CALIFORNIA ACADEMY OF SCIENCES

Sand Investigation

What is sand made of? Where does sand come from? Geologists make observations to study the physical characteristics of sand sediments in order to understand how they form. Be a sand scientist and use your observations and tools like geologists to learn how sand forms!

Materials

Pencil
Photos of beach sand samples (pages 3-7)
Photos of California beaches (page 8-12)
Paper to record observations

Directions

1. **Look** at each of the beach sand samples starting on pages 3-7. **Think about** the following questions and **write down** your observations.
    a. *What colors do you see in the sand? What might cause the difference in color?* The color of the grains can give us clues about what types of minerals make up the sand.
    b. *Are all the grains of sand the same size*? Sand grains come in different sizes. Smaller grains are typically older, have traveled farther and been worn down, or are made of softer materials than larger grains. How does sand get like this?
    c. *What shapes are the grains of sand?* Are any of the grains rounded or angular? What might this tell us about how long ago the sand was formed?
2. **Look** at the pictures of California's beaches starting on page 8 and **compare** them to the pictures of sand we looked at earlier. The beaches along the California coast are composed of many different types of sand that have formed in different ways.
    a. Do you recognize any of these beaches? Have you been to any of them?

   b. What does the sand look like? Does it remind you of the earlier photos?

   c. How do you think the sand got there?

3. Next time you go to a beach, take a closer look at the sand and see what you can learn!

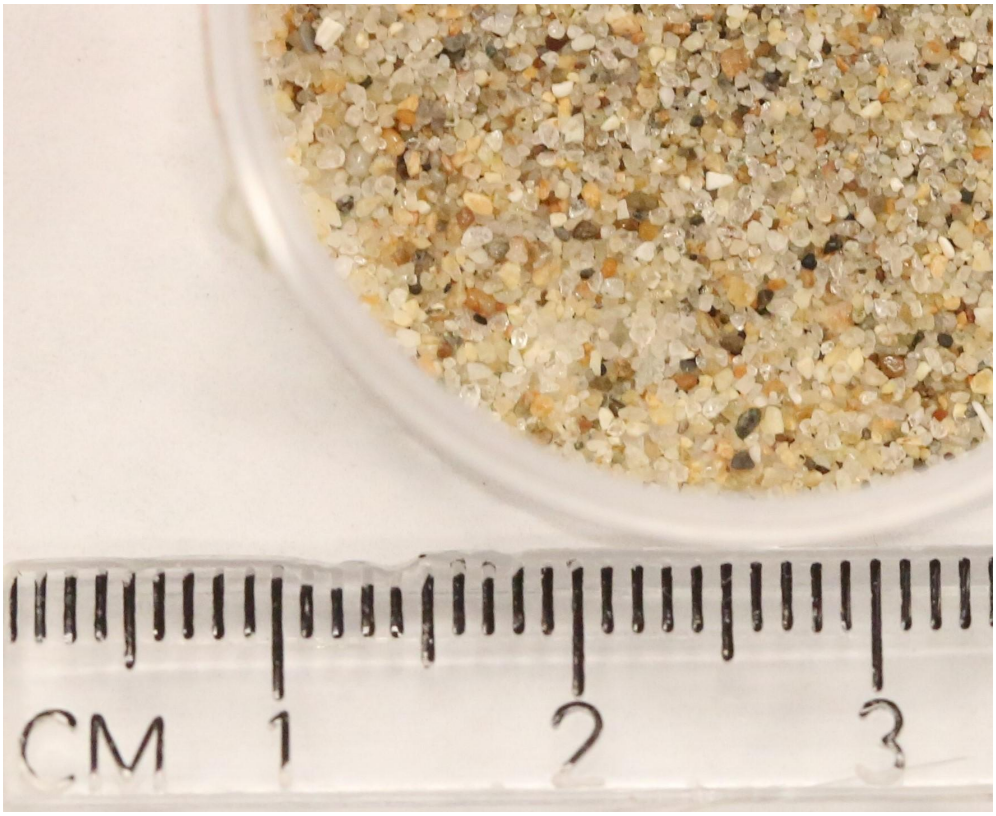
The science of sand

Geologists use different tools to study the color, size, and shape of sand to learn how it was created and how it got there.

