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Teaching Materials for "Spineless Science"

(an introduction to classification focusing on the invertebrates)

Text by Michael DiSpezio
Illustrations by Tessa Morgan
For Woods Hole Oceanographic Institution Sea Grant Program

Color Overhead Transparencies for Classroom Overview *(Enclosed)*

Vertebrates (animals with backbones)
There are all sorts of animals. Most of us, however, are more familiar with a small group of creatures known as **vertebrates**. Known as "animals with backbones," the vertebrates include dogs, cats, hamsters, fish, sharks, whales and of course, humans.

Run your hand down the center of your back and you'll feel a row of small bumps. Beneath these bumps are distinct segments of bone. These segments are called **vertebrae.** Strung together like beads on a string, the chain of vertebrae form a bendable rod that we call the backbone. Not only does the backbone give an animal its support, but it protects a delicate cable of nerves, called the spinal cord.

In most vertebrates, the skeleton is made of bone. Bone is a living material that includes large deposits of minerals. These minerals (such as calcium) gives bone its strength and hardness. But bone is also a living structure. It has all sorts of cells and tissues that help maintain its health. Without its living components, bone couldn't grow or repair itself.

In one group of vertebrates, the skeleton is not made of bone. Instead, its parts are formed from a less rigid material called cartilage. Even though cartilage lacks the larger mineral deposits of bone, it still offers support for the animal's skeleton.

Animals that have cartilage skeletons include sharks, rays, and skates. Cartilage is also found in animals that have bone skeletons. For example, your nose, ear, and rib attachment points are formed from this more flexible support material.

Invertebrates (animals without backbones)
Humans have backbones, as do most of our pets. Yet most animals in the world lack backbones. Animals that do not have backbones are called **invertebrates.** Invertebrates include all sorts of very different animals. From sponges to giant squid, animals without backbones form the bulk of animal life on planet Earth.

Perhaps you are wondering how an invertebrate survives without the support of a backbone? It depends. Some invertebrates have hard shells. Others depend upon thick and tough skin. Still others have a hard and spiny outer covering that offers both protection and support.

Classification of Animals
There are all sorts of ways to group or classify animals. In this guide, we'll use the classification scheme developed by scientists. As you'll discover, it's based upon similarities and differences among animals. Some of the features used to classify animals are easy to spot. Other characteristics, however, may be microscopic or relate to an animal's chemistry.

To begin, all animals belong to the Kingdom Animalia. Although the word animalia is an impressive Latin word, we'll stick to the simple (and more commonly used expression), *the animal kingdom*.

The next rank that all members of the animal kingdom are assigned to is called a **phylum**. Each phylum has its own distinguishing characteristics. Within each phylum, animals are further ranked into smaller and smaller groups, each group sharing one or more special features.

The next level of ranking is called a **class**. Animals that are in the same class share certain class features. Animals that are in the same phylum, but in different classes have different class characteristics (but will share the phylum features).

There are other categories or tiers of classification. These include groupings such as families and orders. It also includes the two most basic parts of an animal's identification; genus and species.

Rankings may also include the prefix sub or **super**. As you might imagine, these add-ons identify additional ranks that are inserted either above (super) or below (sub) the group they identify. For example, a superclass would include a group of several related classes. A subclass would identify a specific group within the class of animals.

Two-name name

All organisms on our planet can be identified by a two-word name. The fancy term for this naming system is "binomial nomenclature." In real terms, it means that each animal is assigned a unique, two-word name.

Humans are called *Homo sapiens*. Notice that both words are in italics. The first letter of the first word is upper case and all other letters remain in lower case. If you didn't use italics, these words would need to be underlined. The first word is the genus. Humans belong to the genus *Homo*. The second part of the name is the species. Humans belong to the species *sapiens*. By the way, the word "species" can either be singular or plural.

When scientists refer to a species, they identify both the genus and species name. The full two-word name for a house cat is *Felis domestica*. *Felis* is the genus of cats. It includes all sorts of cats such as lions, cougars, and tigers. The species name *domestica* identifies the specific type of cat as the domestic, or "house" cat.

Ranks of Classification

Although we won't be using all of the levels (or tiers) of classification, it may be helpful to see a visual layout of this structure. As presented below, our classification hierarchy begins with the kingdom and eventually gets down to the species level.

