REPLACEMENT OF CALCITE BY GYPSUM

R. E. RETTGER, *Cornell University*

The writer was recently presented with some specimens of Tertiary fossil shells, which are interesting because they appear to represent a complete replacement of calcite by gypsum.

The shells, whose structural features are well preserved, are mainly *Vasum*-like and *Clabalithes*-like forms. They were collected in Peru, South America, where they were found lying in the loose residual material derived from the weathering of a shale, and were distributed over a considerable area.

On superficial examination the specimens seemed to be normal calcareous shells; but closer study reveals occasional reflecting surfaces of gypsum crystals on the surface of the shell as well as in the cavities of the same. An acid test shows only slight and much localized effervescence, leading one to the conclusion that very little of the original carbonate of lime remains. The shells have retained practically their original shape and the surface irregularities are generally well preserved. Several of the specimens are unduly heavy due to the fact that the spiral cavities have been completely filled with gypsum.

Examination of thin sections of the shells under the microscope indicate quite clearly that gypsum has not only filled the shell cavities, but that the carbonate of lime of the shell itself has been almost completely replaced by that mineral. Some of the gypsum crystals in the cavities are quite large, several being noticed that were six millimeters in diameter. The structure of the spiral shell is well outlined by a dark substance which appears to be limonite and around which the gypsum has formed. Apparently the iron oxide was brought in and deposited around and in the calcite prior to its replacement by the gypsum.

Such a replacement as this can be explained by reactions which are common to the belt of weathering and would be expected to take place under certain favorable conditions. It seems curious that such replacements are not more common in view of the widespread occurrence of calcite and the not uncommon presence of sulphuric acid as a product of sulphide alteration under surface conditions. So far as the writer is aware, however, there seems little or no reference in the literature to such a replacement process, and therefore this case seems worthy of record.