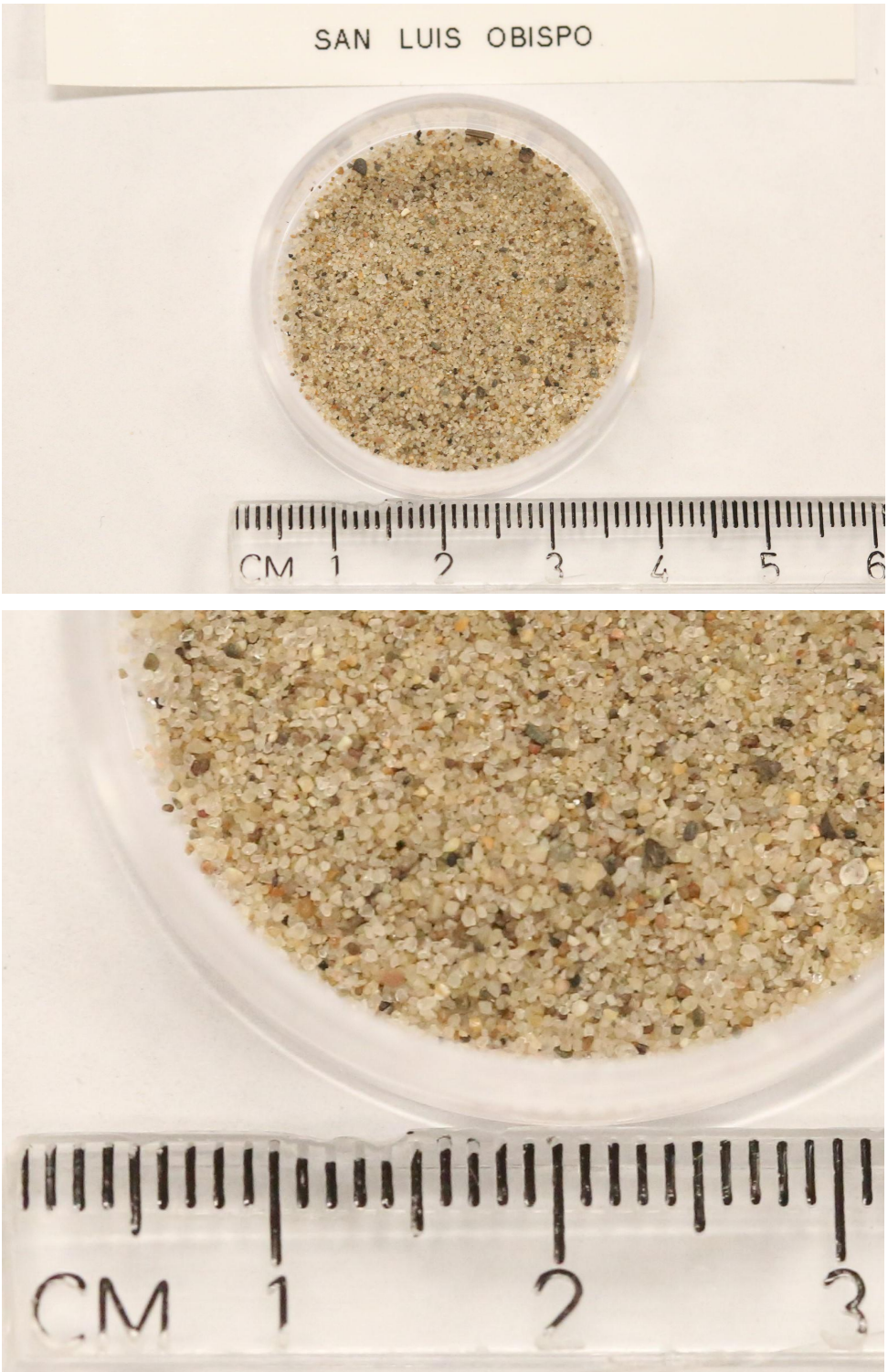
Beach sand is formed in many different ways.

