

Who's Who in the Intertidal Zone?



Atlas for Peterson Bay Field Station



How to Use the Atlas

The Fact Sheets in the Atlas provide information on 50 plants and animals that are commonly observed during Center for Alaskan Coastal Studies field trips to the Peterson Bay and China Foot Bay intertidal zones. Each invertebrate fact sheet includes the illustration that appears on the laminated, full-color "Beachcomber's Guide to Intertidal Marine Invertebrates of Southcentral Alaska" which are available for use during CACS field trips and at a reduced price to teachers who participate in the field trip program.

A teacher or group leader can use the fact sheets in a number of ways to help make the trip educationally rewarding:

1. Students or groups of students can become experts on the natural history of an organism or related group of organisms. They can obtain additional information and report to the entire class in a variety of ways.
2. Students can pool information on individual fact sheets to construct predator-prey relationships, food chains, and food webs.
3. Students can identify various types of adaptations and symbioses.
4. The fact sheets can be laminated and used during beach hikes at Peterson Bay Field Station for identification and transect activities.

Teachers are encouraged to make additional copies for classroom use only.



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Illustrations: By permission of Conrad and Carmen Field or public domain sources:

Alaska Seaweed Curriculum Series, Alaska Seagrass Program; and illustrations by Cathy Eaton in the 1979 National Park Service publication *The Intertidal Life of Bartlett Cove, Glacier Bay National Monument*

The Center for Alaskan Coastal Studies is a membership-based, 501-c-3 educational nonprofit organization whose mission is to foster responsible interaction with our natural surroundings and to generate knowledge of the marine and coastal ecosystems of Kachemak Bay through environmental education and research programs.

Goals

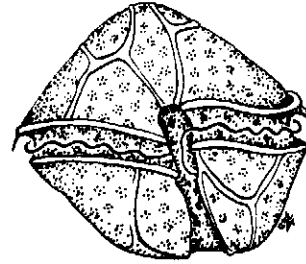
Education: To increase awareness and understanding of the coastal and marine ecosystems by providing environmental education programs and field experiences to students and the general public.

Stewardship: To be caretakers and to motivate others to be caretakers of the Alaskan coastal and marine environments.

Research: To acquire data needed for making informed decisions on the use and sustainable development of Kachemak Bay, and to facilitate research efforts by governmental, academic, and private research agencies.

Producers

Algae, Seaweeds, Phytoplankton



Phytoplankton

What It Looks Like: Single-celled.
Diatoms float in sea water or form a crust on rocks and other hard surfaces in the intertidal zone

Gets Food By:

Photosynthesis.

PRODUCER

Various species

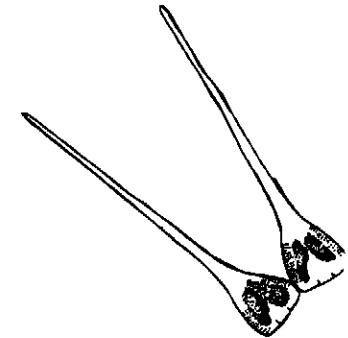
Eaten By:

Zooplankton, filter-feeders, suspension-feeders

**Habitat: Floating in
Ocean Water**

How It Moves:

Floats.





Green Algae or Seaweed

Sea Lettuce

Class:
Chlorophyta

Ulva spp.

What It Looks Like:

Not always green. Sea lettuce is a large, thin green sheet, sometimes with holes

Gets Food By:

Photosynthesis

PRODUCER

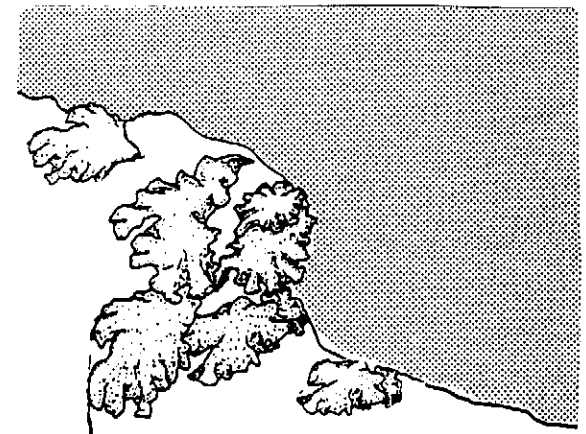
Gets Eaten By:

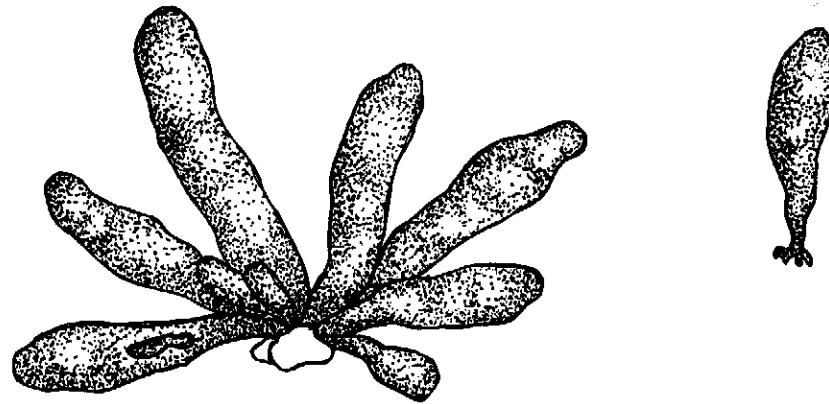
Limpets and people (good source of Vitamin C, protein, iodine, and iron for people during spring). Toxic to amphipods.

FUN FACTS:

1. Sea lettuce is only two cell layers thick, and tears easily.
2. Sea lettuce, like many green algae that grow in the upper intertidal zone, is very tolerant of extremes in temperature (above freezing to 77° F.).

Habitat:
Rocky areas





Sea Sac

Halosaccion glandiforme

Red Algae or Seaweed

Class:
Phaeophyta

What It Looks Like:

Not always red. Sea sac grows as a clump of 2-4"-long sacs that are more green than red at some life stages.

Gets Food By:

Photosynthesis

PRODUCER

Gets Eaten By:

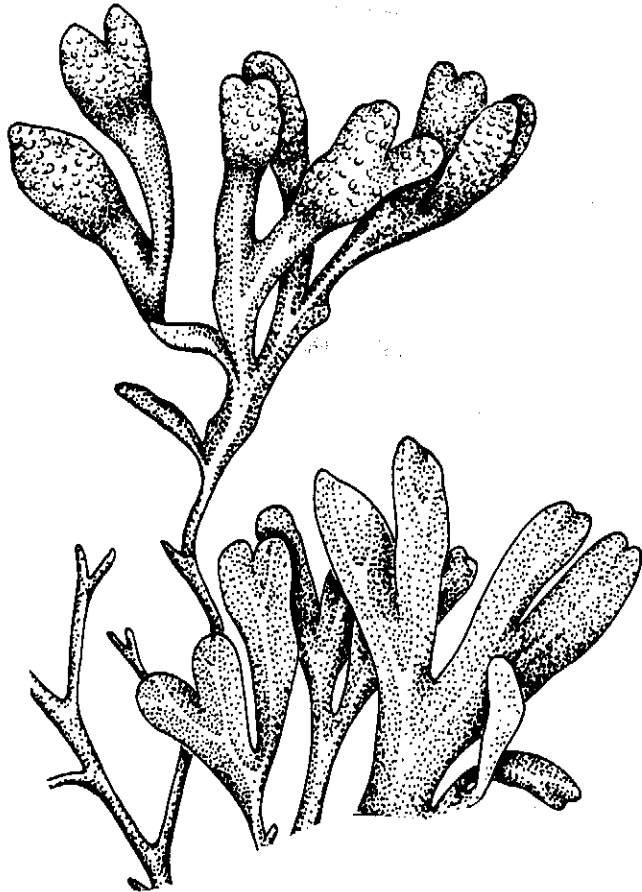
Limpets.

FUN FACTS:

1. Amphipods sometimes chew into the base of sea sacs and stay in the sac for protection.
2. The sacs of sea sac have pores that admit sea water when the tide comes in. The sacs fill except for a bubble of oxygen at the tip which provides for rapid photosynthesis and acts as a float. The water in the sac keeps the plant cool and moist during low tide.

Habitat:

Rocky areas



Rockweed or Popweed

Fucus spp.

What It Looks Like:

Most plant-like seaweed - short with branching, flattened blades that ends in fat tips filled with gas in older plants.

Gets Food By:

Photosynthesis

PRODUCER

Gets Eaten By:

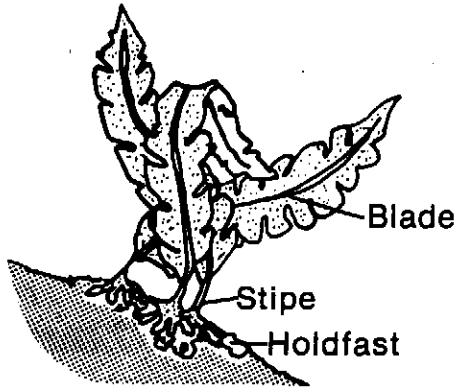
Periwinkles, isopods, limpets, people (eat young tips in spring). Contains chemicals that make it indigestible to many species.

**Habitat: Rocky
areas, forms a dis-
tinct band in Middle
Intertidal Zone**

FUN FACTS:

1. Gas bubbles in tips act as floats to hold blades upright in water. This keeps the blades in the area of most sunlight.
2. Very resistant to drying and freezing.





What It Looks Like:

Often large, long brown leafy blades with thick stipe and holdfast. Ribbon Kelp has a single large rib and may have several small reproductive blades at the base. Sugar Kelp has a broad flat band up the middle of the long blade. Both grow up to 10' long.

Stays Wet Enough By:

Growing low in the intertidal zone or subtidally. Forms a canopy that lies flat and covers a large area when the tide is out.

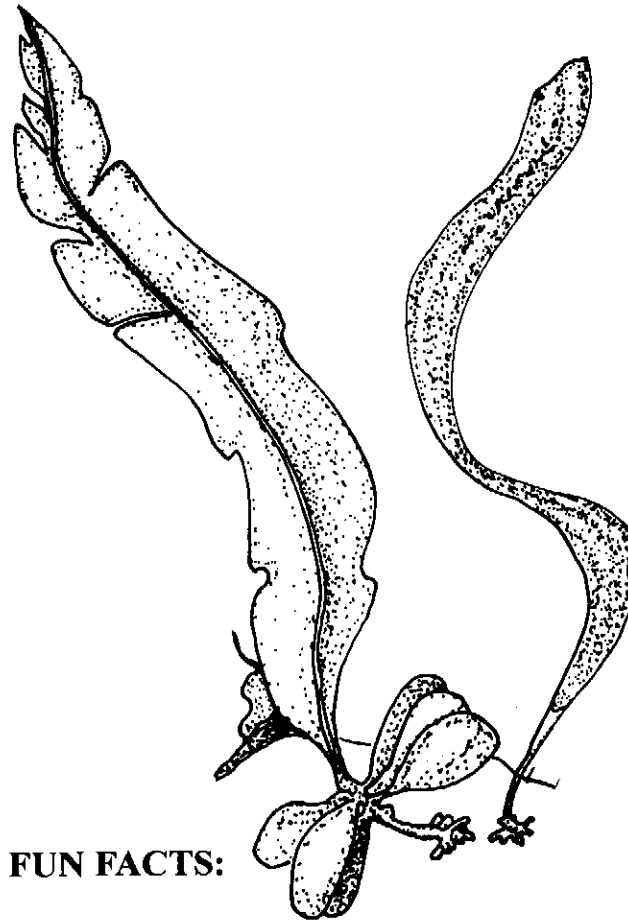
Gets Food By:

Photosynthesis

PRODUCER

Gets Eaten By:

People (good sources of vitamins, iodine, and protein), sea urchins



FUN FACTS:

1. Many animals shelter in the calmer waters near kelp holdfasts or attach to the kelps. For example, sea otters wrap themselves in kelp to sleep.
2. Sugar kelp, like some other large kelps, is an annual that regrows each year. The kelps contribute large amounts of organic material to marine food chains and have some of the fastest growth rates of any plants.

