

are of great interest to the Bible student because they speak of time--time required for growth, time for the evaporation of the sea water, and time for the final covering layers to be deposited above. Let us first consider the length of time needed for growth of the reefs.

In Chapter 3 we saw that the process of growing a thick reef in the Pacific requires at least many hundreds of thousands of years. Now it is obvious that a coral reef which is buried deeply in the middle of a continent is likely to be even older than the reefs which are still in the process of growth. Just as we saw in the case of the Eniwetok and Bikini reefs, the preserved remains of the many species of marine animals and plants which make up the ancient, buried reefs have an extensive history to reveal to those who will take the trouble to study them.

The type of organisms present is an important source of information. If strictly marine animals are present, then we immediately know that the reef was formed in some part of the oceans, or in a bay or sound which was connected with a body of sea water. As we saw in Chapter 4, the sea urchins, starfishes, sea lilies, and corals are all animals which are found only in sea water. This is because the chemical nature of their cells requires the abundant minerals which are present in sea water. River or lake waters can not supply this amount of minerals. The contrast between the mineral content of sea water and that of fresh-water lakes and streams is spectacular. For example, average sea water contains approximately 3.4% of dissolved minerals by weight. Most fresh-water streams and lakes contain less than 0.04% minerals. The Columbia River in the northwestern United States has an average of only 0.012% total dissolved minerals, and the very "hard" water of the Colorado River has only 0.076%.<sup>3</sup>

There are numerous present-day species of "sea lilies" and other echinoderms, and a great many species of modern corals, in the world today; but none of them are found in fresh-water environments. The physiological characteristics of such marine animals are "set" at much different levels than are required for enabling an animal to live in fresh water. Thus the abundance of corals and echinoderms in the Canadian reefs shows that some part of the ocean once covered that area. The presence of ocean waters in that region is also demonstrated by other marine organisms which are present, and by the chemical nature of the strata which surround the reefs.

#### Marine Strata and Reefs in Northwestern Alberta

One of the most informative oil producing areas of Canada is in what is called the "Rainbow area" of northwestern Alberta. (It is named for the town of Rainbow Lake, Alberta.) This area was opened up for oil production in 1965. The drilling records from the great number of wells, together with detailed seismic studies of the underground formations, present an unusually complete picture of the stratigraphic nature of the entire district. The first producing