In The Zone: Where the Land Meets the Water

A Field Guide to Marine Life in the Tidal Zone of Northern New England

By the 7th Grade Students of Windsor House
King Middle School
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Preface

Thank you for selecting this field guide which was entirely produced, written, edited, and illustrated by the students of Windsor House grade 7, King Middle School, Portland, Maine. We were inspired by the work of King students who produced: The Ocean: What's Under There? (1995). We hope that this updated and colorized version of our field guide will help you to appreciate and understand the types of organisms living within Maine's tidal zones.

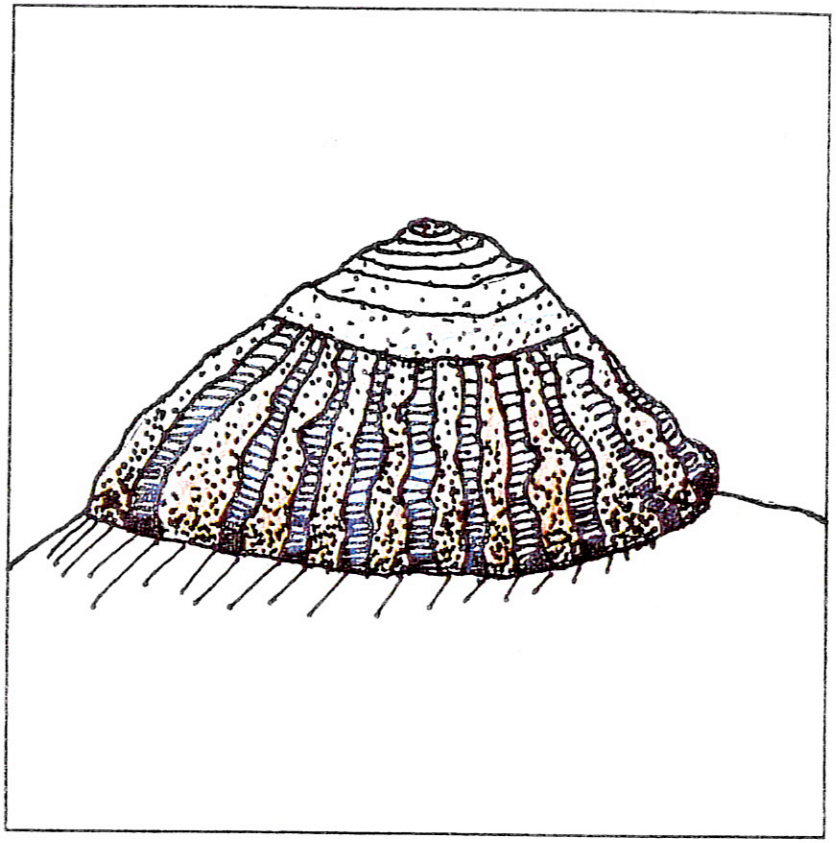
This guide was the final project to our In the Zone Learning Expedition on the intertidal zones of Casco Bay. Through fieldwork, research and active learning experiences, we were immersed (literally!) in the plant and animal life found within the ocean waters of Maine.

Each student chose an organism to study and to complete extensive research on. This included both on site and classroom lab work, many revisions of text and illustrations, and underwater photography and snorkeling. Examining organisms in their natural environment helped us to produce an authentic field guide and also made learning fun because we were actually doing the work like real scientists. Additional activities included a visit to a touch tank at the Marine Research Aquarium in West Boothbay, Maine and a seafood festival where we celebrated the publication of this guide.

We would like to thank our core teachers Mrs. Burns (Language Arts), Mr. Cronin (Science), Ms. Germani (Math), Mrs. Norton (Art), Ms. Platt (Social Studies). We would also like to thank Ms. Abbott (Outward Bound), Mrs. Brann (Project Exploration), Ms. Ellis (Future 2000), Ms. Henderson (Coordinator of Volunteer Services), Ms. Jolliffe (Teaching Strategist), Mr. Michaud (Intern), Mr. Morgenstein (Computer), Ms. O'Donnell (Teacher Assistant), and all the parent volunteers that helped us in any way. Finally we would like to thank our principal, Mr. McCarthy, for encouraging and supporting our work. We are very proud of it!

Atlantic Plate Limpet

Scutus unguis



General Description: Limpets can vary from the size of the tip of your pinky finger to the size of a quarter. The Great Keyhole Limpet of the Pacific is the largest species of limpet, it can grow to be up to 4 inches long. Most limpets have a bluish white checkered shell with dark brown marks radiating from the summit.

Habitat: Most limpets attach themselves to rocks and may be collected at low tides. Some prefer deeper water, the rest live in tide pools.

Geographic Range: Most limpets prefer cooler waters of the Atlantic and Pacific.

Protection/Adaptations: Because the limpet lacks an operculum (a plate on the foot of a gastropod mollusk that closes the shell), the edges of its shell must fit snugly against a rock so that it can retain water at low tide. The limpet accomplishes this by shuffling back and forth, grinding down both rock and shell until they form a perfect seal.

Uses: The only use for the limpet is to shell collectors who collect them. Shell collectors call limpets Chinese Hats.

Observations: Limpets have spiral shells as larvae but soon settle down and grow their flattened cone shaped shells. A number of species have a hole at the peak of the spiral; others do not. A limpet may travel and feed up to about 8 inches (20cm) from its home spot but it must return there as the tide begins to fall. Experiments have shown that limpets have some sort of "homing instinct" just as higher animals do. The limpet is one of the most ancient and primitive types of snails.

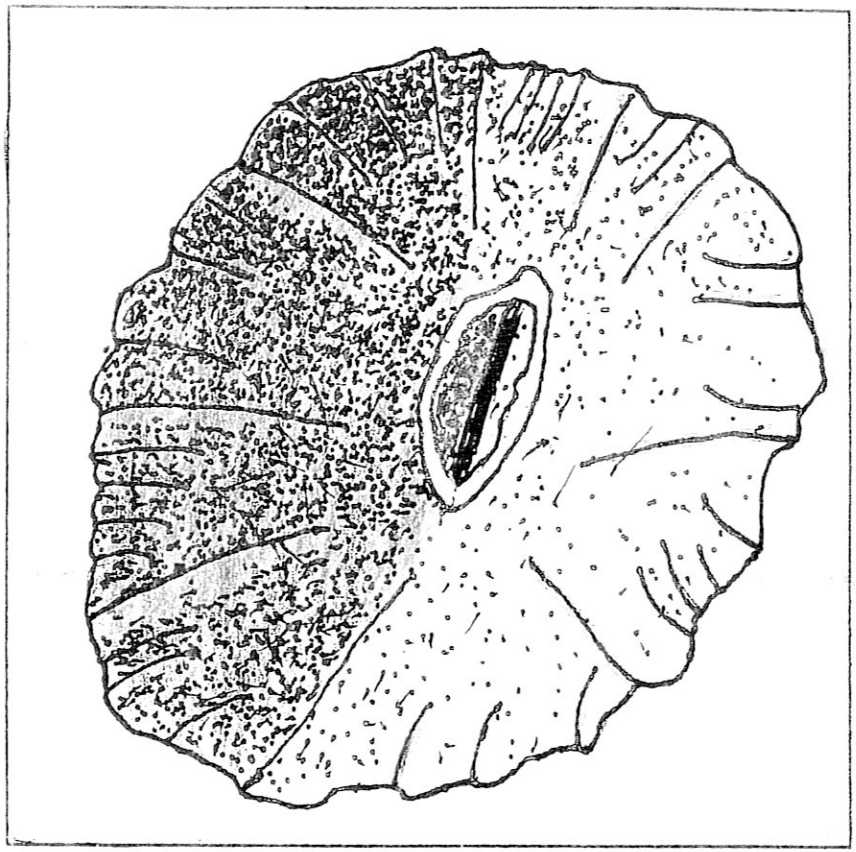
Reproduction: The female limpet does not make protective capsules for her eggs in the fashion typical of many snails, but exposes them directly to the sea. Whether the eggs are fertilized within the mother's body or while floating at sea is uncertain. The larvae drift or swim for a time in the surface waters; the survivors then settle down on rocky surfaces and change from the larvae to the adult form. Probably all young limpets are males, later changing to female;- this is not uncommon for the mollusks.

Limpets move from their home spot to graze on tinyF seaweeds from the rocks. Limpets feed on the carpet of green seaweed that covers many rocks. The extent of a limpet's wanderings can be seen clearly from the bare trail it leaves, where it has rasped away the seaweed with its toothed radula.The limpets are at the bottom of the food chain because it eats seaweed, algae and moss. The green crab eats the limpets when they die.

Moira

The Barnacle

Balanus balanoides



General Description: The barnacles are about 1/2 an inch in height and 1/4 inch all the way around and they are dense white.

Habitat: The barnacle lives on rocks in the tide because that's where lots of plankton are found and barnacles eat plankton.

Geographic Range: They live from the Northern Atlantic to Delaware.

How it Protects Itself: The barnacle has a protective shell to protect itself.

Uses: Barnacles produce a kind of glue that might help keep dentures in. It is a brown substance found inside the barnacles.

Observations: At low tide if you looked out over the barnacle-covered rocks, you would see sharp little rocks. Nothing moves so nothing looks like it is alive. But when they have to eat, little animals that you can barely see stick their legs out and pull in food to their shell.

Reproduction: Barnacles have both male and female sex organs. They have to be impregnated by a neighbor that sticks out a tube with sperm in it and puts the sperm into the female sex organ.

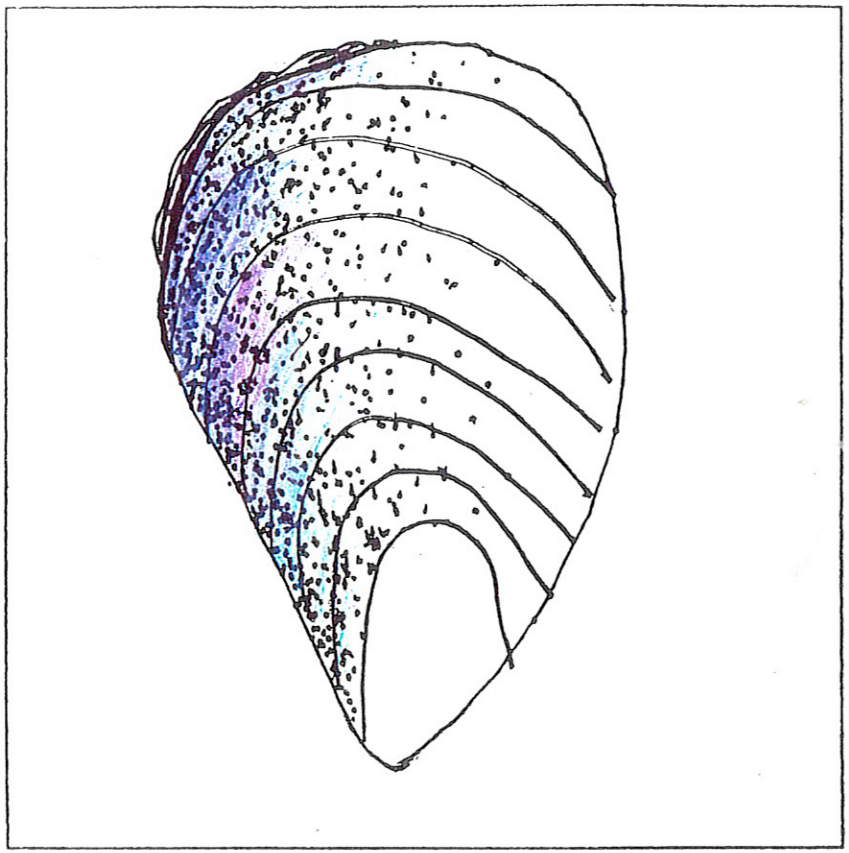
Food Chain: Barnacles eat plankton.

Life Span: Barnacles can live for 30 to 50 years.

David

Blue Mussel

Mytilus edulis



General Description: The blue mussel's size is usually from one to two inches wide and three to four inches long. Their shells are a bluish-black color on the outside and a pearly blue color on the inside.

Habitat: The blue mussel lives in shallow waters and in tide pools attached to rocks by thin silky threads that secure them

tightly to the rocks. Babies live in holdfasts.

Geographic Range: The blue mussel ranges from the Arctic Ocean to South Carolina.

How it Protects Itself/Adaptation: The blue mussel protects itself by hiding inside it's hard-to-break open shell and by clinging tightly to rocks.

Uses: The blue mussel can be found as a food delicacy in many parts of the world, such as the United Sates and Europe. They are put in soups, chowders, sandwiches, and in butter dips.

Observations: Blue mussels are the most common sea mussels in the whole world. They eat tiny organisms that are called plankton. Then the plankton is filtered though the mussel's gills from the sea water. Sometimes they will form large mats of their silky threads to cover big areas of their wet habitat to claim their territory.

Food Chain: The blue mussel is at the bottom of the food chain because they only eat tiny organisms and have many predators.

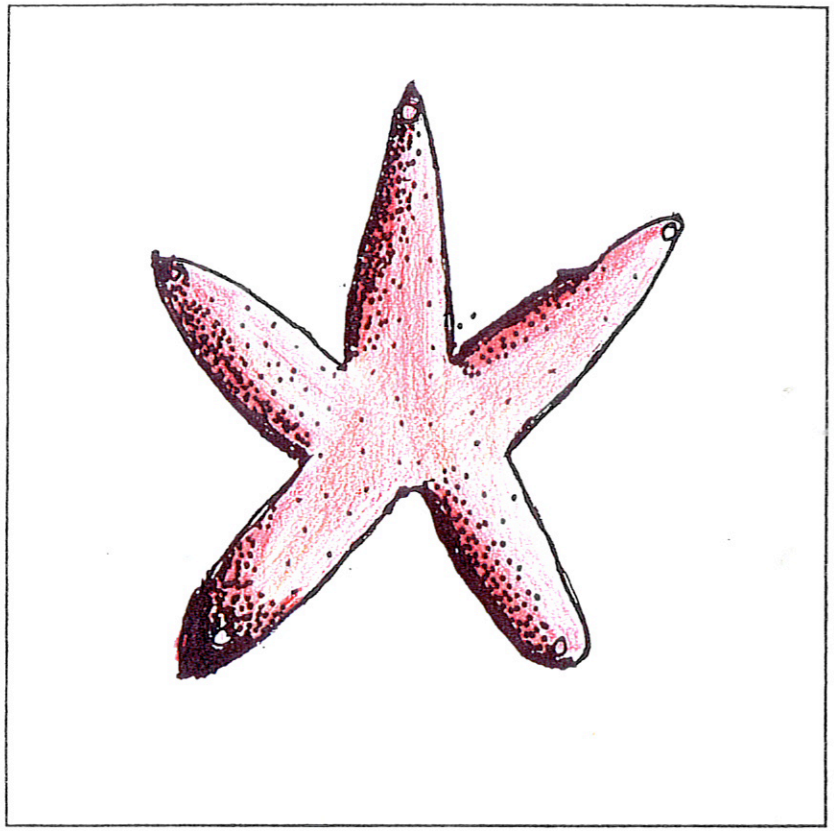
Reproduction: Unknown

Life Span: The blue mussel usually lives from two to four years.

Chelsea

Blood Star

Henrica sanguinolenta



General Description: The blood star is a brightly colored sea star with five arms and two rows of equally- sized tube feet. It usually has a red or orange coloring, but is also sometimes purple, yellow, or mottled. Its size is between 2.5"-4".

Habitat: Its fairly common in tidal pools from Maine northward. Its found subtidally southward in cold water (i.e. 15 ft. to 80 ft. or more) in New Jersey.

Geographic Range: The blood star lives from polar regions to Cape Hatteras.

How it Protects Itself: If a predator attacks the blood star and grabs one of it's arms, the arm rips off and the blood star grows a new one.

Uses: The blood star is used for study, observation, and food for pet crabs or lobsters.

Observations: They're part of the Henrica species and the family they belong to is called Echinastardae.

Reproduction: The females make a pouch to keep the eggs where they can turn into tiny sea stars. From there they continue to grow until they are old enough to be able to live on there own. There is also no free swimming at the larval stage.