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Primates
Family	Hominodea
Genus	Homo
Species	Homo sapiens

As you can see, the word vertebrate doesn't come up in the above ranking. That's because scientists assign the term "vertebrata" to only some of the chordates. It's inserted as an "extra" ranking called subphylum. The subphylum goes between the phylum and class levels.

Phylum	Chordata
Subphylum	Vertebrate

Class Mammalia

Sound confusing? Perhaps. But don't worry about it. For now, we'll concern ourselves with the general meaning of vertebrate and invertebrate. Vertebrates include all of the animals that have backbones. Invertebrates include all of the animals that lack backbones.

Check out the list below. It presents the major phyla in order of evolutionary lineage:

Kingdom Animalia
- Phylum Porifera (sponges)
- Phylum Cnidaria (stinging-celled animals)
  - Class Hydrozoa (hydrozoans)
  - Class Scyphozoa (jellyfish)
  - Class Anthozoa (coral animals and anemones)
- Phylum Ctenophora (comb jellies)
- Phylum Platyhelminthes (flatworms)
- Phylum Nermertina (ribbon worms)
- Phylum Annelid (segmented worms)
- Phylum Mollusca (mollusks)
  - Class Polyplacophora (chitons)
  - Class Gastropoda (snails and kin)
  - Class Bivalvia (clams, mussels, and kin)
  - Class Cephalopoda (squid, octopuses)
- Phylum Arthropoda
  - Class Arachnida (spiders, ticks and kin)
  - Class Crustacea (crabs, lobsters, and kin)
  - Class Diplopoda (millipedes)
  - Class Chilopoda (centipedes)
  - Class Insecta (insects)
- Phylum Echinodermata (spiny skinned animals
  - Class Asteroidea (sea stars)
  - Class Echinoidea (sea urchins and sand dollars)
  - Class Holothuroidea (sea cucumbers)
  - Class Ophiuroidea (brittle stars)
  - Class Crinoidea (sea lilies)
- Phylum Chordata (chordates)
  - Subphylum Urochordata (tunicates and sea squirts)
  - Subphylum Cephalochordata (lancelets)
  - Subphylum Vertebrata (vertebrates)
    - Class Agnatha (jawless vertebrates)
    - Class Chondrichthyes (sharks, rays and kin)
    - Class Osteichthyes (bony fishes)
    - Class Amphibia (frogs, salamanders and kin)
    - Class Reptilia (lizards, snakes, turtles and kin)
    - Class Aves (birds)
    - Class Mammalia (mammals)

Background Information:

<u>The Concept of Grouping</u>

Grouping in science = taxonomy, classifications, order

- Ask participants to name/list characteristics that help form groups
- Which characteristics are "correct"? Answer: all

- History of Grouping (scientific): gross anatomy
  microscopically-detected features
  biochemical composition
  DNA

While DNA may reveal the most accurate characteristics for grouping, what does DNA mean for kids? Not much. At the level we're working at today, it's important to remember this: we are trying to develop a structure, an organization, in which to teach about invertebrates

Introduction to Sponges

The sponges are the simplest of the many-celled marine animals that we'll cover in this set of overheads. The phylum name, Porifera, means "pore bearing," which refers to the holes that are found on the sponge's body. Water passes through these holes and into the inner chambers of the animal. Their specialty cells, called collar cells, grab onto the passing bits of food that are carried within the water currents. The food is absorbed by these cells and shared among other cells of the animal.

Teaching Tip: It is important to explain that although sponges may superficially resemble plants, they are animals. Classification within the animal kingdom is based both upon the cell structures and the manner in which sponges actively feed (removing bits of food from the passing water currents).

Illustrations:

• crumb of bread sponge (*Halicondria panicea*): Explain that the green color comes from a symbiotic algae that lives within the tissue of the sponge. The larger holes are the passageways through which water exits the sponge body.
• red beard sponge (*Microciona prolifera*): Named after its ruddy, beard-like appearance. This species is often found attached to pilings or rocks. When dried, the bright red fades to a dull brown color.
• collar cells - These are the characteristic cells that line the cavities of the sponge. Known as choanocytes, these cells have a collar surrounding a hair-like flagellum. Movement of the flagellum creates tiny currents that draw in food and oxygen-rich water.
• cross section This image shows the simplest type of sponge structure. Water moves into the smaller sponge pores called incurrent canals. The central cavity that is lined with the collar cells is called a spongocoel.
• skeletal needles The skeletal needles or rods are known as spicules. These supportive structures can be made of material with chalk-like (calcareous spicules), glass-like (silicaceous spicules) , or spongy (spongin spicules) properties.
• boring sponge (*Cliona celata*): This sponge decays the calcium carbonate mollusk shells upon which it grows. The material is then used to produce the sponge skeletal rods. Often, pitted mollusk shells showing the effects of this chemical action will be cast upon the shore.