1. In many tropical places, sand grains form when the shells of small marine animals are broken down by waves.
2. Some sand grains along tropical beaches are created by the poop — that's right, poop! — of coral-munching parrot fish swimming along the reefs.
3. Some sand grains are created when waves erode beach cliffs and rocky bluffs.
4. Volcanic eruptions also produce sand grains, like the ones found at some black and green sand beaches.
5. In California, many beaches are formed by sand grains that are brought to the ocean shores by rivers that deposit their sediments into the sea. For example, much of the sand along Ocean Beach eroded from the Sierra Nevada Mountains and reached the beach via the San Joaquin and Sacramento rivers, which empty through the delta out into San Francisco Bay. **Looking at the color of sediment grains is helpful in understanding what type of minerals make up the sand.**

1. Minerals like amphibole, hornblende, and magnetite tend to produce dark grains.
2. Minerals like chert, feldspar, and hematite (iron ore) tend to produce red, orange, or even yellow grains.
3. Many of the clear sand grains we see are broken down fragments of quartz.
4. The mineral garnet, when weathered, often produces rare purple sand grains.

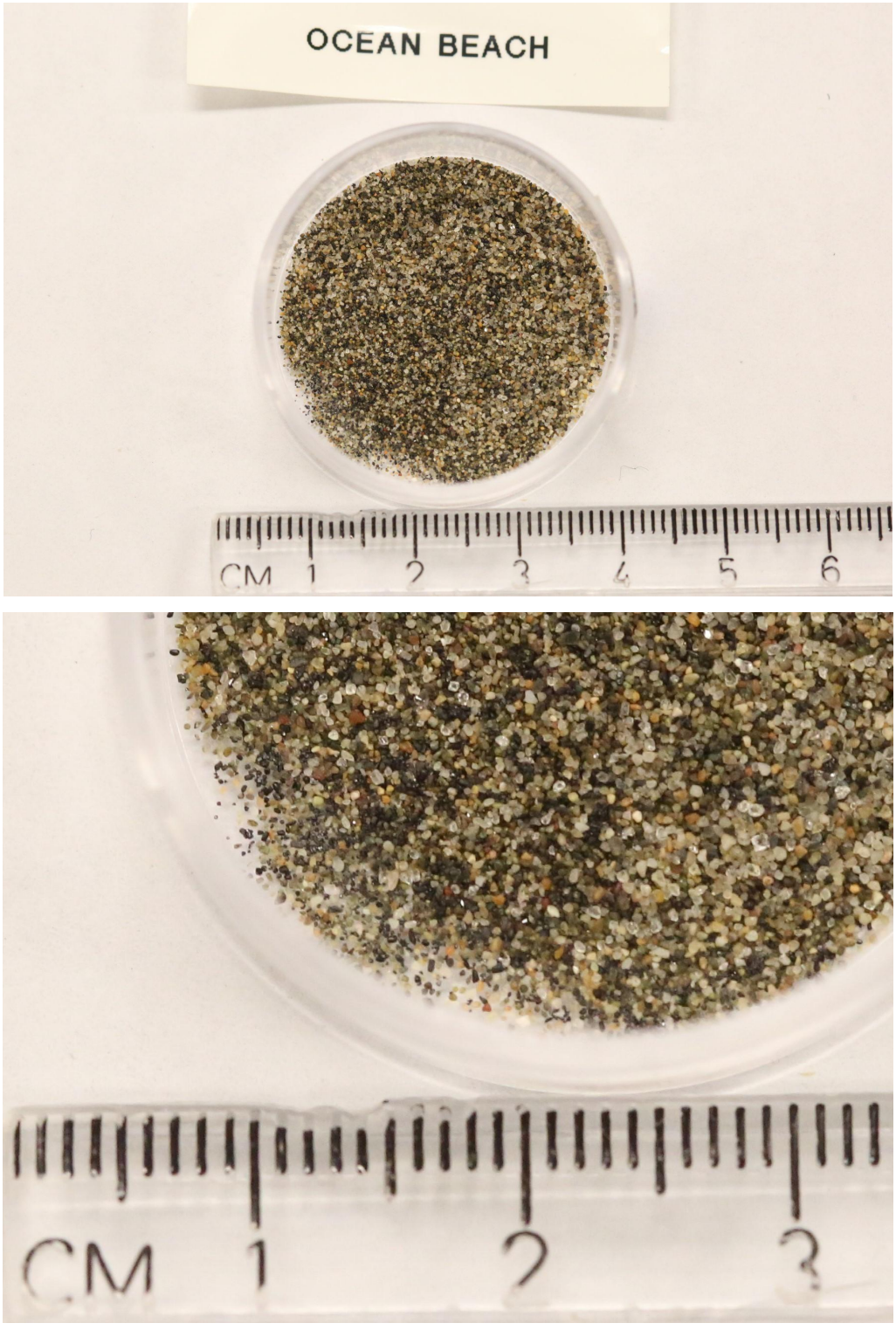


Santa Cruz, California



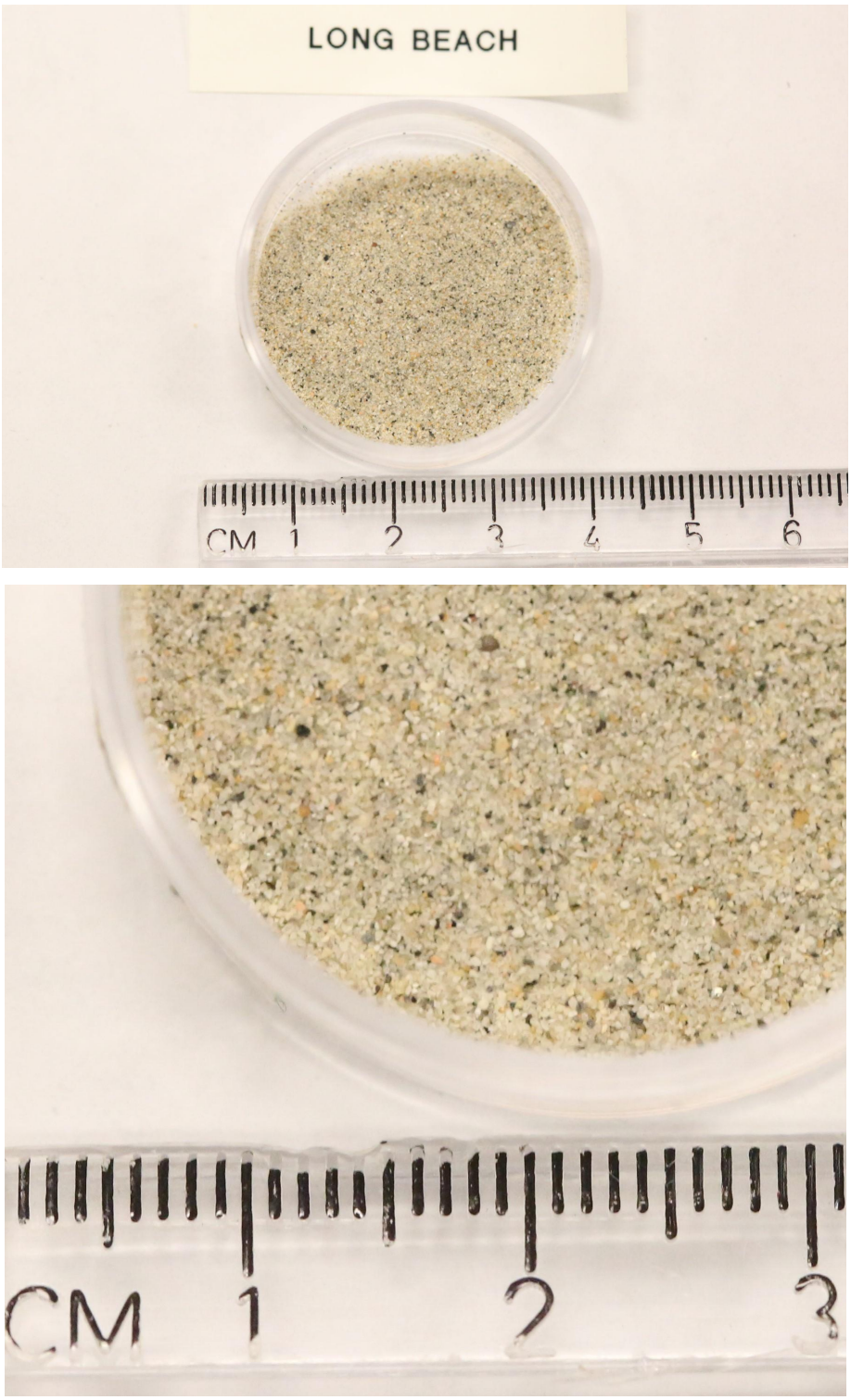
San Luis Obispo, California

Rodeo Beach, California

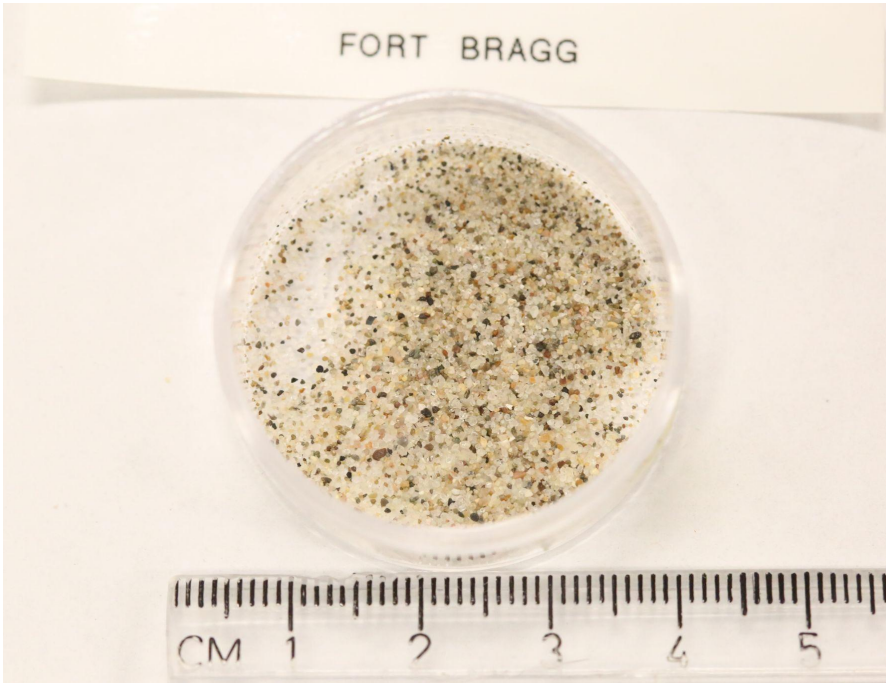


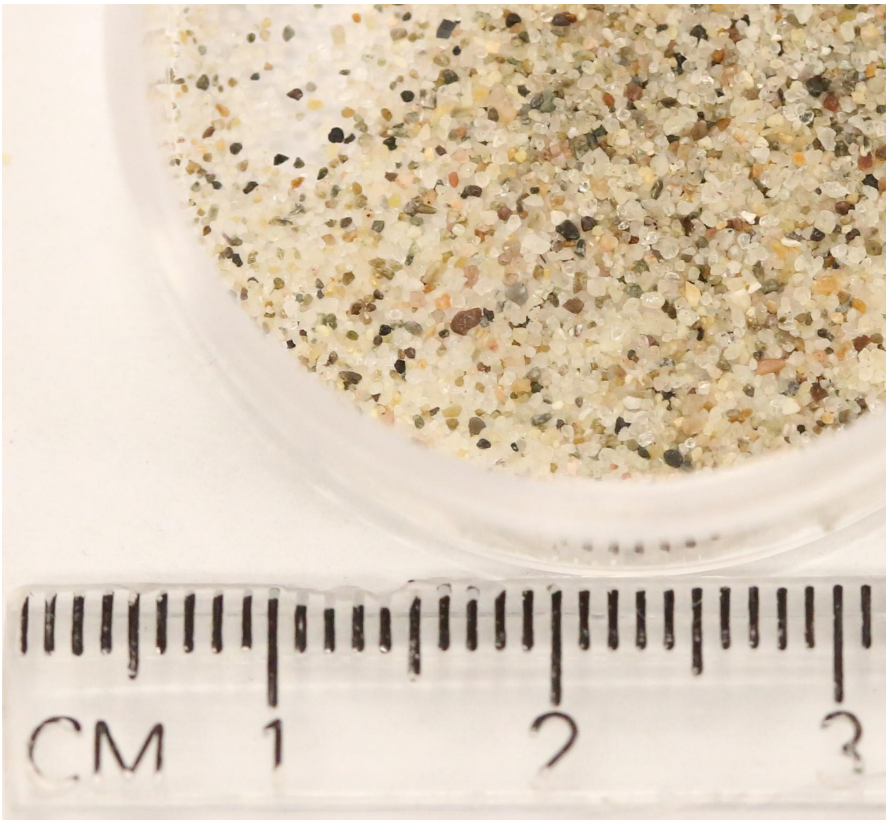