**Brown
Seaweed
Kelp**

Ribbon Kelp
Sugar Kelp/Sea Cabbage

Phaeophyta

Alaria spp.

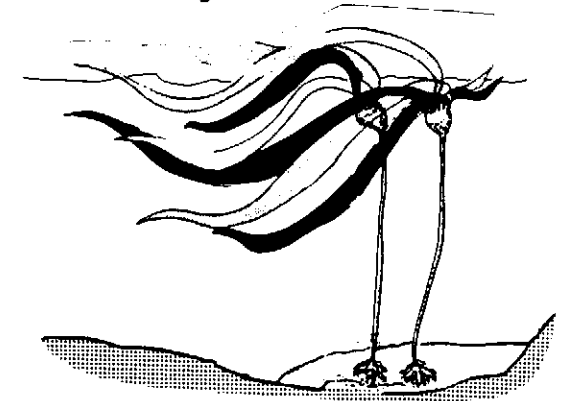
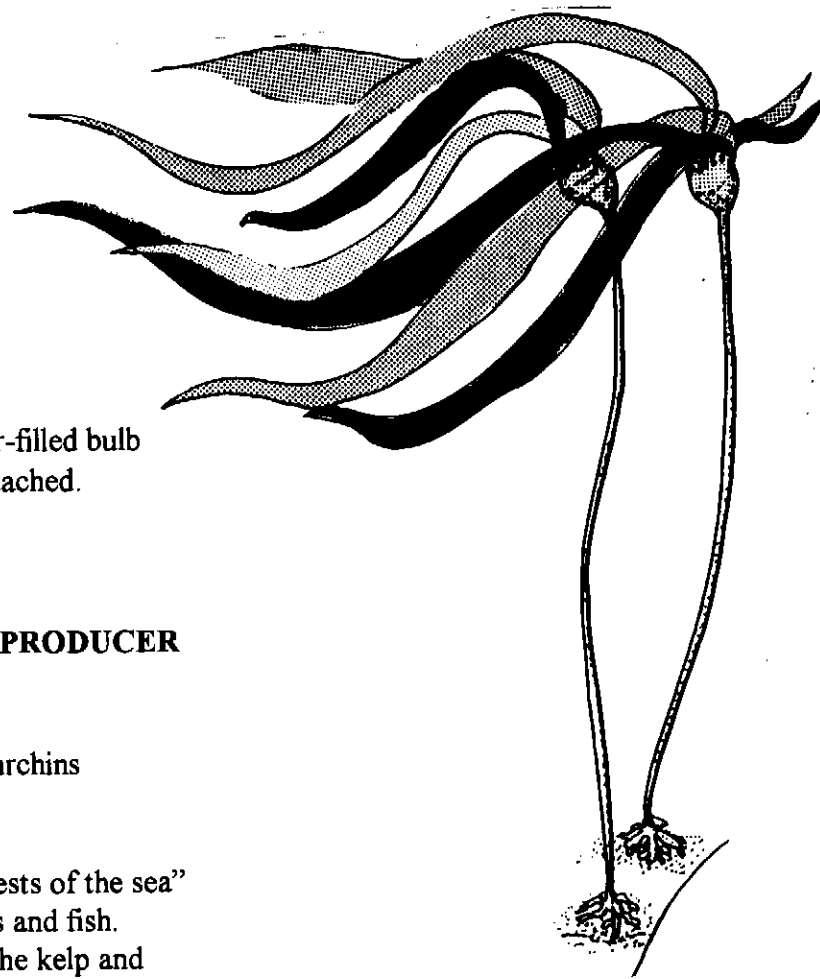
Laminaria spp.

**Habitat: Lower in-
tertidal zone, rocky
shores**

Brown Seaweed Bull Kelp

*Nereocystis
leutkeana*

**Habitat: Forms
large beds offshore
on rocky areas**



What It Looks Like:

Long stipe (to 30 feet) with air-filled bulb that has several long blades attached.

Gets Food By:

Photosynthesis

PRODUCER

Eaten By:

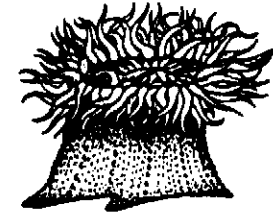
People (make kelp jelly), sea urchins

FUN FACTS:

1. Bull kelp beds are “the forests of the sea” - good habitat for sea otters and fish. Otters wrap themselves in the kelp and anchor themselves in place to eat or sleep. The beds help to blunt the effect of waves onto shore. Bryozoans and other animals live on the stipe and blades.
2. The bulb acts as a float - the stipe grows fast in deeper water which keeps the blades high in the water where they receive enough light for photosynthesis.

Cnidarians

Phylum Cnidaria



Burrowing Green Sea Anemone

*Anthopleura
artemisia*

**Habitat: Pockets of
sand and mud in
rocky beach areas**

What It Looks Like:

If closed up, may only see a circular depression at surface. May be completely covered with sand and shell. If open, will see a circle of thin, greenish tentacles.

Stays Wet Enough By:

Attaching to a rock under the surface in the middle intertidal zone and closing up when the tide is out

Gets Food By:

Stunning prey that touch its tentacles and moving it into its mouth; the nematocysts (stinging cells) contain poison

PREDATOR

Avoids Becoming Food By:

Most predators avoid anemones to avoid getting stung, however, it can detach itself from its rock and roll along bottom with waves to find another place to attach when it senses a predator.

Gets Eaten Anyway By:

Some sea slugs can eat them without getting stung.

How It Moves:

Usually glued to a rock under the surface. Can change the shape of its body or detach.

How It Reproduces:

Can reproduce sexually or asexually splitting into two halves.

FUN FACTS:

1. The shell and sand that becomes attached to its body help the anemone to keep cool by reflecting the sunlight.
2. Not always green - green color is from the inclusion of algae inside its tissue. The algae absorb nitrogen from the anemone and photosynthesizes sugars that anemone can eat if starved for prey.

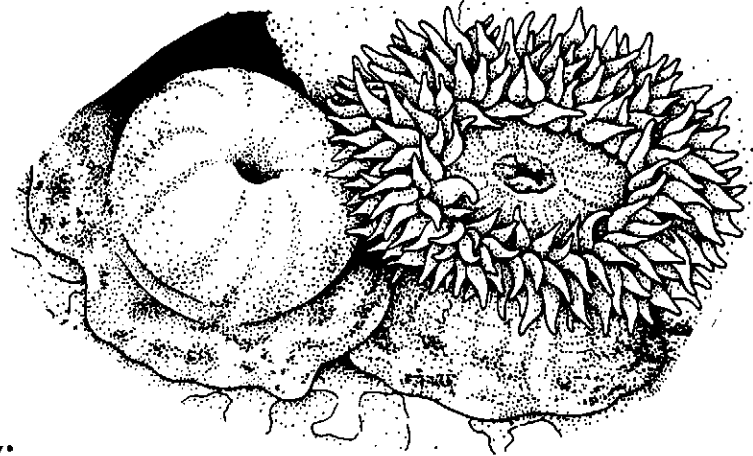
SYMBIOSIS - COMMENSALISM

What It Looks Like:

Base column has red and green blotches.
Crown of fat, brownish tentacles can be up to 10 inches in diameter. Tentacles have a "velcro" feel.

Stays Wet Enough By:

Settling and attaching in the lower intertidal zone.

**Gets Food By:**

Stunning prey that encounter tentacles with firing of nematocysts (stinging cells), then capturing prey with tentacles and moving it to the mouth. Eats snails, chitons, crabs, sea urchins, fish as well as barnacles and mussels if they get torn off rocks by waves.

Avoids Becoming Food By:

Stinging nematocysts protect it from predators.

Gets Eaten Anyway By:

Some types of sea slugs

How It Moves:

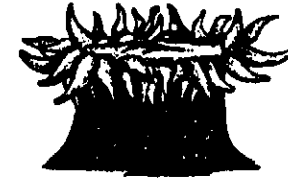
Stays attached to a rock.

How It Reproduces:

Larvae disperse as zooplankton.

FUN FACTS:

1. Some shrimp can live among tentacles and scavenge food dropped by the anemone
SYMBIOSIS - COMMENSALISM
2. When the tide goes out, they slump helplessly from where they are attached on a rock or fall over on their neighbors in flat areas.
3. They may live 60-80 years.

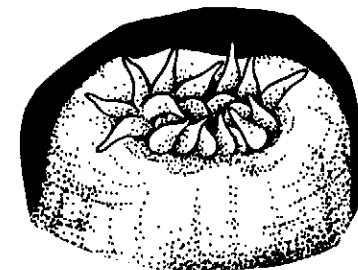


Christmas Anemone

Urticina crassicornis

Habitat:

**Rocky areas, Lower
Intertidal Zone**



Mollusks

Phylum Mollusca

What It Looks Like:

Bluish-black smooth-shelled bivalve (2 shells) attached individually or in clumps with byssus (yellowish-brown threads), to rocks or other hard surfaces

Stays Wet Enough By:

Closing shell when tide is out. Groups of mussels stay moist longer than a single mussel would.

Gets Food By:

Opening shell slightly and drawing a current of water inside over gills where plankton and detritus particles stick to the mucus coating on gills. Ciliated cells guide the trapped food toward the mouth where it is swallowed. Non-food items are rejected

FILTER FEEDER

Avoids Becoming Food By:

1) Hard shell. 2) Can trap dogwinkle snails by “lassoing” with byssal threads. Snail is toppled or suspended and can starve to death if it can’t free itself. 3) Small mussels can move.

Gets Eaten Anyway By:

Dogwinkle and moon snails bore holes in shell. Birds drop them from a height to smash the shell. True stars pull them open with their tube feet.



How It Moves:

Young larvae float in plankton and later stages can swim. The larvae eventually settle and secrete byssal threads to anchor to rock or other mussels. Young mussels can move around, but older mussels stay in one place.

How It Reproduces:

Disperse larvae as zooplankton. Larvae are attracted to settle in places where mussel beds are already established.

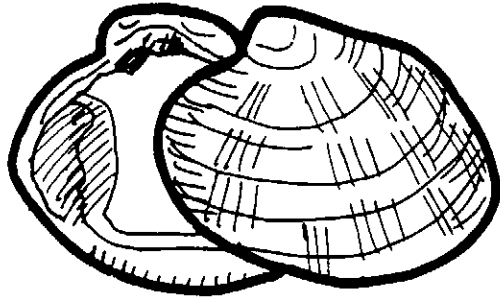
FUN FACTS:

1. Mussel beds are a habitat for many other plants and animals. They provide shelter from strong currents and places where mud and sand settle and provide burrowing sites. Barnacles and other plants and animals may grow on the shells of mussels.
2. Mussels feed continuously when submerged. A single adult mussel can pump 25 gallons/day.

Pacific or Edible Mussel

Mytilus trossulus

**Habitat: Rocky
areas**



What It Looks Like:

Bivalve (two shells). Shells are tan checkerboard pattern - heavy ribs crosshatched by rings. Short siphons.

Stays Wet Enough By:

Burrowing and withdrawing siphon into shell and closing tightly.

Gets Food By:

Cilia on gills beat and draw water in through one siphon and out the other. On way through, mucus on gills trap food particles which are then guided to the mouth.

Avoids Becoming Food By:

Staying below surface and retreating to shell.

Gets Eaten Anyway By:

True stars, moonsnails, octopi, sea otters, humans. Sculpins nip off siphons.

How It Moves:

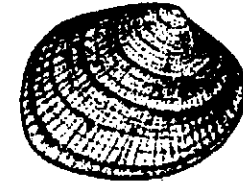
Can use muscular foot to move to a different part of the beach

How It Reproduces:

Larvae disperse as zooplankton.

