

Drilling Records from Living Coral Reefs

The drillings made by the U. S. Geological Survey on the Bikini and Eniwetok atolls in the Marshall Islands revealed that these reefs are extremely thick, and that they are built on top of old, deeply submerged, volcanic cones, called "seamounts." (See Figures 2 and 3 for the location and form of these reefs.) One drill hole on the Bikini atoll penetrated 2,556 feet of reef material, and one at Eniwetok penetrated 4,610 feet before reaching the volcanic base.¹ So it is evident that a great amount of reef growth is represented in these atolls.

We should here explain that some of the volcanic cones which form seamounts are elongate or otherwise imperfectly shaped, but they do have a general circular shape, as viewed from the air. Many of these conical mountains were relatively flat topped before the coral deposits began to form on them. Such a truncated volcanic mountain is called a "guyot" or "flat-topped seamount," and is known to provide a good foundation for the growth of a reef. In the case of the Eniwetok atoll in the Marshall Islands, the drillings made by the U. S. Geological Survey revealed that the guyot on which it was built had the typical broad platform at the top.² The guyots are composed largely of basalt, which is the most common form of volcanic rock. Basalt is of course radically different from the fossil-bearing limestone of which the reefs themselves are composed. The research at Eniwetok atoll showed that the guyot on which it was built stands two miles above the surrounding ocean floor, with the atoll rising nearly another mile above it.³ Several other atolls in the Marshalls were shown to have similar bases. It must of course be remembered that the corals and other reef-forming organisms could not begin their growth until the volcanic platform had cooled to a mild temperature, and until a favorable water depth over the platform had been established.

Growth Rates of Corals

If we want to know the length of time required for forming a reef such as the Eniwetok atoll, a knowledge of the growth rates of corals and the other marine organisms which grow on the reef will be of great value. There are several important retarding effects which influence upward growth of the reef. Some of these are the dissolving action of water, the mechanical destruction accomplished by wave action, and the mechanical and chemical destruction produced by the numerous boring organisms which live in the reef rock. But, if we know the growth rates of the main organisms and then allow additional time for the various retarding effects, it is possible to make a meaningful estimate of the length of time required for the construction of the layers of reef material found during the drilling of a test hole into an atoll or other reef.

A study of growth rates may seem at first sight to be a technical matter with which we need not bother in this book. However, numerous Bible students have often gone astray in thinking that growth rates have no fundamental controls or constancy, and have thus thought that the creatures which form reefs can not be used as a gauge for time.