Talking Points:

- Students, esp. younger students, may wonder, "why is a sponge an animal and not a plant?" After all, sponges basically just sit there and don't do a whole lot (at least that we can see). Sponges themselves are not photosynthetic and they gather food. Within the sponge are several chambers. Water goes into the body of the sponge and through its chambers and out again. This brings in food.
- Sponges also have "collar cells." (For a demonstration of the way collar cells work, and you should do this with your class, try "THE WAVE.")
- Imagine now, that you were all part of a sponge. When you were doing "the wave," imagine what happens to the water as you were moving back and forth. The water moves over and through the sponge, bringing in food. So a little activity—but not much—is all that it costs a sponge to get a meal.

- Sponges also have internal skeletal rods (which helps classify them)
- How do sponges get their color? Some sponges get their color from symbiotic algae

Sponge activity:
Use hand lenses to examine natural and synthetic sponges.

Stinging-celled animals
The stinging celled animals belong to the phylum Cnidaria. Also known as coelenterates, these animals have a jelly-like body that displays radial symmetry (no front or back). The animals have tentacles that contain stinging cells called nematocysts. When discharged, some of these cells shoot-out a tiny thread that contains a paralyzing toxin. Certain species can deliver a lethal dose of this toxin to humans.

There are three classes of cnidarians. The class Hydrozoa contains animals that alternate between a free-swimming medusa and a fixed polyp stage. It also contains animals that may omit either of these stages. The class Scyphozoa contains the true jellyfish. The scyphozoans have a dominant medusa stage. The class Anthozoa includes the corals and sea anenomes. Members of this class have a dominant polyp stage.

Illustrations
• moon jelly (*Aurelia aurita*): This is a common jellyfish that may form huge summertime blooms. The prominent pink to gray horseshoe-shaped structures within the jelly-like mass are gonads.
• Lion's mane jellyfish (*Cyanea*): This is a highly poisonous jellyfish. It's fleshy, layered, frilly tissue, resembling a lion's mane hang from the brightly colored bell. Do not touch this jellyfish if it is washed ashore. Its stinging cells remain active and can produce serious injury to the unaware beachcomber.
• northern sea anemone (*Metridium senile*): This is the common northern sea anemone in its orange and extended body form. Other individuals of this species may appear brown or mottled. When fully contracted, the bushy tentacles are drawn within a compressed and highly flattened body form.
• nematocyst: This is the stinging cell characteristic of the phylum. The upper image illustrates the undischarged cell. The lower image shows the cell with its thread-like extension discharged. Note the tiny extension at the top right corner of the cell that helps trigger the firing.
• pink-hearted hydroid (*Tubularia crocea*): This species displays many of the typical hydrozoan features. The illustrated body-form is the polyp stage. Free-swimming larvae are developing in clusters beneath the whorl of tentacles.
• northern coral (*Astrangia danae*): Like its southern counterparts, the northern coral is formed by a colony of polyps. The polyps produce a hard lime communal skeleton in which the polyps are protected. Rarely growing larger than fist-size, the colony can form a covering over rocks and other exposed surfaces.

Coral activity
- Using hand lenses, take a close look at the piece of coral (use different types if possible) Is coral a rock? An animal? A Home for animals?
- Coral is an animal. However, it can also provide a home for other animals, particularly worms, and it can also be considered a rock after the coral animal, or polyp, dies and the structure, or skeleton (exoskeleton) is left behind
- When you look at a cross-section of coral, the animal (or polyp) is the top section. The skeleton serves as the base and is formed by secretions that the polyp generates continuously. Coral polyps are always making skeletal material.
- Once the polyps die, what is left behind is the cups, which you can observe through the hand lens. These are actually part of the skeleton.

Comb Jelllies

Comb jellies are animals that are slightly more advanced than the stinging-celled animals. Their jelly-like bodies retain radial symmetry. Rows of comb plates are positioned along the outside of the body. Through a coordinated flapping motion, the plates beat downward helping propel the animal through the water.