FUN FACTS:

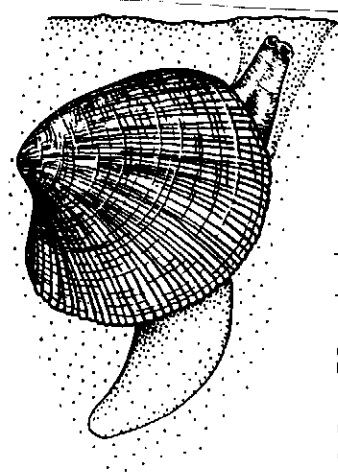
1. Can be contaminated by toxic (PSP) microalgae but doesn't store it as long as butter clams.
2. Rings can indicate growing conditions - they are deeper where wave energy is higher.
3. Grows slowly - takes 10 years to reach maximum size



Steamer or Pacific Littleneck Clam

*Protothaca
staminea*

**Habitat: Close to
surface in muddy
gravel**



**What It Looks Like:**

Bivalve (two shells) - shells are heavy and relatively large (to 5 inches long) and chalky or grayish white with many fine lines. Siphons extend 1-2 inches. Large black hinge on outside of shell.

Stays Wet Enough By:

Staying below the surface and closing shell.

Gets Food By:

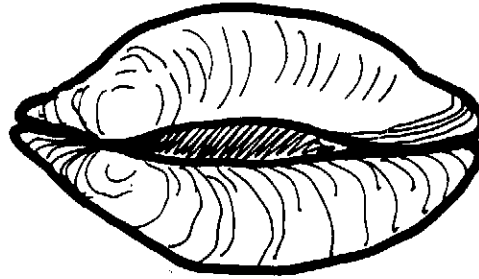
Cilia on gills beat and draw water in through one siphon and out the other. On way through, mucus on gills trap phytoplankton, bacteria, detritus (dead matter) which are then guided to mouth. **FILTER FEEDER**

Avoids Becoming Food By:

Withdrawing siphon into the heavy shell which it can close tightly with strong muscles. Burrowing also avoids some surface predators.

Gets Eaten Anyway By:

True and sunflower stars can dig them out and moon snails can bore through the shell. Sculpins nip off the siphons. Also eaten by Dungeness crabs, sea otters, and humans.

**How It Moves:**

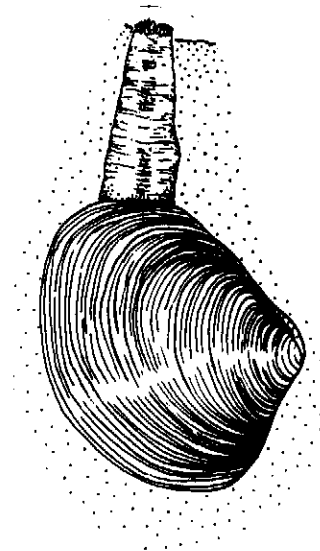
Can burrow with muscular foot to 12 inches deep.

How It Reproduces:

Larvae are dispersed as zooplankton.

FUN FACTS:

1. Can live for more than 20 years.
2. PSP toxin is isolated in siphons and can be stored for two years. Sea otters, sculpins, and glaucous-winged gulls can distinguish and avoid butter clam siphons with PSP.

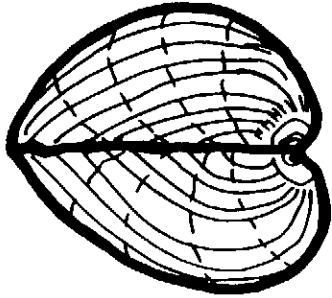


Butter Clam

Saxidomus gigantea

Habitat:

**Rocky beaches
where gravel or
sand has accumu-
lated**



What It Looks Like:

Bivalve (two shells) with cross-hatched pattern and deep ribs and crescents on each rib. Yellowish-brown mottled with red or reddish brown.

Stays Wet Enough By:

Burrowing just below surface in lower intertidal zone

Gets Food By:

Cilia on gills beat and draw water in through one siphon and out the other. On way through, mucus on gills traps phytoplankton, bacteria, and detritus (dead matter) particles which are then guided to the mouth.

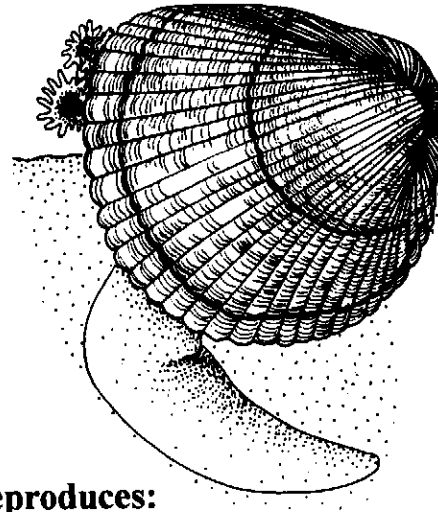
Avoids Becoming Food By:

Burrowing and the type of shell - the scalloped edges of the shell fit tightly so are harder for sea stars to open.

Gets Eaten Anyway By:

Sunflower stars, gulls, and people dig them up. Dungeness crab chip away at shells with their pincers.

How It Moves: Muscular foot, but doesn't burrow - needs to be on or near surface due to short siphons



How It Reproduces:

Disperses larvae as zooplankton.

FUN FACTS:

1. The cockle can use its foot to flip itself away from its predators. The tickle of a sunflower star's tube feet elicit this reaction.
2. Has annual growth rings because it ceases to grow during winter
3. Has numerous tiny eyes on edge of mantle inside shell
4. Can live to be 16 years old



Nuttall's or Heart Cockle

Clinocardium nuttallii

Habitat:

**Near surface in mud
or sandy mud**

What It Looks Like:

Small (less than 1 inch long) bivalve (2 shells). White outside, deep pink inside shell.

**Stays Wet Enough By:**

Burrowing

Gets Food By:

Extending one siphon above surface and sucking up detritus. Digests bacteria and microscopic algae and expels the rest through the other siphon.

SUSPENSION FEEDER

Avoids Becoming Food By:

Burrowing and retreating into shell.

Gets Eaten Anyway By:

Birds eat them whole and regurgitate the shells later. Western sandpipers, in particular, have a bill that is the perfect length for how deep most of these clams can burrow and still extend their siphon to the surface to feed. Mallards, American wigeon, and other dabbling ducks stir up the bottom and filter out food items through their bill. Crabs and shrimp nip off the siphons.

How It Moves:

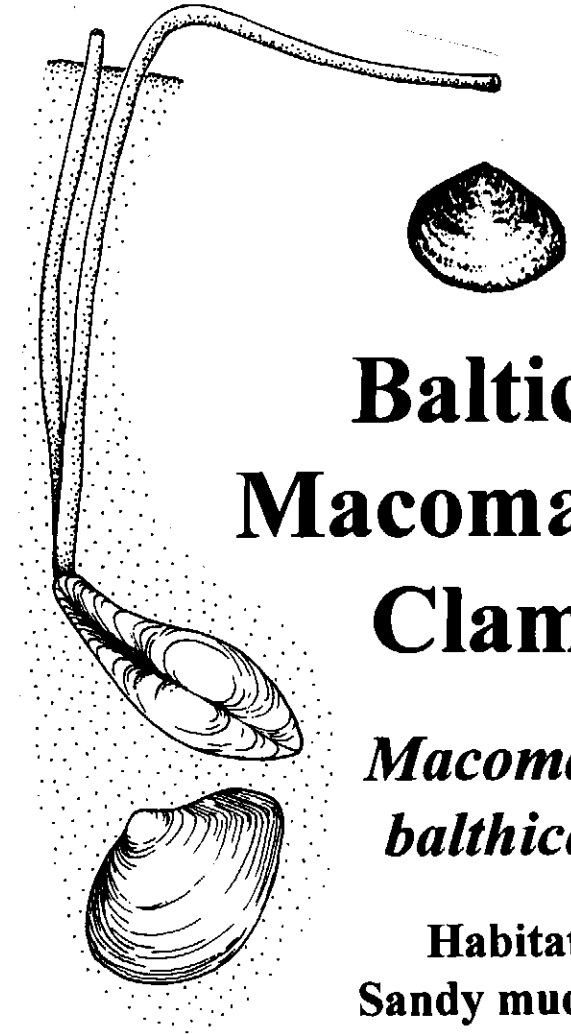
Can move with muscular foot and extend siphons.

How It Reproduces:

Larvae are dispersed as zooplankton.

FUN FACTS:

Very important food source for the shorebirds and waterfowl that migrate through Kachemak Bay during spring.



Baltic Macoma Clam

*Macoma
balthica*

Habitat:
Sandy mud,
very near surface

What They Look Like:

Single, often mottled conelike shells. Plate limpet is squashed-looking ("flat as a plate") and sometimes has a tuft of green algae attached to the top.

Stay Wet Enough By:

Clinging tightly to rocks when the tide is out.

Get Food By:

Moving around underwater, scraping the seaweed, microscopic algae, and bacteria off the rock with its radula (whiplike, toothed tongue)

Avoid Becoming Food By:

Clinging so tightly to rocks that it is hard to dislodge. Plate limpets "run away" from sea stars when they smell them approaching and can also wiggle their shell from side to side to shake off a sea star. Shield limpets can't move as fast; they stay higher up in the intertidal zone where they can avoid sea stars that can't move into the upper area and survive drying.

Gets Eaten Anyway By:

Sunflower, true and six-armed stars catch them or pull them off the rock with their tube feet. Dogwinkle snails bore holes in the shell. Large crabs chip away at edges of shell. with their pincers.

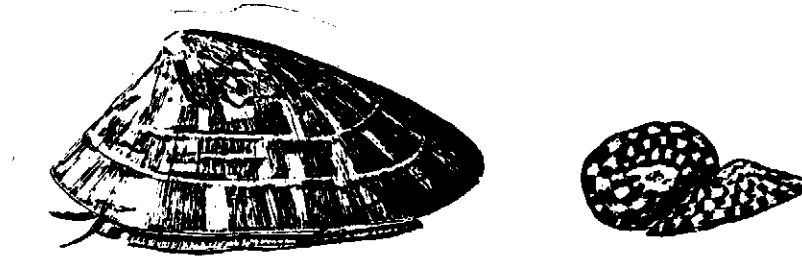


Plate Limpet
Tectura scutum

How They Move:

Large muscular foot

How They Reproduce:

Larvae disperse as zooplankton.

FUN FACTS:

1. All limpets can be eaten as emergency food because, as grazers, they don't filter and concentrate PSP toxins.
2. The radula of the plate limpet is huge - it can be two times as long as the shell. Listen for the loud rasping sounds it makes while feeding.
3. They move up and down the rocks with the tides, feeding below the surface and staying in place when the tide is out.

Limpets

Habitat:
Rocky areas.



Dunce Cap Limpet

Acmaea mitra

Habitat:
**Rocky areas with
coralline algae**

What It Looks Like:

Small cone - as tall as it is long. Chalky white or covered by encrusting pink coralline algae

Stays Wet Enough By:

Staying in extreme low intertidal zone, often in tidepools. Clamps tight to rocks to form an airtight seal when tide is out

Gets Food By:

Scraping coralline algae with its radula (whiplike, toothed tongue)

Avoids Becoming Food By:

1) Camouflaged by pink color after eating coralline algae. 2) Hard shell. 3) Clinging tightly to the rock

Gets Eaten Anyway By:

White-winged scoters can pry them up.

How It Moves:

Large, muscular foot

How It Reproduces:

Disperse larvae as zooplankton

FUN FACTS:

1. The teeth on the radula are made of opal and an iron compound.
2. The limpet eats coralline algae and receives the benefit of camouflage from algae that grow on its shell. The algae get another place to grow and the surface of the algae is kept free of other algae that might grow on top and block the sunlight needed for photosynthesis.