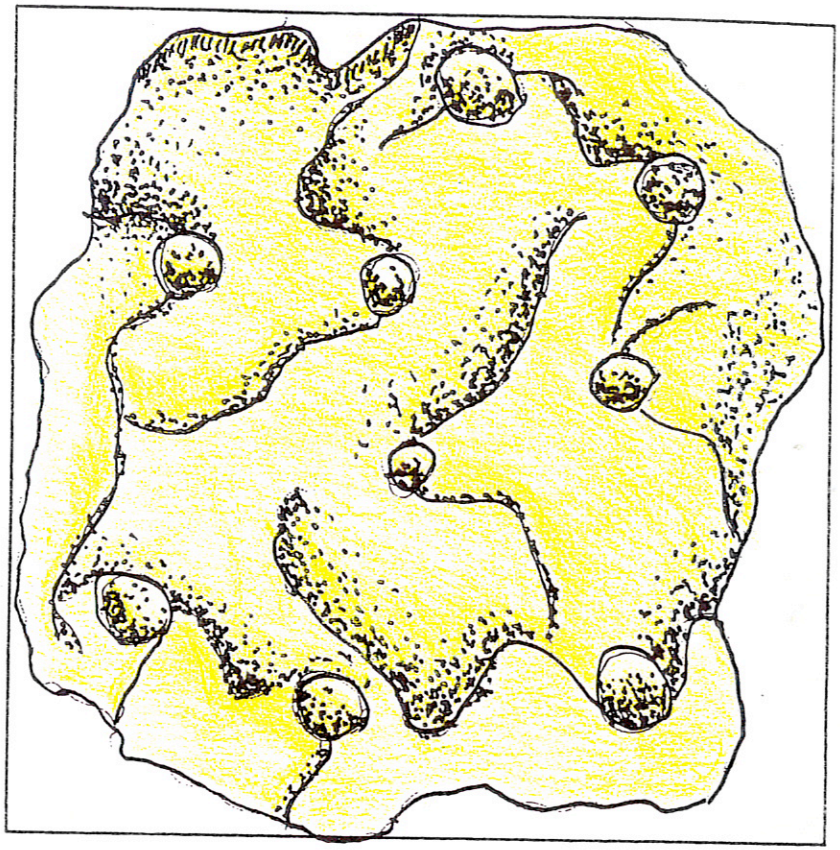
Food Chain: The blood star feeds on sponges, muscles, and snails. Crabs, lobsters, sea gulls, and other animals feed on the blood star.

Life Span: Unknown

Ian

Bread Crumb Sponge

Halichondria panicea



General Description: The Bread Crumb Sponge is about 30 cm. wide. The Bread Crumb Sponge has a crumbly texture. The sponge comes in yellow, orange, or green. The Bread Crumb Sponge is green because of microscopic algae. It has a softer texture than most sponges, and it crumbles easily, like bread. It often forms a velvety-looking carpet over rocks and at the bottom of tide pools.

Habitat: The Bread Crumb Sponge lives in the middle or lower level rocks and pilings, in mussel beds and shaded tidal pools.

The Bread Crumb Sponge cannot live in muddy waters, because mud will clog the hole from which the sponge gets water.

Geographic Range: The Bread Crumb Sponge lives north of Cape Cod in the Atlantic Ocean.

How it Protects Itself: The Bread Crumb Sponge protects itself by using the chemicals it naturally has inside. The prickly spines that cover the Bread Crumb Sponge also protect them.

Uses: The Bread Crumb Sponge can be used for anything from doing the dishes to packing airplane parts.

Observation: In the right conditions if you were to cut of a piece of the sponge it would grow back in a matter of time.

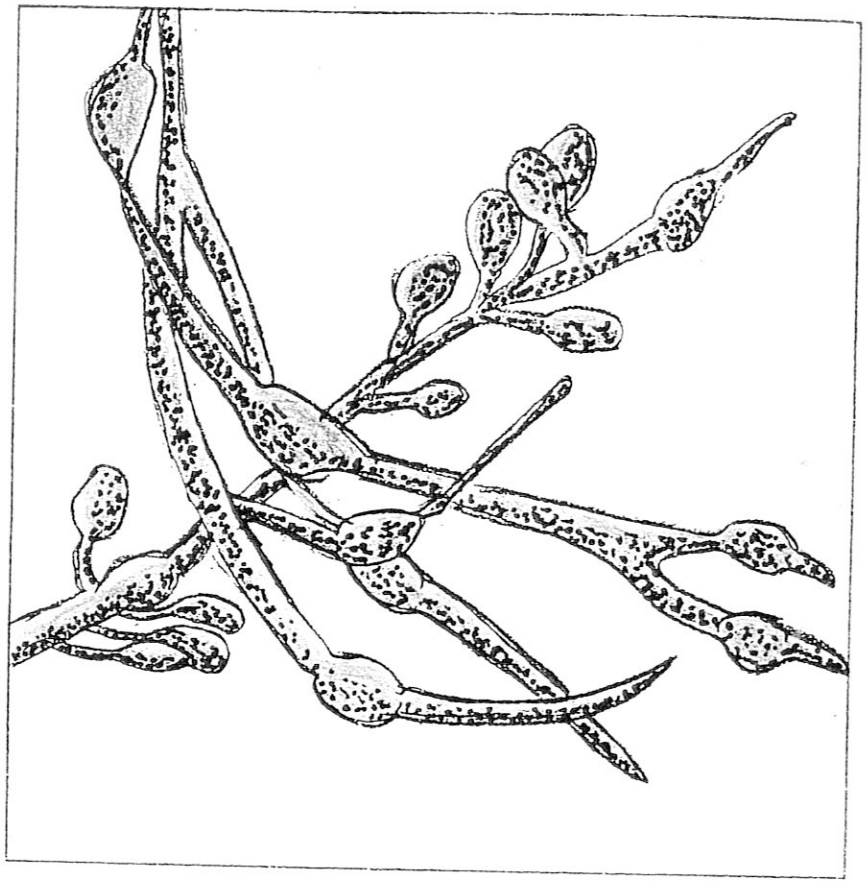
Reproduction: Sponges can reproduce in two ways: sexually and asexually. Sponges develop from two sex cells that join or asexually from methods not involving sex cells.

Food Chain: Most animals do not eat the Bread Crumb Sponge because they do not taste good and they also smell bad! They have chemicals that other animals do not like, chemicals that could also be harmful to the animals. The Bread Crumb Sponge can also have sharp spines. There are still some animals that will eat the Bread Crumb Sponge such as the sea slug or certain starfish. The Bread Crumb Sponge filters plankton from water to get its food. The Bread Crumb Sponge is a consumer not a producer.

Sarah

Brown Algae

Ascophyllam nodosum



General description: There are several kinds of species of brown algae. The Knotted Wrack can grow to be 2 meters long. They have little pods filled with air on them and the color of it is greenish brown.

Habitat: Brown algae lives in sheltered shores and tide pools.

Geographic Range : Brown algae is found on the Atlantic and Pacific coasts.

How it protects itself: Brown algae protects itself by planting itself in tide pools to stay away from the big waves.

Reproduction: Brown algae reproduces by the union of male and female cells, which swim into the water.

Food Chain : Titans eat brown algae. Brown algae lives off photosynthesis, which is the process which plants use to make their own food from sunlight.

Life Span : Brown algae lives about 20 years.

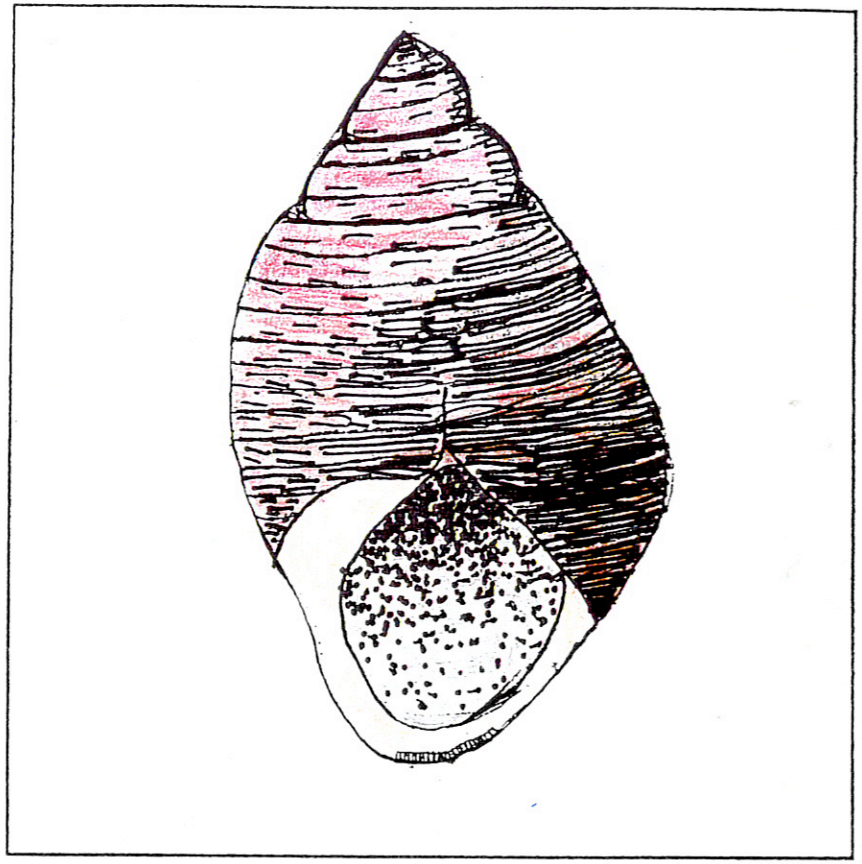
Observations: Brown algae can not stand being under water for a long period of time. Their air pods help them float.

Uses: Brown algae can be used for fertilizer, conditioning soil, and food for animals. Because they put algae in their food,they have found that cows produce more milk. They have also found that chicken eggs have better color and pets get healthier.

Michael

Common Periwinkle

Littorina littorea



General Description: It has a brownish colored shell with a cream color around the opening.

Habitat: It lives in tide pools so it can graze on seaweed just like cows graze on grass.

Geographic Range: The periwinkle lives in the northern Atlantic ocean.

How It protects itself: It has a shell to protect itself.

Uses: People can eat periwinkles.

Observations: Periwinkles live in a large family called Littorinidae. Their shells are 3 in. long and 2 in. wide. They love to sleep on rocks. They crawl underwater on the ocean's floor. A periwinkle is the common name for several species of small snails.

Reproduction: They lay their eggs in a jelly-like substance which it then attaches to a plant.

Food Chain: Crabs eat periwinkles and periwinkles eat algae.

Steve

Coiled Tube Worm

Spirobis borealis

General Description: The tube worm is white and it is 3 mm wide.

Habitat: It is cemented to something on the bottom of the intertidal zone.

Geographic Range: It lives in waters off the coast of Maine to Cape Cod.

How it Protects Itself: It hides itself from baby crabs between rocks, stones, and seaweed.

Uses: There are no uses for the coiled tube worm.

Observations: Inside a tiny segmented worm there is a ring of yellow-orange around the mouth.

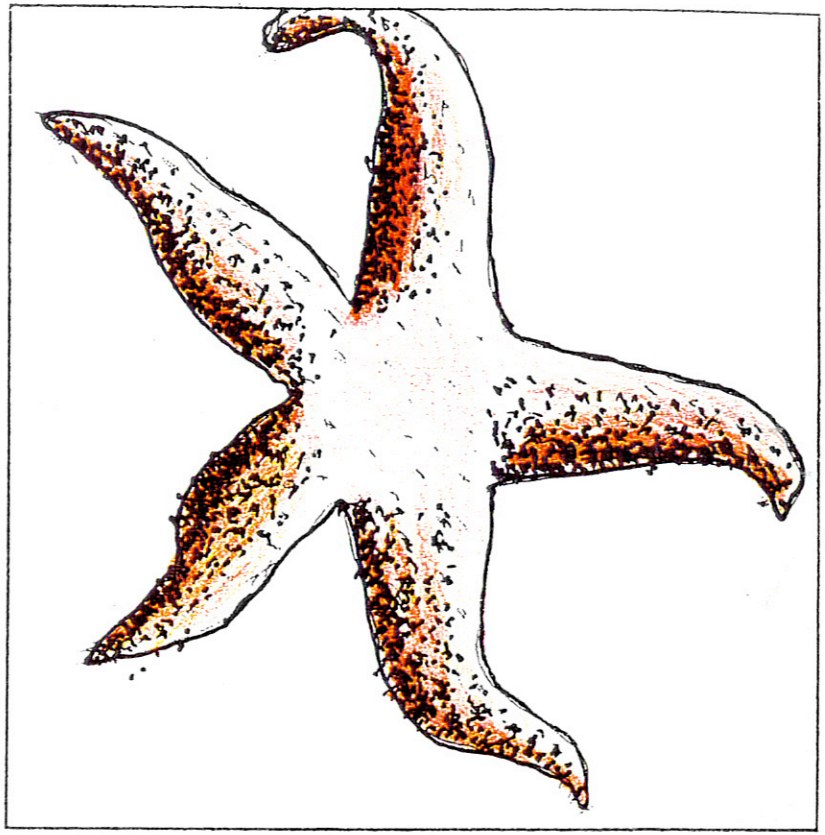
Reproduction: Each worm is both male and female and it can reproduce by itself.

Food Chain: They get eaten by baby crabs and they eat small invertebrates like protozoa.

Dawn

Common Sea Star

Echinoderms



General Description: A common sea star can grow up from 2-30 inches. Th common sea star is orange-red with a red spot on each arm. They have sp t on their body.

Habitat: The common sea star lives on rocks or in the water of tide pool They can also live in sandy puddles on the beach just about all over the world.

Geographic Range: The common sea star can be found all over the world

low It Protects itself: The common sea star has red spines around them that vill cover and protect them.

Jse: Unknown

Observation: When a starfish cannot eat its meal because his mouth is too mall, they can push their stomach out of their mouth and digest the food utside, then the starfish pulls their stomach back inside their body with the food.

eproduction: A female starfish releases a cloud of tiny eggs, a nearby male sends out a cloud of sperm, and the male and female cells join together.

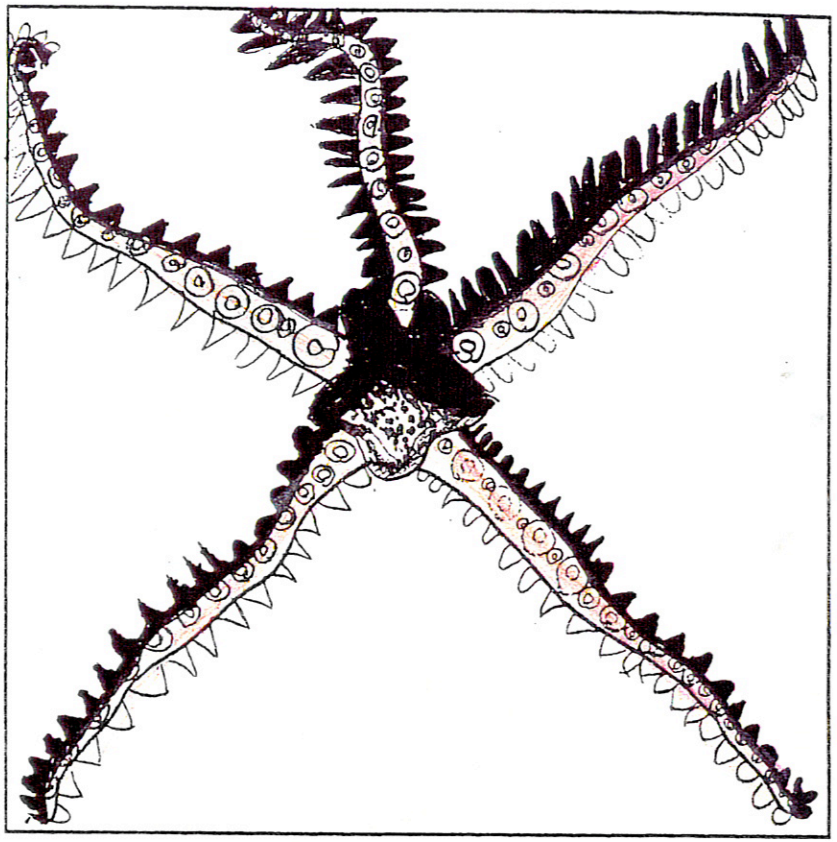
ood Chain: The common sea star eats other starfish, mussels, oyster, fish, rab, clams, and shellfish. Some starfish eat the common sea star.

ife Span: Unknown

Phong

Daisy Brittle Star

Ophopholis aculeata



General Description: The daisy brittle star's arms are long and fragile. Their disk grows from two to four centmeters wide. Their length is five centimeters long. The daisy brittle star's arms are very flexible. Daisy brittle stars can be green, red, yellow, or tan.

