c5 Tidal flats and sabkhas < mudcracks, nodules, dolomite >

This indigested vomit of the Sea, —Andrew Marvell (1621-1678).[1]

Tidal-flat estuarine environments (***Footnote c5.1***) accumulate laminated muds with desiccation cracks on their intertidal (covered and uncovered by tides) flats and cross-bedded sands in tidal channels that traverse their flats. These channels link the ocean to brackish supratidal marshes that are reached by seawater only when spring tides and storm-driven surges occur.[2]

In warm dry regions evaporation makes the laminated muds of tidal flats calcareous and the supratidal marshes hypersaline to the degree that grazing animals and shading seagrasses are excluded. There, calcareous algae build mounds called *stromatolites*.[3]

In regions of extreme aridity, deep desiccation is of supratidal sediments that are wetted by landward-seeping seawater from the intertidal margin. In this environment, called a *sabkha*, wind deflation of sediments is down to the capillary fringe of the water table. There, nodules of gypsum (anhydrite) form and evaporation-produced hypersaline water, as a result of its high density, finds passage through less dense water of normal salinity below. "Reflux theory" is that here underlying limestone is dolomitized by the evaporite brine that seeps down though it on its way back to the ocean.[4] ❑

Footnote c5.1 An *estuary* is where land freshwater of river, stream, and spring riperian, mixes with tidal incursions of seawater in inlets, drowned river valleys (as Chesapeake and Delaware bays), bays (as San Francisco Bay, and Tampa Bay), harbors (as Boston Harbor), sounds (as Puget Sound), lagoons, keys, and deltas. Bordered variously by rocky shores, sandy beaches, and oyster reefs, estuarine environments grade from wooded swamps and open freshwater ponds in sand and mud flats via mangrove forests[5] to salt marshes and tidal pools with sea grass and kelp beds, and support diverse and abundant wildlife: marine mammals (as manatees, otters and dolphins), reptiles (as alligators and turtles), shore-, sea-, and migratory birds, crustaceans (as crabs and lobsters), shellfish (as clams and oysters), echinoderms (as sand dollars and starfish), coelenterates (cnidarians as the fearsome Indo-Pacific box-jellyfish (*Chironex fleckeri*) that can bellows-propel itself faster than a good swimmer and from each of the 4 corners of its bell trails some 15 three-meter long tentacles each with about 5,000 lethally poisonous stinging cells),[6] marine worms, and, as "nurseries of the sea," raise a wide variety of coastal fish (by U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, 1990 estimate: 75% of America's commercial fish catch, and 80-90% of the recreational fish catch)[7] and ocean-going fish, including rarities as *Scarus guacamaia* (the largest herbivorous fish in the Atlantic).[8]

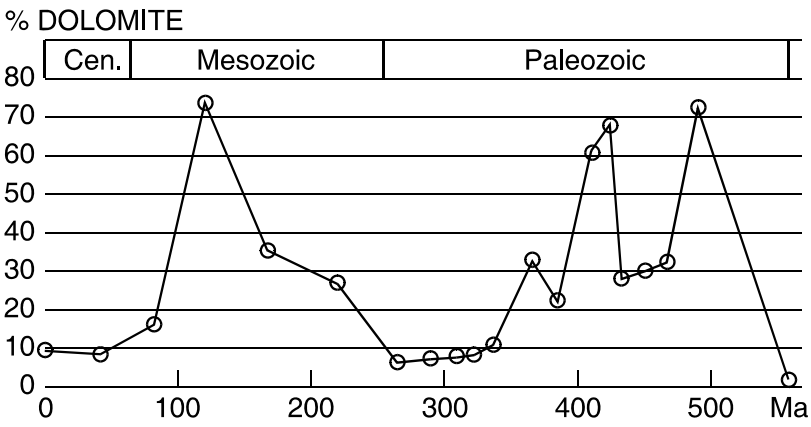

Figure c6.1 [1] Plot in 1956 by George V. Chilingar(ian) (1929-) of percent dolomite as a function of age refutes Francis Maurice Van Tuyl's (1887-1975) 1916 hard to stamp out falsehood: "With regard to the relation of dolomites to time, they occur in every geological system of the stratigraphic column and are being formed in the seas today. They attain their maximum development, however, in the early Paleozoic systems and roughly decrease in importance with time."[2]