SYMBIOSIS - MUTUALISM



What It Looks Like:

Huge, heavy brownish shell and white foot that can be extended well beyond shell.

Stays Wet Enough By:

Staying in the lower intertidal zone. Can withdraw into shell and close it with a hard operculum (trapdoor).



Gets Food By:

Hunting during high tide using a zig-zag search pattern. Burrows and detects a steamer clam, cockle, or other soft-shelled clam, then drags it deep into the mud where it drills a hole with its radula (toothed tongue) and pours in enzymes that dissolve the shell and tissue. Inserts proboscis and rasps and sucks out the tissue. Can also smother a mollusc with its large foot.

PREDATOR

Avoids Becoming Food By:

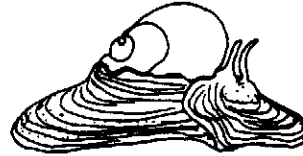
Withdrawing into shell.

Gets Eaten Anyway By:

Large predatory fish, sunflower stars, and octopi eat them whole.

How It Moves:

Can extend foot over most of shell, then plow through layers of sand or mud



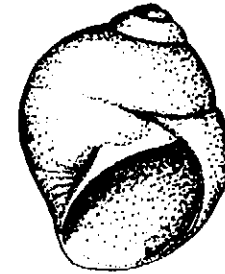
How It Reproduces:

Females lay eggs in a circular mucus/sand sandwich that looks like a rubber gasket. Larvae are incubated in the sand collar, then released to disperse as zooplankton.



FUN FACTS:

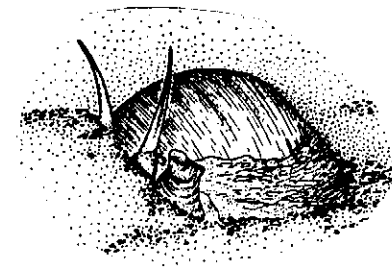
1. Body can occupy four times the volume of the shell when fully extended.
2. Another moon snail species was observed to eat a clam every four days.
3. Female moon snails can live to be 14 years old.



Moon Snail

Natica clausa

Habitat: Sandy or muddy areas



What It Looks Like:

Small shells (1-1 1/2 inches high) with spiral ridges, various colors

Stays Wet Enough By:

Retreating into shell

Gets Food By:

Drilling a hole in the shell of a mussel or barnacle and scraping the flesh out with its radula (toothed tongue)

How It Moves:

Move on muscular foot.

How It Reproduces:

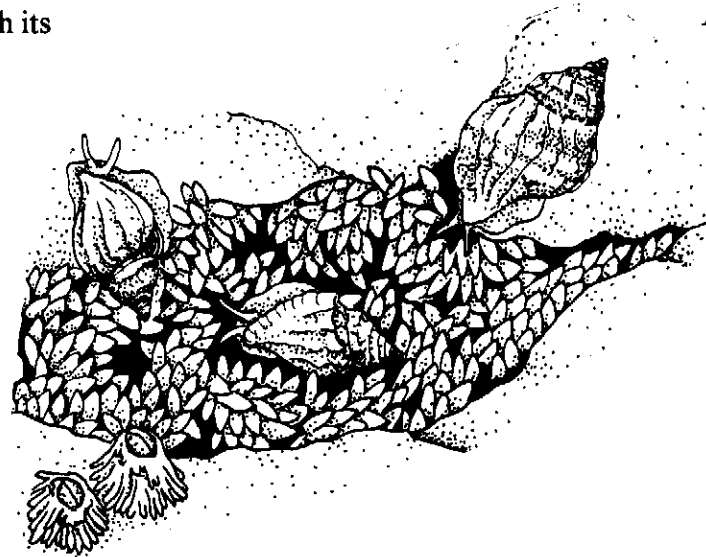
Females lay egg masses, juveniles hatch out as young snail with no larval stage in zooplankton.



File Dogwinkle
Nucella lima



Frilled Dogwinkle
Nucella lamellosa



Dogwinkle Snails

Nucella spp.

Avoids Becoming Food By:

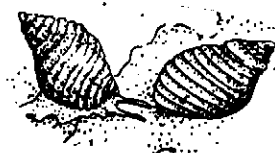
Retreating into its heavy shell

Gets Eaten Anyway By:

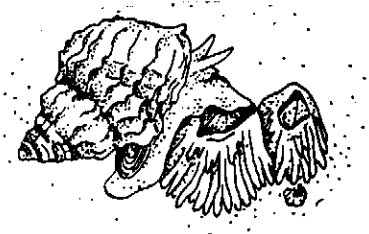
True stars eat them.

FUN FACTS:

1. Hermit crabs use the shell for a house.
2. Mussels have an interesting defense against the file dogwinkle - they lasso it with a byssal thread to suspend it or topple it. If the snail stays suspended, it can starve to death.



Habitat: Rocky areas, file dogwinkle often in musselbeds



What It Looks Like:

Small (less than 1 inch high) dark or check-board-pattern on shell

Stays Wet Enough By:

Hiding under seaweed, forming groups, retreating into shell and closing it with an airtight, hard operculum (trap door). Most are adapted to the splash zone and avoid being submerged - they would drown.

**Gets Food By:**

Scraping Black Sea Lichen, seaweeds, and microscopic algae off rockweed, with radula (whiplike, toothed tongue)

Avoids Becoming Food By:

Retreating into shell and closing it with its operculum

Gets Eaten Anyway By:

Sea stars, seaducks, and gulls eat them whole.

How It Moves:

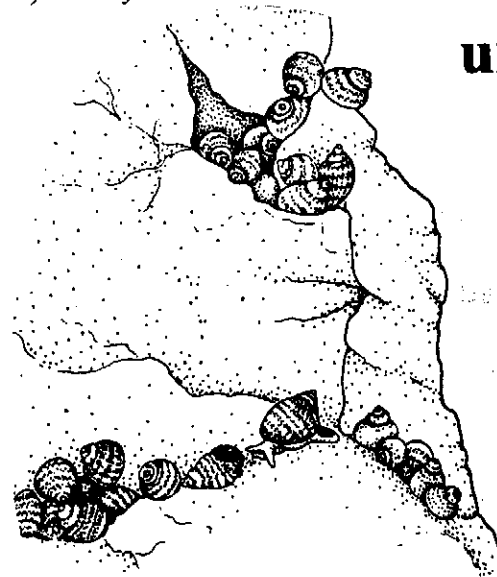
Moves on muscular foot. They travel on slime trail and each periwinkle can track other periwinkles by the scent to find food or a mate.

How It Reproduces:

Females lays eggs in cases in a mass. Small snails hatch out - no larvae stage in zooplankton.

FUN FACTS:

1. Periwinkles compete for space with barnacles by bulldozing off newly-settled barnacle larva.
2. Hairy hermit crabs use their shells for homes.
3. Most move less than three feet in a month.
4. The scraping of periwinkle radulas has been estimated to deepen tidepools by 1 cm (.4 inch) in 16 years.



Periwinkle

Littorina spp.

Habitat: Rocky areas - often on or under seaweeds

What It Looks Like:

Black leathery oval with white shells showing along center of back. Underside is fleshy orange foot.

Stays Wet Enough By:

Staying in lower intertidal zone and clinging tightly to rocks to make an air-tight seal when tide is out.

Gets Food By:

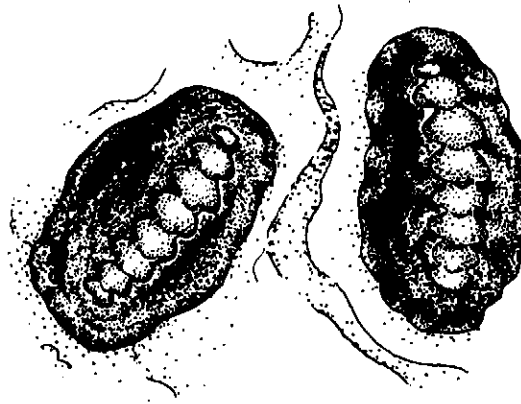
Moving over rocks and using its radula (whip-like tongue with teeth like a file) to scrape off young seaweed plants and diatoms (microscopic algae) **GRAZER**

Avoids Becoming Food By:

Clinging tightly to rocks. Leathery girdle is tough.

Gets Eaten Anyway By:

Sea urchins, leather stars, and people can pry them off the rocks.

**How It Moves:**

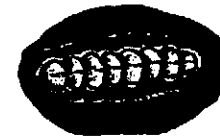
Uses large muscular foot on underside

How It Reproduces:

Larvae disperse as zooplankton and then settle to metamorphose into adult form.

FUN FACTS:

1. Good survival food because isn't affected by PSP. Traditional food of Native Alaskans.
2. The wing shaped plates in its back have been used to make jewelry.



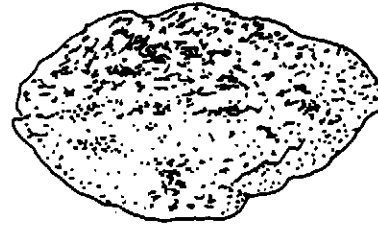
Katy Chiton, Black Leather Chiton

*Katharina
tunicata*

Habitat: On rocks

What It Looks Like:

Looks like a meatloaf or half of a bumpy football clamped to the rock. Large, leathery, and dull brownish-orange.

**Stays Wet Enough By:**

Staying in lower intertidal areas and clinging to rocks

Gets Food By:

Scraping seaweed and coralline algae off rocks with radula (whip-like, toothed tongue)

GRAZER

Avoids Becoming Food By:

Clinging to rocks

Gets Eaten Anyway By:

Tidepool sculpins nip at their flesh. River otters and people can pry them off.

How It Moves:

Moves on large, muscular foot on underside, usually only in a small area

How It Reproduces:

Lays gelatinous strings of eggs on rocks. Waves break up strings and eggs develop into zooplankton

FUN FACTS:

1. A scaleworm usually lives on the chiton and feeds on algae and detritus swept by from currents created by the chiton. The scaleworm helps keep the chiton "clean" of things that would settle on it

COMMENSALISM

2. Largest chiton in the world, up to 13 inches long
3. Lives up to 20 years but grows slowly, so it's easy to overharvest.



Gumboot Chiton Giant Pacific Chiton

Cryptochiton stelleri

Habitat: On rocks

**What It Looks Like:**

Small oval, with overlapping, colorful, reddish-patterned plates

Stays Wet Enough By:

Staying in the lower intertidal zone and clinging tightly to rocks to form an airtight seal

Gets Food By:

Using its radula (whip-like, toothed tongue) to scrape rock crust (a coralline algae) and diatoms off rocks

Avoids Becoming Food By:

Camouflage - turns pink from eating rock crust. Also clings tightly to rocks.

Gets Eaten Anyway By:

Six-armed sea stars, seaducks, and river otters can pry them off the rocks.

How It Moves:

Moves on large, muscular foot on underside

How It Reproduces:

Larvae disperse as zooplankton and settle on rock crust.

FUN FACTS:

The lined chiton requires rock crust to live - the larva will die if it can't find it. But the rock crust also benefits from being grazed because it removes algae that are growing on top and blocking light or smothering it.

MUTUALISM

Lined Chiton

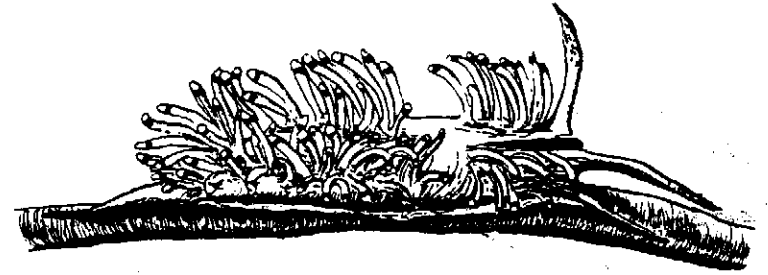
Tonicella lineata

Tonicella insignis

**Habitat: On rocks
and in tidepools
with coralline algae**



**Maned Nudibranch or
Shag-Rug Sea Slug**
Aeolidia papillosa



Opalescent Sea Slug
Hermisenda crassicornis

What It Looks Like:

Slug body with cerrata (fleshy plumes) on back and tentacles on head, often brightly colored

Stays Wet Enough By:

Staying in lower intertidal zone, often remains in water

Gets Food By:

Approaching sea anemones cautiously and spreading slime to avoid effects of nematocysts (stinging cells) in tentacle, then using jaws and radula (narrow toothed tongue) to tear off chunks and swallow them. Eats other Cnidarians such as hydroids by nipping off individual animals in a colony.

