and readily identifiable.[8] Since the deposits of chalk are made up almost entirely of the skeletal remains of microscopic marine organisms, and possess very little other matter, it is evident that these beds were formed in a relatively quiet sea where the water was not seriously disturbed by any currents which could bring in foreign, land-derived sediments. When we remember that the chalk-producing organisms can form only a few millimeters of carbonate ooze per hundred years (at the most), we can see that at least several millions of years were required for the formation of these European chalk deposits. Then some time after the deposition was complete the land arose--or else the sea level became lower--leaving the chalk as a part of the continent.[9]

Methods of Sea-Floor Exploration

We mentioned earlier in this chapter that research cruises have revealed much about the sediments of the ocean by dredging the bottom, and by the taking of cores of sediments. The taking of cores is a more effective method of investigating the sea floor than is dredging, since each core is brought up as a relatively undisturbed column of the sediment layers, in their natural order.

It was shortly after the Second World War that ocean research vessels began to make real progress in developing better coring methods which could bring up long cores from the sea floor, even where the water was 2 or more miles deep. During this time, the Woods Hole Oceanographic Institution and the Lamont Geological Observatory--both located on the east coast of the United States--were very active in investigating marine life, sediments, and the sea floor. The Lamont Geological Observatory had been founded in 1949 by Dr. Maurice Ewing, a professor at Columbia University. Ewing was enthusiastic and tireless in developing a research team for investigating the sea floor, and during the next 20 years obtained a colossal amount of data from the many voyages made with the research vessels used by the team. The three primary types of research equipment used at sea were: (a) the echo sounder, which constantly records the exact water depth between the ship and the sea floor as the voyage progresses, (b) the seismic survey apparatus, and (c) the piston corer. The seismic survey equipment measures the thickness of the various deep layers of which the floor is composed, enabling the scientists to determine with a fair degree of accuracy the total thickness of sediments which lie on top of the deeper, igneous (non-sedimentary) foundation. In order to obtain a recording of the seismic waves which make this analysis of the floor possible, it is necessary to produce strong, artificial shock waves in the water by such means as detonating a charge of approximately one-half pound of TNT explosive out in the water at frequent intervals. The shock waves produced by the explosion travel through the water, pass into the ocean floor, and bounce back from the harder layers beneath.

In the early days of the Lamont Geological Observatory's explorations, Ewing greatly improved the piston coring device, so that cores of as much as 20 meters length could be brought up intact in