and proper conditions for the concentrated brines to be produced by the evaporation. This requires many years for each foot of evaporative sediment formed.

The evidence for the shallow-water condition during a part of the reef's history consists not only of the shallow water types of mineral deposits mentioned above, but also of the remaining marks of weathering processes. Bebout found these remaining effects in the reef limestone and dolostone at numerous levels on the sides of the Rainbow reefs, and also in the reefs of nearby subbasins which are buried at similar depths. He refers to this as vadose (above the water level) weathering (Bebout, 1973, p. 298-301, 314-321).

The evaporitic covering layers which fill the spaces between the reefs, lap up on to their sides, and finally seal them over are roughly indicated in Figure 1. A more detailed description of them is given in Bebout (1973), Davies (1973), Klingspor (1969), McCamis (1968), and Wonderly (1977, p. 77-83, 88-94). (The reason that such thorough descriptions of the evaporite layers have been published in the journals of petroleum geology is that evaporite strata very frequently serve to trap petroleum in the reservoirs in which it has collected. Understanding the origins of both the reef reservoirs and the evaporite coverings enables the petroleum geologists to predict the locations of the best deposits of oil.)

The first evaporite layers (no. 1 of Figure 1) which began to cover the reefs show very thin, alternating layers in the drilling cores. These laminations (microlayers) are composed mainly of anhydrite, but some of the thinner ones are of relatively pure calcium carbonate (called "calcite" in the geologic literature); and some are of dolomite (similar to calcium carbonate but including magnesium). The anhydrite laminations range from less than one millimeter to a few millimeters in thickness. They closely resemble the thin layers of the "banded anhydrite" from the Delaware basin of West Texas, of which there are more than 200,000 sets (Anderson and Dean, 1972). There is regularly a very thin, dark layer of organic material between each anhydrite layer. This is taken to be the remains of the microscopic organisms which were living in the water before it reached such a high salt concentration that they died.

We must here pause to reflect on the meaning of these laminations. What can thin layers of anhydrite, calcium carbonate, and organic matter tell us about the lengths of time which elapsed? Each of the laminations apparently represents at least a seasonal change in the environment. This is evident from the fact that it takes time for a body of water to develop a new population of organisms for formation of the organic layer. It is also evident from the known length of time required for evaporating enough water to form calcite and anhydrite layers of this thickness.

The anhydrite (and probably also the calcium carbonate) for producing the evaporative layers usually comes out of the mineral-laden water by precipitation, the minute particles of precipitant then settling to the bottom. In order to bring about the precipitation of the calcium carbonate ($CaCO_3$), normal sea water has to be evaporated to a concentration of about one-half of its original volume. Then, if evaporation continues until the volume is only about one-fifth of the original, this forms a sufficiently strong brine to begin the precipitation of anhydrite ($CaSO_4$).

The thin microlayers of evaporite minerals present here in the