Avoids Becoming Food By:

Are able to move undischarged stinging cells up into cerrata to protect themselves from predators.

Gets Eaten Anyway By:

Most other animals avoid them, however, some sea slugs eat other sea slugs.

Strategy for Movement:

Move on fleshy foot

Strategy for Reproduction:

Each nudibranch is both male and female but two animals mate with each other. Females lay egg masses. Larvae disperse as zooplankton.

FUN FACTS:

1. Most nudibranchs of this type have a well-developed jaw with chitin (same substance in crab shells). The shag rug sea slug also has cuticle lining its mouth and esophagus to protect the animal from the nematocysts.
2. Nudibranchs are often very aggressive and fight if they meet another nudibranch of the same kind. The winner may eat the loser.

Sea Slug Nudibranch

Several species

**Habitat: Low in the
intertidal zone on
rocky shores**



Spotted Nudibranch
Dialula sandiegensis



False Lemon Peel
Archidoris montereyensis

What It Looks Like:

Flat and fleshy with tentacles. Some have bushy gills which can be retracted. False Lemon Peel is yellow; Barnacle-eating Onchidoris is cream and brown.

Stays Wet Enough By:

False Lemon Peel stays in lower intertidal zone

Gets Food By:

Rasping off parts of animals that don't move (like sponges) with its radula (broad, toothed tongue). Barnacle-eater sucks tissues out of barnacle.

PREDATOR

Avoids Becoming Food By:

Color provides camouflage or bright colors advertise that they taste bad Most animals avoid eating them.

Gets Eaten Anyway By:

Rose stars eat them.

How It Moves:

Large muscular foot, also uses slime

Strategy for Reproduction:

Each animal is both male and female but two mate with each other. Female lays egg masses. Larvae disperse as zooplankton.

FUN FACTS:

Some nudibranchs secrete sulphuric acid from their skin.

Sea Slug Nudibranch

Several species

**Habitat: Usually on
its food source in
lower intertidal zone**

What It Looks Like:

Large head and eight tentacles.

Stays Wet Enough By:

Staying in lower tidal zone and denning in a crevice

Gets Food By:

Hunting from den or stalks prey and flicks out arm or pounces like a cat. Holds on with muscular arms and suckers. Also has a poison gland that can paralyze prey. Eats limpets, steamer clams, scallops, crabs, shrimp, herring, halibut, and flounders.

PREDATOR

Avoids Becoming Food By:

Changing colors to camouflage itself. When pursued, can shoot out a cloud of black ink that hangs in the water like a shadow while the octopus escapes. The ink acts as a smoke screen that blinds the predator and blocks its sense of smell.

Gets Eaten Anyway By:

Dogfish sharks, sea otters, seals, sea lions, and humans are sometimes successful in catching them.

How It Moves:

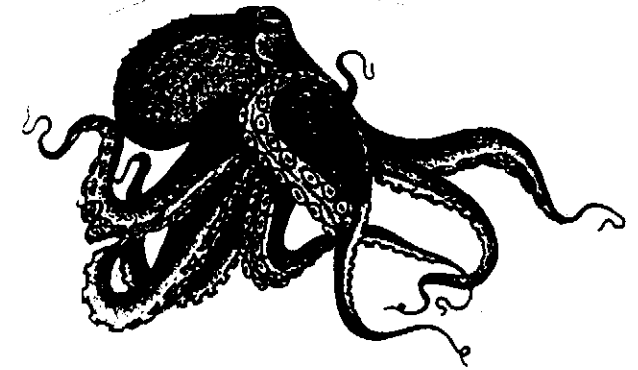
Crawls over surface of sea bottom in search of prey. Can also pull itself along rocks with suckers or swim rapidly by jet propulsion (drawing water under its mantle and shooting it out through its funnel).

How It Reproduces:

Male and female mate, then female guards eggs for several months. Since she can't eat, she dies soon after they hatch out. Young octopi spend two months as zooplankton, then sink to bottom.

FUN FACTS:

1. An octopus is very intelligent. It can solve problems that require memory.
2. An octopus can get out of a container if there is a hole larger than its beak.
3. The species in Alaska is the largest octopus in the world - can grow to 100 feet long and weigh 35-45 pounds. The record weighed over 600 pounds and had a 31-foot arm span. (Ones in intertidal zone are usually 2-3 feet long.)
5. Like other mollusks, they have a radula which they use to drill holes in mollusc shells and clean out crab shells. They have no shell - their only hard parts are their beak and radula.



Giant Pacific Octopus

Octopus dofleini

Habitat: Rocky areas, crevices of large rocks. Pile of mollusk shells will indicate a den site.

Echinoderms

Phylum Echinodermata

What It Looks Like:

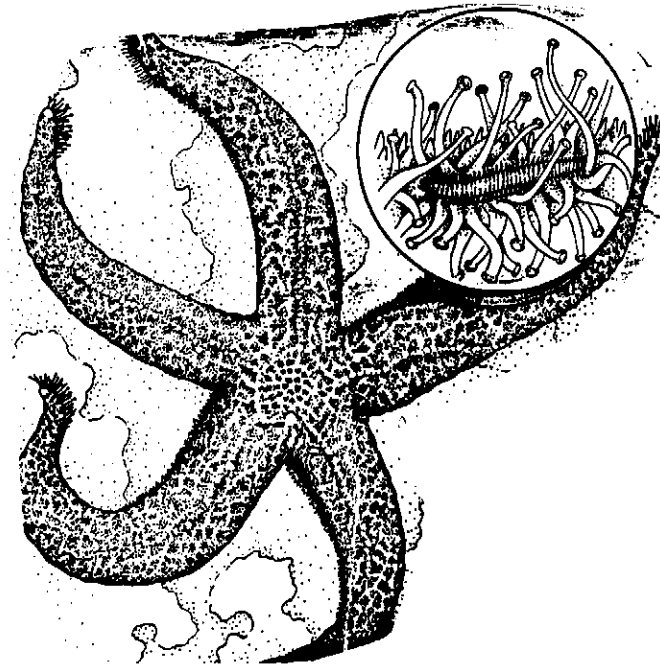
Five stiff, long slender arms, variety of mottled colors, hard and scaly, with spines

Stays Wet Enough By:

Staying low in the intertidal zone

Gets Food By:

They move up during high tide and feed as the tide goes out. They use their tube feet to pull apart mollusks and barnacles and to pull them off rocks. When clams close up, they apply pressure to both shells until the clam tires and the shell opens slightly. The sea star everts its stomach (turns it inside out) and begins digestion. **PREDATOR**



**True Star,
Northern
Star,
Mottled Star**

*Evasterias
troschelli*

Habitat:
**Rocky areas,
protected shorelines**

How It Moves:

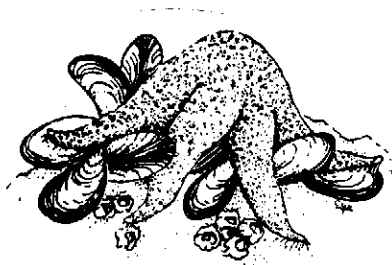
Moves on tube feet.

How It Reproduces:

Males and females come together in groups and spawn. Larvae disperse as zooplankton.

FUN FACTS:

1. Plate limpets rise up off bottom and gallop away from true stars.
2. A sea star with an arm length of 5 inches can exert a force of approximately 10 pounds for six hours and a maximum force of approximately 12 pounds.



Avoids Becoming Food By:

Has spines and pincers (pedicellaria)

Gets Eaten Anyway By:

Sunflower stars and king crabs move faster, gulls eat them when the tide is out.

What It Looks Like:

Largest sea star. Very soft-bodied with up to 24 soft, flabby arms joined to a floppy disk. Various colors.

Stays Wet Enough By:

Staying in the extreme low zone in intertidal zone - only exposed at lowest tides.

Gets Food By:

Chasing or capturing large clams, mussels, barnacles, snails, chitons, sea urchins, several other sea stars, sea cucumbers, and hermit and other crabs. Can dig up clams by passing sediment along tube feet.

Swallows prey whole.

PREDATOR

Also scavenges dead or dying fish.

SCAVENGER

Avoids Becoming Food By:

Being very large, fast, and aggressive.

Gets Eaten Anyway By:

Other sunflower stars or king crabs.

How It Moves:

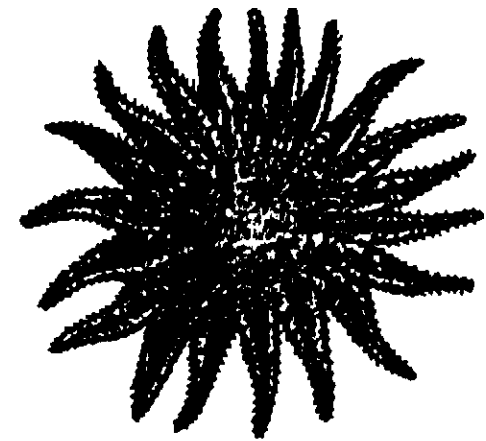
On its tube feet - may have up to 15,000.

How It Reproduces:

Larvae disperse as zooplankton and metamorphose into 5-armed juveniles at 9-10 weeks.

FUN FACTS:

1. Many prey species have impressive avoidance behaviors when they sense the approach of a sunflower star.
2. Largest, heaviest, softest, and swiftest sea star in North Pacific Ocean, perhaps in world. Can move 5-10 feet/minute.

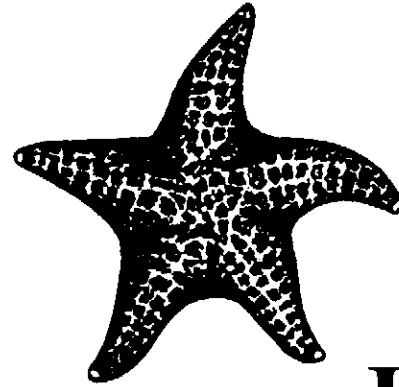


Sunflower Star

*Pycnopodia
helianthoides*

Habitat:

Rocky areas



Leather Star

What It Looks Like:

Orange and reddish-brown mottled appearance, sticky, but smooth surface; five short, stiff arms. Bright yellow madreporite.

Stays Wet Enough By:

Secreting slime and staying in the lower intertidal zone

Gets Food By:

Swallowing sea cucumbers, sea anemones, encrusting bryozoans, and sponges whole
PREDATOR

Avoids Becoming Food By: ?

Gets Eaten Anyway By: ?

How It Moves:

Uses tube feet

How It Reproduces:

Larvae disperse as zooplankton.

FUN FACTS:

1. Smells like rotting garlic
2. Often has a Red-banded Commensal Scaleworm living off food scraps
SYMBIOSIS COMMENSALISM
3. Contact with a leather star causes some anemones to detach from the surface and swim away.

*Dermasterias
imbricata*

Habitat:

Rocky areas



Blood Star

*Henricia
leviuscula*

Habitat:
Rocky areas

What It Looks Like:

Bright red/orange upper surface, five thin arms, relatively smooth surface. No spines or pedicellaria (pincers).

Stays Wet Enough By:

Staying low in the intertidal zone

Gets Food By:

Everting its stomach (turning it inside out) onto surface and begins digesting encrusting bryozoans and the crumb-of-bread sponge.

PREDATOR

Can also produce mucus streams on surface of body to trap bacteria, plankton, and detritus. Moves food to its mouth with beating cilia. **SUSPENSION FEEDER**

Avoids Becoming Food By: ?

