if it were possible for it to grow as rapidly as a modern reef, more than 50,000 years would be required for development of the main 1,200 foot thickness. In fact, nearly 50,000 years would have been required, even without any interruptions of growth, or any spreading and leveling effect of waves. But the Capitan reef has numerous unconformities which represent periods of time when there were long delays in its upward growth. It also has large deposits of fossiliferous reef debris on the sides, which were evidently washed off from the upper parts of the reef as it grew. Thus at least several hundred thousand years must have been required for its formation. This of course does not include the very long periods of time which were required for the subsequent covering of the entire area with thousands of feet of sediments, which will be discussed below.

Another reason that such a long period of time is represented here is that what is spoken of as "the Capitan reef" is actually a series of reefs which grew parallel to each other. The newer reefs were farther from the shore, growing next to the fresher water in the large central basin, as is seen in Figure 18. As each new reef grew, it partially buried its predecessor. Thus a horizontal, as well as upward, reef growth was achieved. The reason for this horizontal advance was that reef-forming organisms thrive only on the side facing the sea, which brings oxygen-and-food-laden water. The water in the lagoon area (between the growing reef and the shore) is usually too stagnant to support active reef growth. The multiple structure of the Capitan reef, which resulted from these conditions, left a broad band of overlapping reefs around the Delaware basin. Obviously it took much more time to grow such a series of reefs than a single one, growing only upward, would have required.[5]

Another meaningful time indicator in the vicinity of the Capitan reef is the extensive series of alternating layers of evaporites and dolostone which extends landward from the reef. In Figure 18 the thick deposits which are labeled "Tansill," and "Yates," extending shoreward from the reef, are the formations which contain these interbedded evaporite and dolostone layers. At certain times while the reef was growing, and for a long period of time afterward, evaporative conditions existed next to the shore, and in the sediments on shore, just above the tide level. This resulted in the series of alternating layers of anhydrite and/or gypsum, and dolostone which we find today on the outer perimeter of the reef. (Anhydrite is calcium sulfate, and gypsum is calcium sulfate chemically bound to water molecules.) These alternating deposits are similar to the ones which lie next above the 20 sabkha cycles which we described from the Rainbow area in Canada. The alternating layers of anhydrite and dolomite in New Mexico and Texas evidently were formed on an arid shore in much the same way as those. This is especially indicated by the large nodules of anhydrite, the regular patterns of dessication cracks in the evaporite layers (due to periods of drying and sun baking), and the accompanying buried layers of windblown quartz sand.[6]

Regardless of the details of reef growth and arrangements of the parts of the Delaware basin, these features show that the deposits