Habitat: Daisy brittle stars live in tide pools and among holdfasts.

Geographic Range: The daisy brittle stars live from the Arctic Ocean to Cape Cod.

How it Protects Itself: The daisy brittle star hides during the day and comes out at night so its predators, such as the scud, cannot get it.

Uses: There are no uses for the daisy brittle star.

Observations: The daisy brittle star's arms are long and expanding. Daisy brittle stars are rapid crawlers.

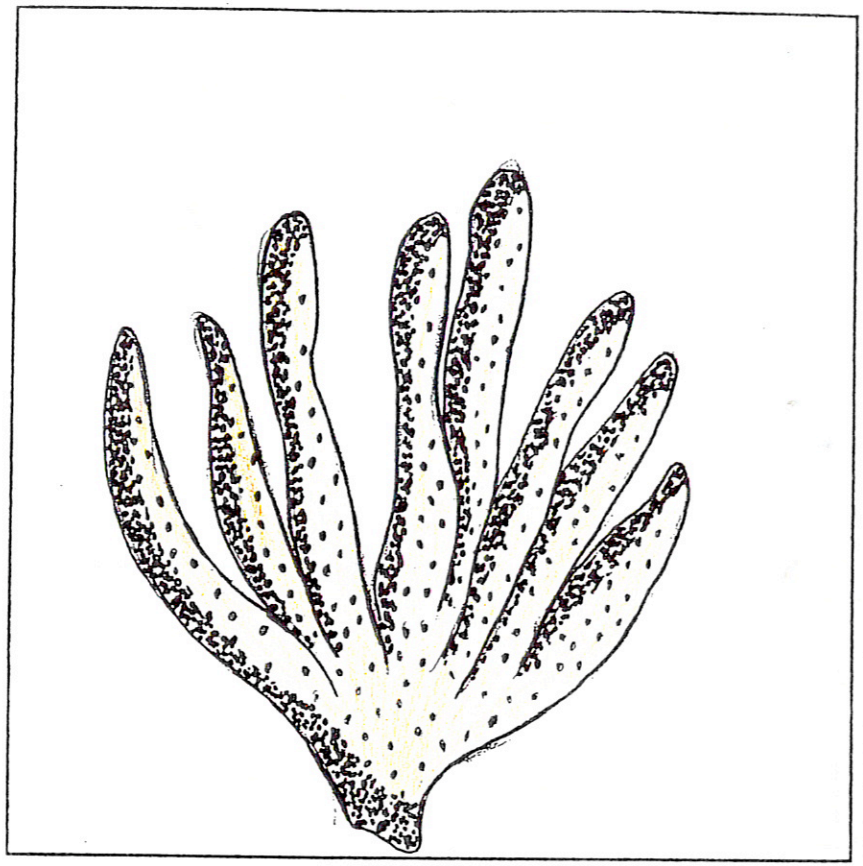
Reproduction: The daisy brittle star makes a pouch for its eggs until they hatch and are big enough to crawl.

Food Chain: The daisy brittle star is a predator to clams. The daisy brittle star eats clams and plankton.

Amanda

Finger Sponge

Haliclona permollis



General Description: Each kind of sponge has many different shapes, sizes, and colors. Because of this they are hard to identify. There are several thousand species of sponges. The Finger Sponge is a tannish-pinkish color and resembles many rounded fingers. Finger Sponges can grow to 18 inches tall. Algae, bacteria, shrimps, various worms, crabs, barnacles, clams, and snails live in or on a sponge. When you look at a sponge you see the exoskeleton.

Habitat: Sponges can be found attached to rocks, shells in tide pools, or in shallow protected places along the shore. Adult sponges can not move themselves about.

Geographic Range: Finger Sponges are found from Labrador to Long Island Sound, and are sometimes found in Cape Lookout, North Carolina.

How it Protects Itself: Sponges are seldom eaten because of bad taste, bad odor, and many species have little spines all over their bodies.

Uses: Sponges are related to jellyfish and coral. Some types of sponges are washed, bleached, and then dried and sold in stores for household use.

Observations: For many years scientists did not know whether sponges were plants or animals. Now they know that they are animals. When a sponge is cut into pieces, it is able to regenerate itself.

Reproduction: Reproduction can happen sexually or asexually. Sponges have both male and female organs but cross fertilize one another. One way they reproduce is by an egg and a sperm uniting in the water to become a swimming larva that settle on a new surface. Another way they reproduce is when a small bud (gemule) breaks away from the parent and forms a new sponge.

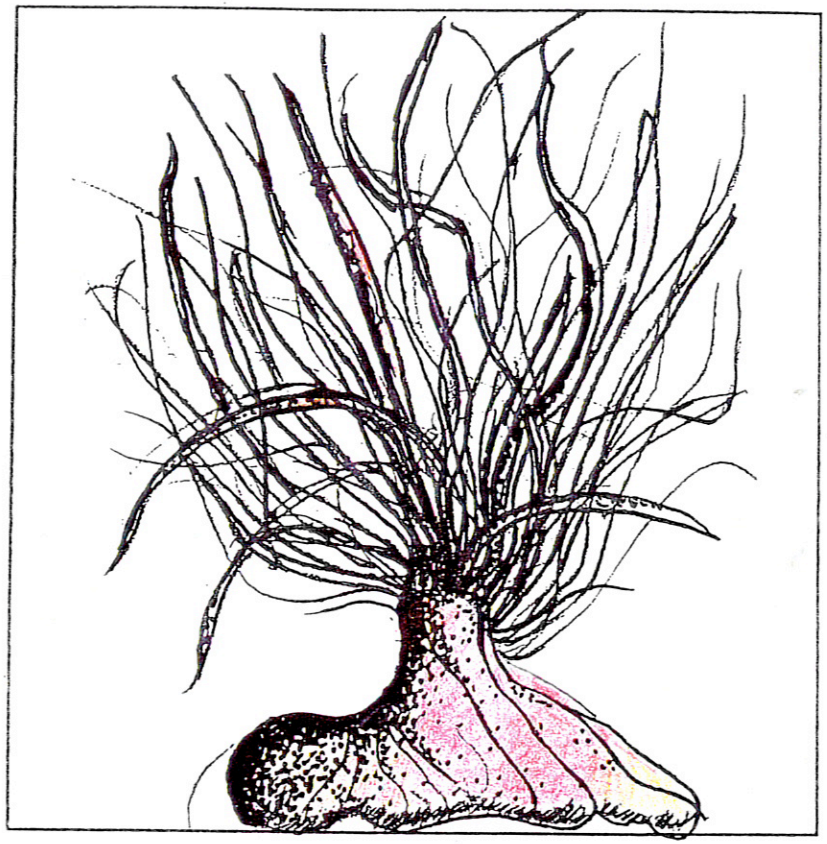
Food Chain: Sponges eat tiny plant and animal plankton. Sponges are simple invertebrate animals that have an outer layer of covering cells and an inner layer of flagellated cells, which are hairy cells, that move water throughout their bodies. Sponges use holes in their bodies to breathe as well as to catch food. They catch their food by taking in water through the holes and filtering the water for plankton.

Life Span: Sponges have been around for 600 million years. A large sponge can live for up to 50 years.

Esmc

Frilled Sea Anemone

Metridium senile



General Description: The Frilled Anemone is about 18 inches high. The Striped Anemone is about 3/4 inch high. A sea anemone looks more like a plant than an animal. Their tentacles look like flower petals when they wave back and forth in the water, as they catch small sea animals to eat.

Habitat : The Sea Anemone lives in tide pools and in the water by large rocks.

Geographic Range: Unknown

How it Protects Itself: Their tentacles are armed with stingers so people will stay away from them. They use their stingers for self defense, too. They can't kill people, but they can hurt them. They live by large rocks so they will not get eaten by large animals.

Uses: Unknown

Observations: They are related to the jellyfish. Like the jellyfish, the Sea Anemone's tentacles have stingers that help catch food. The Sea Anemone does not float on top of the water like a jellyfish.

Reproduction: Sea Anemones have many methods of asexual reproduction. They will pull apart into two halves.

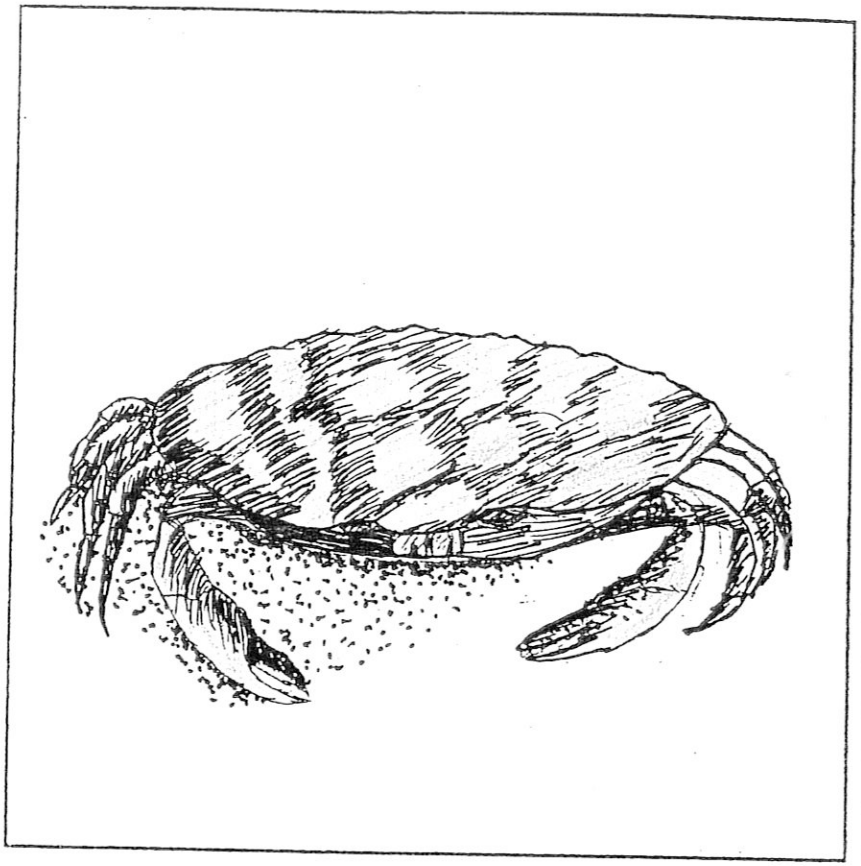
Food Chain: They eat small fish and are eaten by large fish if they're out beyond large rocks. Sometimes crabs eat them in tide pools. Sometimes they dig into the mud to get their food faster. They swim on their sides so they can get small fish but not as fast as in the mud. The Sea Anemone has a hollow tube opening at one end of its mouth. They mostly attach to rocks and shells.

Life Span: Unknown

Loretta

Green Crab

Carcinus maenas



General Description: A green crab grows three inches wide and two and half inches in length. The green crab is orange-red underneath and greenish black on top. Their young vary in color and have different patterns.

Habitat: The green crab lives in the upper tidal zone. They live in tide pools when the tide is low. Green crabs live in small pools

or under rockweed. If you want to catch a crab, it can be caught with a net or by hand. If caught by hand, the most common place to look is under rock weed.

Geographic Range: The green crab can be found from Nova Scotia to New Jersey.

How it Protects Itself/ Adaptations: Like all crabs, they have claws. Green crabs have two claws that they use for eating and to prepare for a fight.

Uses: Some people eat green crabs.

Observations: When I looked at real green crabs, some of their shells were softer than the others. When I picked up a crab, it folded all of its legs against his body. It did not attack me, it just pretended that it was dead.

Reproduction: The female can only produce eggs in the summer time. When the male and female crabs mate, the female stores the sperm until the eggs are ready to be released. When the female releases the eggs, the sperm that she had stored flows to the eggs to fertilizes them. The eggs are attached to a big mass which look like a sponge in the female abdomen until they are ready to be hatched.

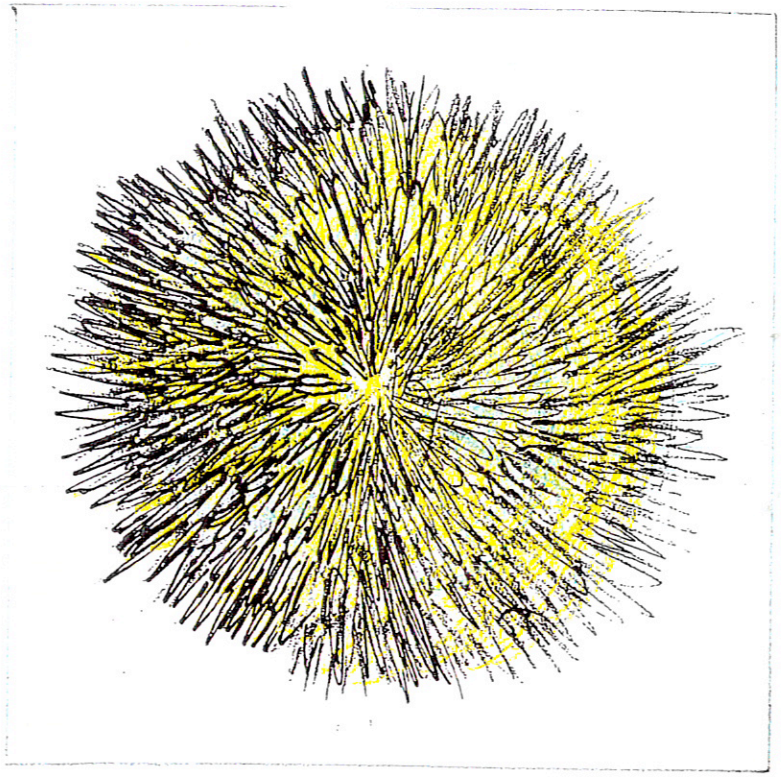
Food Chain: They are not eaten a lot by other animals because of their shells and claws. They are eaten by people in different parts of the world. The green crab is a scavenger. As a predator, it eats almost anything that is dead.

Life Span: The green crab can live up to 12 years.

Khanh

Green Sea Urchin

Strongylocentrus droebachiensis



General Description: The green sea urchin is able to move by using their movable spines and tube feet. Although most people believe that sea urchins are excellent clingers, they are not. They cling to rocks by using their mouths. They do this to scrape algae off of rocks. The mouth of the sea urchin can be found on the bottom of its body, while the anus is on top of its body.

Habitat: The green sea urchin lives in the shallow waters of the tide pools. They live between rocks and out in the open.

Geographical Range: Sea urchins exist all over the world. The green sea urchin lives in the Atlantic Ocean from the Arctic region to New Jersey.

How it Protects Itself: The green sea urchin protects itself by using its sharp spines. Because of their spines, most sea creatures stay away from the sea urchin.

Uses: There are approximately seven-hundred other species of sea urchins. They belong to the class named echinoderms. Some species, including the green sea urchin, are used as deliquesces in places such as Japan. The reproductive organs are the parts usually eaten because they are the biggest organs in its body.

Observations: I have observed the death of the green sea urchin. The spines fall off, leaving only the test (shell).

