

BUILD-A-HORSESHOE CRAB

OVERVIEW

During this lesson, students will discover many fascinating facts about horseshoe crabs.

OBJECTIVES

Following completion of this lesson, students will be able to:

- Identify and describe three main parts of a horseshoe crab (**prosoma, abdomen, and telson**);
- Begin to know the history and habits of the horseshoe crab,
- State several reasons why horseshoe crabs are important, and;
- Understand how to properly handle real horseshoe crabs and why.

GRADE LEVELS

K-6th grades

NJCC STANDARDS

Science Indicators: 5.1: 1, 2, 3; 5.2: 1, 2, 6; 5.5: 1, 3, 5, 5.6: 1, 2, 3, 4, 5, 8; 5.7: 1, 2, 4, 7, 8; 5.12: 1.

Language Arts Indicators: 3.1: 1, 2, 3, 4, 6, 7, 8, 12; 3.2: 1, 2, 3, 6, 7, 11; 3.4: 1, 2, 4; 3.5: 1, 7.

Mathematics Indicators: 4.1: 2, 3, 4, 8, 9; 4.3: 4, 6, 7; 4.4: 1, 2, 3, 5; 4.9: 1, 2; 4.11: 1, 4, 6.

Social Studies Indicators: 6.7: 1, 2; 6.9: 1, 2, 3.

MATERIALS

- Horseshoe crab templates included in this lesson plan,
- Tape, fasteners, construction paper, wiggly eyes, scissors, glue,
- Fact cards, and the book *“Harry Horseshoe Crab”* by Suzanne Tate,
- Live horseshoe crab or shell (if possible).

PROCEDURES

Read “Harry Horseshoe Crab” aloud, discussing content and pictures and/or using information from the “Background” section of this plan or your own research. Explain the horseshoe crab’s three main body parts, the **prosoma, abdomen**, and the **telson**. Discuss other horseshoe crab facts such as history, habits and importance to humans.

Next, students assemble a paper horseshoe crab using paper cut to represent the three main body parts (2 templates are supplied in this lesson plan). Prepare paper parts in advance or have older students cut out their own.

Final Assembly: Use scotch tape to hinge the **prosoma** and **abdomen**.

This makes the model flexible, representing the horseshoe crab's ability to bend and flex, allowing it to swim (which they do upside down). Next, use a brass fastener to connect the **telson** to the abdomen. The fastener allows the **telson** to move around 360° just like a real horseshoe crab can. A complete assembly diagram is supplied in this lesson plan.

Finally allow students to sort through fact cards (master sheets included in this lesson plan) and select one or several to glue onto their project.

BACKGROUND

The horseshoe crab has been on earth for over 500 million years leading many people to consider this animal a "living fossil." Today only four species of horseshoe crab remain and even they are not widely distributed worldwide. *Limulus polyphemus* is one of the four and we are fortunate to be able to find it living on the Jersey Shore (including Delaware Bay) since its range is narrow (from Maine to the Gulf of Mexico). While its hard shell and numerous appendages resemble a crab, the horseshoe crab is not a crab at all. The horseshoe crab belongs to the arthropod phylum, along with spiders and scorpions. True crabs have two pairs of antennae, a set of **mandibles** and five pairs of legs with only one pair with claws. Horseshoe crabs lack antennae and jaws and, like spiders, have eight legs.

When the horseshoe crab is hungry, the search for prey begins. To find food, the horseshoe crab pushes its way along the bottom, digging little furrows along the way. They use their first set of appendages, *cheliceræ*, as feelers to determine the presence of prey. When a horseshoe crab feels or smells a worm, clam, or dead fish, one of its legs picks it up and pushes it toward the. Since there is no jaw, the crab brings all its legs together and uses the **gnathobases** to crush the food. The crushed food then gets pushed to the mouth.

Although the horseshoe crab has a frightening exterior, it is harmless and needs our protection. To properly handle a horseshoe crab you should never pick it up by its **telson**, which is NOT a stinger or poisonous. Picking up the animal by its **telson** could cause it to break off. The **telson** is crucial to animal's survival as it uses it for steering and as a lever to flip itself upright. The correct way to handle a horseshoe crab is by gently gripping the sides of the shell like you were picking up an upside-down bowl. If you find the horseshoe crab bottom side up, make sure that it turns itself back over or help it to turn over. Stranded bottom side, the crab is vulnerable to attack from birds or to drying out.

