OIMB GK12 CURRICULUM

2nd Grade **45 minutes**

Between the Grains - Interstitial Meiofauna

Oregon Science Content Standards:
2.1 Structure and Function: Living and non-living things vary throughout the natural world.
2.1L.1 Compare and contrast characteristics and behaviors of plants and animals and the environments where they live.
2.2 Interaction and Change: Living and non-living things change.
2.2L.1 Describe life cycles of living things.
2.4 Engineering Design: Engineering design is a process used to design and build things to solve problems or address needs.
2.4D.1 Use tools to construct a simple designed structure out of common objects and materials.

Ocean Literacy Principles:

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

Goals: To introduce students to the tiny animals that live between grains of sand on sandy beaches.

Concepts:

- Beach meiofauna are tiny animals that live between grains of sand.
- Some meiofauna are the babies of larger animals, some stay as meiofauna their entire life.
- Meiofauna face many challenges including living in sand that is shifting and being washed away by waves, so have adaptations to help them survive.

Materials:

- Paper and pencils for each student
- Metric ruler
- PowerPoint on meiofauna
- Miscellaneous craft supplies such as pipe cleaners, puff balls, and foam discs
- A tray or pan of rocks that are about 6” in diameter

Lesson Plan:

1. Ask the students to list animals they have seen on the beach.
2. Explain that they are going to learn about a group of VERY TINY animals that live BETWEEN the sand grains…so even beaches that look “empty” are full of life!
3. Ask the students to think about what it might be like to live between sand grains, and to draw a picture of how such an animal might appear. Some might draw fanciful creatures and some might draw plankton, knowing that most plankton are very small.

4. Teach the students the word for the animals that live between the sand grains -- meiofauna. Explain that "fauna" means "animals" and "meio" means "smaller". Write the word on the board and repeat several times as a group.
5. Have the children look at a metric ruler. Point out a 1mm division and explain that meiofauna are all smaller than this, that 10-20 would fit end to end in one cm.
6. Show the PowerPoint with pictures of meiofauna from California.
7. Briefly discuss similarities and differences between the animals. Point out two of the major adaptations: (1) slender, worm-shaped bodies and (2) hairs or spines. Discuss how being worm-shaped helps the animals move between the grains, and how the spines and hairs help to prevent the animals from being flushed out by waves.
8. Explain that sandy beaches are moving (the sand shifts), so there is nothing firm to hold onto, but that there are tiny areas of water between the sand grains and the meiofauna live in these tiny films of water. Explain that some meiofauna are the larvae (babies) of slightly larger animals, so only live between sand grains for part of their life cycle, while others spend their entire life there. Discuss that some meiofauna are eaten by juvenile fish and that they are easily harmed by contaminants in the sand. (See Teacher Background below).
9. Explain that scientists sometimes use models to represent things that are either very small or very large. Have the students build their own meiofauna models using craft supplies.
10. Add the students' meiofauna to a tray or pan of rocks that represent sand grains. Nestle the meiofauna among the "sand grains" to show them in their usual habitat.
11. Wrap up the class by reviewing the definition of "meiofauna" and ask the students to explain why they are worm-shaped and hairy or spiny.

Assessment: Have students tell you what type of animal they have made (meiofauna), where it lives (between grains of sand), and why it is shaped the way it is (e.g. slender to move between grains, suctions or spikes to keep from being washed away).

Teacher Background:

- **Interstitial Meiofauna** -- small organisms living in the spaces between, in this case, grains of sand. Meiofauna is a **classification based on size--**between 0.5-1.0 mm.
- **very diverse** – most classes of animals have meiofauna, AND on a beach there are usually many more species of meiofauna than of macrofauna
- **large biomass** – usually at least equal to the biomass of macrofauna on a beach; where meiofauna are found, there are on average 2 million individuals per m^2 ; most in upper 2 cm**,** but **patchy distribution** (not found everywhere)
- They are **temporary meiofauna** if they are the larval stage of larger things; **permanent meiofauna** if they are between 0.5-1 mm their entire life cycle
- **interstitial space** of sand is 30-40% of the sediment volume
- Meiofauna **use film of water** surrounding individual sand grains to move through sediment

