

by deposition from the same or some other mineral solution. Geodes are common in veins of ore, and also occupying the cavities of amygdaloids.

The concentric structure is produced also by *consolidation progressing inward from the exterior* — a *centripetal* process. Spheroidal masses of sand, often of oblong-spheroidal, as well as other shapes, colored deeply with iron oxide, are often hard outside, and have mere loose sand within; or they have one or more concentric layers of ferruginous color within, or a series of concentric shells of sand, and sometimes also a loose ball, as in Fig. 75.

A concentric structure is produced also by decomposition along fracture-planes, when these divide a rock into small portions (as explained on page 127), and also by alternate heating and cooling (page 337).

2. Original Positions of Strata.

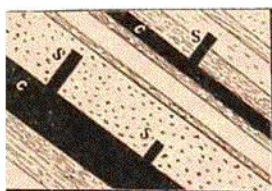
Strata in their original positions are commonly *horizontal*, or nearly so. The level plains of alluvium and the extensive delta and estuary flats show the tendency in water to make its depositions in nearly horizontal planes. The deposits formed over soundings along seacoasts are other results of sea action; and here the beds vary but little from horizontality. Off the coast of New Jersey, for 80 miles out, the slope of the bottom averages only 1 foot in 700, — which no eye could distinguish from a perfect level. Over a considerable part of New York and the States west and southwest, and in many other regions of the globe, the strata are actually nearly horizontal at the present time. In the Coal-formation, the strata of which have a thickness, as has been stated, of 5000 to 15,000 feet, there is direct proof that the beds were horizontal when formed; for in many of the layers there are fossil trees or stumps standing in the position of growth, and some-

times several of these rising from the same layer. Fig. 85 represents these tilted coal-beds *c, c*, with the stumps *s, s, s*. Since these trees must have grown in a vertical position, like all others, and as now they are actually at right angles to the layers, and parallel to one another, they prove that the beds originally were horizontal. The position of shell accumulations and coral reefs in modern seas shows, further, that

all limestone strata must have been nearly or quite horizontal when they were in the process of formation.

Variations from horizontality. — (1) Some variation from horizontality may be produced by the slope of the sea-bottom in certain cases; and in lakes, off the mouths of rivers (Fig. 86), quite a considerable inclination may result from the fact that the successive layers derived from the inflowing waters take the slope of the bottom on which they fall.

85.



86.