Unlike the stinging cell animals, the comb jellies lack cell parts that penetrate and inject toxin into their prey. Instead, they have "sticky" cells. Like the stinging cells of the Cnidarians, these cells eject a string-like extension. The end of this extension is covered with adhesive sites that stick to the prey.

Illustrations

• sea gooseberry (*Pleurobrachia pileus*): This is a common species that often forms summertime blooms. Note the rows of locomotor comb plates. This species, like other members of the class Tentaculata have two tentacles that are lined with colloblasts (sticky cells).
• sticky cells: These cells are known as colloblasts and like their equivalent in the coelenerates are discharged against prey. The cell tips have adhesive vesicles that can stick onto surfaces. Prey that becomes "stuck" to these extended thread are drawn back into the tentacles and then transported upwards into the animal's mouth.
• comb plates: The comb plates are composed of short bands of cilia. The body of a ctenophore has eight bands of comb plates arranged up and down along the sides of the jelly-like body. Through coordinated beating, the plates help propel the animal through the water.
• Leidy's comb jelly (*Mnemiopsis leidyi*): A common species that sometimes appears to have a faint, pink hue. Look for the iridescence associated with the beating of the comb plates. Like other comb jellies, its possess eight rows of comb plates that extend along the prominent body lobes.

Comb Jellies Demonstration

Purchase a "sticky" toy that can be thrown against most hard surfaces, will stick briefly, and then 'crawl' downwards. These can be purchased at most toy or novelty stores.

Mollusks

- We'll be discussing three of the five classes of mollusks. The first is the Univalves; "uni" meaning one; "valve" meaning shell. So, single shelled mollusks. These are also referred to as gastropods ("gastro" = stomach; "pod" = foot. Stomach, footed)
- Within this class of mollusks are periwinkles, whelks, and snails
- An interesting feature of the univalves is their anatomy: one one end of their shell, the animal has a foot/mouth end ("putting your foot in your mouth" isn't something that would bother a univalve mollusk) and, on the opposite end, what is called an opericulum. When the univalves pull their soft body into their shells, they opericulum end serves as a tightly sealed "door" to close out predators.
- Univalves feed mostly on algae, although some whelks and snails will prey on other mollusks by "drilling" through their shells. Moon snails, for example, prey on quahogs (clams) on Cape Cod
- *Crepidula*, also shown here, are an interesting univalve. They all start out as male, but tend to cluster together. Once one clusters on top of another crypigalla, the bottom animal turns female, and so on.
- The second class of mollusks we'll talk about is the Bivalves ("Bi" = two; "valve" = shell; two shelled mollusks.
- Bivalves have siphons: one to bring in water which transports food, oxygen, and gases to the animal; the other to extract the water after it has been filtered

- Most bivalves are filter feeders
- Mussels, such as the blue mussel, has "byssal threads" that help the animal adhere to surfaces, such as rocks, piers, boats, and other shells, even aquatic vegetation. Byssal threads are studied for the adhesive properties as a way of finding new adhesives that work in corrosive marine environments
- An interesting fact about the arc shell, shown here, is that, when cut, it bleeds red, just like humans. This is because its blood contains hemoglobin.
- An interesting historical fact about the quahog, or hard clam, shown here, is the characteristic purple color found inside its shell. The native Americans called the purple shells "wampum" which led to its scientific name, *Mercenaria mercenaria*, meaning "money, money."
- The third type of mollusk we'll discuss is the Cephalopods. ("cepha" = head; "pod" = foot).
- Cephalopods are the most advanced group of mollusks.
- Included in this group are squid (including giant squid), octopus, cuttlefish, and nautilus
- With the exception of nautilus, cephalopod shells are internal
- Interesting feature of squid and cuttlefish is an ink sac. These animals can squirt ink as a defense mechanism to confuse predators while they escape or change color and blend into the environment
- Squid, octopi, and cuttlefish all have the ability to change color and exhibit a repertoire of body patterns, which are used in mating and for defense
- Two remaining groups of mollusks that we haven't discussed (and won't) are chitons (8-part shells, fleshy foot), and scaphopods
- There are also shell-less mollusks, known as the nudibranchs. They resemble slugs and are gastropods.
- All mollusks have a mantle, which is basically a thick outer skin. The mantle does one of two things, depending on the type of mollusk: secretes material that forms the shell or serves as a protective covering for the animal

Annelids

Annelids are segmented worms. Like other worms, they have a "head region" in which many of their sensory organs are located. Although there are several classes of annelids, most marine representatives belong to the class Polychaeta.