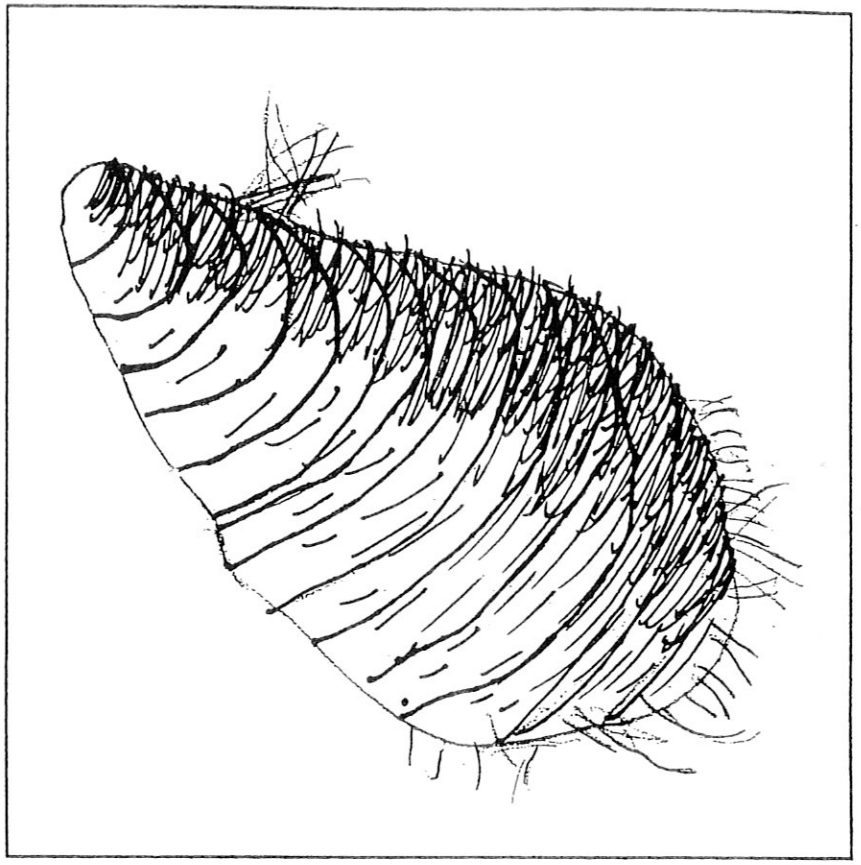
Reproduction: The green sea urchin reproduces by letting go of its reproductive organs. The male releases its sperm and the female releases her eggs. When the two organs meet, they join together to make one sea urchin. The baby sea urchin settles on the ocean floor and goes through many stages before emerging into an adult.

Food Chain: The sea urchin is a predator to many sea creatures. Even though the starfish is part of the sea urchin family, the starfish is predator to the green sea urchin.

Ashley

Horse Mussel

Modiolus modiolus



General description: The horse mussel is about 5-6 inches long. They are a bluish black.They usually have a white spot on the front of their shell. The front side and the back of the shell have strings of kelp on it.

Habitat: The horse mussel lives in deep water, so they can cling to rocks.

Geographic range: The horse mussel is mostly found in the Arctic to N. Florida, and Alaska to California.

Protection: It protects itself by its hard shell.

Uses: We use the horse mussel to make pearls out of them, but the pearls are of low quality.

Observations: I observed that they are inedible. (It can't be eaten.) I also observed that people make pearls out of them.

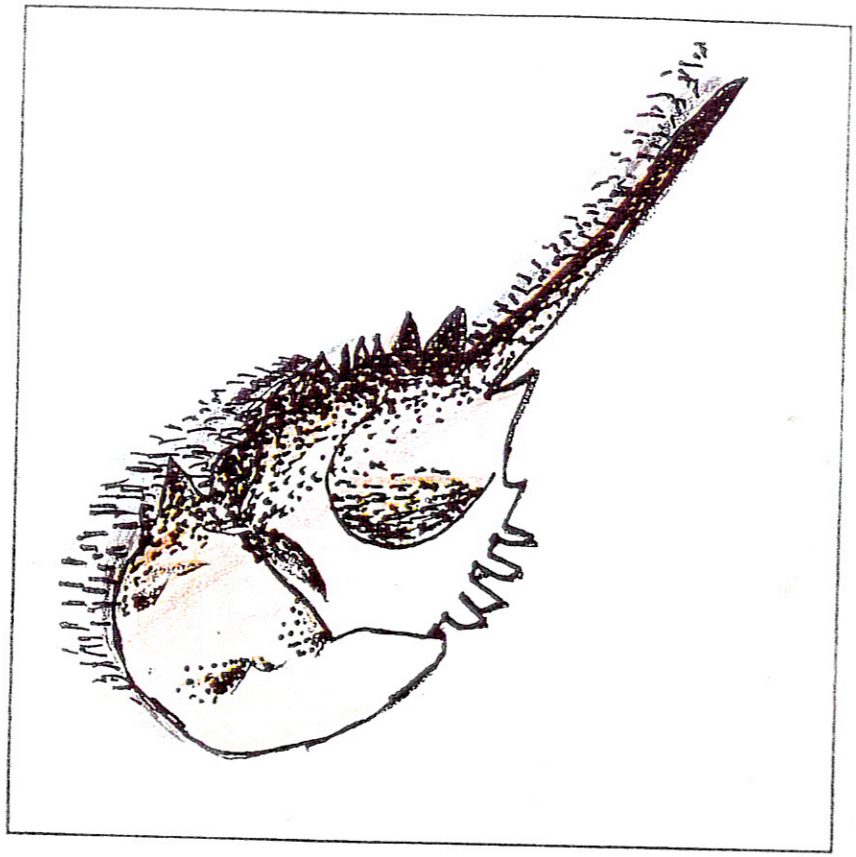
Reproduction: A mussel can be a female most of its life than can turn male. They produce out of the shell into the water.

Food chain: The horse mussel eats organic material floating in the water. It is hunted by green crabs, dog whelks, and sea stars.

Daniel

Horse Shoe Crab

Limuluspoly phemus



General description: The brownish, black crab can be as big as 3 feet long! The male horse shoe crab is about 1 foot long, and 12 inches wide. The female horse shoe crab is about 33 inches long, and 18 inches wide. The female is usually 20 inches longer than the male. Horse shoe crabs have exo skeletons, that means their skeletons are on the outside. Horse shoe crabs are verterbrate. Their shell is made up into two parts, that are hinged together. The front portion is bigger than the back portion. Their eyes are in the front and they are compund, that means they can move in and out. About 1 quarter of its length is its tail. The horse shoe crab's tail is unjointed. Some Indian tribes use these sharp tails

as spear points. If the horse shoe crab gets turned over, it uses its tail to turn it back over. On the undersides of the crabs, they have an oval shaped mouth in between the base of the legs. They have 12 legs, the bigger 10 are used for crawling, and bringing food to its mouth. The other two are specially made for digging. All the legs have sharp claws on the ends of them.

Habitat: They live in tidal pools, and near the coast because that is where their food sources live.

Geographic range: The horse shoe crab can be found along the North eastern shores of the U.S., along the Atlantic ocean. They also can be found around the Gulf of Mexico, the Indies, India, China, and Japan.

How it Protects Itself: It protects itself withits hard shell. When they get infected by a bacteria in the water, their blood automatically forms a clot to prevent an infection. They use their tail to hit hungry predators that want a meal. They have spikes on their shell near their tail.

Uses: Unknown.

Observations: They are not really crabs, but descendants of Eurypterid, which lived over 400 million years ago. Their nearest relatives are spiders, and scorpions. Theya re in the plyum group of, echinoderms. Its class is merostmata. They are crustateans. They have blue blood, even when its open to the air. Horse shoe crabs are harmless when left alone.

Reproduction: Female horse shoe crabs lay their eggs on the beach, nar the shore. The eggs are 1 eighth of an inch in diameter. When they hatch ,they are sandy colored, and they live in deep waters.

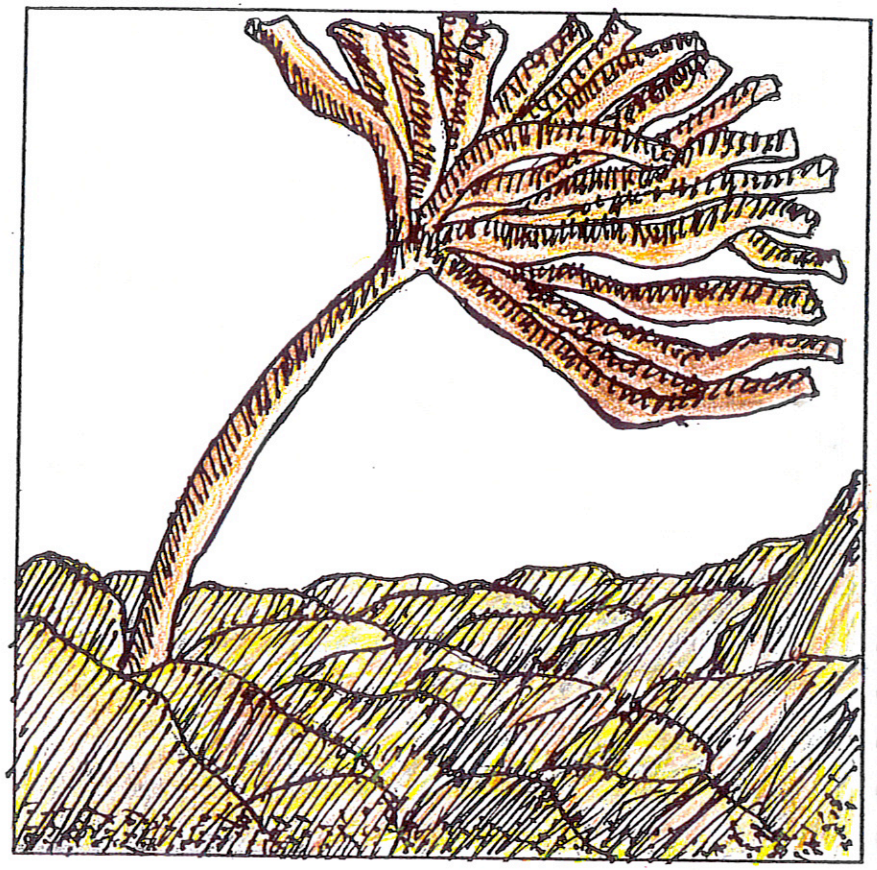
Food Chain: They are prey and predator. They eat snails, chitons, worms, bugs, and water slugs. Their major predators are humans, and birds.

Life span: Unknown.

Devin

Horse Tail Kelp

Laminaria digitata



General Description: Horse Tail Kelp looks like a horse's tail with a round stem-like branch and fringe-like strips coming off one end. Horse Tail Kelp can be up to one meter long. Giant kelp (found on the west coast) can grow to be 200 feet long. Horse tail kelp is a variety of large brown seaweed.

Habitat: Kelp is usually found clinging to rocks or intertwined with other kelp.

Geographic Range: Kelp is found all over the world, but Horse Tail Kelp is found on the east coast.

How it Protects Itself: Kelp protects itself by clinging to kelp blades so it will not be eaten by fish or other sea life.

Uses: Kelp is used for many resources such as food, vitamin C, animal feed, fertilizer and many other things. Kelp may be used as a salt substitute.

Observations: Kelp is considered to be algae. Kelp grows in great masses along the coast. Kelp is also a source of vitamins and minerals. Atlantic kelps are smaller than any other kelp. Horse Tail Kelp is one of the largest kelps on the Eastern coast. Kelp forms gas bladders that act as balloons to keep the plants suspended in the water. The principal genera of kelp is *Laminaria*. Kelp is mostly found on exposed shores. Kelp grows in water depths up to one hundred feet. Kelp is very slippery when wet. Many divers and swimmers have been injured when they slip on kelp or sea weed. Kelp (sea weed) is called beds of sea weed when it is found in large patches. Giant kelp is too fibrous for people to eat on a regular basis

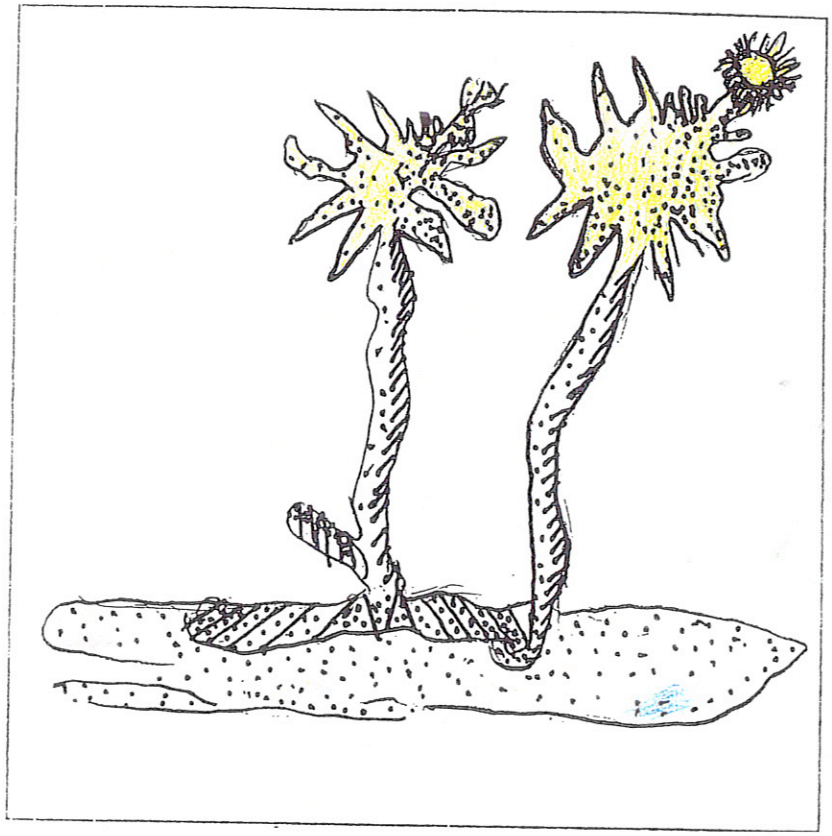
Reproduction: Kelp reproduces by alternation of generations.

Food Chain: Kelp is the prey of fish and other sea life because it does not eat but it is eaten by sea life. Kelp is a producer in the food chain.

Heather

Hydroid

Tubularia crocea



General Description: Hydroids look like plants. They are small in size. They form colonies. The colonies are less than two inches wide. The color is clear or pinkish.

Habitat: Hydroids can be found attached to rocks, shells and wharf pilings. They live at the bottom of the ocean where they provide hiding places for small animals.

Geographic Range: Hydroids are found along the Atlantic Coast from Maine to the Gulf of Mexico.

How it Protects Itself: The hydroids protect themselves by living in a large colony. Some polyps protect the colony by stinging their enemies.

Uses: Unknown.

Observations: The clear animal got its name from a Greek monster. They have a lot of different kind of polyps. Some of the polyps are for feeding and some for protection.

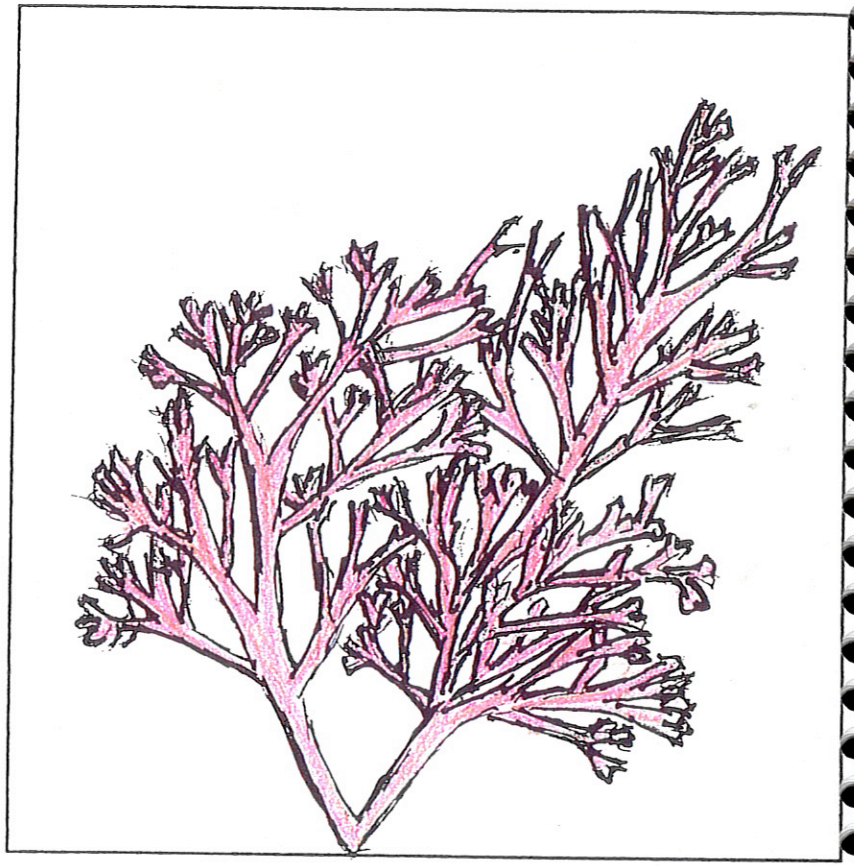
Reproduction: Reproductive polyps produce young for the colony.