Thanks to the horseshoe crab, medical science has made great advances. Much of what we know about the human eye and how we see began 50 years ago with studies of the horseshoe crab's large, compound eye. The horseshoe's shell, made of chitin, has been instrumental in the development of surgical sutures and wound

dressings, and its blood provides an extract that helps detect bacterial contamination in drugs.

VOCABULARY

Prosoma-top

Abdomen-back

Telson-tail

Mandibles-jaws

Gnathobases-the spiny projections that surround the mouth

EXTENSIONS

This model can become “3-D” by cutting two “V’s” out of the front of the **prosoma**, bending the edges together and affixing with tape underneath.

REFERENCES

Hall Jr., William R; The Horseshoe Crab. University Of Delaware, Sea Grant College Program.

Hall Jr., William R; Shuster Jr., Carl N; Horseshoe Crab Model. University Of Delaware, Sea Grant College Program.

Tate, Suzanne; Harry the Horseshoe Crab: A Tale of Crawly Creatures; Nags Head Art, Inc., Nags Head, NC 27959; 1991. ISBN #1-878405-03-9.

Internet Resources:

<http://www.dnr.state.md.us/education/horseshoecrab/lifehistory.html>

<http://www.horseshoecrab.org>

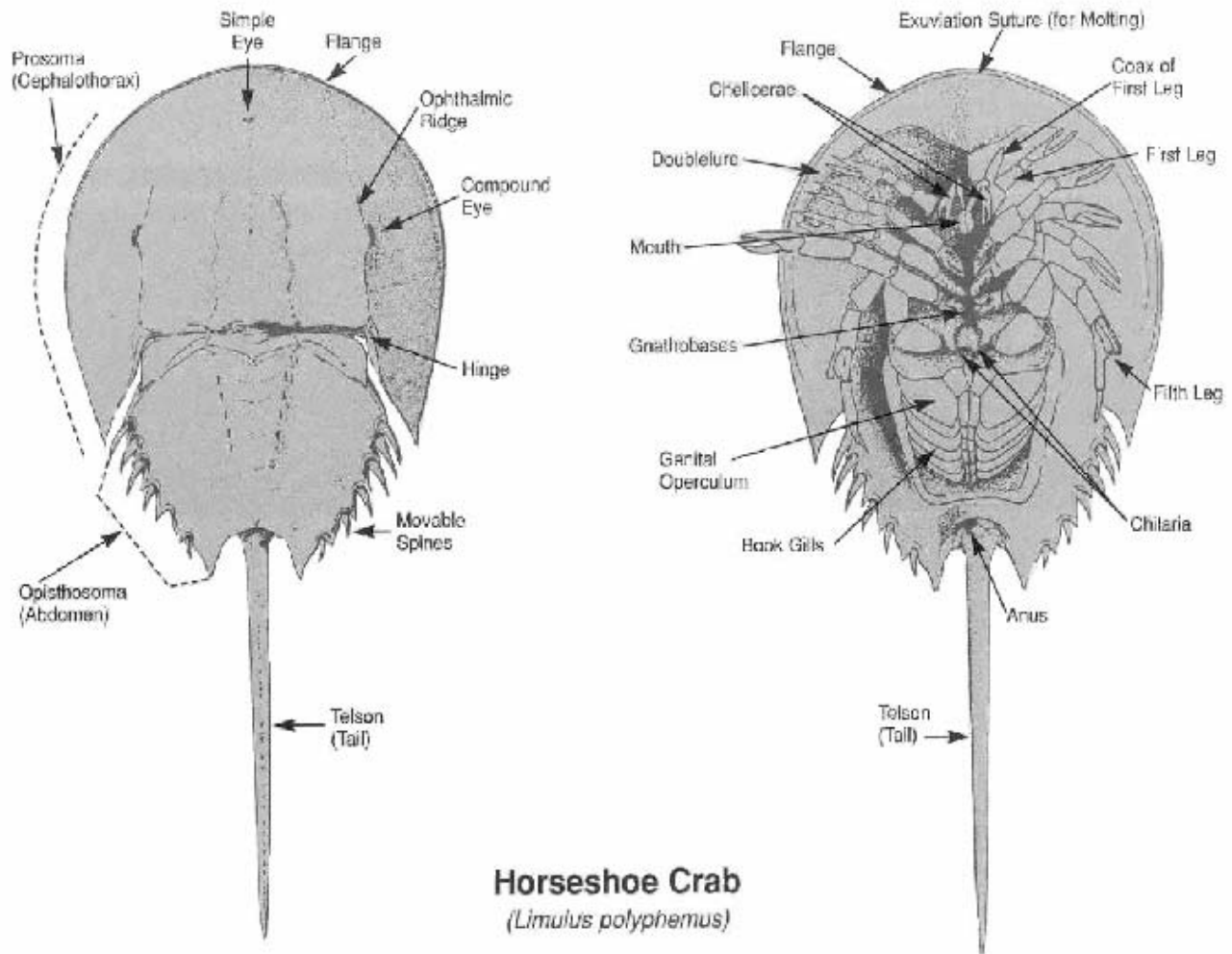
<http://www.state.nj.us/drbc/crab/crabhome.htm>.