Most polychaetes have fleshy, flap-like extensions on each body segment. These extensions (each called a parapodium) function in both locomotion and in the exchange of respiratory gases. Parapodia are often segmented and are supported by hard bristles called setae. Polychaetes such as the clamworm (*Nereis*) have lens-containing eyes and sensory tentacles.

Illustrations

• Ice cream cone worm (*Pectinaria*): This worm constructs an external shell covering by cementing together grains of sand. From this sand sculpture, the worm's gold-colored bristles extend.

• coiled worm (*Spirobis borealis*): This tiny coiled worm is often found anchored to seaweed and other hard, exposed surfaces. The white shell is formed by calcium carbonate and can be sealed up as the worm retracts deeper into this protective chamber. By closing off the shell's opening, the worm protects itself from predators and the exposed conditions of low tide.

• decorator worm (*Diopatra*): As its name suggests, the decorator worm decorates its body covering with pieces of tiny shells and debris. Its head and antennae extend outward from the animal's camouflaged body

• twelve-scaled worm (*Lepidonotus squamatus*): The body of this animal is covered by two rows of overlapping scales. Often the animal can be observed scurrying in and around bits of mollusk shells or clumps of seaweed holdfasts.

• clam worm (*Nereis virens*): This common intertidal worm has tiny jaws that are capable of inflicting a pinch. The animal's iridescent body undergoes major transformations associated with mass breeding events. Timed to a tidal cycle, highly modified worms will vacate their sedentary lifestyle and swim to the surface of bays and rivers. As they swarm at the waters' surface, they'll release gametes into the water.

Arthropods (**Jointed-Legged Animals)**
Arthropods comprise the largest phylum of all living organisms (there are over 300,00 species of beetle alone!). One of the distinguishing characteristics of this group is jointed legs. Another notable feature common to all arthropods is a segmented body that is covered by an exoskeleton. The exoskeleton (which is reformed during each molt) is composed of chiton (pronounced KITE-ton). In addition to sensory antennae, arthropods have compound eyes.

Although trilobites are an important extinct group, today's species are found in two subphylums, Chelicerata and Mandibulata. The chelicerates do not have jaws nor antennae. Although this group is represented by spiders, ticks, and scorpions, the most familiar marine species is *Limulus* (horseshoe crab). Other marine chelicerates include a group unusual looking species called sea spiders.

The animals found in the subphylum Mandibulates have jaws and antennae. The major group of marine representatives are placed in the class Crustacea. The crustaceans include barnacles, crabs, shrimp, lobsters and a variety of microscopic species such as copepods. All members of this class have a fused head and thorax (called the cephalothorax).

Illustrations
• Rock amphipod (Gammarus): Amphipods are an order of crustaceans that are recognized by a strongly side-to-side compressed body. The eyes are not stalked, but instead these kidney-shaped organs are positioned on the head segment. The last three pairs of legs are modified for leaping. This behavior has lead to their common name "sand flea". Since there are several closely related species that are difficult to distinguish, we've cited only the genus name.
• Japanese shore crab (*Hemigrapsus sanguineus*): Although not native to the New England coast, this animal has survived well since its introduction to the Atlantic coast in 1987 (most likely released from ballast water at a New Jersey port) . It has a typical true crab form with a short and broad carapace (contrast this to the long and narrow carapace of a shrimp or lobster) The abdomen is bent sharply beneath the thorax. Take note of the last pair of legs. Unlike swimming crabs that have these appendages modified into paddle-like structures, the shore crab has only "walking" legs. Called a "bioinvader," the Japanese shore crab poses a threat to both coastal ecosystems and aquaculture efforts.
• Horseshoe crab (*Limulus polyphemus*): The horseshoe crab is not a true crab, but instead more closely related to spiders and scorpions. The animal's tough shell is composed of two parts that are attached by a hinge-like joint. A spike-like tail called a *telson* extends from the body. The telson does not contain poison, nor is it a stinger. It is a body part that the animal uses to right itself when flipped onto its back. The horseshoe crab has two large compound eyes positioned just under the upper shell ridges. During mating season, the smaller males use a pair modified legsto grab onto the female's telson. She pulls these "hitchhikers" along as she comes ashore and deposits eggs. Sperm released by the males fertilizes the eggs and the animals return to the shallow depths of the sea.
• Marsh prawn (*Palaemonetes vulgaris*): This is the small shrimp that is found in eelgrass of marshes and bays. The translucent body has pigment spots that help camouflage the animal. The exoskeleton spike that extends forward from between the eye sockets is called a *rostrum*. The marsh prawn can be distinguished by its long, serrated rostrum that will have eight or nine teeth lining its upper edge.

