

proved from beds of marl or lacustrine limestone full of freshwater shells, or from fine silt with leaves, fruits, and insect remains. Such deposits are growing abundantly at the present day, and they occur at various horizons among the geological formations of past times. The well-known Nagelflue of Switzerland—a mass of conglomerate attaining a thickness of more than 1000 feet—can be shown from its fossil contents to be essentially a lacustrine deposit (Book VI. Part IV. Sect. ii. § 2). Still more important are the ancient Eocene and Miocene lake-formations of North America, whence so rich a terrestrial and lacustrine flora and fauna have been obtained (Book VI. Part IV. Sect. i. § 1).

(c) Old sea-bottoms are vividly brought before us by beds of marine shells and other organisms. Layers of water-worn gravel and sand, with rolled shells of littoral and infra-littoral species, unmistakably mark the position of a former shore-line. Deeper water is indicated by finer muddy sediment, with relics of the fauna that prevails beneath the reach of waves and ground-swell. Limestones full of corals, or made up of crinoids, point to the slow, continuous growth and decay of generation after generation of organisms in clear sea-water.

(d) Variations in the nature of the water, or of the sea-bottom, may sometimes be shown by changes in the size or shape of the organic remains. If, for example, the fossils in the central and lower parts of a limestone are large and well-formed, but in the upper layers become dwarfed and distorted, we may reasonably infer that the conditions for their continued existence at the locality must have been gradually impaired. The final complete cessation of these favorable conditions is shown by the replacement of limestone by shale, indicative of the water having become muddy, and by the disappearance of the organisms, which had shown their sensitiveness to the change.

(e) The proximity of land at the time when a fossiliferous stratum was in the course of accumulation may be sufficiently proved by mere lithological characters, as has been already explained; but the conclusion may be further strengthened by the occurrence of leaves, stems, and other fragments of terrestrial vegetation, with remains of insects, birds, or terrestrial mammals, which, if found in some numbers in certain strata intercalated among others containing marine organisms, would make it improbable that they had been drifted far from land (see p. 765).