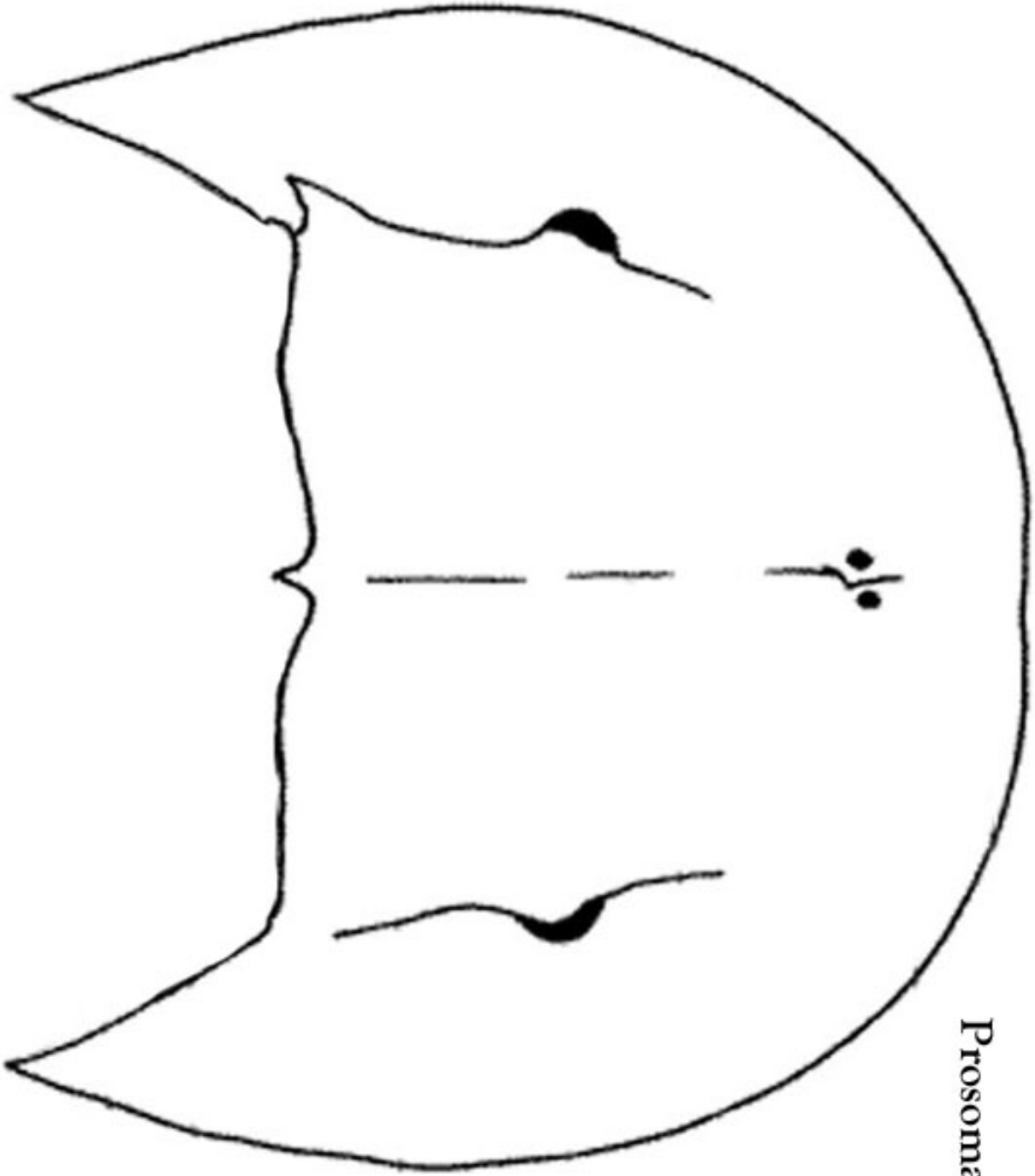
REV. 11/11/10



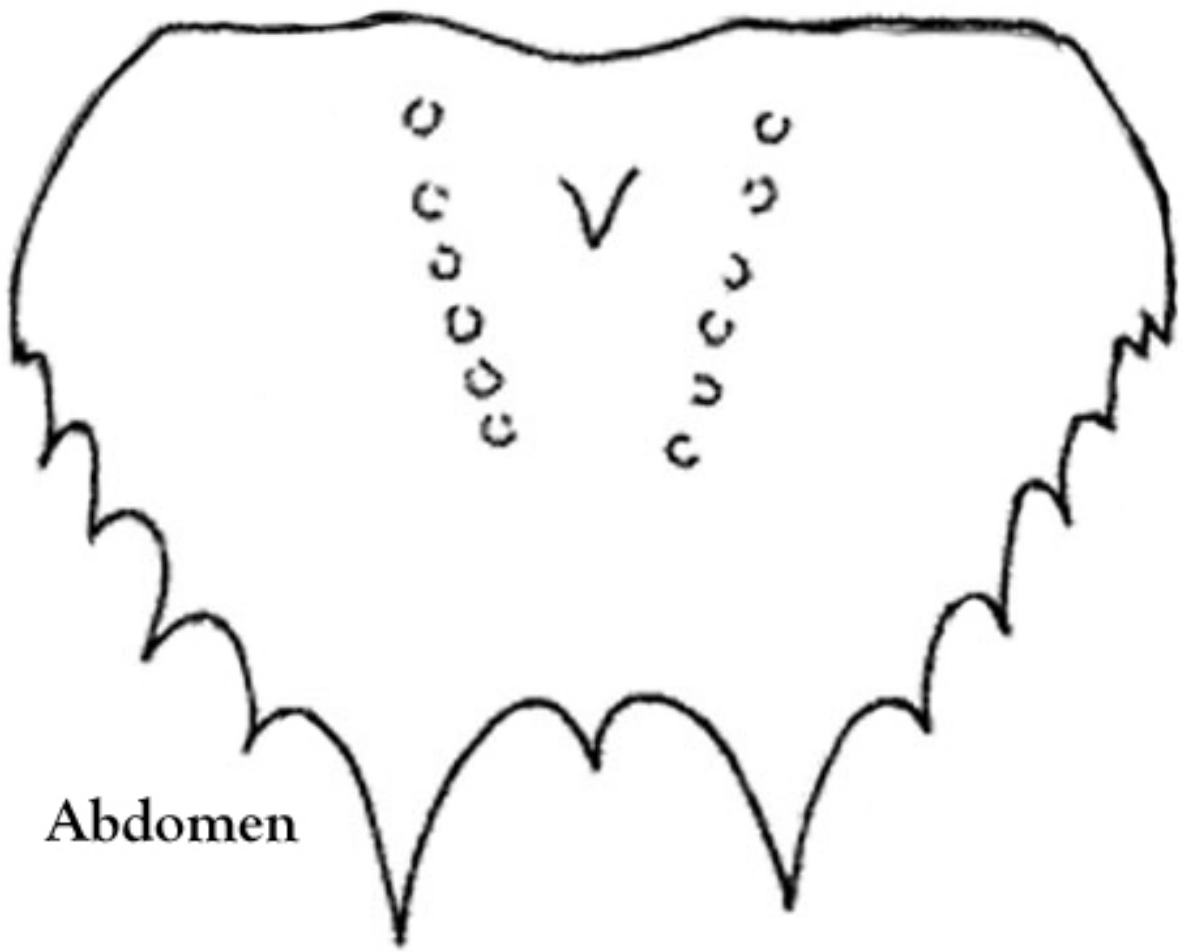
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Build-A-Horseshoe Crab