- **adaptations:**
  - to live in narrow spaces: miniaturization, “worm-like” elongation and flexibility
  - to an environment in motion: adhesion, “spines”
  - to dark conditions – reduction of pigments and eyes
- important **role in food webs** between bacteria and larger fauna
- **indicators of pollution** because of high sensitivity to contaminants in sediments
- **prey** for juvenile fish

Sources: Images from: http://hooge.developmentalbiology.com/meiofauna/

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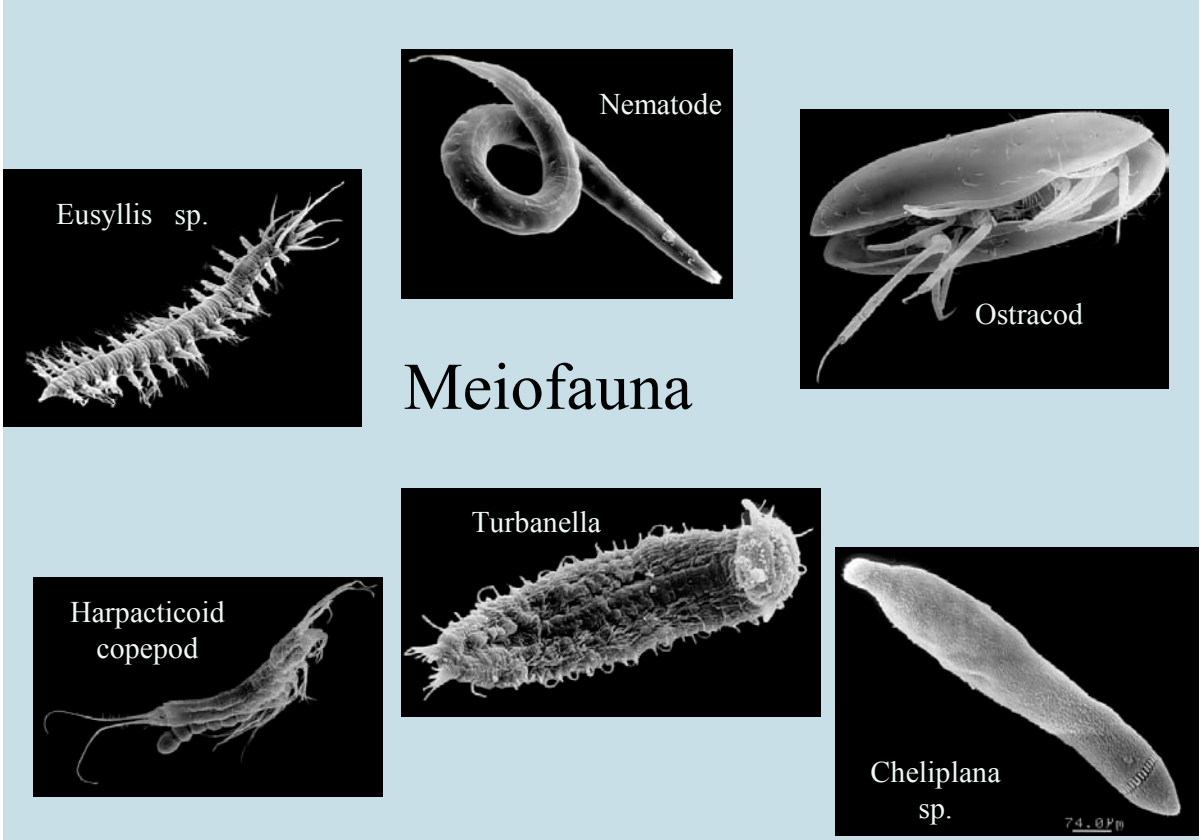
Examples of student made meiofauna:

Examples of meiofauna from the PowerPoint



Images from: Humboldt Co., CA, http://hooge.developmentalbiology.com/meiofauna/