Ocean Beach, California

Monterey, California

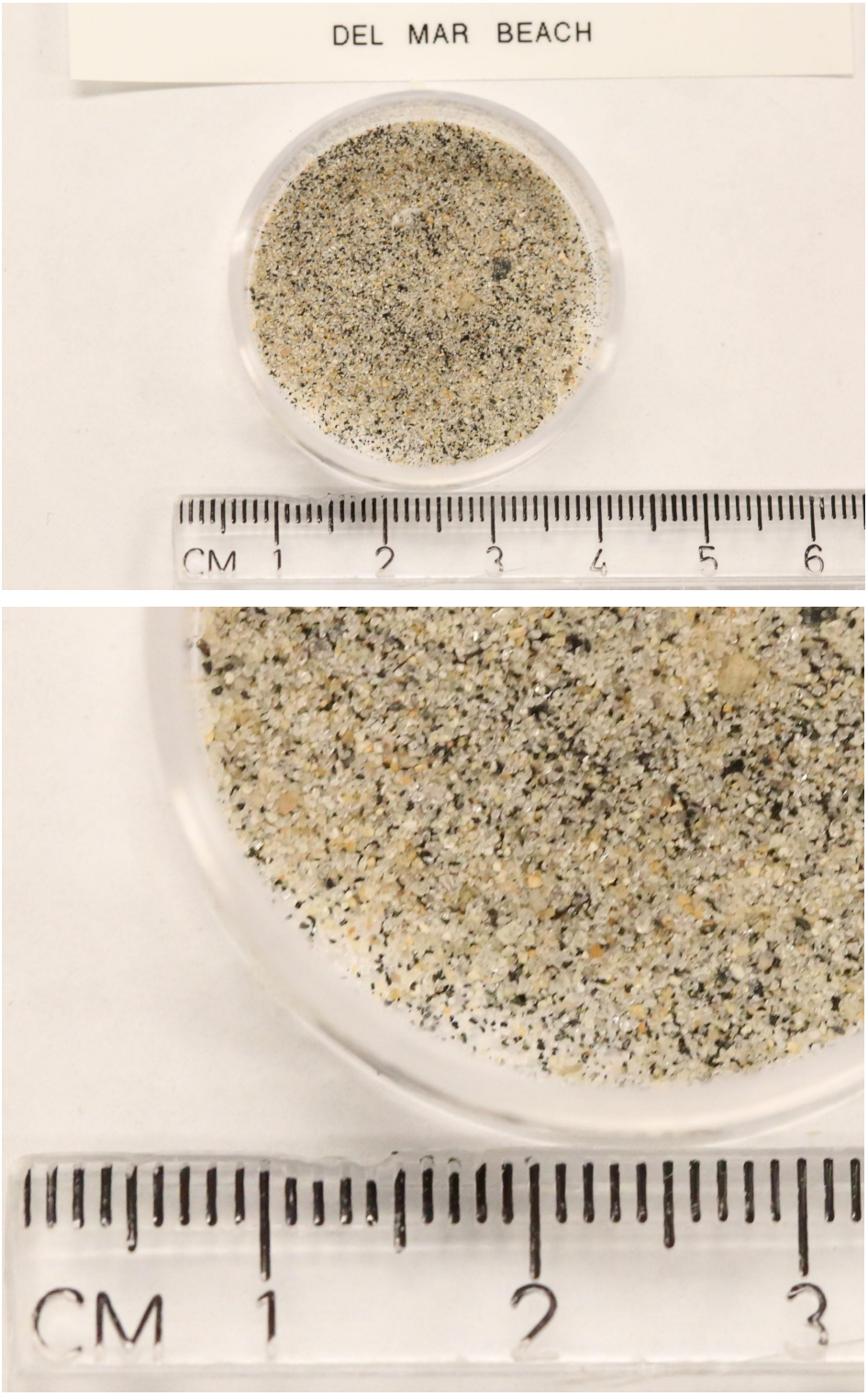


Long Beach, California

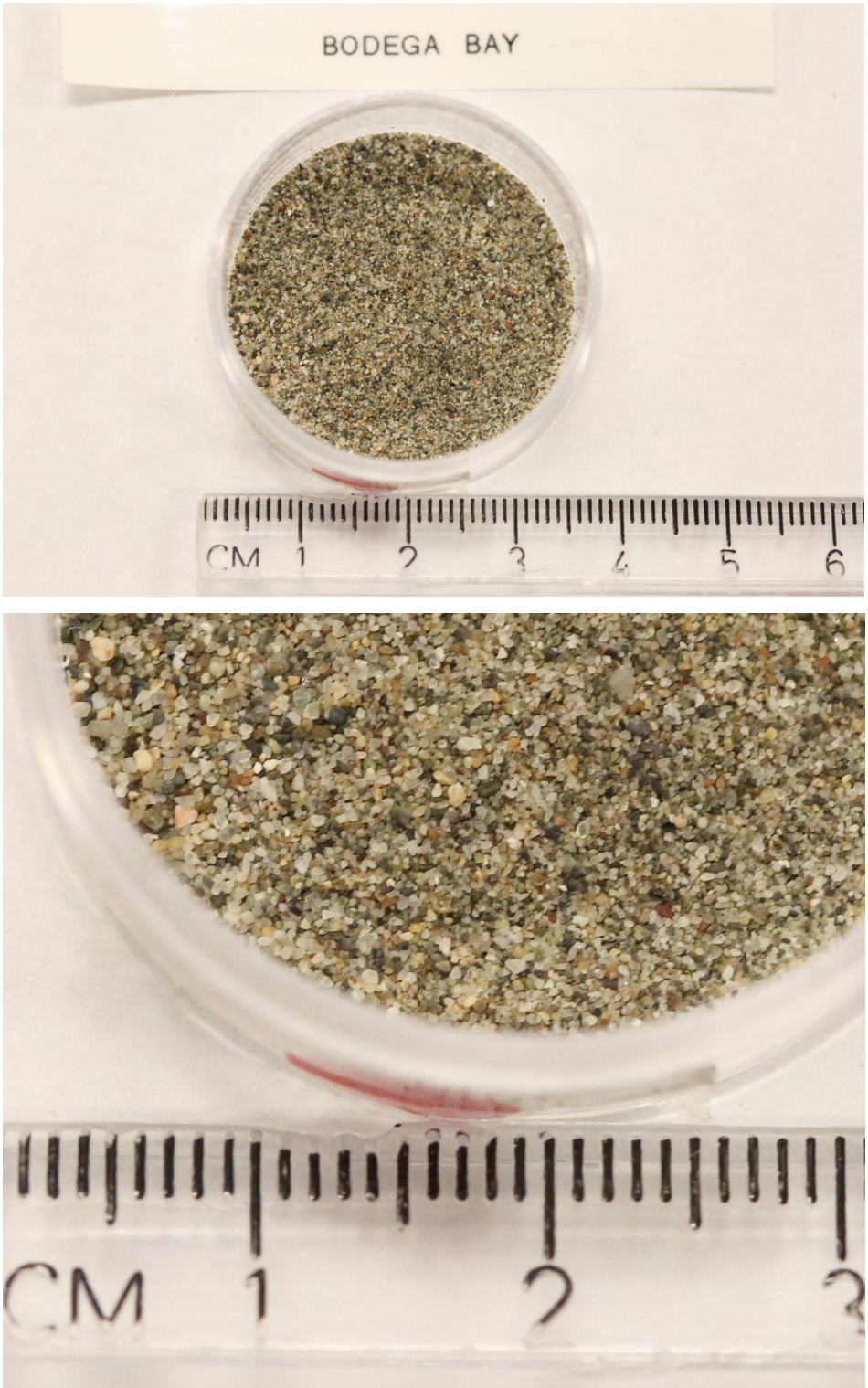




Fort Bragg, California



Del Mar, CA



Bodega Bay, CA

Santa Cruz, CA

San Luis Obsipo, CA

Rodeo Beach, CA

Ocean Beach, CA

Monterey, CA

Long Beach, CA

Fort Bragg, CA

Del Mar, CA

Bodega Bay, CA