Gets Eaten Anyway By: ?

How It Moves:

Using its tube feet

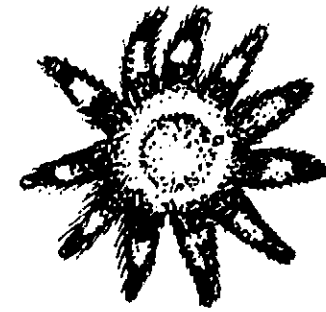
How It Reproduces:

Larvae disperse as zooplankton.

FUN FACTS:

Often has a Red-banded Commensal Scaleworm that eats food scraps.

SYMBIOSIS - COMMENSALISM



Rose Star

Crossaster papposus

**Habitat: Rocky
areas**

What It Looks Like:

Fat-bodied sea star with 8-16 rather stubby arms. Has red and white bands.

Stays Wet Enough By:

Staying in the extreme lower intertidal zone, only exposed at lowest tides.

Gets Food By:

Moving fast to capture sea slugs, bryozoans, and other sea stars. **PREDATOR**

Avoids Becoming Food By:

Having spinelets on surface and moving fast (up to 28 inches/minute)

Gets Eaten Anyway By:

Sun and sunflowers stars catch them.

How It Moves:

Moves on tube feet

HowIt Reproduces:

Females broadcast eggs which develop into larvae. Larvae metamorphose into juvenile sea stars that settle to bottom.

FUN FACTS:

1. Usually has a scaleworm that lives on it and that eats food scraps. The sea star benefits by having its surface kept clean of other animals that might grow on it.
- SYMBIOSIS MUTUALISM**

2. Grows slowly - it takes 10 years to grow to their maximum size of 12 inches.
3. Can survive to be at least 20 years old, maybe older.

What It Looks Like:

Small (less than 3" across), grayish sea star with six arms

Stays Wet Enough By:

Staying under rocks in the middle intertidal zone

Gets Food By:

Swallowing periwinkles, small limpets, mussels, sea cucumbers, chitons, and barnacles whole.

PREDATOR

Avoids Becoming Food By:

Hiding under rocks.

Gets Eaten Anyway By:

Sunflower and Rose Stars and crows catch them.



How It Moves:

Moves on tube feet

How It Reproduces:

Female broods egg during spring. Juveniles hatch out as young sea stars with no larval stage in the zooplankton.

FUN FACTS:

Since the female holds the eggs close to her mouth, she can't feed for several weeks.

**Six-rayed/
Six-armed
Sea Star**

*Leptasterias
epichlora/
hexactis*

**Habitat: Often
under rocks or in
mussel beds**

What It Looks Like:

6-10 thin, flexible arms connected to a small, hard, circular disk

Stays Wet Enough By:

Staying under rocks, often in groups in lower intertidal zone. Groups stay moist longer than individuals.

Gets Food By:

Mucus on tube feet captures plankton and detritus food particles, then tube feet move the food to the mouth.

SUSPENSION FEEDER

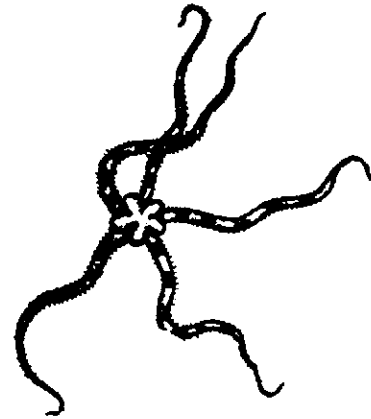
Tube feet and arms also used to pick up detritus off bottom. **SCAVENGER**

Avoids Becoming Food By:

Hiding under rocks. Surface has large spines.

Gets Eaten Anyway By:

Fish nip off their arms.



Daisy Brittle Star

Ophiolis aculeata

Habitat: Under rocks or on seaweed holdfasts

How It Moves:

Uses tube feet and arms.

How It Reproduces:

Larvae are dispersed as zooplankton.

FUN FACTS:

Arms break off very easily and can regenerate quickly.

What It Looks Like:

A fleshy cylinder whose color varies from dark purple to brick red. Up to 10 inches long. If tentacles are out, they will be a busy orange structure. The body is often buried or wedged in a rock crevice. Has five rows of tube feet.

Stays Wet Enough By:

Living in the extreme lower tide zone and burrowing or wedging into a crevice.

Gets Food By:

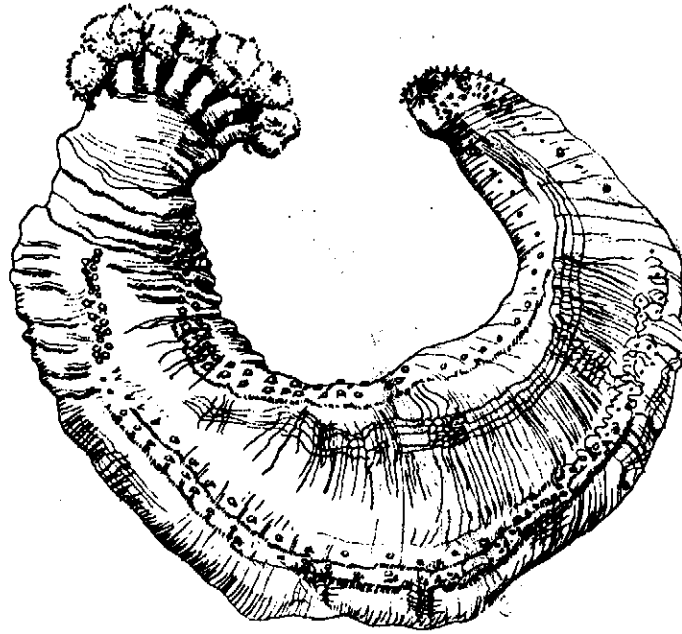
Holding on to rocks with tube feet and extending tentacles with mucus covering. When it senses a tentacles has food on it, the tentacle is slowly contracted and brought into the mouth to wipe off plankton and detritus particles and swallow them. Then the tentacle is extended again.

SUSPENSION FEEDER**Avoids Becoming Food By:**

Burrowing. (See Fun Facts)

Gets Eaten Anyway By:

Sun stars, leather stars, and sunflower stars eat them whole. People capture them and eat them.



Red or Orange Cucumber

Cucumaria miniata

How It Moves:

Uses tube feet. Can also extend and contract body by moving water around in an internal hydraulic skeleton.

How It Reproduces:

Disperses larvae as zooplankton, which do not feed before settling.

FUN FACTS:

When attacked by a predator, it distracts it by throwing up its entire insides and moving away. (The internal organs later regenerate.)

**Habitat: Rocky
areas, often under
rocks, prefers areas
with strong currents**

What It Looks Like:

A greenish cushion with sharp spines, sometimes bleached white

Stays Wet Enough By:

Staying in the lower intertidal zone

Gets Food By:

Scraping rock surfaces for seaweeds, microalgae, coralline algae, and small barnacles, or chews off seaweed with its jaws.

GRAZER

Avoids Becoming Food By:

Shell, long spines plus pedicellaria (pincers). Can sense some approaching predators chemically.

Gets Eaten Anyway By:

Gets eaten whole by sunflower stars, large sea anemones, crabs, and tidepool sculpins. Sea otters smash them with a rock held on their stomach. Gulls, crows, and ravens pick them up and crush them by dropping them from a height. People harvest them and crush the shell.

How It Moves:

Tube feet.

How It Reproduces:

Females broadcast eggs which are fertilized and develop into larvae that disperse as zooplankton.

FUN FACTS:

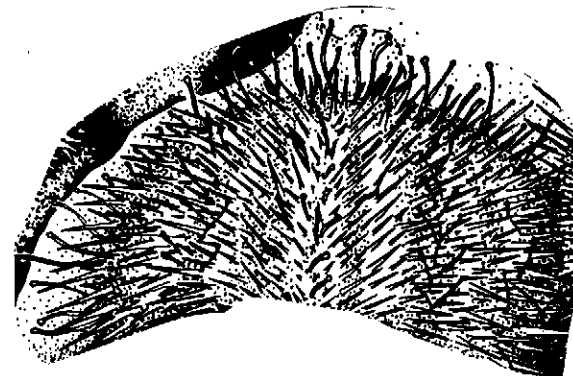
1. They move seaweed and debris onto their back to shade from sun.
2. "Strongylocentrotus" means "ball of spines"
3. Can live 10 years or more.
4. The jaw structure is called Aristotle's Lantern.



Green Sea Urchin

Strongylocentrotus droebachiensis

Habitat:
Rocky areas



Arthropods

Phylum Arthropoda



Pacific Red Hermit Crab

*Ellassochirus
gilli*

**Habitat: Rocky
beaches, often
under rocks**

What It Looks Like:

Bright red or orange body, larger right claw.

Stays Wet Enough By:

When the crab withdraws into its shell, it uses the right claw as an operculum to close the door

Gets Food By:

Probably uses its claws to get detritus

SCAVENGER

Avoids Becoming Food By:

Hard shells, claws, and being able to “close the door” to its shell with its large right claw

Gets Eaten Anyway By:

Pigeon guillemots feed them to their chicks in the nest.

How It Moves:

On its front legs, dragging shell behind

How It Reproduces:

Larvae disperse as zooplankton.

FUN FACTS:

Uses shells of Oregon Tritons, moonsnails, and whelks as its house; but changes for larger shells as it grows.

What It Looks Like:

Small dark, hairy crab with lower portion of body in a small, light shell

Stays Wet Enough By:

Staying under rocks or seaweed in lower part of intertidal zone. Withdraws into shell

Gets Food By:

Catching small animals like snail hatchlings

PREDATOR

or picking up detritus (dead matter) with claws and transferring to mouth

SCAVENGER

Avoids Becoming Food By:

Withdrawing into shell

Gets Eaten Anyway By:

Tidepool Sculpin, Amphiporus Worm

How It Moves:

Uses crab legs and drags shell with it.

How It Reproduces: The females carry eggs on their legs attached to the abdomen curled inside the shell. Disperses larvae as zooplankton

FUN FACTS:

1. Hairy hermit crab prefer to use shells from periwinkles, moonsnails, and file dogwinkles.
2. They will try on shells to see if they fit, but they carry their old shell around until they find a new one. If there is a good supply of shells on the beach, the crab will come out of shell when handled. If not, it will hold on to its shell.
3. The abdomen is curled inside the shell and the fifth pair of legs is curled over the back to hold onto the shell.

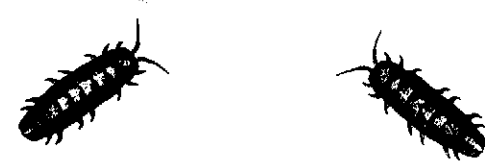
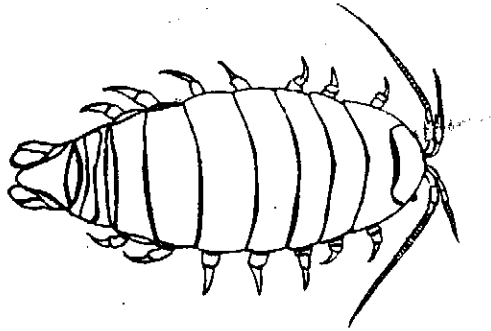


Little Hairy Hermit Crab

Pagurus hirsuitusculus

Habitat: Among cobbles and beneath algae





Seaweed Isopods
Peridotea wosnesenski

Isopods

What It Looks Like:

Segmented, flattened, pillbug-type body

Stays Wet Enough By:

Staying under rocks or seaweed and clinging tenaciously

Gets Food By:

Eating algae

GRAZER

Avoids Becoming Food By:

Hiding under rocks and in seaweed, camouflaged by olive green or brown color, curls up in a ball if disturbed

Gets Eaten Anyway By:

Fish catch them.