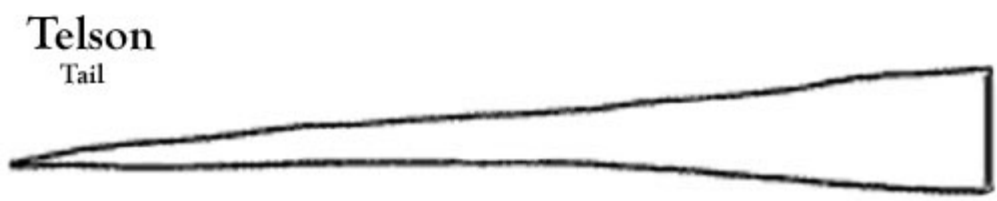




Prosoma

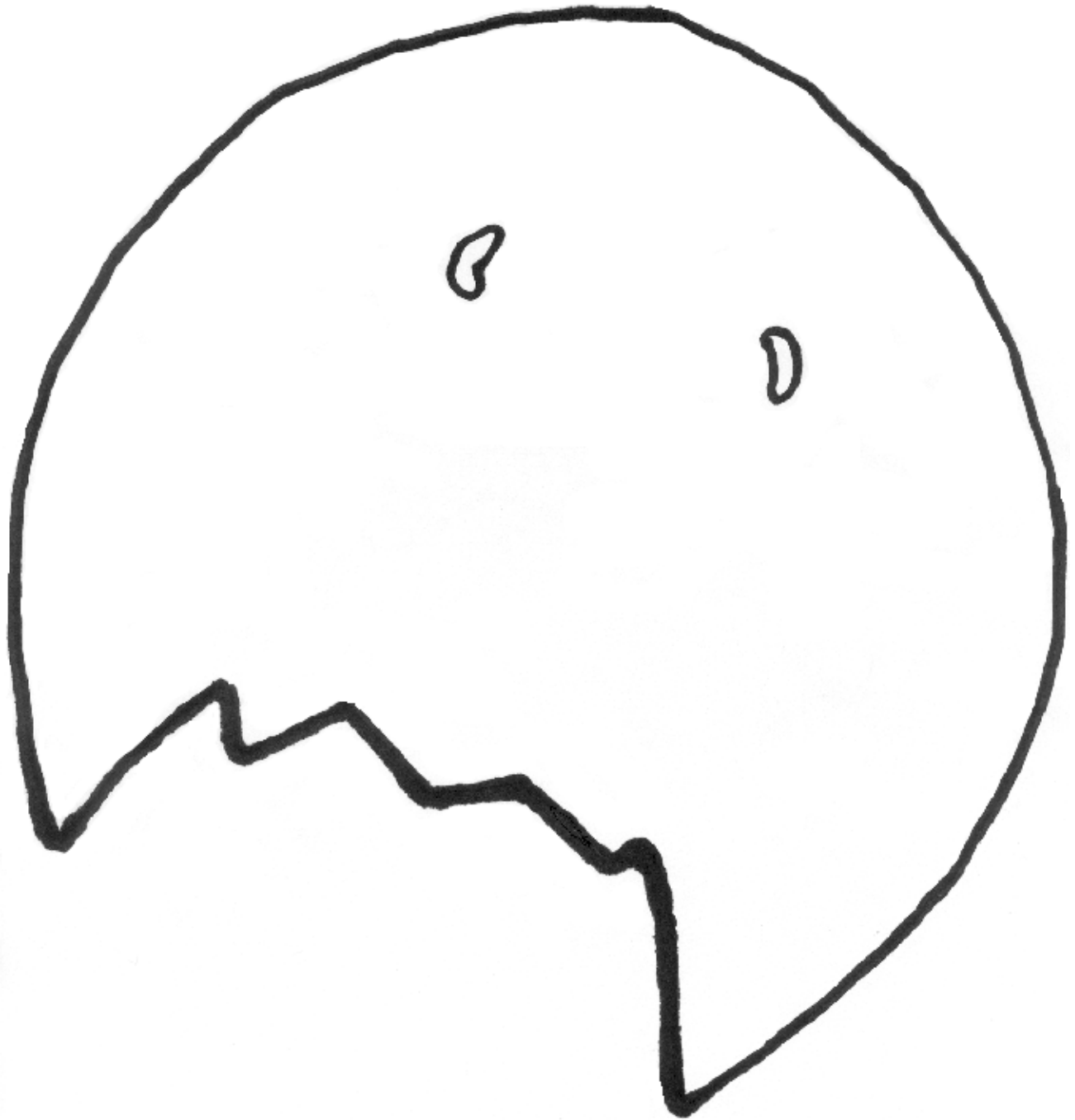


