surfaces before those surfaces were deeply buried under other layers. The marks, most of which were formed by creatures of kinds similar to those known today, show that the particular rock surface in question was exposed to the action of water and organisms on the sea bottom for a considerable time before being covered over. Since lithified limestone strata often form within the first few inches of sediments on the ocean bottom, it is easy to see that a slight change in bottom currents could expose the upper surface of the rock layer, making it available to the work of boring and building organisms.

Animals and plants which bore holes in the limestone surfaces, in nearly all cases do so by a slow dissolving process carried out by acid which they secrete. Certain kinds of algae, sponges, and snails are among the most common boring organisms. Frequently the holes and channels formed by these organisms are so distinct that the observer using magnification sees that the ends of invividual, previously cemented sediment grains were cut off. Thus, the bored channel shows the ends of the grains in much the same way as they would be seen after having been bored with a mechanical drill. This is definite evidence that the rock had hardened before the marine organisms carried out their boring process on it.

Along with, or following, the boring and partial disintegration of the limestone surfaces, encrusting organisms--including oysters, clam-type mollusks, bryozoans, lime-secreting marine worms, and sessile foraminiferids--frequently attach themselves to the rock surface.[7]

Whenever we find limestone layers which have their upper surfaces showing this boring and encrusting, we of course know that each such surface was exposed for an appreciable length of time before the layer was covered by other sediments. No noticeable amount of boring or of building of encrusting deposits could be accomplished in less than several months of time. The extensive results of these processes which are often found certainly must have required much longer than that for each surface showing the boring and encrusting. So wherever we find limestone showing such layers, we have to recognize not only the many years for the deposition and cementation of each carbonate layer, but also the additional periods for boring and encrusting.

One of the types of geologic deposit in which the bored and encrusted upper surfaces of the limerock layers can be observed is the Cretaceous chalk beds of the British Isles. Here the soft layers of chalk can be easily removed from the numerous, repeating hard layers which have the fossilized encrusting organisms built on to their surfaces. Similar series of encrusted layers of limerock are found in many other parts of the world. (These flat, hard layers are often called "hardgrounds.") A typical example is found in the Turonian chalk beds of England. The thin, hard layers, when they are removed and cleaned, show on their upper surfaces the work of various boring organisms; and are also encrusted with the