Food Chain: They feed on zoo plankton and jellyfish so they are predators. The hydroid is an important part of the food chain. It provides food for the sea spider.

Solomon

Irish Moss

Condus crispus



General Description: Irish moss can grow from two to ten inches high. Irish moss can be red, purple and purplish-green. Irish moss can also be white when exposed to the sun.

Habitat: Irish moss is found on the rocks in the lower tidal zone and in tidal pools.

Geographic Range: Irish moss is found from Long Island, New York to Newfoundland. It is also found in northern Europe.

How It Protects Itself /Adaptations: Irish moss protects itself by camouflage. Irish moss is able to hide because of its color.

Uses: Irish moss is harvested with rakes to be used in gelatin, ice cream, chocolate milk and tooth paste. It is also used for cosmetics and hand cream.

Observations: Irish moss has some medicinal value, because it relieves throat pain. It was once given as a medicine. Irish moss is also called carrogeen. Irish moss is classified in the kingdom of plants, division of rhodophle, and is a species of red algae.

Reproduction: Irish moss reproduces by spore production. Irish moss reproduces during both the summer and the fall. When Irish moss is harvested it takes away the old moss leaving room for the new plants.

Food chain: Irish moss is a producer. Irish moss gets its nutrition from the sun through a process called photosynthesis. The predators of Irish moss are limpets, scavengers and humans.

Kate

Knotted Wrack

Ascophyllum nodosum

General Description: Knotted Wrack is a brown seaweed plant. It has thin, leathery branches with air pockets. The air pockets grow singularly instead of in pairs. They usually grow 2-3 feet tall.

Habitat: Knotted Wrack is found in calm Atlantic waters near rocks, salt marshes and tide pools.

Geographic Range: Knotted Wrack ranges from Virginia to the Arctic.

How It Protects Itself: Unknown

Uses: It can be used for poultry meal, fertilizer and garden mulch.

Observations: In the winter small, round yellow leaf-like bumps grow on the branches that later disappear. Air bubbles on the Knotted Wrack can keep the plants afloat when the tide comes in.

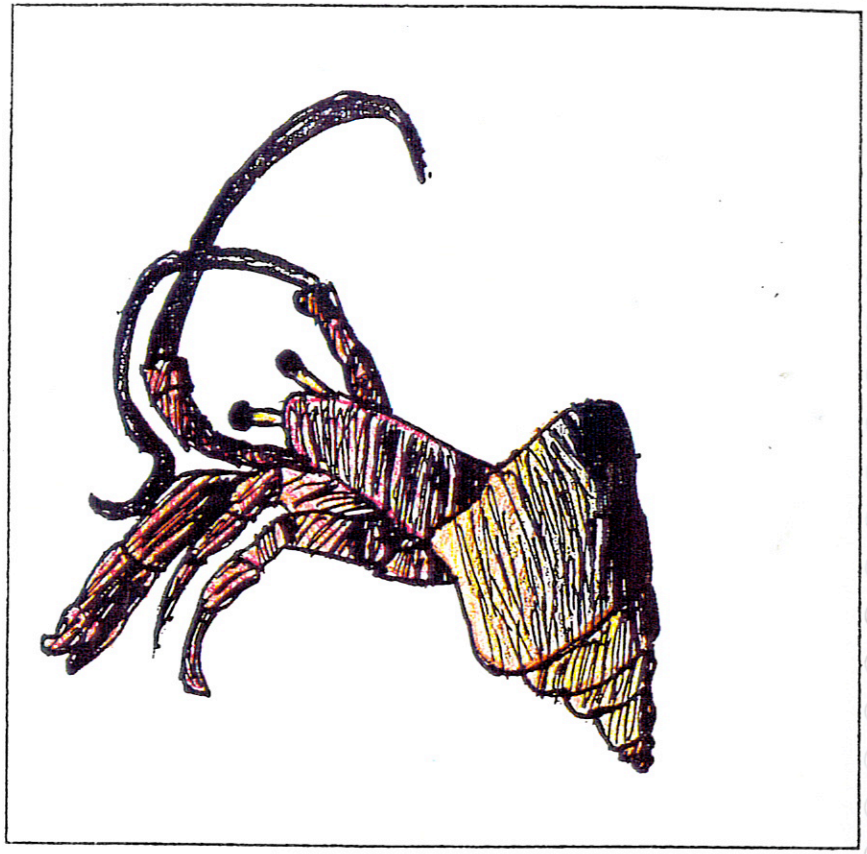
Reproduction: Knotted Wrack contains special cells that are released into the water from the reproductive part of the plant. They then form together to start a new plant.

Food Chain: Knotted Wrack gets its food and energy from the sun through a process called photosynthesis.

Kelly

Long-Clawed Hermit Crab

Pagurus longicarus



General Description: The long-clawed hermit crab has yellow eyes, a blue antennae, and an orange stripe on it's pincers. The carapace is 3/8 in. long (that is about 9 mm long).

Habitat: They live on sand, mud, rocks, and weed bottoms along open shores and in brackish estuaries. They are found from the low-tide line to water 150 ft. [45 m] deep.

Geographic Range: The are found in locally in warm bays to Nova Scotia. They are also found in Massachusetts Bay, in North Florida and in the Gulf of Mexico.

How it Protects Itself: The prey of the long-clawed hermit crab are octopuses. When the crab is attacked it fights vigorously. Sea anemones cling to the spiral shell of the hermit crab. The sea anemone's stinging tentacles protect the crab from their prey.

Uses: Hermit crabs help our world with their legs and their bodies because we can eat the meat in their legs.

Observations: Hermit crabs have five pairs of legs which have several functions. The first set of legs have large claws used for feeding and protection. The next two pairs of legs are used for walking. The last two pairs function in holding their bodies to their acquired shell.

Reproduction: The male hermit crab fertilizes the female just after she molts. The resulting fertilized eggs are carried and protected within her acquired shell until they hatch.

Food Chain: Predators of the hermit crab are almost any type of fish and the octopus.

Sam

Maned Nudibranch

Aeolidia papillosa

General Description: The Maned Nudibranch is about 4 inches long and quite thick and stubby. Its back is covered with hundreds of slender, finger-like projections, called *Cerata* with a bare area down midline. The Maned Nudibranch's color varies from whitish to gray to a tawny brown with many pale speckles.

Habitat: The Maned Nudibranch is generally found on mud flats, rocks, pilings, and shaded tide pools . It can be found anywhere between the low tide line to up to 2,200 feet below the surface .

Geographic Range: The Maned Nudibranch ranges from the waters of the Arctic to Maryland and from Alaska to Southern California.

How it Protects Itself/Adaptions: The Maned Nudibranch is an *eolid,* which is a class of nudibranchs. *Eolids* have the unique ability to digest all of a sea anemone except for its stinging cells. It then transports the stinging cells to the tip of the Cerata where it uses them for protection .

Uses: Unknown

Observations: Although as an adult the Maned Nudibranch does not have a shell, when the young are still developing in the egg they have a small coiled shell. Also, the *Cerata* are used for breathing. They are exposed gills.

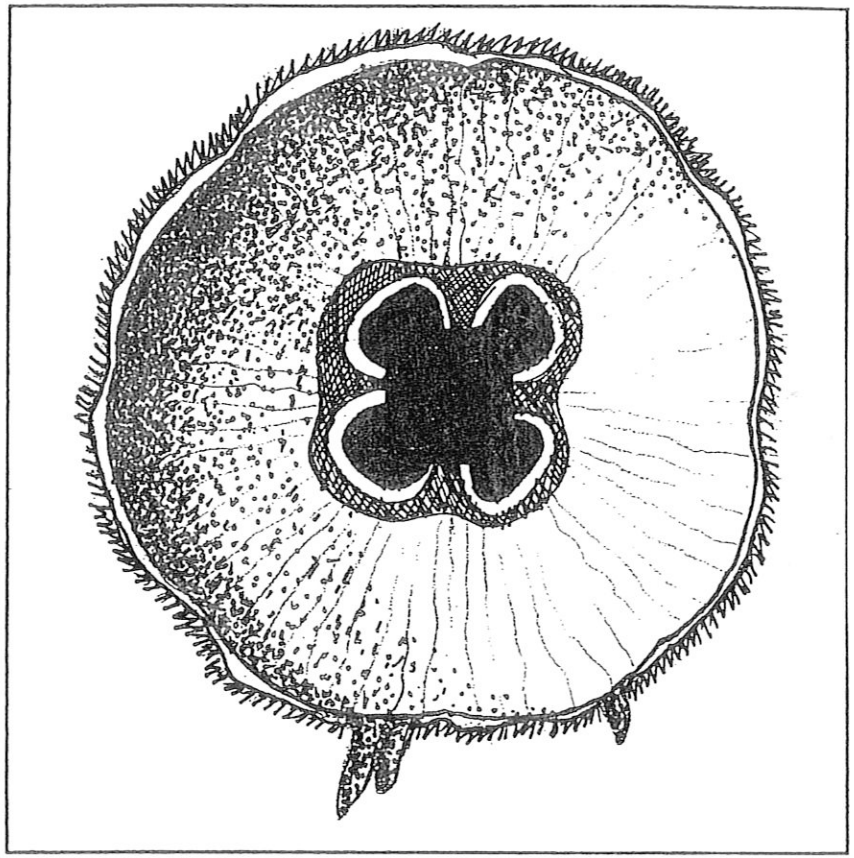
Reproduction: The Maned Nudibranch lays long strings of eggs on rocks, seaweed and other supports.

Food Chain: The Maned Nudibranch eats a species of anemone called the Frilled Anemone. As far as predators go, the Maned Nudibranch has almost none because of the stinging cells at the end of the *Cerata.*

Stacey

Moon Jelly

Aurelia aurita



General Description: Moon Jellies have four, white, U-shaped bodies that are visible through a milk-white jelly bell. Its color ranges from tan to orange-pink.

Habitat: Its habitat is in the intertidal zones in summer. They can be stranded in low tide pools by strong winds and ebb tides. Moon jellies may move and swim in mid to top water where humans usually are. They probably live close to the top water

because that's where their foods live and because at the bottom of the ocean, there are corals reefs and other hard animals and plants. A jellyfish needs softness and space.

Geographic Range: Moon Jellies appear in spring and summer in Cape Cod bays. By July they can appear in Maine. They also live in tropical waters around the world.

How it Protects itself: Its protection is its stinging tentacles which give a rash if handled. The predator who eats it may die. The sting is deadly, more deadly than a snake bite to some smaller organisms.

Uses: Unknown

Observations: When Moon Jellies die they evaporate into water because they are 96% water.

Reproduction: The mature jellies produce eggs and sperm cells by late July or August. In autumn, eggs hatch into larvae that attach to lower level rocks in crevices and tides pool on sheltered shores. Miniature moon jellies released early in spring reach sexual maturity in six months to two years.

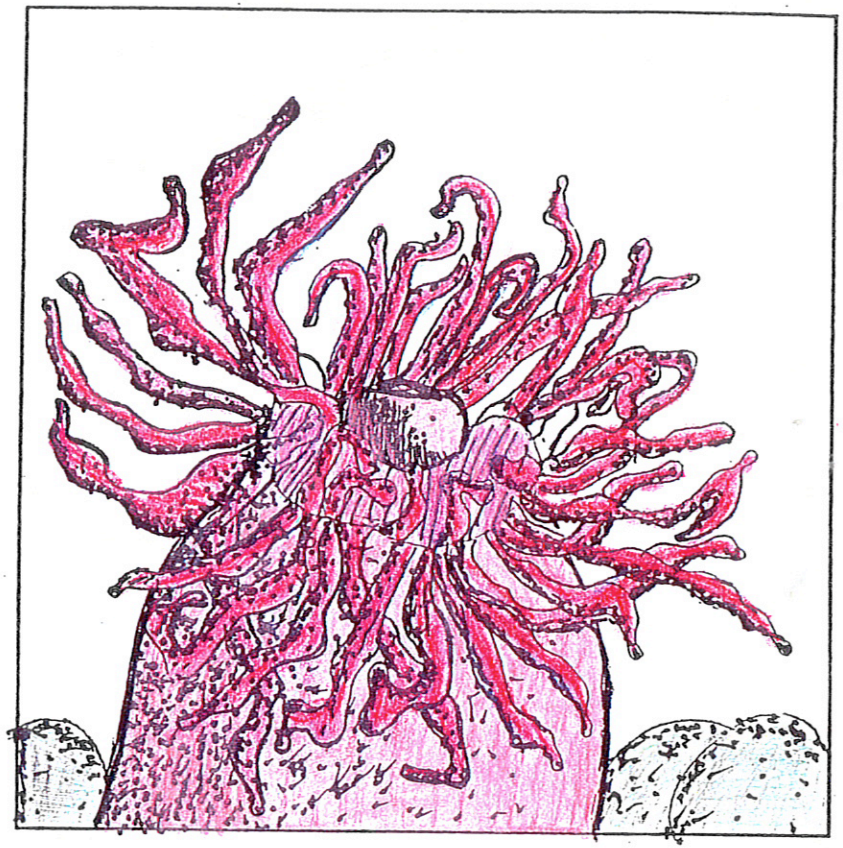
Food Chain: They eat plankton and small crustaceans. Animals that eat moon jellies include bigger fish.

Life Span: Their deaths are caused by October storms. The moon jellies can travel 50 miles or more before it dies.

Charanay

Northern Sea Anemone

Tealia felina



General Description: The Sea Anemone looks like a flower growing in the sea. The shape of its body and its bright colors gives it a plant like appearance. Its body may be many different colors, such as blue, red, green, pink, or a combination of colors. They measure about one fourth of a foot to three feet.

Geographic Range: The Northern Sea Anemone lives in the Pacific and Atlantic oceans.

Habitat: The Sea Anemone lives in the Intertidal Zone and in

deep waters. It usually stays attached to rocks , wharfs and many other things.

How it Protects Itself/Adaptations: The Sea Anemone protects itself by its tentacles which have poisonous stinging cells in them.

Uses: Unknown.

Observations: One end of the Sea Anemone's cylinder shaped body attaches to rocks. The end has a mouth surrounded with tentacles.

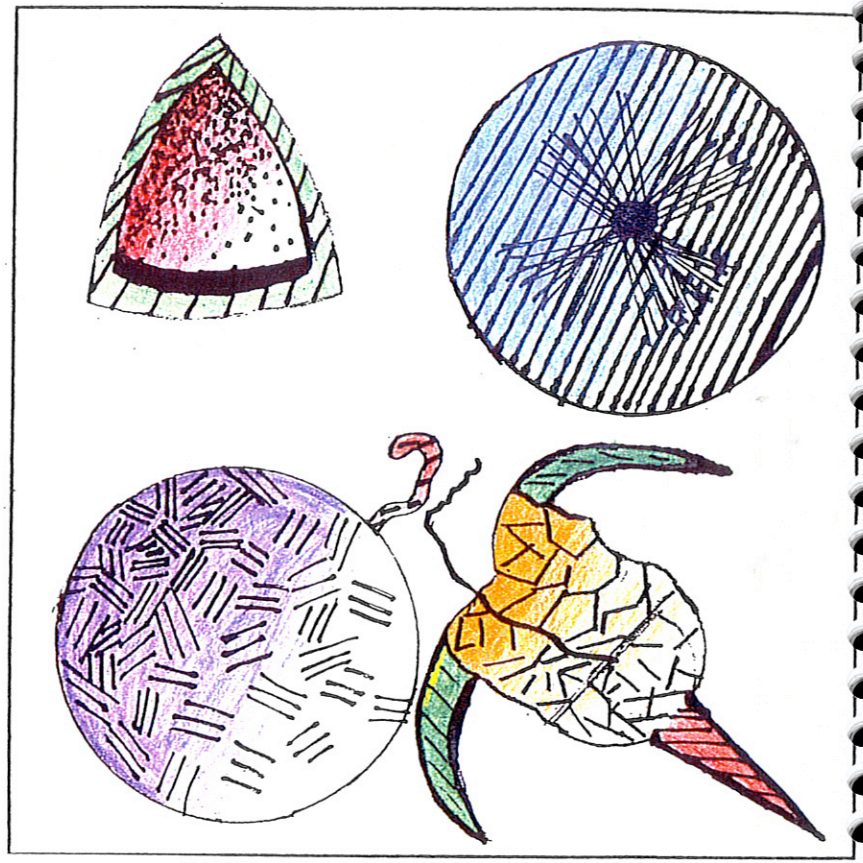
Reproduction: A Sea Anemone divides in half after forming eggs (budding.) When a Sea Anemone buds, a young Sea Anemone grows out of the parent's base and eventually pulls away.

