

Quick Change Artist

FOR THE TEACHER OR PARENT

Audience: This model is a little complicated and will appeal most to students who can measure, cut, and be trusted with straight pins. The model can be assembled by one or a pair of students.

Duration: 45 minutes to an hour

STEM Process Skills: measurement, constructing and developing models of biological activities.

Learning Objectives/Goals:

Students will be able to assemble a model, demonstrate, and explain the action of cephalopod color changes

TEKS: TEKS for any grade concerning use of models and/or animal adaptations and responses to their environments, for example, 3:10A, 5: 9A, 6: 3C, and 7: 3B&C

Ocean Literacy Principles: 5. The ocean supports a great diversity of life and ecosystems.

Vocabulary: cephalopod, chromatophore, model

Set Up/Break Down: Depending on the ages of your learners, you may wish to handle the straight pins or needles for them. Students may work independently, but pairs or small groups may be more effective.

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Description/What you will do: Work by yourself or with a partner to: assemble a paper craft model of a cephalopod chromatophore and demonstrate how a cephalopod changes color.

Background: The octopus and squid, it seems, exist only to amaze us. They hold our attention with at least eight sucker-covered arms. They stare back at us with large eyes much like our own. We imitate their jet propulsion, but we'll never come close to their wild color changes!

Cephalopods (head-foot animals) need less than a second to flash amazing color patterns. Round sacs of pigment called chromatophores are opened and closed to reveal brown, black, red, blue, yellow, and orange. Each chromatophore contains only one color, but a single squid may have several colors.

For a Deep Look at what goes on when cephalopods change color, watch, [You're Not Hallucinating. That's just Squid Skin](#), available at KQED's Deep Look collection on YouTube.

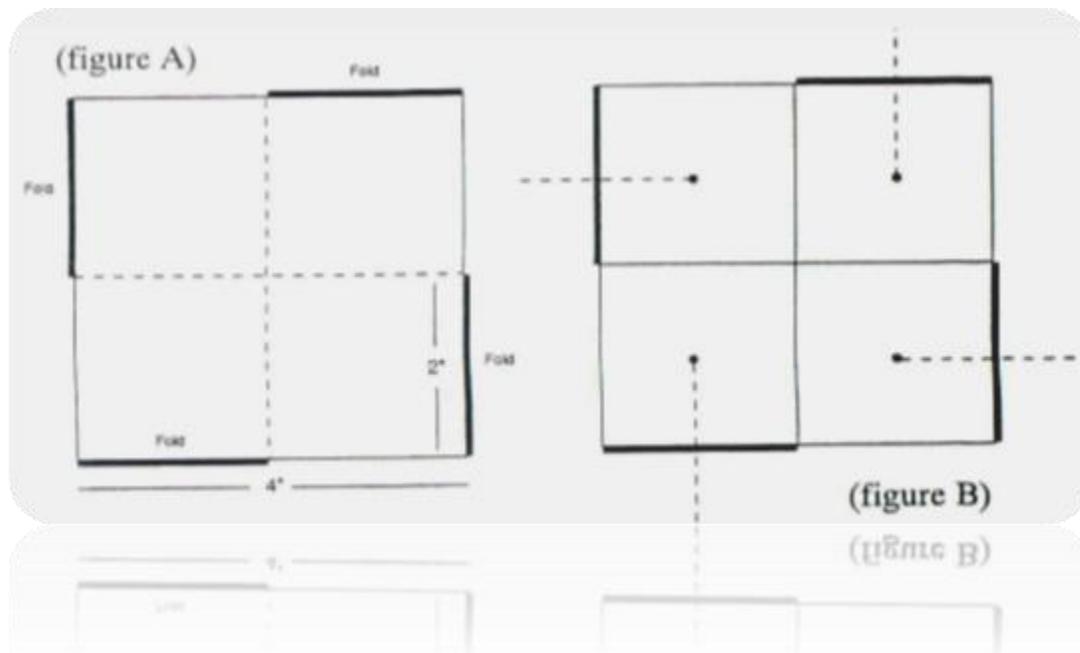
Materials/What you will need: crayons or markers, glue, construction or heavy paper, ruler, scissors, straight pins and or needles (your teacher or parent may be handling these), thread or yarn

Procedures/How you will do it: Opened and closed by stretchy muscle fibers radiating outward, color-changing chromatophore action can be modeled with this paper craft:

1. Measure and cut four strips of pale or light-colored construction or heavy paper measuring 4" x 2".
2. Fold each strip in half, producing four 2" squares.
3. Arrange the folded squares to form a larger 4" square. Place them so that the folded edges are on the outside, but not facing or touching another fold (see figure A).
4. Glue the squares, in this arrangement, to the center of another piece of heavy paper measuring at least 8" on all sides.

5. Locate and mark the exact center of each square and flap, then use a straight pin or needle to pierce through the layers of each center point. If using yarn, make your holes large enough for the yarn to pull through. Your teacher or parent may want to make the holes in the paper.
 6. Measure 2" straight out from the pin holes (with the flap folded down) and pierce the paper your squares are mounted on (see figure B). Again, your teacher or parent may want to pierce the paper for you
 7. Cut four 8" strands of thread or yarn, then run one thread through each pair of pin holes. Each thread represents a muscle.
 8. Knot the threads under each flap. The long ends of the threads should be under the large paper your chromatophore is mounted on.
- Pull gently on the thread/muscles from under the large paper/skin, and your chromatophore should open.
 - Color the paper inside your open chromatophore model. Use brown, black, red, blue, yellow, or orange.
 - Pull all four threads to open the chromatophore model, revealing the hidden pigments.

Figures



Extensions: Draw a large squid and attach several chromatophore models with larger strings. Models are often imperfect representations of reality. Read more about chromatophores, then design and make a better model using materials you have around your home or classroom.

For more about cephalopods: We suggest the [cephalopod page](https://ocean.si.edu/ocean-life/invertebrates/cephalopods) at the Smithsonian's Ocean Find Your Blue webpage (see <https://ocean.si.edu/ocean-life/invertebrates/cephalopods>).