THE BARIUM CONTENT IN THE CALCAREOUS SKELETAL MATERIALS OF SOME RECENT AND FOSSIL CORALS OF THE HAWAIIAN ISLANDS

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ABSTRACT

Seventeen samples of some living Madreporaria corals and fossil corals from a deep drilling core were obtained for determination of their aragonite-calcite ratios and analysis of their barium and calcium contents. The aragonite-calcite ratios were determined with a Temp-Pres D-1, x-ray diffraction unit, and from a standard aragonite-calcite curve obtained by analyzing known mixtures of the two minerals.

Ion-exchange methods were utilized to separate barium from calcium and for its concentration to measurable quantities. The barium content was measured with a Perkin-Elmer 303 atomic absorption spectrophotometer utilizing the method of "additions." Determinations of calcium were made with a Beckman DU flame photometer.

X-ray diffraction analyses determined that all the living corals were composed entirely of aragonite. The amount of aragonite in the fossil corals decreases with depth, confirming the theory that age and increasing pressure gradually convert aragonite to calcite and at greater depths complete recrystallization occurs.

The barium concentration in the living corals varied from 5.2 $\pm$ 10% ppm to 12.5 $\pm$ 6.4% ppm. This variation in barium uptake by coral organisms cannot be attributed to differences in environmental parameters since all samples

were taken from the same area. Barium was found to be concentrated from sea water by the skeletons of living corals in very small amounts. Concentrations ranged from 1.0 to 2.2 times greater than the concentrations of the element in the sea water.

Barium in fossil corals decreased with depth, roughly following the decrease in their aragonite content, suggesting a quantitative relationship exists between barium and the amount of aragonite present. Barium may possibly act similarly to strontium as an inhibitor in the aragonite to calcite conversion. Additional work, however, would be necessary to confirm this with certainty.