

is interested in time-indicating strata, that this is a fabulous find. Some of the most significant facts concerning this laminated deposit are as follows:

1. The alternating microlayers of calcium carbonate and anhydrite are distinct from each other. This shows that a radical change in the concentration of the sea water occurred for each calcium carbonate-anhydrite pair. (These thin cycles are frequently called "couplets." Even though there is a third layer--the organic matter--in each cycle, the fact that this third layer is much thinner and less noticeable than the other two layers encourages the use of the term couplet.) As was explained in the section on the evaporites of northwest Alberta, calcium carbonate precipitates out of sea water before it becomes evaporated sufficiently to precipitate anhydrite (calcium sulfate). Since there is thus a distinct difference in sea-water concentrations at the times when the two chemicals precipitate out of the water, the calcium carbonate forms the first microlayer; and then the anhydrite is added later, after more evaporation takes place. Figure 19 is a photograph of three of the well cores of banded anhydrite studied by Dean. In the figure notice the thinness of the couplets, as judged by the scale of millimeters near the top. Dean found the mean thickness of the thousands of couplets he measured to be 1.1 to 2.0 millimeters.⁹

2. Horizontally, there is a remarkable uniformity of the couplet layers over a broad area of the Delaware basin. Some of the individual couplets can be traced laterally from well to well for a distance of 60 kilometers (37 miles), by noting the exact percentages of their chemical composition, and by correlating the thicknesses of the series of couplets immediately above and below.¹⁰ This is an indication that the water which was precipitating the layers was uniformly concentrated over a broad area, and was very quiet (non-turbulent).¹¹ Further evidence of the calm nature of the basin during the deposition of these layers is found in the fact that the latter contain no large amounts of terrigenous (land-derived) sediments, and no evidence of volcanic activity.

3. The thicknesses of the microlayers of calcium carbonate and anhydrite were found to be in proportions very similar to those precipitated upon evaporation of ordinary sea water. Thus, in each couplet, the calcium carbonate layer is much thinner than is the anhydrite, as one would predict from a knowledge of the calcium carbonate and calcium sulfate content of sea water. (See Table 1 for "total deposit" amounts from one liter of sea water, and Table 3 for the actual thicknesses of some of the mineral layers in the drilling cores studied by Dean.) Dean lists the thicknesses of the microlayers in 12,800 couplets which he carefully measured.¹² This consistent proportion of the two minerals in the couplets is more than sufficient evidence that the layers were being formed by actual evaporating sea water, rather than by some other fluid mixture or solution.

4. The thin organic layer which exists in most couplets is