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Diatoms

These images of microscopic diatoms were drawn by Dr. Ernst Haeckel, a German zoologist who discovered thousands of new species of plants and animals more than 100 years ago. The diatom species in the poster are found in European waters where Haeckel studied. Beginning from the top with the star-shaped diatom and moving clockwise, their scientific names are *Ammphithetras elegans, Govena pedalis, Asteromphalus imbricatus, Triceratium moronense, Pyrgodidcus armatus, Tricertium digitales, Campylodiscus bircruiatus* and *Actinoptychus heliopelta*. These species of diatoms are not necessarily found in the Gulf of Mexico; however some diatoms in the Gulf are of the same genus and are similar in structure.

Diatoms are one of two main groups of phytoplankton. Phytoplankton are tiny one-cell plants that drift in the upper water layer in the photic zone where light can penetrate. The two main groups of phytoplankton are diatoms and dinoflagellates. Dinoflagellates have a tail or flagella, which enables them to move independently. Diatoms do not have flagella to control their movement. Both diatoms and dinoflagellates are important primary producers. because they ?hey recycle nutrients and release oxygen through photosynthesis. Both have hard shells.

Dr. Haeckel drew the shell or "test" of these plants. The shell is made of silica, the primary ingredient in glass. Diatoms have two shells or tests; one is slightly larger than the other and overlaps the small one like a lid on a box. Generally the shell is round or elongated and the ornate structure of silica and space make up the beautiful complex structure of the test that you see in the illustration. The strong web of silica and space protects the plant while allowing water, nutrients and gases to reach the plant so it can grow and reproduce.

Diatoms are found all around the world in oceans, lakes, streams and in bottom sediments. Diatoms are one-celled and can exist as colonies in the shape of filaments or ribbons. These microscopic plants range in size from 3 micrometers to more than 1 millimeter. There are more than 250 genera of diatoms and an estimated 10,000 to 100,000 species worldwide. In the Gulf of Mexico, 1,000 species have been identified, with the most commonly found from the genus *Chaetoceros* spp., *Nitzchia* spp., *Rhizsolenia* spp., *Mastogloa* spp., *Ceraulina* spp. and *Thalassionema* spp.

Diatoms are some of the most vital plants on the planet. Most life on earth depends upon phytoplankton, either directly or indirectly, because they are the base of the food chain. They play a key role in the marine food web by providing food for zooplankton, such as copepods, sea jellies and filter feeders such as anemones, barnacles, clams and mollusks, which are food for fish and other animals further up the food chain. Phytoplankton account for 30-50% of the primary production in the *world* and diatoms are responsible for 40% of it. In converting CO_2 into oxygen during photosynthesis, diatoms produce 25% of the oxygen on earth.

Diatoms drift with the currents and tend to sink when there is limited water movement. They depend upon currents and waves to keep them afloat in the photic zone, where they grow and reproduce. Some diatoms, such as centric diatoms, produce oil, which provides some buoyancy, but in calm water they can sink about one meter per day, gradually falling to the bottom. Diatoms reproduce asexually by fragmentation and have rapid increases in their population resulting in blooms when conditions of sunlight, nutrients, phosphorous, nitrogen, and silica are right. During repeated fragmentation, the cells become smaller and smaller. When they get too small they can reproduce sexually which brings the population back to normal size and health condition.

Once these large communities die, they sink to the bottom where their shells form thick layers, and over geologic time, become fossilized rock known as diatomaceous earth. Deposits of diatomaceous earth are found in the northeastern and western United States, Europe and Canada. These deposits are evidence that the ocean once covered these areas millions of years ago. Diatomaceous earth is used as an abrasive in toothpaste and shaving and cleaning powder and metal polish. It is also used in absorbents, cat litter and as a stabilizing component of dynamite. Since it is heat-resistant, it is used as a thermal insulator. It is also used to filter drinking water, fish tanks, beer, wine, syrups and honey, facial scrubs, and can be used for pest control.