of the reef. Then too, we must make allowance for the long intervals of exposure and erosion of the Eniwetok atoll, placing it much farther back in time than any simple application of the growth rates would yield.

Within the last 10 years very reliable methods for chemically deriving maximum calcium carbonate production rates of reefs have been developed. These are based on the amount of calcium in the water, and on the controlling factors such as temperature and rate of movement of the water across the reef. An article by S. V. Smith and D. W. Kinsey (1976) gives an excellent summary of these chemical methods of growth rate estimation, the results obtained, and how they compare with the earlier biological estimates. In several extensive series of chemical tests, including new tests made in the Marshall Islands, 5 mm of upward growth per year was found to be the maximum possible with the present Ca^{++} and CO_3^{--} content of sea water. It is of course possible that the ion concentrations of sea water were formerly significantly different from those at present; but, when we take into account the necessity of reasonably constant kinds of environment for the animals and plants of the world, we can not postulate enormously greater growth rates than the maximum ones found on the earth at the present time.

ANCIENT BURIED CORAL REEFS IN CANADA

There are many coral and coral-algal reefs which long ago ceased to be living reefs, and have been buried under a thick series of various kinds of sediments. Some of the best known of these are in the oil fields of Alberta, Canada. Since the ancient reefs are highly porous they serve as important oil reservoirs in many parts of the world, and the oil drilling records give us extensive data on the nature of the reefs.

In the "Rainbow area" of northwestern Alberta there are a number of true coral reefs found at a depth of between 5,000 and 6,000 feet below the land surface, in Middle Devonian, marine strata. These reefs apparently developed under favorable conditions, as numerous of them grew in the familiar forms (shapes) seen in the thriving Great Barrier Reef area in Australia (Barss, 1970, p. 34-35). In fact, some of the atolls still retain the clear distinction between what was the more vigorously-growing side (facing the flow of water brought by the prevailing winds) and the less-rapidly-growing side (Barss, 1970, p. 34). This corresponds to the growth of living atolls in the Pacific, where the lime-secreting organisms on the windward side respond to the inflow of water which is laden with a fresh supply of oxygen and food.

The organisms which produced these Canadian reefs were typical marine animals and calcareous algae. The fossils of these are abundant in the bodies of the reefs, and numerous places in the reefs have the fossils still in undisturbed position. J. R. Langton and his associates made a detailed study of drilling cores from forty-five wells which had been drilled into these reefs in the Rainbow area. They carefully examined 15,000 linear feet of well-core slabs under low-power microscopes (as well as studying some of the sediments under higher powers). In this study they were able to identify scores of kinds of fossils, and also to note which cores contained types of fossils which normally grow in the forereef, the lagoon, and the basins beside reefs, respectively. Numerous parts of the reefs were found to be still intact, having been built by wave-resistant organisms, including both colonial septate corals, and the extinct tabulate corals (Langton, 1968, p. 1,933-1,943).