Food chain: The Sea Anemone eats small fish. The Sea Slug eats the Sea Anemone.

Tonya

Plankton

Zoo plankton
Phyto plankton



General Description: Plankton is microscopic. If you could see it, plant plankton looks like many shapes and designs. Animal plankton looks like different types of insects with large antennae.

Habitat: Plankton live anywhere there is cold water. They live at the top of the intertidal zone. The reason plankton live at the top is because plant plankton need sunlight and animal plankton eat plantplankton so they have to stay at the top.

Geographic Range: Their range is all over the world.

How It Protects Itself/Adaptations: Plankton protects itself by being so small. Some plankton have bodies that are shaped to float. Some produce oil. Oil helps plankton stay at the top of the water because oil floats so when the plankton release oil they can stay at the top of the water.

Uses: Plankton is the most valuable thing in the ocean because it produces food. Without plankton there would be no marine life. Plankton provides lots of food to the ocean so scientists are trying to find a way for people to eat plankton.

Observations: When some animals are born they float amongst the plankton. These animals eat the plankton until they become old enough to swim by themselves. Some plankton larvae become bigger animals. If you were to go to the ocean and scoop up some water in your hand you would have thousands and thousands of plankton in your hand. Sometimes at night sailors can see multicolored clumps of plankton in the water because they are phosphorescent. Sailors can only see plankton if there are billions and billions in a clump.

Reproduction: Plankton reproduces by splitting in half and after a short while the halves grow. Plankton can split up to 10,000 times. Because they can reproduce so many times, there is an immeasurable amount of plankton in the water.

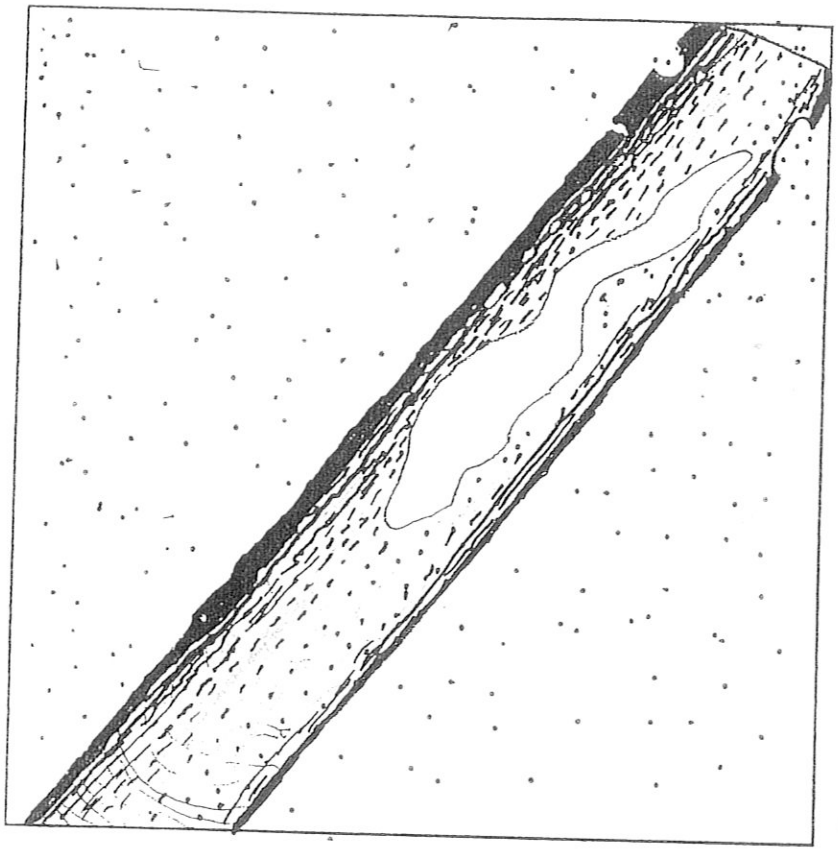
Food chain: Plankton is at the bottom of the food chain because it is so small. Plankton uses minerals and the sun for energy. Plankton is a producer.

Life span: Plankton's life span is unknown because there are so many and they are being eaten constantly.

Vikash

Razor Clam

Ensis directys



General Description: The razor clam has two teeth on the right side of it as you look at the top. Razor clams come in all colors but they are usually sea green or other sea colors.

Habitat: Razor clams live on the bottom of the sand bars on the Atlantic shore so they don't get shattered on rocks.

Geographic Range: The Atlantic razor clam's range is all over the Atlantic coast.

How it Protects Itself: The Atlantic razor clam has a shell to protect itself and two teeth-like pieces of shell on the right.

Personal Observations: The Atlantic razor clam is a sea greenish color usually. It has one foot to crawl around with. People eat them. Indians make them into beads to be used for wampum.

Reproduction: The Atlantic razor clam mates by the male releasing sperm and the female releasing eggs. When the sperm and eggs meet in water they fertilize. After a week they hatch.

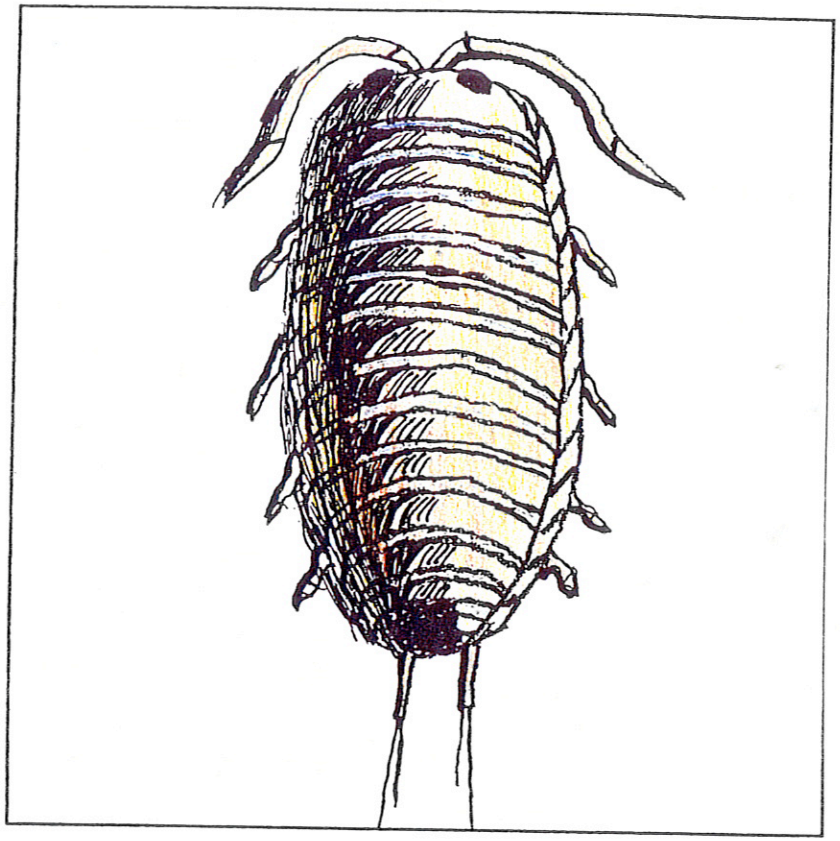
Food Chain: The Atlantic razor clam eats small plants like plankton and most all predators eat them. Seagulls eat them as well.

Life Span: Unknown.

Brad

Northern Sea Roach

Ligia oeahice



General Description: The Sea Roach is gray or tan. Two pair of antennae eyes are at each side of the head. The Northern Sea Roach is one and a quarter inches long.

Habitat: Sea Roaches live on rocks and pilings in the upper intertidal zone.

Geographic Range: The Sea Roach's range is from Cape Cod north at least to Maine.

How it Protects Itself: It protects itself by hiding under rocks and also because it has a hard shell.

Uses: Unknown

Reproduction: Unknown

Observations: Unknown

Reproduction: Unknown

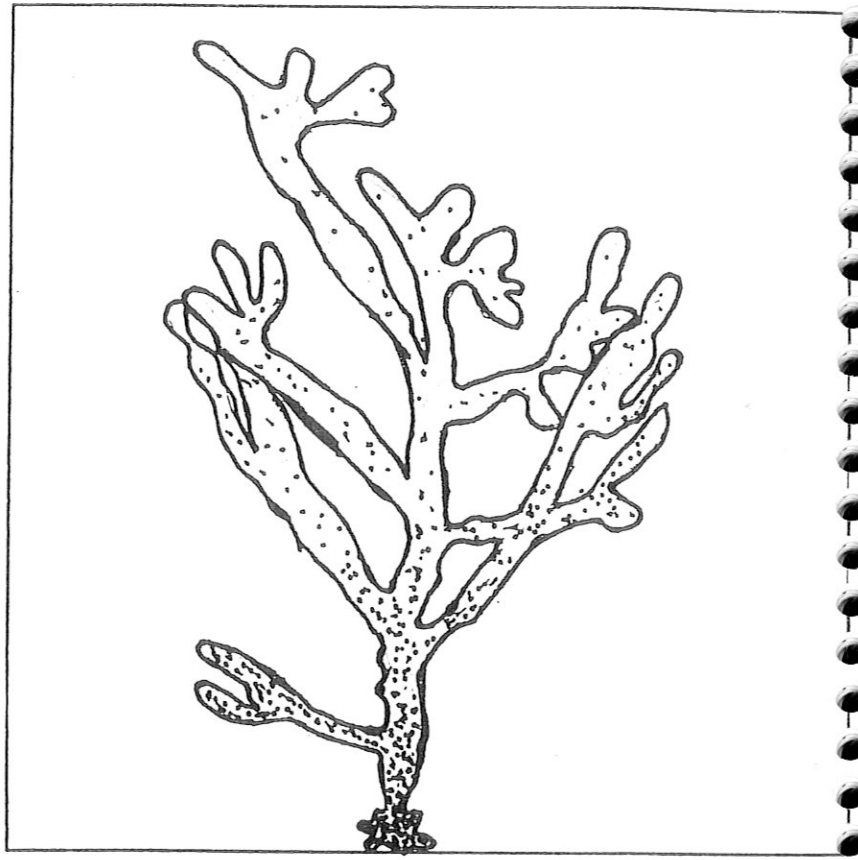
Food Chain: Its prey are sea shells and clams. It is a scavenger and an omnivore.

Life Span: Unknown

Moses

Rockweed

Fucus spiralis



General Description : The Rockweed is a brownish green color and waves around in the water. They can grow up to 30 cm long.

Habitat: The Rockweed attaches to the top or middle rocks on beaches that are not out in the open. They grow on the top of the water because they need to be near the rocks.

Geographic Range: The Geographic Range is around and in the

Atlantic coast.

How It Protects Itself/Adaptations: The way it protects itself is by hiding in the rocks instead of where the waves can get them.

Uses: The Rockweed can be used for many things like fertilizer, tea flavorings, and clambakes.

Observations: The air bubbles in the Rockweed help tie up the plants. The rockweed is related to the seaweed.

Reproduction: Plant reproduces asexually.

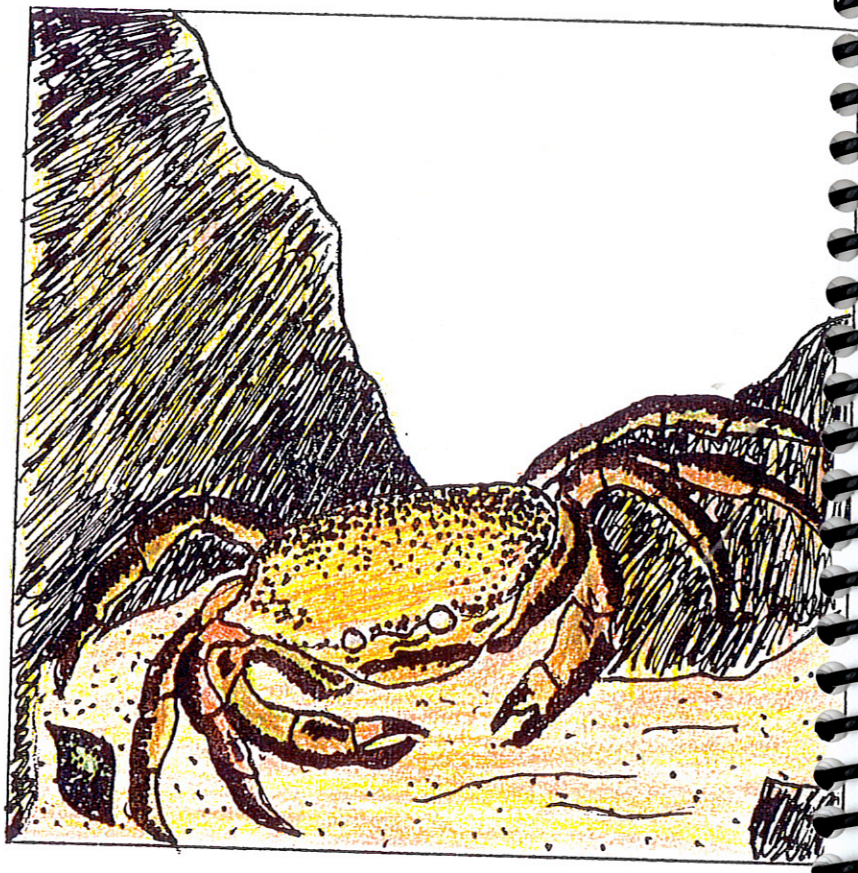
Food Chain: The plant gets energy from the sun. Marine animals eat the rockweed.

Life Span: The rockweed can live as long as 2 to 5 years.

Kristin

Rock Crab

Cancer Irroratus



General Description: Rock Crabs have smooth, yellow shells with olive brown and reddish brown markings. The underbelly of the crab is pale yellow. The Rock Crab's body is about 5 1/4" wide and 3 1/2" long.

Habitat: You can find young Rock Crabs in tidal pools. Larger crabs need deeper water. Rock Crabs need cooler waters, and grow larger along the northern shores of both coasts. You can find them in the middle and upper intertidal zones. Unlike their name, they live on sandy bottoms as well as on the rocky beaches. You can find them along with the Green Crabs under the rocks and in cracks in the rocks of tide pools.

Geographic Range: Rock Crabs range from the Arctic to South Carolina. Rock Crabs are some of the most common crabs in New England. They can be found downward to the depths of over two thousand feet.

How It Protects Itself: The Rock Crab has a reddish shell that covers around its soft body. Rock Crabs run from danger or hide in broken shells between rocks.

Uses: Rock Crabs are used for seafood. It is a popular seafood.

Observation: Rock Crabs have a hard, oval shell with teeth along the edge. It is easy to confuse Rock Crabs with Jonah Crabs. The difference between the Rock Crabs and the Jonah Crabs is the upper side of the Rock Crab is yellow, closely dotted with reddish or purplish spots. Underneath the Rock Crab is white to vanilla yellow. The upper side of the Jonah Crab is dull rosy to red, beneath is yellowish. Rock Crabs are in the family called Cancridae.

Reproduction: The female releases a pheremone (chemical) which attracts the male crab. The male crab then carries the female crab for weeks in order to mate. Mating can happen only during a short time after the female has changed her old shell and before her new one has hardened. At that time the male crab always protects her because her shell is soft. The female carries her eggs under her body near the stomach.