Abdomen

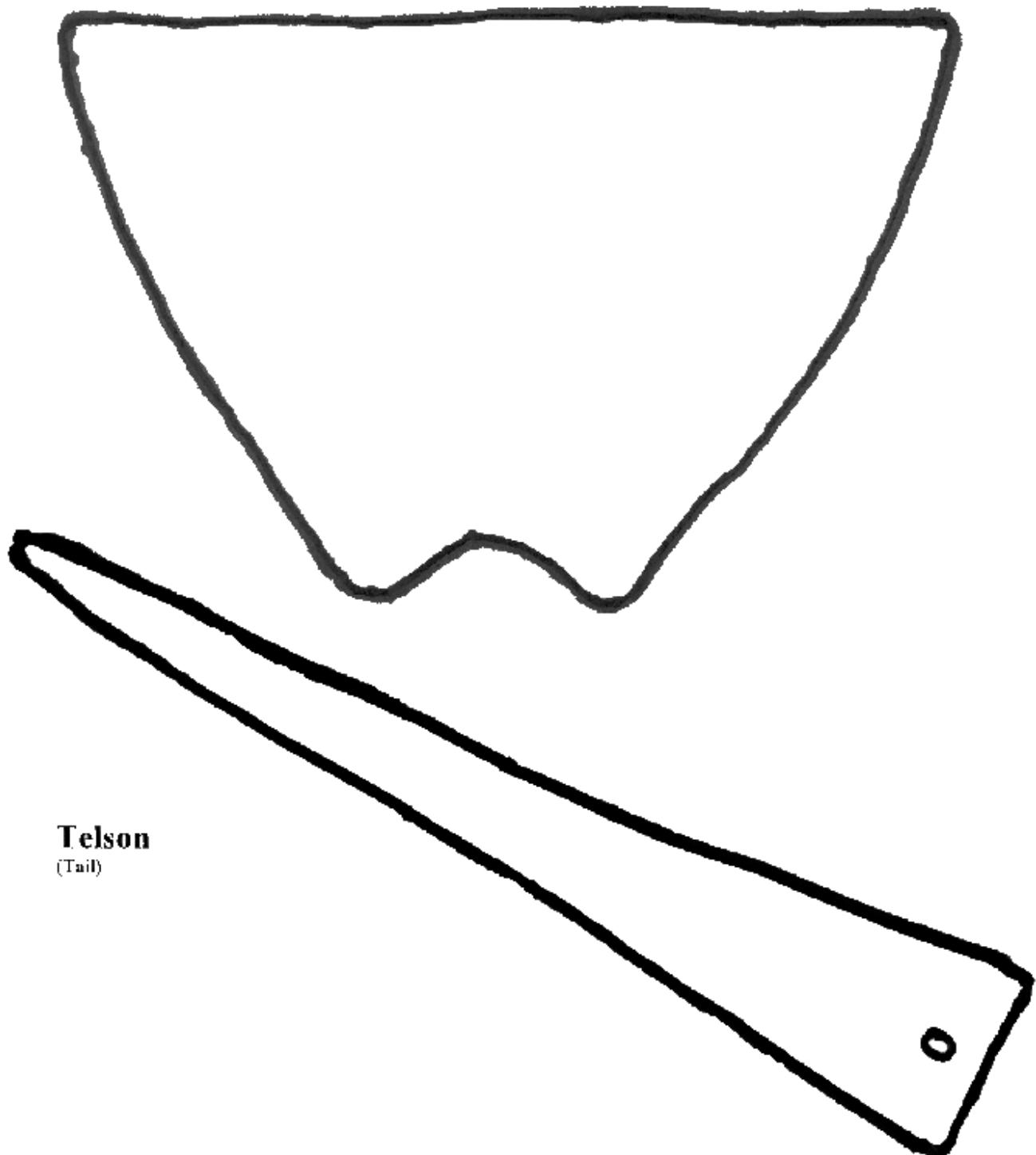


Telson
Tail