How It Moves:

On its many jointed legs

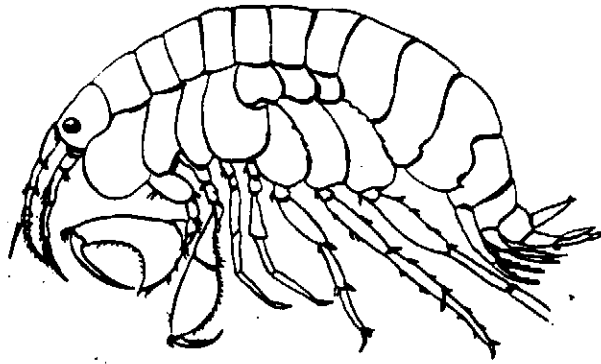
How It Reproduces:

Female carries young in a brood pouch

FUN FACTS:

1. Name means "same-feet" - all the legs are similar.
2. The seaweed isopod sometimes have white blotches on their body which camouflages them against mixtures of seaweed and bits of broken shell

Habitat: Often in seaweeds, especially rockweed



Beach Hopper, Amphipod

Several species

**Habitat: In decaying
seaweed and under
rocks**

What It Looks Like:

Small and shrimp-like with segmented body and many legs and antennae. Body is flattened from side-to-side

Stays Wet Enough By:

Burrowing into clumps of seaweed or hiding under rocks, avoids being covered by rising tide

Gets Food By:

Scraping or collecting detritus (dead matter) off seaweed

SCAVENGER

Avoids Becoming Food By:

Hides in clumps of seaweed or under rocks. Jumps away if disturbed.

Gets Eaten Anyway By:

Sculpins, gunnels, and gulls feed on ones that float in large numbers at the highest tides.

How It Moves:

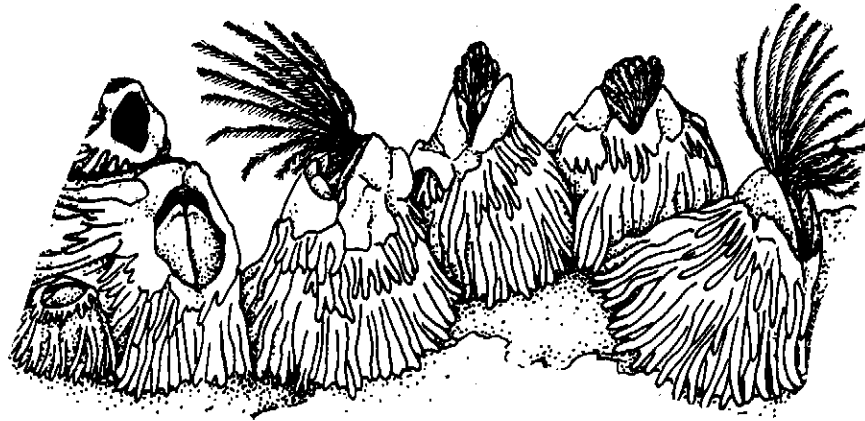
Wriggling and jumping

How It Reproduces:

Females carry eggs in a brood pouch

FUN FACTS:

1. Can jump 50 times their length - like a six-foot-tall human jumping 300 feet!
2. Able to navigate, can return "home" over 100 feet in 15-20 minutes if moved.
3. Amphipods will strip carcasses clean - can be used to clean bones or skeletons.



What It Looks Like:

Shrimp-like, lives inside a volcano-like shell of plates cemented onto a rock, shell, or other surface. Shell has downward-pointing spines or shallow ridges

Stays Wet Enough By:

Living in the lower intertidal zone and closing its shell when the tide is out.

Gets Food By:

Opening its shell and sweeping cirri (feathery feet) when the tide is in to comb the water and swirl plankton and detritus into shell and mouth **FILTER FEEDER**

Avoids Becoming Food By:

Living inside a shell

Gets Eaten Anyway By:

Predatory snails bore through the shell. Sunflower stars pull them off rocks with their tube feet and eat them whole. The crumb-of-bread sponge grows on top of them and digests them with acids.

How It Moves:

Larvae disperse as zooplankton. After they become attached, they stay in place the rest of their life

How It Reproduces:

Each barnacle is both male and female but mates with another barnacle.

FUN FACTS:

1. Thatched barnacles compete for space on rocks with common acorn barnacles and limpets. Limpets can bulldoze off newly-settled larvae.

COMPETITION

2. Can live 10-15 years.

Thatched Barnacle

*Semibalanus
cariousus*

**Habitat: Attached to
rocks**

What It Looks Like:

Shrimp-like crustacean. Lives inside a volcano-like shell of six white, chalky plates cemented onto a rock, shell, or other hard surface.

Stays Wet Enough by:

Living in middle intertidal zone and closing the “lid” to shell-like fortress of hard plates

Gets Food by:

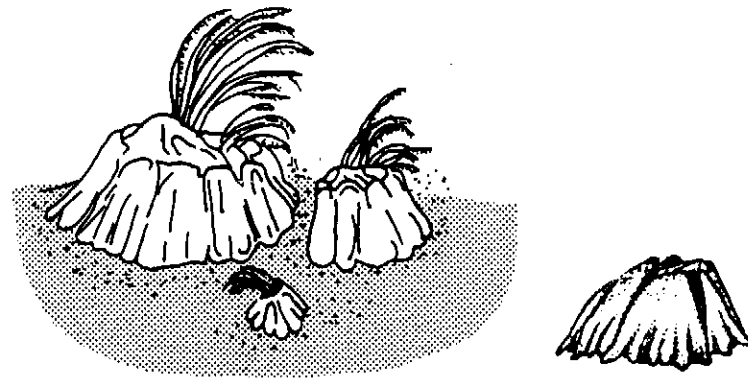
Filter-feeding when the tide is in - opens up top plates and sweeps six pairs of cirri (feathery feet) to comb the water for plankton and dead organic matter and to swirl particles into mouth

Avoids Becoming Food by:

- 1) Hiding inside its “fortress” of plates. Closes down when a shadow passes over.
- 2) Avoiding places where predatory snails have left a mucus (slime) trail.

Gets Eaten Anyway By:

Dogwinkle snails drill holes in the shells. Six-armed, sunflower, and true stars and barnacle-eating sea slugs pull the shells apart. Sculpins nip off cirri.

**How It Moves:**

Floats as a young nauplius larva, metamorphoses into a cypris larva and settles onto a hard surface, becomes attached with glue, and grows its shell. Stays fixed in one place the rest of its life.

How It Reproduces:

Each barnacle can produce both eggs and sperm, but one barnacle provides sperm to a nearby barnacle. Thousands of larva are dispersed to float as plankton and find a new home. Young larva can detect and settle in areas where other barnacles are or have left barnacle “glue.”

FUN FACTS:

The barnacle “cement has been of interest to people because it can work underwater as glue for 30-40 years and can withstand extreme pressure and temperatures up to 440 degrees F., as well as strong acids, and bacterial attack. It has been reproduced chemically and is used by dentists but is very difficult to remove from boat hulls where it slows down the speed of the boat.

Common Acorn Barnacle

Balanus glandula

Habitat: Attached to rocks, shells, and other hard surfaces

Other Invertebrate Phyla

Sponges, Bryozoans, and Worms of all sorts

What It Looks Like:

Dirty yellow or green patches encrusted on rocks or shells. Somewhat mushy and has an odor like exploded gunpowder.

Stays Wet Enough By:

Found only in lower intertidal zone, sometimes under kelp.

Gets Food By:

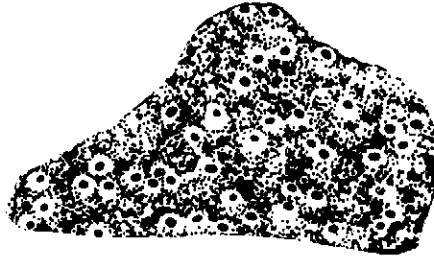
Drawing water in through small pores and circulating it, extracting plankton and detritus. Water is expelled through volcano-like pores **FILTER FEEDER**

Avoids Becoming Food By:

Has an inner skeleton of sharp, glassy spicules.

Gets Eaten Anyway By:

Some sea slugs and blood stars are able to digest them.

**How It Moves:**

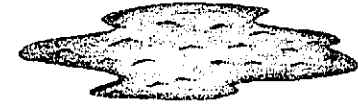
Large masses can creep very slowly

How It Reproduces:

Reproduce asexually by budding or sexually. Larvae can swim and live a few days in the water column before settling down.

FUN FACTS:

1. Sponges that are green in color have green algae that living inside their tissues. The sponge benefits by nutrients provided through photosynthesis. **SYMBIOSIS**
2. If the sponge is injured, it makes its own antibiotics and can repair itself.
3. If a patch of sponge is broken into fragments, each fragment can form a new sponge and attach itself to a rock.



Crumb-of-Bread Sponge

Halichondria panicea

Habitat: On rocks, low in intertidal zone

Commensal Scale Worm

Arctonoe spp.

Habitat: Lives on gumboot chitons and sea stars.

What It Looks Like:

Cream-colored, segmented worm with 30 or more pairs of scales in rows along its sides.

Stays Wet Enough By:

Living on animals that stay in lower intertidal zone

Gets Food By:

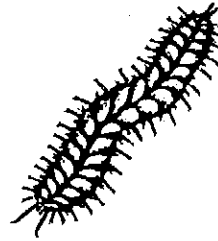
Eats detritus scraps from grazing activities of chitons and predatory activity by sea stars

SCAVENGER

Avoids Becoming Food By:

Living on another, larger animal reduces chance it will be attacked by a predator. It finds a new host animal if something happens to present one.

Gets Eaten Anyway By: ?



How They Move:

Wiggles and pushes with setae (bristles)

How They Reproduce:

Female free-living scaleworm broods eggs under her scales. Both types disperse larvae as zooplankton.

FUN FACTS:

1. The female free-living scale worm may brood 3,000-45,000 eggs.
2. Scale worms can regenerate parts.
3. Commensal scale worms are attracted to the substances secreted by the host, but will avoid one that is injured.
4. Several small commensal scale worms may live on a single host animal, but only one large one. The larger scale worms defend their host as their territory and attack other scale worms that approach.

Free-living Scale Worm

*Harmothoe
imbricata*

Habitat: Under rocks.

What It Looks Like:

Wiggling mass of scales - segmented worm with 15 pairs of scales, brownish mixed with cream and black

Stays Wet Enough By:

Staying in the lower part of the intertidal zone under rocks.

Gets Food By:

Senses vibrations of amphipods and stabs them by shooting out a proboscis armed with four jaws. May also graze on algae. **PREDATOR**

Avoids Becoming Food By:

Being well-camouflaged against muddy rocks and stones.

Gets Eaten Anyway By: ?

What It Looks Like:

Pinkish tan sausage shaped worm with gold bristles on both ends - not segmented.

Stays Wet Enough By:

Digging and staying in a burrow

Gets Food By:

Spinning a slime net and capturing detritus. Swallows the slime net after it gets several inches long and clogged with food particles.

SUSPENSION FEEDER

Avoids Becoming Food By:

Staying in its burrow under rocks

Gets Eaten Anyway By: ?**How It Moves:**

Can crawl using back bristles, can dig with proboscis

How It Reproduces:

Disperses larvae which are not in the plankton.

FUN FACTS:

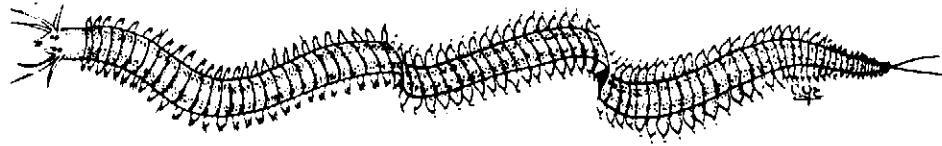
The burrow often provides a home for a red scale worm, tiny crab or small fish. The worm, crab, or fish benefits from shelter and food scraps and the fat innkeeper neither benefits or is harmed.

