c8 Pelagic deposits < planktonic, nektonic; ooze, "red clay" >

How inappropriate to call this planet Earth, when clearly it is Ocean. —Clarke (1917-2007).[1]

Bottom living aquatic organisms in sea, lake, or river, are *benthonic*. Those that live attached are *sessile*. Those that move are *vagrant*. *Epifauna* live on, and *infauna* live in sediments. Organisms that swim within the body of water are *nektonic*. *Plankton* are drifting microscopic organisms that, at or near the surface of marine and freshwater, float or swim slower than effecting winds and currents.

Phytoplankton (“garden of the sea”) photosynthetic producers include: diatoms, golden algae, green algae, cyanobacteria (the misnamed “blue-green algae”), dinoflagellates, bacteria and archaea (***Footnote c8.1***). Phytoplankton comprise the base of the food chain. Its abundance, which varies regionally with the amount of dissolved inorganic nutrients that support plant life, is shown by satellite imaging of ocean chlorophyll (red orange – high level, blue – lowest, in SeaWiFS images).[2]

Zooplankton consumers include: dinoflagellates, foraminifera, larvae of nektonic and benthonic invertebrates and vertebrates, jellyfishes, worms, mollusks, small crustaceans, and fry of fish.

In the last half billion years (the time of the Phanerozoic) many pelagic (planktonic *and* nektonic) organisms evolved shells (skeletons, tests) of chitin (a polysaccharide), calcite or silica.[3] Their shells make them heavier than water and so for a pelagic life they are motile, contain oil for buoyancy, or are slow sinking due to anastomosing pseudopods (as is so of radiolaria) or threadlike chitinous extensions (as is so of diatoms) beyond the shell.[4] The common fate for those not eaten is to settle from where they lived to accumulate as lake-bottom or seafloor as ooze or muck. In productive (nutrient rich) waters, ooze accumulates at rates measured in millimeters per thousand years.

Oozes are sediments with 30% or more the skeletal residue of pelagic organisms. The remainder is inorganic in origin, such as terrigenous (washed from the land) clay or meteoric (settled out of the air) dust. Muck is similar but has a high proportion of organic fleshy material. Sapropels are such. Marine ooze is the far-from-shore accumulation of the shells of pelagic life. Lithified marine ooze composed almost entirely of calcareous shells is called *chalk*. In oceans, seawater is saturated with respect calcite above –4500 m (deeper in regions of high surface productivity) but below is undersaturated. The boundary below which rate of dissolution of $CaCO_3$ particles equals their rate of delivery is called the carbonate compensation depth (CCD). Lithified lake or marine ooze composed mostly of siliceous shells is called *diatomite*.Pelagic deepsea sediments with almost no skeletal and no terrigenous component are called *red clays* (a misnomer: the first described had that color but most are brown). Red clays are composed of meteoric (wind-borne) clay, some quartz and feldspar dust, volcanic ash, and minor but noticeable amounts of cosmic and meteorite infall. ❑

Footnote c7.1 Scleractinian coral polyps grow tentacles in multiples of six. Stony scleractinians have *external* calareous skeletons. Octocoral (gorgonians or horny coral) polyps grow tentacles in multiples of eight. Hard forms of octocorals have *internal* rods of horny material and, more rarely, calcite. “Precious coral” is the internal skeleton of deepwater gorgonians.[5] Varieties are:

gold coral (protein skeleton of Antipathidae)
black coral (protein skeleton of Parazoanthidae)
pink (pearly luster) to red (ivory luster) coral (calcite skeleton of Corallidae)
bamboo (chatoyant luster) coral (bundled calcite and protein rods—the skeleton of Isididae)

Footnote c8.1 The top <600 feet of the water column in the oceans is a region of intense photosynthetic activity. Productivity was long credited to eukaryotic algal species, including diatoms, dinoflagellates, and their relatives. Vanishingly tiny archaea are now known to comprise between 20 and 30 percent of all the microbial cells in the ocean. In *Natural History*, May 2003, Edward F. DeLong recounts how the development of epifluorescence microscope in the late 1970s allowed even picoplankton (cells between 0.2 and 2.0 microns across) to be seen. *Method*: To seawater sample add fluorescent dyes that bind to DNA, wait 5 minutes, collect the microorganisms on a filter, and using the microscope, count the individual microbial cells that glow under ultraviolet light).[6]