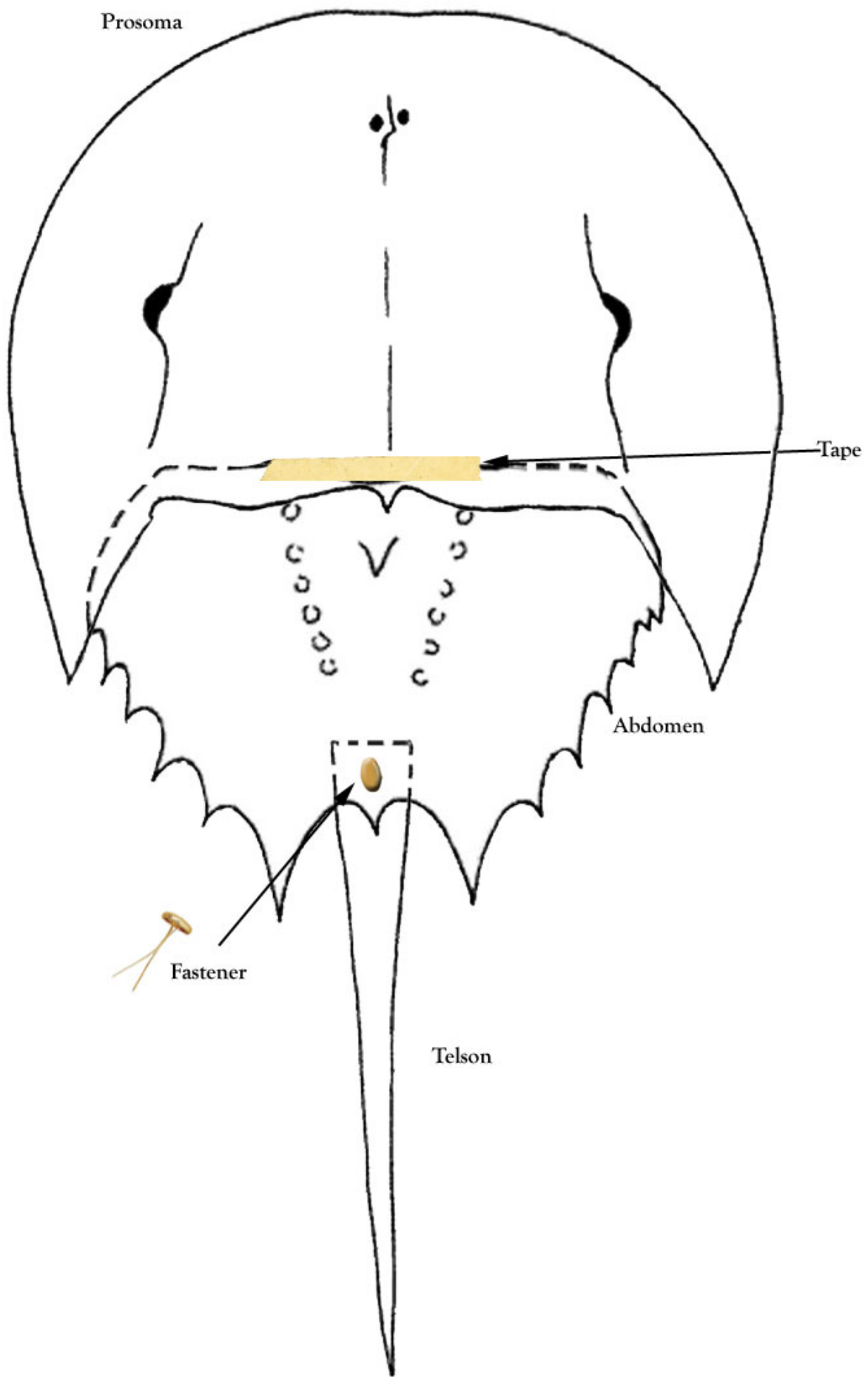
**Template
(Prosoma)**



Abdomen



Telson
(Tail)