SYMBIOSIS - COMMENSALISM

Fat Innkeeper, Spoonworm

*Echiuris
echiuris
alaskanus*

Habitat: In burrows under rocks where mud accumulates in crevices.



Clam Worm

Nereis spp.

How It Moves:

Wiggles and crawls with setae

How It Reproduces: (See Fun Facts)

FUN FACTS:

1. Adults undergo a transformation into a different form, then release eggs and sperm in a swarm of male and female worms. Fertilized eggs are laid in masses of jelly as large as a chicken egg which may wash up on beaches in the spring. Larvae disperse as plankton but don't feed.
2. Many clam worms will evert their proboscis repeatedly when held, but some can give a painful sting.

Habitat:

Under rocks, in mussel beds, and in seaweed holdfasts

What It Looks Like:

Segmented worm up to 10 inches long, often appear iridescent when exposed to sunlight. Has parapodia (body wall extensions) and setae (bristles) on every segment.

Stays Wet Enough By:

Staying under rocks in middle and lower intertidal zone and secreting mucus (slime).

Gets Food By:

Everting (sticking out) a proboscis (hollow tube) with considerable force to grasp a variety of small animals. Also eat algae.

PREDATOR

Avoids Becoming Food By:

Writhing and secreting a lot of mucus (slime) if grasped by a predator.

Gets Eaten Anyway By:

Ribbon worms stab them with a stylet and injects a poison, then swallows the clam worm whole. Fish also eat them.





Amphiporus/ Many-eyed Ribbon Worm

What It Looks Like:

Worm-like, but may be wide rather than long if it has eaten recently. Brick red on top, medium pink on bottom, has two triangle shaped white patches on head

Stays Wet Enough By:

Staying under rocks or among mussels or rockweed in the middle intertidal zone.

Gets Food By:

Stabbing prey with proboscis that comes out of mouth and then sucks out their tissues. Eats amphipods and hermit crabs. **PREDATOR**

Avoids Becoming Food By:

Hiding under rocks. May have toxins in skin.

Gets Eaten Anyway By:

Crabs, fish, and birds

How It Moves:

Muscle contractions move it along the bottom and they glide on a trail of mucus.

How It Reproduces:

Larvae disperse as zooplankton, but can swim using cilia that covers the body.

*Amphiporus
bimaculatus*

Habitat: Under rocks, in mussel beds, or among rockweed beds

What They Look Like:

Thin, flat body which can stretch out, no segments. Red, black, or dark green.

Stay Wet Enough By:

Staying under rocks and in mussel beds

Get Food By:

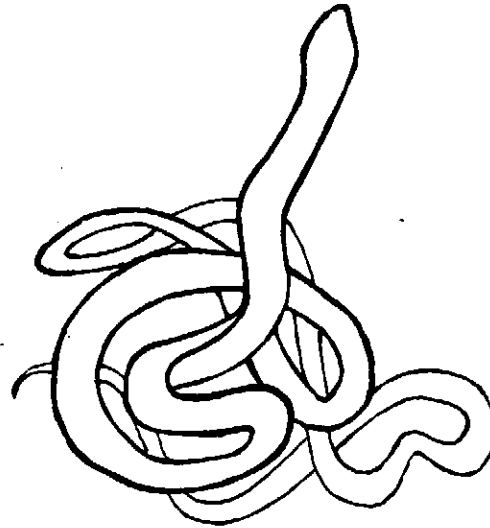
Stabbing prey with a dagger-like proboscis that extends out of mouth and injects poison. Eats segmented worms, crustaceans, fish, molluscs, barnacles, dogwinkle snail eggs.

Avoid Becoming Food By:

Using proboscis for defense

Get Eaten Anyway By:

Crabs, fish, and birds



Ribbon Worms

**Phylum:
Nemertea**

How They Move:

Puts out mucus slime, then contracts muscles along body

How They Reproduce:

Sexually or asexually.

FUN FACTS:

Breaks up into pieces in the hand, but can regenerate from tiny pieces (a form of asexual reproduction - fragmentation)

**Habitat: Under
rocks, in seaweed
holdfasts, among
mussels**

What It Looks Like:

The tube is hard, whitish, and coiled, sometimes covered with algae - about the diameter of a pencil. Bright red tentacles out when the worm is feeding under water.

Stays Wet Enough By:

Retracting the tentacles and closing the mouth of the tube with an operculum (trap door)

Gets Food By:

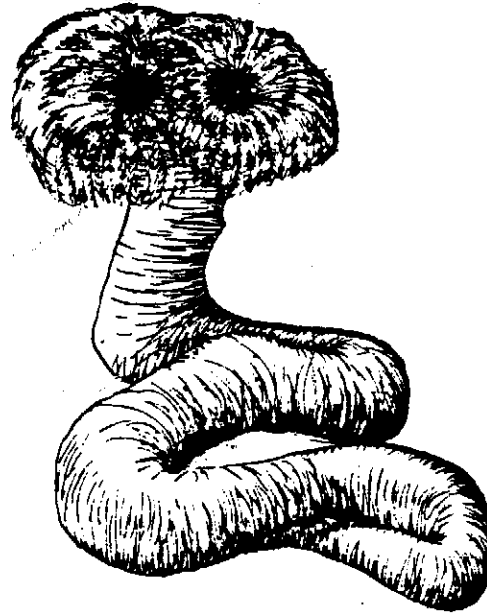
Extending tentacles and selecting plankton
FILTER FEEDER

Avoids Becoming Food By:

Pulling tentacles back into its hard shell

Gets Eaten Anyway By:

Sea stars and snails



Red or Calcareous Tube Worm

*Serpula
vermicularis*

How It Moves:

Stays in one place

How It Reproduces:

Larvae disperse as zooplankton.

FUN FACTS:

1. If its operculum is torn off, it grows a new one.
2. Eye spots on the tentacles sense danger so worm can close the operculum if threatened.

**Habitat: Attached to
rocks or other hard
surfaces**

What It Looks Like:

Looks like an ice cream cone - lives in a small sand tube. When feeding underwater, white bristles emerge from tube and bright red gills show.

Stays Wet Enough By:

Living in a tube in the middle intertidal zone. The tube has an operculum (trap door).

Gets Food By:

With the wide end of the tube and its head down in sand, the worm digs and feeds. Its tentacles select detritus to swallow. The detritus is passed through its body and sand is expelled from narrow end.

SCAVENGER

Avoids Becoming Food By:

Tube is fairly well-camouflaged and can be closed with the operculum.

Gets Eaten Anyway By: ?**How It Moves:**

Tentacles and bristles help it crawl along

How It Reproduces:

Larvae can swim and feed in the plankton.

FUN FACTS:

The cone worm constructs its tube by using its tentacles to select single sand grains and molds the tube with its mouth. The completed tube is only one sand grain thick.



Cone or Tusk Worm

*Pectinaria
granulata*

**Habitat: Under
rocks or in mussel
beds**

What It Looks Like:

Flat, scaly patch or a branched, bushy, or leafy structure

Stays Wet Enough By:

Attaching to objects in the extreme lower or lower intertidal zones or underwater

Gets Food By:

Individual cells in the colony are animals with a circle of tentacles and beating cilia that draws water through to filter food particles

FILTER FEEDER

Avoids Becoming Food By:

Having a hard skeleton around each individual. Colonies are often scaly and brittle and hard to chew off what they are attached to.

Gets Eaten Anyway By:

Sea slugs (nudibranchs) chew the tentacles off. Colonies grow spines after being preyed on by a sea slug.

How It Moves:

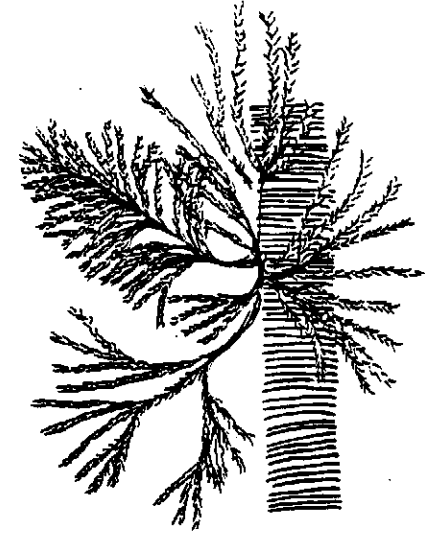
Larvae float as zooplankton. After they settle, they stay in place the rest of their lives, but what they are attached to may move.

How the Colony Reproduces:

The colony releases large numbers of larvae. Individual larva settle, then reproduce by budding to create the rest of the colony.

FUN FACTS:

1. Because they develop from a single animal, all individuals in the colony are genetically identical, but some become specialized to make the spines for defense of the colony or to reproduce. The colony has a single nervous system and individual animals share food.
2. Like barnacles, bryozoans can create a problem when they settle on ship bottoms. More fuel is needed to move the ship through the water.



Bryozoan

Several species

Habitat: Forms a crust on seaweeds, rocks, and shells. Also grows on the bottom of docks and on piers.

Tidepool Vertebrates

Fish



What It Looks Like:

Gunnels have long, compressed eel-like bodies with small heads and eyes. Continuous fin on back, tail, and halfway up lower side. Crescent gunnels have bracket-like markings on back.

Stays Wet Enough By:

Staying inactive under rocks and algae in lower intertidal zone when tide is out. Also by secreting large amounts of mucus (slime)

Gets Food By:

Catching isopods, amphipods, and other small crustaceans and mollusks. Also nipping off legs (cirri) of feeding barnacles.

PREDATOR

Avoids Becoming Food By:

Hiding under rocks and in tidepool crevices. Also well-camouflaged.

Gets Eaten Anyway By:

Merganser ducks.

How It Moves:

Wriggles and swims

How It Reproduces:

Both male and female guard the eggs.

Larvae disperse as zooplankton.

FUN FACTS:

1. Small size and thin bodies are adaptations to occupy holes, crevices, and spaces under rocks where the risk of being swept away by currents and waves is less.
2. The penpoint gunnel changes color when it eats certain invertebrates that obtain pigment from seaweeds the invertebrates eat. The gunnel is thus camouflaged among that type of seaweed.

Gunnel

Crescent Gunnel

Pholis laeta

Penpoint Gunnel

Apodichthys flavidus

**Habitat: Tidepools
or under rocks,
often among algae**

What It Looks Like:

Stubby fish with relatively large, distinct fins and tail. Dark saddlelike markings on back. Hard to see, because very well-camouflaged.

Stays Wet Enough By:

Staying in tidepools or under rocks

Gets Food By:

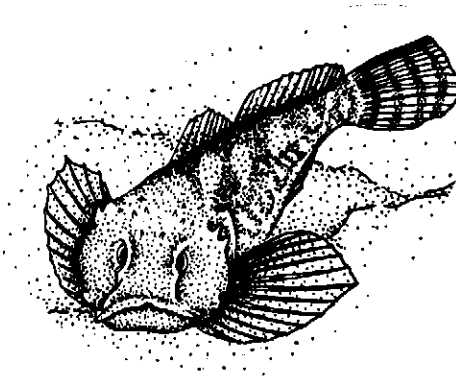
Darting out and seizing worms, isopods and other small crustaceans. Bites off whole barnacles or nips off barnacle cirri (feet). **PREDATOR**

Avoids Becoming Food By:

Hiding under rocks and remaining motionless while being camouflaged. Can swim fairly fast.

Gets Eaten Anyway By:

Larger fish and seaducks catch them.

**How It Moves:**

Swims with darting movements

How It Reproduces:

Male and female mate and female lays eggs. Larvae hatch out and disperse as zooplankton for two months, then move to intertidal zone.

FUN FACTS:

1. Have ability to home to "their" tidepool if moved up to 300 feet.
2. Can withstand a wide range of temperature and salinity that sometimes occurs in tidepools.

Tidepool Sculpin

*Oligocottus
maculosus*

Habitat:

Rocky areas - in
tidepools or under
rocks