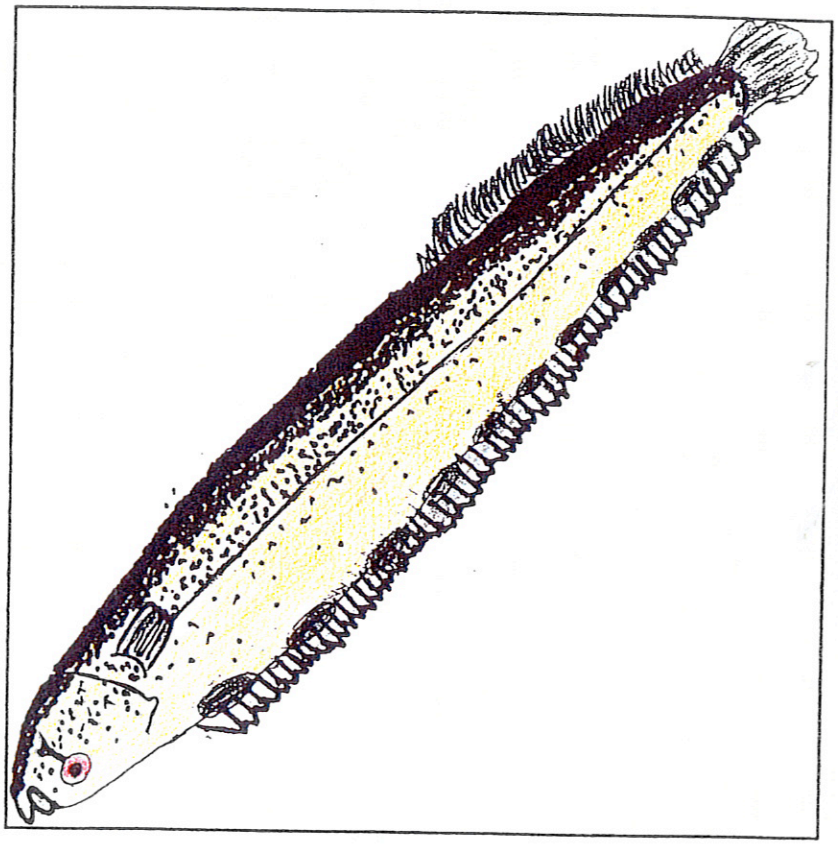
Food Chain: Rock Crabs search for small worms, mollusks, and crustaceans to eat, but are known to be scavengers as well as fierce predators. Crabs are eaten by gulls, herons, sea urchins and fish, so they are also prey.

Life Span: Rock Crabs may live from 3 to 12 years.

Thuan

Rock Gunnel

Pholis Gunnellus



General Description: The Rock Gunnel is a fish that can grow up to thirty centimeters. It has a dark color. It can be black, orange, red, and yellow. It has spots. Their bellies are pale.

Habitat: It lives under rocks, sea weeds, mud and in cracks.

Geographic Range: They are found along the rocky, marine area of the northern Pacific and Atlantic coasts.

How it Protects Itself: It protects itself by hiding under rocks, under mud, in cracks, and in the sea weeds.

Uses: Unknown

Observations: When the Rock Gunnel is disturbed, it squirms. They are also called Butter fish because they are so slippery.

Reproduction: From December to March the female lays her eggs in a mass. The eggs are one inch in size. The eggs are so fragile that it can be impossible to separate one from the mass. The Rock Gunnel rolls its eggs into a ball that both parents protect.

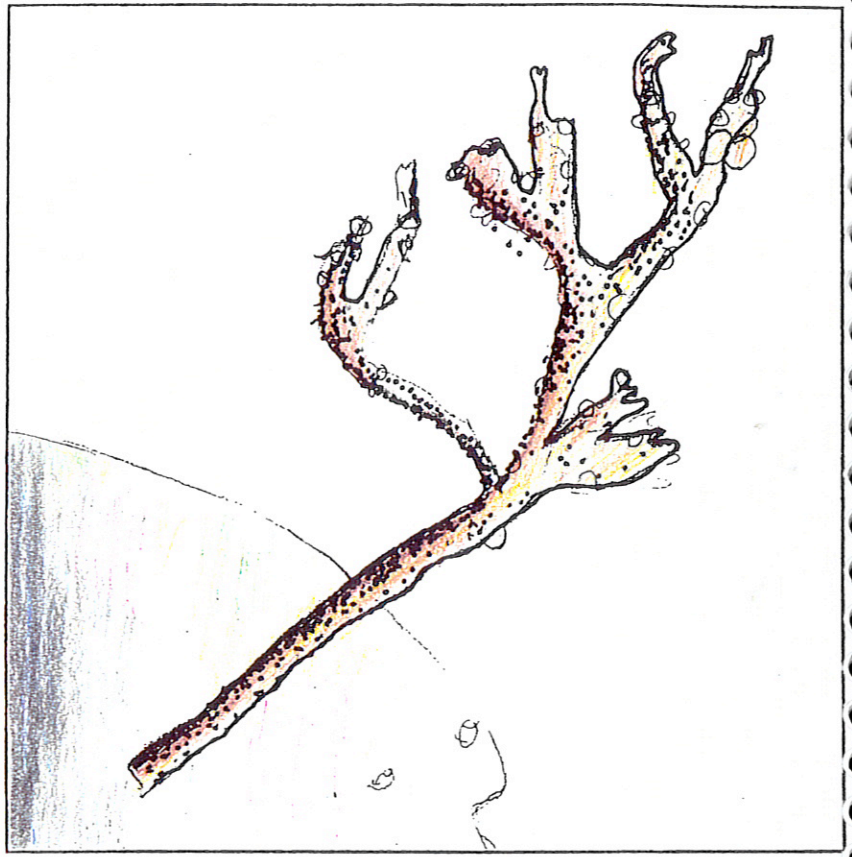
Food Chain: Its prey are shellfish, shrimp, and worms. Its predators are cod, pollock, and sea birds.

Life Span : It can live through the whole year.

Samat

Rockweed

fucus



General Description: Rockweed has many flat branches with ribs in them. It 's brown and has little air bubbles and it grows up to 3 feet.

Habitat: Their habitat is in the ocean mostly deep sometimes shallow.

Geographic Range: Rockweed mostly lives all over the world.

How it Protects Itself: It adapts to the bottom of the ocean by blending in.

Uses: Alganic acid that's used in ice cream and other things are derived from rockweed.

Observation: Rockweed grow up to 2 to 3 feet tall.

Reproduction: Unknown

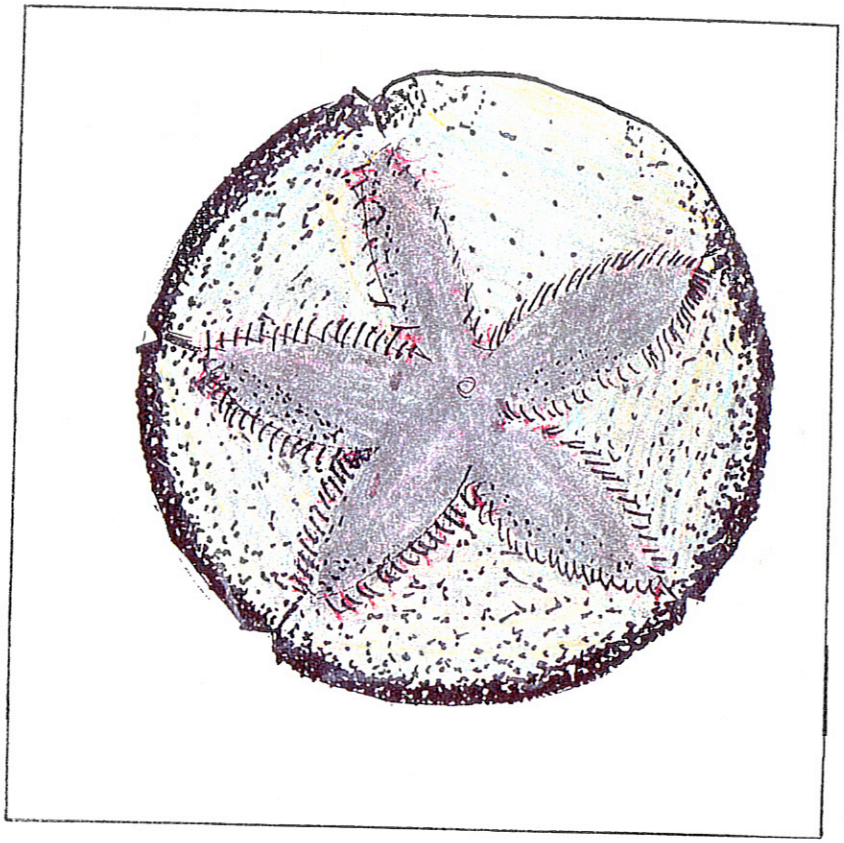
Food Chain: Rockweed needs to stay on top of the water because that is the way rockweed producers its food.

Life Span: Unknown

Josh

Sand Dollars

Echinarachnius parma



General Description: Sand Dollars are cookie shaped and are about one to two inches in diameter. Sand Dollars range in color from dark brown to red.

Habitat : Sand dollars only live on sandy bottoms because they burrow for protection from waves and predators. They also obtain food from the sea floor.

Geographic Range: Sand Dollars are usually found in shallow water.

How it protects itself: To protect themselves, Sand Dollars pile sand in front of them and move into the sand pile.

Uses: Scientists that study embryos use Sand Dollars

Personal Observation: If you pick up a sand dollar and turn it upside down, you will see a small hole in the center. The center is its mouth. When the sand dollar dies, they turn white and wash up to the beach. If you shake the shell and something rattles inside, it may be some of the animals teeth. You can break open the shell to look at them. Sand dollars are covered with movable spines so soft and so tiny that sand dollars seem to be covered in velvet. Sand dollars move on small tube feet. The sand dollar feeds by waving these cilia, as they are called, so that the food is pushed into its mouth, which is on the underside of its shell.

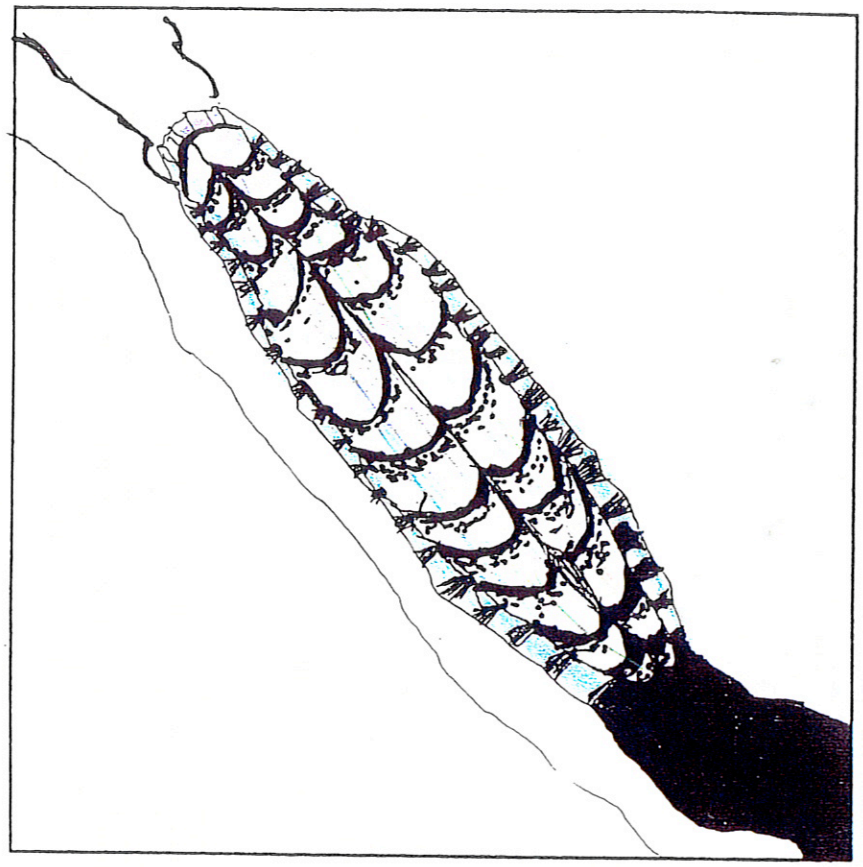
Reproduction: Sand Dollars have separate sexes: Eggs and sperm are spawned directly into the surrounding water through five small openings around the sieve plate.

Food Chain: Sand Dollars eat plankton and other organic organisms in the ocean. Starfish are one of the main enemies of Sand Dollars. When a starfish crosses a bed of a Sand Dollar, the Sand Dollar will go down current from the starfish and will quickly bury itself. Some other predators are Cod, Haddock and Flounder.

Tarah

Scale Worm

Harmothoe imbriciti



General Description: The scale worm is a member of the polychaetes, and also a bristle worm. That errant polycheate is not obviously segmented. The segments are attached by tiny stocks. The segments are not obvious to the overlapping scales. They have fifteen scales. Each segment has a pair of muscular muscles which act like feet (Parapodia).Usually the head has feelers which help the worm see. The bristles (seate) help the worms grip on the surfaces they travel. They live in slime covered tubes.The bristle worms make up the largest group of aneids, the most highly developed worms.

Habitat: Scale worms live in tunnels lined with slime. They burrow through ground to get the nutrients in the dirt.

Geographic Range : Scale worm ranges from tidal pools up and down the Maine coast.

How it Protects Itself/Adaptations: It releases scales and curls into a ball.

Uses: None apparent.

Observations:

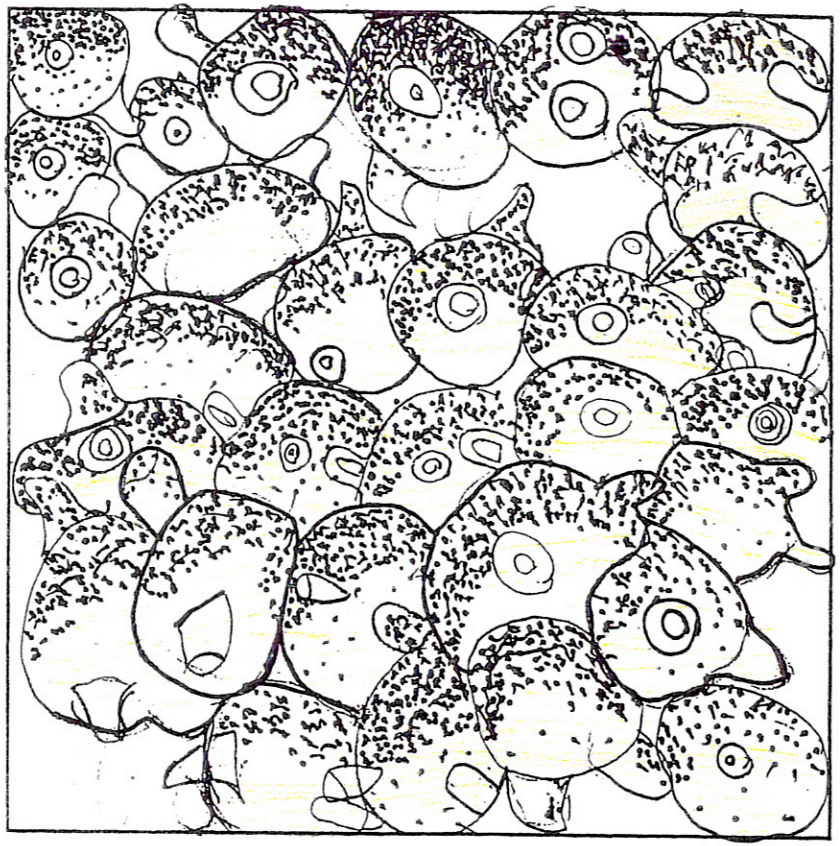
Reproduction: When ready to mate, the worm releases a smell attractive to others and then climbs to the bottom surface and lies next to another scale worm as slime encases their bodies. Each donates sperm and ova to each other. After leaving ,the slime rolls off, hardening, collecting both sperm and ova and creating a fertile egg sack.

Food Chain: The scale worm acts as prey.

Matthew Dame

Sea Grape

Ciona iestinalis



General Description: The sea grape is also named sea squirt. It ranges from 1/100 inch to seven inches (0.025 to 18 cm) in diameter. The color of sea grapes is grey to green. They look like balloons with holes in the middle of them.

Habitat: Most sea grapes live permanently attached to objects such as rocks, shells and wharves.

Geographic Range: The geographic range of the sea grape is

along the Atlantic and California coasts.

How It Protects Itself / Adaptations: A sea grape protects itself is with its arms which go into holes so that the green crab will think it is a plant, not an animal, so then the green crab will not eat the sea grape.