Build-A-Horseshoe Crab

Cut along lines

<p>Horseshoe Crab Fact:</p> <p>Horseshoe crabs are not crabs at all. Horseshoe crabs belong to the same animal family as insects. Their closest relatives are spiders.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>	<p>Horseshoe Crab Fact:</p> <p>A Horseshoe crab can have many other animals attached to its shell from barnacles to blue mussels, slipper snails, and worms.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>
<p>Horseshoe Crab Fact:</p> <p>The Lenape Indians used the horseshoe crab's shell to empty water from their dug-out canoes, and they used its tail as a spear tip .</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>	<p>Horseshoe Crab Fact:</p> <p>Birds depend on eating the eggs of the horseshoe crab to complete their migration.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>
<p>Horseshoe Crab Fact:</p> <p>Horseshoe crabs have seven pairs of legs under their hard shells. Adult males have two special claws called pedipalps up front that look like small boxing gloves.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>	<p>Horseshoe Crab Fact:</p> <p>Female horseshoe crabs lay their Eggs in late May and early June, at the time of the full or new moon. Some females can lay up to 20,000 pale green eggs.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>

Build-A-Horseshoe Crab

Cut along lines

<p>Horseshoe Crab Fact:</p> <p>Horseshoe crabs can live to be 30 years old. In comparison, the blue claw crab lives a maximum of four years!</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>	<p>Horseshoe Crab Fact:</p> <p>Much of what we know about how our eye works began over 50 years ago with scientists studying the horseshoe crab's large compound eyes.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>
<p>Horseshoe Crab Fact:</p> <p>Females grow up to be larger than males by 30% or about one third.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>	<p>Horseshoe Crab Fact:</p> <p>Horseshoe crabs have been on earth For at least 100 million years! They were already here when the dinosaurs arrived.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>
<p>Horseshoe Crab Fact:</p> <p>A horseshoe crab is virtually a walking hotel, with any number of creatures living attached to it's shell, from barnacles to blue mussels, slipper shells, bryozoans, sponges, flatworms, and microscopic bacteria and diatoms.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>	<p>Horseshoe Crab Fact:</p> <p>Horseshoe crabs were among the dominant species 100 million years before the dinosaurs arrived! Once there were numerous species of horseshoe crabs, but only four species exist in the world today.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>

Build-A-Horseshoe Crab

Cut along lines

<p>Horseshoe Crab Fact:</p> <p>Horseshoe crabs, some scientists speculate, can live to be 30 years old. Maturity for breeding takes until the age of 8 or 9. In comparison, the blue claw crab reaches maturity at 18 months and lives a maximum of four years!</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>	<p>Horseshoe Crab Fact:</p> <p><i>Limulus Polyphemus</i> is the single most-studied invertebrate animal in the world! Much of what we know about our eye function began over 50 years ago with scientists studying the Horseshoe crab's large compound eyes!</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>
<p>Horseshoe Crab Fact:</p> <p>Horseshoe crabs have been observed mating from April till December, but mating activity peaks during the highest tides in late May and early June, at a time of the full or new moon. Some females can lay up to 20,000 pastel green eggs.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>	<p>Horseshoe Crab Fact:</p> <p>Horseshoe crabs are colored to match the muddy or sandy bottoms on which they live. They may range from dark olive brown to light tan.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>
<p>Horseshoe Crab Fact:</p> <p>Adult horseshoe crabs rarely swim, but when they do, they swim upside down, moving their book gills in a successive wave.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>	<p>Horseshoe Crab Fact:</p> <p>The horseshoe crab's Telson (tail) isn't poisonous as some people believe. However it does have an important use, it helps overturned crabs to right themselves.</p> <p>Visit The New Jersey Sea Grant Consortium at www.njseagrants.org</p>