Cassiopeia Culturing Lab

Grade Level: 8th Grade and Above

Timing: This is a one hour long lab. Students monitor data throughout their stay. Results discussed during "Summary".

***** Embryos take up to 3 days to develop into polyps; this lab has best results when conducted on the first evening students arrive *****

Summary: The lab is focused on aquaculture, learning about the life cycle of *Cassiopeia,* and designing an experiment to test jellyfish settlement cues. The life cycle of the jellyfish will be explained and observed, along with various settlement cues invertebrates utilize when going from planktonic larva to a sessile phase. Students will use this information to design experiments that will test settlement cues utilized by *Cassiopeia* planula. Student pairs will design and carry out experiments to "culture" Cassiopeia embryos to the polyp stage during their stay at MarineLab. Data will be collected daily and results are discussed during "summary" class.

Program Objectives:

Students will be able to…

- Explain two benefits and two downsides to aquaculture
- Identify the 2 methods of *Cassiopeia* spp. Reproduction
- State three settlement cues utilized by various invertebrates during the planktonic larval phase
- Analyze data from an experiment they have designed

Concepts Covered:

- Pros/cons and challenges of mariculture/aquaculture
- *Cassiopeia spp.* life cycle
- Biological parameters necessary to culture

Vocabulary: aquaculture, medusa, polyp, planula, embryo, budding, substrate, larva, gravid, settlement cue

Procedure: This inquiry based lab provides students an opportunity to visualize life stages of the Cassiopeia jellyfish. The activity begins with students observing medusa jellyfish along with embryos that have been extracted. Large and small group discussions will focus on the challenges of aquaculture and the Cassiopeia life cycle before students work in pairs to design an experiment. Experiments are meant to test preferred settlement cues, an important component to understand when utilizing aquaculture with invertebrates. Experimental vials are labeled and monitored by students throughout the week. Students look for developing planula and polyps in their vials through the following days. Results are discussed during "summary" class.

Resources:

http://lanwebs.lander.edu/faculty/rsfox/invertebrates/cassiopeia.html

http://lanwebs.lander.edu/faculty/rsfox/invertebrates/aurelia.html

http://www.thecephalopodpage.org/MarineInvertebrateZoology/Cassiopeaxamachana.html

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Standards Addressed:

Next Generation Sunshine State Standards

SC.8.N.1.1 Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

SC.8.N.1.6 Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.

SC.912.L.17.5 Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.

SC.912.L.17.6 Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.

SC.912.N.1.1 Define a problem based on a specific body of knowledge

SC.912.N.1.3 Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.

SC.912.N.1.7 Recognize the role of creativity in constructing scientific questions, methods and explanations.

Ocean Literacy Principles

Principle 5. The ocean supports a great diversity of life and ecosystems.

d. Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms (symbiosis, predator-prey dynamics, and energy transfer) that do not occur on land.

Principle 6. The ocean and humans are inextricably connected.

d. Humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean. Human development and activity leads to pollution (point source, non-point source, and noise pollution), changes to ocean chemistry (ocean acidification) and physical modifications (changes to beaches, shores and rivers). In addition, humans have removed most of the large vertebrates from the ocean.

g. Everyone is responsible for caring for the ocean. The ocean sustains life on Earth and humans must live in ways that sustain the ocean. Individual and collective actions are needed to effectively manage ocean resources for all.

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