or stoppage due to the development of unfavorable environmental conditions as explained in Wonderly (1977, p. 25-32).

During the past 75 years several research projects have been carried out for actually measuring the rates of growth of living reefs in tropical and sub-tropical waters. Probably the most elaborate and extensive of these projects was that of A. G. Mayor and his team of scientists and assistants. This was a four-year Carnegie expedition to the Samoan Islands in which Mayor and his associates repeatedly observed and recorded the new reef growth being formed on a measured 2,550,000 square-foot reef flat between Breaker Point and Pago Pago Harbor. The final result of these extended observations, collections, and weight measurements was the conclusion that approximately 8 millimeters of calcium carbonate mineral were being added to the reef flat per year. However, Mayor called attention to the fact that this could not result in a permanent increase of 8 mm per year in the thickness of the reef unless the sea level were rising (or the reef foundation sinking) that much each year. Otherwise most of the added material is pulverized, some to be dissolved, and some to be carried outward to broaden the edges of the reef (Mayor, 1924).

This work of Mayor and his associates is, so far as we know, the most thorough determination of reef growth that has been made in a geographic area of optimum reef-growing conditions. The results were similar to those found in the growth-rate research of Hoffmeister (1964) and of Vaughn (1915).

In the Marshall Islands, growth rate estimates were made at the surface of the Rongelap atoll, which is approximately 300 miles east of Eniwetok. The method used was not a thorough, direct measurement such as Mayor used in the Samoan Islands, but was based on a careful measurement of the amount of oxygen consumed by the entire living population per square meter, per hour. The measurement was made during the night, when the lime-secreting algae would have to use oxygen, just as the corals do. The theoretical deposition rate obtained was 14mm of calcium carbonate per year, but the research team was quick to point out that this was much more than the actual rate, because many of the organisms living on the reef do not deposit lime, and some of them have respiration rates much higher than do the corals and lime-secreting algae (the two main kinds of lime-secreting organisms). Then a further limit on the rate of actual reef growth would be that concerning the rate of sea level change mentioned above, at the end of the description of Mayor's work. When the research team in the Marshall Islands applied another method, viz., that of estimating the rate of growth since the first terrace down from the rim of the atoll was built, they arrived at a figure of only 0.91 mm per year. This was found to be approximately the same for Rongelap, Bikini, and Eniwetok atolls (Emery, 1954, p. 140-141). However, since the 1940's, when these calculations were made, it has been learned that the dates of the last ice age (and the succeeding rise in sea level) were more recent than was thought at that time. Thus, we could safely convert their estimate to 1.8 mm per year.

If we apply the fastest growth rate of Mayor's research (8 mm per year), to the total thickness of the Eniwetok atoll, we obtain 176,000 years. Using Mayor's rate here may be permissible, since the Samoan Islands have a temperature and latitude similar to that of the Marshalls, but we must remember that Mayor's rate was only for the ideal conditions in which the sea level is rising at the same rate as reef growth--a condition which neither he nor we would dare assume for the entire life