
	spider crabs, unidentified	<i>Libinia spp.</i>
5026		

1028	Longfin inshore squid	<i>Loligo pealeii</i>
0820	Macoma clams	<i>Macoma spp.</i>
0478	macroalgae	<i>macroalgae</i>
0824	sea squirts (Molgula)	<i>Molgula spp.</i>
0709	mollusc meat	<i>mollusca</i>
		<i>Monaculodes edwardsi</i>
0738	red-eyed amphipod	
	mud shrimps, unidentified	<i>mud shrimps</i>
1010	Dwarf surf clam	<i>Mulinia lateralis</i>
0882	mysids, unidentified	<i>Mysidae</i>
0574		<i>Mysidopsis bigelowi</i>
0740	Mysid	
0802	Blue mussel	<i>Mytilus edulis</i>
	mantis shrimp, small gray one	<i>Nannosquilla grayi</i>
1112	New England dog whelk	<i>Nassarius trivittatus</i>
0742		<i>Neomysis americana</i>
0699	Mysid	
0510	Clam worm	<i>Nereis spp.</i>
		<i>Ogyrides alphaerostris</i>
0573	long-eyed shrimp	<i>Ophelia denticulata</i>
0754	polychaete	
0755	brittle stars	<i>Ophiuroidea</i>
	long-clawed hermit crab	<i>Pagurus longicarpus</i>
7581	flat-clawed hermit crab	
7582		<i>Pagurus pollicaris</i>
	hermit crabs, unidentified	<i>Pagurus spp.</i>
0758	grass shrimp	<i>Palaemonetes spp.</i>
0620	trumpet worm	<i>Pectinaria gouldi</i>
0667		<i>Peprilus triacanthus</i>
0004	butterfish	
0764	Broomworm	<i>Pherusa affinis</i>
0833	pea crabs	<i>Pinnixa spp</i>
		<i>Platysquilloides enodis</i>
1161	Mantis shrimp	<i>Politolana concharum</i>
1025	isopod	
	polychaete, unidentified	<i>Polychaeta</i>
0775	oyster pea crab	<i>Polyonyx gibbessi</i>
0601	Portunus spp.	<i>Portunus spp.</i>
0578		<i>Rimapeneus constrictus</i>
0595	roughneck shrimp	
	croaker/drum, unidentified	<i>Sciaenidae</i>
0963	shrimp zoea	<i>shrimp zoea</i>
5011	peanut worm	<i>Sipuncula</i>
1109	jackknife (razor) clams	<i>Solenioidea spp.</i>
0790	mantis shrimp	<i>Squilla empusa</i>
0621	mantis shrimp, most common ChesMAP	<i>Squilla empusa</i>
0621	isopod	<i>Travisia carnea</i>
1103		<i>unidentified material</i>
0708	Unid. Material	
	codlings (spotted and red hake)	<i>Urophycis spp.</i>
0053	vegetation	<i>vegetation</i>
5006	worm, unidentified (not polychaete)	<i>worm</i>
0629	mud crabs, unidentified	<i>xanthidae</i>
0594	zooplankton	<i>zooplankton</i>
0971		