• Northern Lobster (*Homarus americanus*): The northern lobster is a delicacy that is easily distinguished from the southern lobster by its two prominent claws. The thick claw is called a crusher. It produces a powerful grip that can crunch the shells of its prey. The thinner claw is called the cutter and its sharp edges are used to slice and tease apart meals. In nature, the lobster exoskeleton is usually a green-brown color (although some individuals have a bright blue shell). However, when cooked the animal's shell turns to the characteristic reddish color.
• Sand shrimp (*Crangon septemspinosa*): Although this animal resembles the marsh prawn, it is distinguished by its short and top-to-bottom flattened *rostrum*. This small shrimp is found mostly on sandy bottoms. Its mostly transparent body makes the animal difficult to uncover, insuring protection against an assortment of predators.

Echinoderms **(Spiny-skinned Animals)**
Echinoderms are an advanced and exclusively marine phylum. As their name implies (*echino*=spiny; *dermata*=skin), the animals have a characteristic hard covering. Like jellyfish and comb jellies, most adult echinoderms demonstrate radial symmetry (without a head and tail region). This symmetry, however, is acquired only after they develop from a larval stage that has bilateral symmetry.

Echinoderms have a water vascular system. This system of canals connects to the animal's tube feet. By altering the hydrostatic pressure within the canals, the feet can be extended, contracted, and controlled to produce the animal's movement.

Phylum Echinodermata
Class Asteroidea (sea stars)
Class Echinoidea (sea urchins and sand dollars)
Class Holothuroidea (sea cucumbers)
Class Ophiuroidea (brittle stars)
Class Crinoidea (sea lilies)

Illustrations
• Daisy brittle-star (*Ophiopholis aculeata*): Like other brittle stars, this animal is likely to cast off legs if mishandled. Also called serpent stars, this group of echinoderms depends upon lashing leg movements (not tube-feet suction) to move along the sea bottom. The daisy brittle star is a common inhabitant of the New England coast. Active at night, it can be found in shallow tidal pools to depths of 5000 feet (1500 meters).
• Blood star (*Henricia sanguinolenta*): The blood star is a brightly colored echinoderm that has two rows of tube feet. The body form demonstrates the five-pointed symmetry characteristic of this phylum. Unlike most other sea stars, the blood star can absorb its nutrition across its spiny skin. Contrast this method of nutrient procurement with that of the northern sea star (*Asteria vulgaris*) that everts its stomach into the pried open shells of living mollusks.
• Sand dollar (*Echinarachnius parma*): This animal is a highly-flattened echinoderm that lives on sandy bottoms. Both tiny spines and tube feet extend from the circular body. The outer shell (called a test) is thin and easily fractured. When the animal dies, the spines fall away and reveal a five-pointed pattern that is etched into the test surface. Complete or broken tests are washed up along sandy beaches.
• Green sea urchin (*Stronglyocentrotus drobachiensis*): Like the sand dollar, the sea urchin also uses spines and tube feet to move along the sea bottom. These spines protect the animal by making it difficult to ingest. In addition, extended spines can help anchor the urchin within rock crevasses. This species has long tube feet that extend beyond the tip of the spines. Its eggs are a delicacy at both the Japanese and the Portuguese restaurants.
• Orange-footed cucumber (*Cucumaria frondosa*): Sea cucumbers comprise a group of lesser known echinoderms. Individuals have a tube-like or sac-like shape. Many, such as the orange-

footed cucumber resemble garden cucumbers. The mouth is located at one end of the leathery body. A ring of reddish-brown and highly-branched tentacles surrounds the animal's mouth. Mucus that coats the tentacles captures plankton that is suspended in the passing water. These extensions are then bent back into the mouth where the food is removed. Once cleaned of its sticky morsels, the tentacles are coated with a new layer of mucus.