Uses: The sea grape can be used to eat, one of the main things they can be used for is to help make jelly.

Observation: The sea grape is round, big, and has tubes sticking out of it, that act as siphons for feeding.

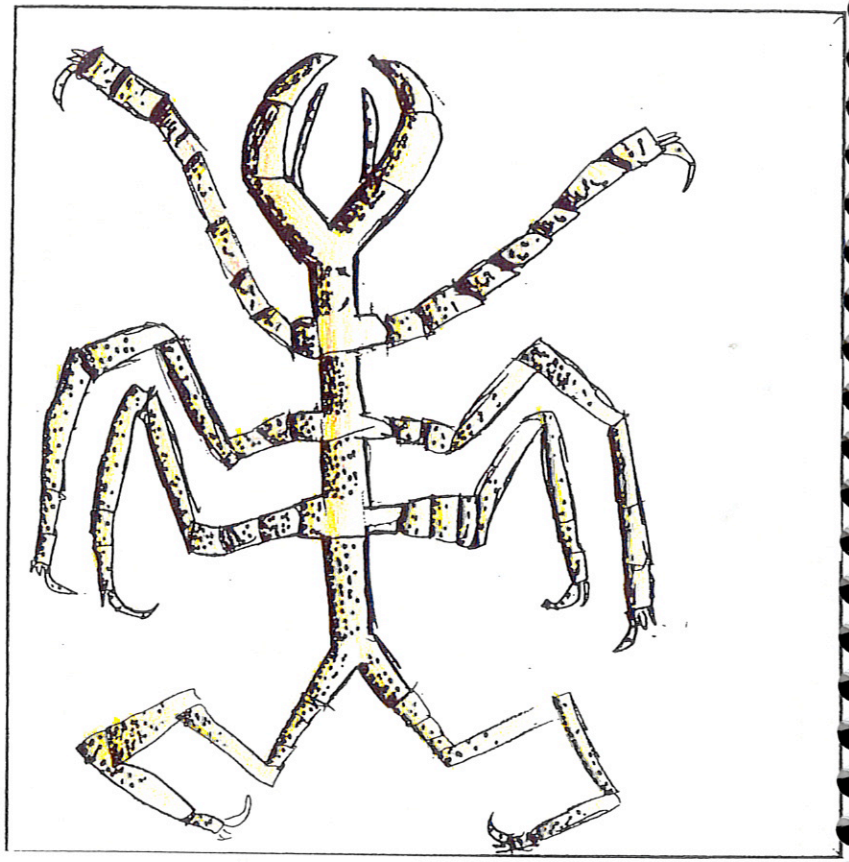
Reproduction: Sea grapes reproduce either asexually or by means of eggs and sperm. In budding, a new sea grape develops as an outgrowth of the parent's body. In sexual reproduction, fertilized eggs develop into tiny tadpole-shaped, free swimming larvae.

Food Chain: Sea grapes eat a type of plant and animal called Plankton. The Green Crab is their predator. When Sea Grapes are dead the Green Crab comes scavenging around looking for the Sea Grape to eat them.

Cindy

Sea Spider

Anoplodactylus ientus



General Description: The sea spider's body is 1/8" long, slender and flattened, with a long neck and tiny abdomen. It has 4 eyes and 4 pairs of slender legs about 1/2" long. The sea spider's color is usually gray or tan.

Reproduction: The eggs and sperm are carried by lamp shells and they are fertilized in the sea.

Habitat: It usually lives on rocky shorelines in heavy growth of hydroids (hydrozoan polyps). It is found between the intertidal zone and the deep sea.

Geographic Range: It lives from the Arctic to Long Island Sound.

How it Protects Itself: It protects itself by using its camouflaging and near motionlessness.

Uses: Unknown

Observations: Although very different from the true spider, the sea spider superficially resembles the real spider.

Reproduction: A special pair of legs are found in males to help them reproduce. As eggs are laid by the female, the male fertilizes them, and then they are collected by the males.

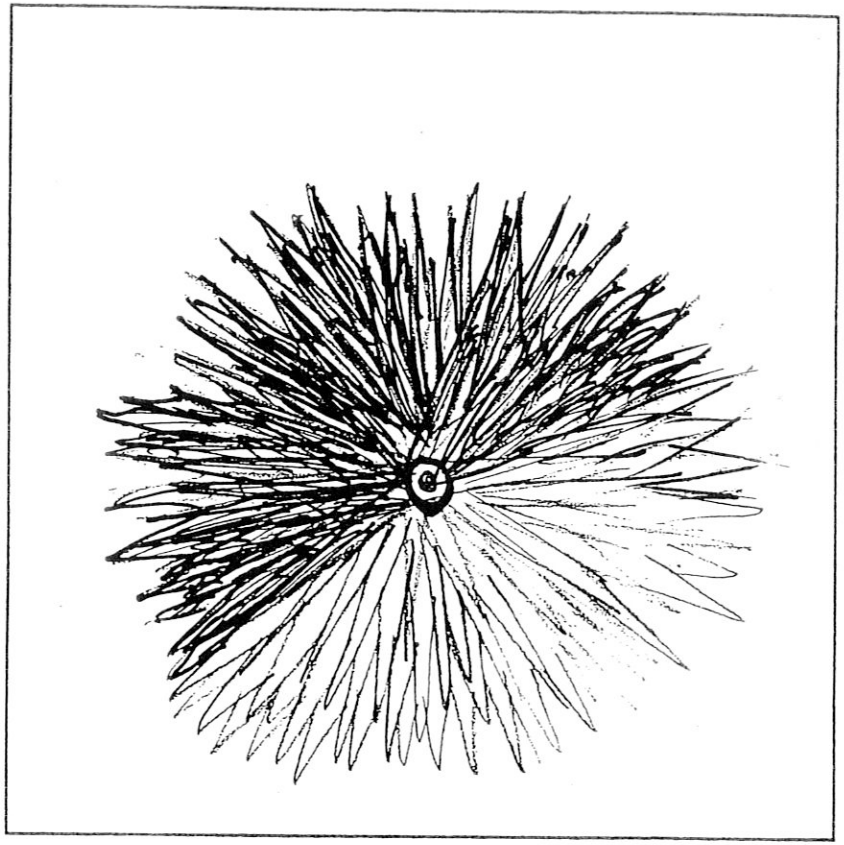
Food Chain: The sea spider usually eats soft coral, sponges and hydroid polyps. Some sea spiders eat detritus, loose material that results directly from the natural breaking of rocks. They feed by sucking up their prey's body tissues through the proboscis, a long flexible rubberband-like snout or nose, or by cutting off pieces of the prey with the chelicera, (fangs). The sea spider can be eaten by anything that is bigger than the sea spider, like the scud or sea roach.

Life Span: Unknown

Tom

Sea Urchins

Strongyiocentrotus droehbachiensis



General Description: Sea Urchins can be red, blue, purple, and brown. A Sea Urchin has a lot of spines. It is round like a ball. It only has five teeth. The Sea Urchin's body is about 3 1/4 inches across, 1 1/2 inches long.

Habitat: Sea Urchins live in deep water and sometimes in shallow water. You can also find a Sea Urchin under rocks.

Geographic Range: Sea Urchins range almost anywhere in the world. Sea Urchins are the most common in the U.S.

How It Protects Itself: The Sea Urchins spines are what protects itself.

Uses: Sea Urchins are used for seafood. A lot of people eat it.

Observation: Sea Urchins have a thick shell that protects itself. Sea Urchins are all difference colors. They can be green, red, blue, and brown. They only have five teeth with which to eat and protect itself.

Reproduction: How a Sea Urchin has babies is all kinds of these little plates are joined together and then babies are made.The female carries her eggs in or near her stomach for a little period of time.

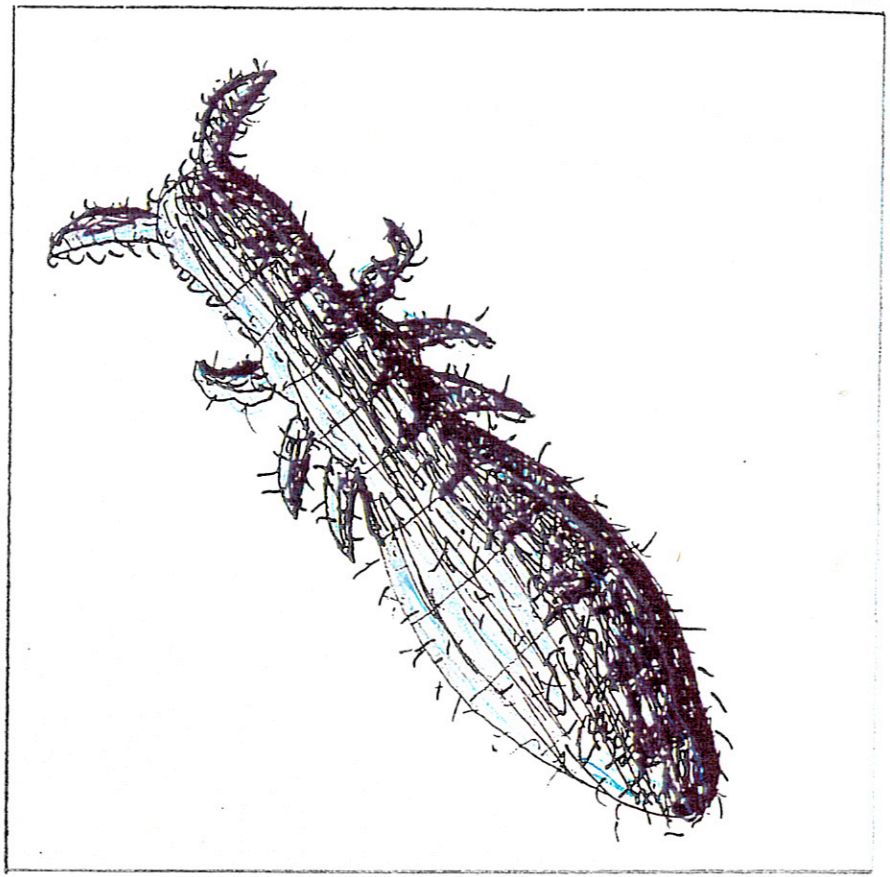
Food Chain: Sea Urchins eat when they are all the way in the water. Sometimes, they eat food that people throw in the water. They go to the bottom of the sea and eat food that has been put down there by other species.

Life Span: Sea Urchins can live up to five to six years.

Sarah

Seashore Springtail

Anurida maritima



General Description: The Seashore Springtail is a wingless, hairy insect about 3 mm. long. They are usually gray and sometimes dark blue with a cylinder body.

Habitat: They live in rocky tidal pools. If a wave ever does crash on the Springtail, it's hairy body can trap enough air to survive for a couple of days. They live in big groups that look like a gray blob floating on the water.

Geographic Range: Seashore Springtails are found throughout the New England Coast.

How It Protects Itself: Unknown

Uses: They are scavengers so they eat all the trash. The world is cleaner place with the Seashore Springtail around.

Observations: An interesting fact about the Seashore Springtail is how it got it's name. Seashore Springtail comes from its tail-like trigger, which is tucked under its abdomen when not in use. In order for it to jump, it straightens out its tail-like figure and that makes them jump.

Reproduction: The female Seashore Springtail can lay eggs in large bunches. When the young are born, they look just like the adults.

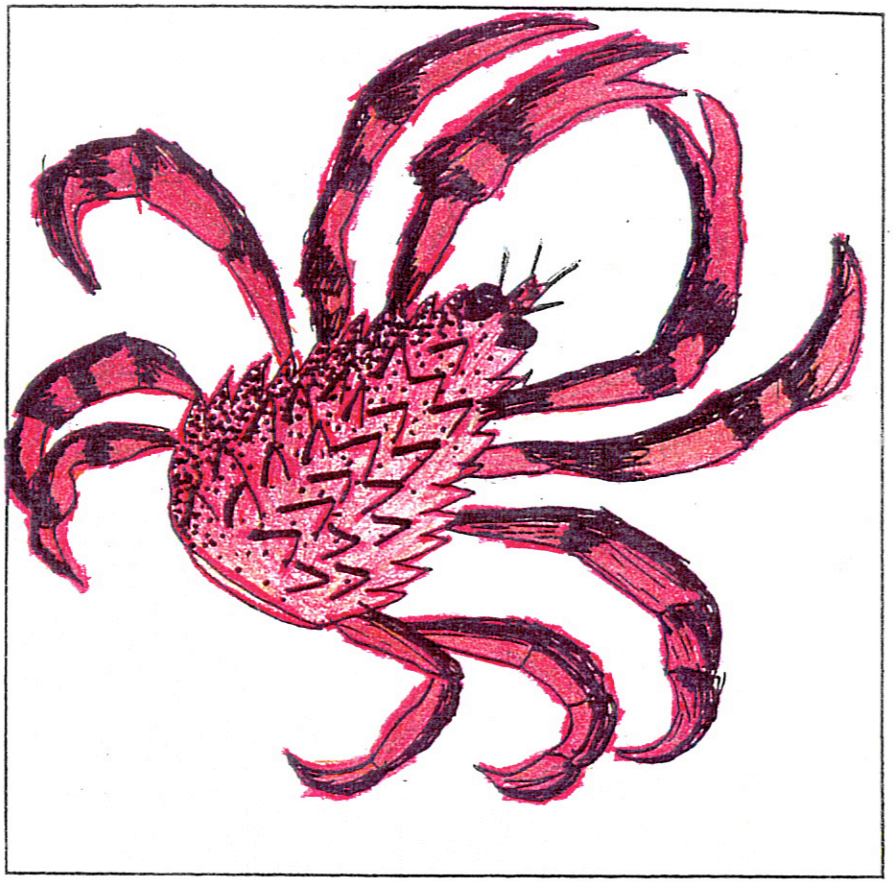
Food Chain: They eat waste from other animals and decaying plants for their diet.

Life Span: Unknown

Kelly

Spider Crab

Libinia emarginata



General Description: The Spider Crab's globular body can be 10 cm. wide and its leg span can be 30 cm. It has an olive-brown to dark brown body with rows of nine spines down the center of the back. Small hairs and spines on their bodies and legs encourage the growth of sponges, hydroids, and algae.

Habitat: Spider Crabs live among kelp holdfasts in low tide pools. Adults forage in the subtidal zone.

Geographic Range: Spider Crabs are found in Japan and in the Gulf of Maine.

How it Protects Itself: The slow moving spider crabs uses camouflage to hide from their enemies.

Uses: It provides food for our world.

Observations: The crabs are classified in the phylum Arthropoda, class Crustacea, subclass Malacostraca, order Decapoda, suborder Pleocyemata, infraorders Brachyyura (true crabs) and Anomura (hermit crabs). A spider crab's leg span can reach 12 feet (4 meters). The giant Spider Crab of Japan (Macrocheira Kampferi) has a shell 1 foot or (30) cm. wide.

Reproduction: Spider crabs lay eggs and that's how they reproduce.

Food Chain: Spider crabs are scavengers.

Life Span: Unknown

Yonas

Sugar Kelp

Laminaria saccharina

General Description: Sugar Kelp has a strong root-like hold fast that supportd a flexible, cylinder-like organism. The kelp can be from 6 to 10 inches wide and may reach a length of ten feet. Laminaria saccharina can be up to 100 feet in height and its color is brown.

Habitat: The Sugar Kelp is attached to stones and shells below the low tide.

Geographic Range: The Sugar Kelp grows along the Pacific Ocean and the New England Coast.

How it Protects Itself: It can't protect itself because is a prey plant.

Uses: Peak picking for sugar kelp is in late spring (for high vitamin C content) and in summer (for high sugar and alcohol content). It is used in fertilizer. Its very high in iodine, bromine, protein, and sugar. It also contains starch, nitrogen, vitamin k , vitamin B 12, vitamin C, sodium, chloride, rudibium and nickel.

Observations: My personal observation is that it feels soft and slippery.

Reproduction: They reproduce by uniting male and female cells which swim out into the water.

Food Chain: Sugar Kelp live in deep water where the sunlight is not so strong. However, sugar kelp contain some chlorophyll even though its darker color hides it. These plants use chlorophyll to combine the energy of the sun with nutrients from the sea to make food.

Life span: It lives about 20 years.

Ariel Martinez

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