

A FLORIDA SHELL MOUND. BY U. F. GLICK.

These old shell mounds are quite numerous on the Atlantic coast of Florida, and are located principally on both shores of the salt water lagoons, the greater number being found on the western or mainland shores and near the water.

The mound in question is on the western shore of the Halifax lagoon, and within the town limits of Daytona, Volusia County, Florida. It is an enormous "kitchen midden" or back door refuse heap, covering at least an acre of surface ten feet thick, and containing something like four hundred thousand cubic feet of shells, bones and pottery. We had a good opportunity of studying the mound, measuring sections, etc., as it was being hauled away to construct streets and roads. More than half this enormous pile of rubbish has been removed in the past two years, opening up the mound in its various features to the curious student and archaeologist.

The contents of the heap are arranged in layers or strata of shell and soil, the layers varying in thickness in different sections (as per chart), the rule being a layer of shells from two to three feet in thickness, and resting on this from eight to ten inches of soil. There are two or more such formations of decomposed shell soil found between the bottom and top, the first being from three to four feet above the general level, which is from three to four feet above low tide in the lagoon near by. Above this soil strata is another of shell two feet thick, followed by another of soil, several feet more of shell reaching to the top. The surface of the mound has quite recently been covered with a heavy growth of forest trees, such as live oak, water oak and wild orange, some of these several hundred years old. A portion of the mound is enclosed, and forms part of the grounds of a Daytona resident. These grounds are rich in tropical and semi-tropical plants and trees, the aloe, banana and tropical pawpaw growing luxuriantly with the fig, oleander and orange. Shells, bones and pottery form the principal part of the contents of the mound, about 95 pt. shell, 5 pt. bone, pottery, roots, etc. The orange and live oak roots find their way through the ten feet of shell and soil into the moist earth beneath, making all imaginable crooks and angles on their way down.

The oyster is the shell found in greatest abundance. The small salt-water clam, conch, quahaug clam and sea-snail follow in the order named. When the water is not too fresh, the oyster is found in the Halifax lagoon. The other shells belong to the ocean. The inflow of fresh water often destroys the oyster. Evidence of this is seen in the mound by a layer of oyster shells being covered by one of the small clams from the ocean beach. The rough (*Fulgur Canaliculatas*) and smooth (*Pyralus Canaliculatas*) conches are distributed throughout the heap. The larger

of these are often broken into, to more easily obtain the animal, the large sea-snail being treated in the same manner. The question may be asked as to how the thick, heavy walled shells were broken, as no stone implements were found. By examination of the rough exterior of the conch (*Fulgur canaliculatas*), in it may be found an excellent implement for the purpose. Bones and pottery are also found throughout the mass. The bones are chiefly those of animals taken in the chase, deer, bear, lynx, alligator, dog and fish, of the latter only the vertebrae remains. The greater portion of these bones crumble to pieces on exposure to the air. The pottery is almost entirely fragmentary, no whole vessels being found to my knowledge, however, the restorations which have been made from large fragments would indicate vessels of ten to twelve gallons capacity. The pottery of the lower layers is rude and rough, and without any ornamentation whatever, while that taken from the upper strata is better made and with some efforts at ornamentation.

The size of these aboriginal cooking vessels would seem to prove that the living shell was heated or boiled to more easily obtain the animal. Shells of the quahaug clam (*Venus mercenaria*), abundant in the refuse heap, are now rare on the adjacent coast. Attempts have been made to determine the age of these ancient heaps of rubbish, but such determination in the light of present data, may be quite conjectural. However, from the evidence it is obvious that they are not recent, but must run far back into the dim ages of the past. It is hoped that further investigation may throw more light upon the manners, customs, habits and history of the people through whose instrumentality these immense accumulations were formed.

A NOTE ON ROCK FLEXURE. BY E. M. KINDLE.

The phenomenon of rock flexure is familiar enough, as it occurs in anticlines and synclines in many regions. These natural bendings of rocky strata, however, afford no data for determining the actual values of the factors producing them, the pressure and the time during which it has acted. The time factor required to produce bending without fracture in a solid stone is so large as to have prevented any except accidental experiments in this direction.

Such an experiment I discovered two or three years ago in progress in a country cemetery one-half mile south of the village of Nineveh, Ind. Over one of the graves there has been placed a horizontal marble slab, which was formerly supported by a brick wall eight or ten inches high surrounding the grave. At the time of my first visit this wall had crumbled down along the greater portion of each side of the slab, leaving it supported mainly by the portions which still