

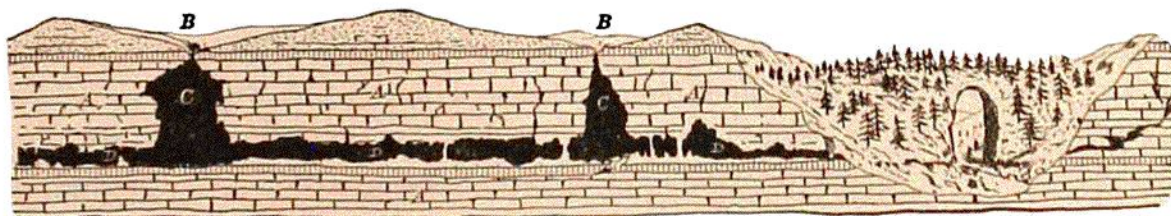
*Spondylus*, *Patella*, *Fusus*, *Purpura*, and *Littorina*, in which the inner pearly layer is aragonite, and the outer calcite. The shells of most Gastropods and of Cephalopods are aragonite; and Corals, including the Milleepores, are mainly so; while shells of Rhizopods, Echinoderms, and Brachiopods consist of calcite.

Further, if the limestone contains iron or manganese combined with the calcite, carbonated water will bring the iron to the surface, or the iron carbonate, or the manganese, for oxidation, weakening and discoloring the rock. The action on feldspar, above mentioned, is a common means of destruction in the case of granites and related rocks.

(b) *Process of draining limited.* — But it is also to be observed that these effects occur only so far as the rocks are porous. The fossils of compact argillaceous sandstones and shales — common kinds of fossiliferous rocks and some dating from the Cambrian — are seldom drained out or injured at all by infiltrating waters, except when near the surface. The iron and manganese taken out of some crystalline limestones are removed only for a short distance inward; but the process destroys the limestone as it eats in, and is thus enabled to erode farther. Deep below the surface the same rocks are solid and not discolored. All deep-water rocks are moist, but the moisture is ordinarily stationary unless a surface drought reaches downward, or an invasion of heat comes upward from below, when the moisture thus lost may be later replaced. Even beds of salt in subterranean rocks are not dissolved away.

(c) *Surface erosion.* — Waters containing carbonic acid or humus acids eat away the surface of solid limestone, fluting precipices, widening crevices, excavating caverns. They often leave calcareous fossils projecting slightly above the surface, and develop with great perfection silicified kinds. The length of the caverns thus made in the Carboniferous limestone of Kentucky,

135.



Making of caverns in limestone. Shaler.

a rock 200 to 1000 feet thick, is estimated by N. S. Shaler to amount to 100,000 miles. The work is begun by the descent of waters along joints in the rock, whenever there is a chance for discharge below, by running down or trickling along between layers of the limestone. The process and result are illustrated in the above figure by Shaler. In the movement of the waters, the fissure or joint (B) becomes enlarged to a "sink-hole," and excavation begins between the layers. The end is a great cave, having, it may