among the argillaceous strata of the Carboniferous system. The concretionary olive-green shales and mud-stones of the Ludlow group, in the Upper Silurian system, exhibit on weathered surfaces, all the way from South Wales into central Scotland, a peculiar structure which consists in the development of concentric spheroids varying from less than an inch up to several feet in diameter, the successive shells being separated from each other by a fine dark ferruginous film (Fig. 215). The lines of stratification are sometimes well marked by layers of fossils, but the rock splits up mainly along the curved surfaces separating the concentric

shells. Concretionary structures are found also in rocks formed from chemical precipitation, as for instance in beds of rock-salt. The pseudoconcretions probably due to pressure (stylolites) have been described on (p. 537).



Fig. 215.—Concretionary structure in Upper Silurian shales, Cwm-ddu, Llangammarch, Brecknockshire (B.).

Alternations and Associations of Strata.—Though great variations occur in the nature of the strata composing a mass of sedimentary rocks, it may often be observed that certain repetitions occur. Sandstones, for example, are found to be interleaved with shale above, and then to pass into shale; the latter may in turn become sandy at the top and be finally covered by sandstone, or may assume a calcareous character and pass up into limestone. Such alternations bring before us the conditions under which the sedimentation took place. A sandstone group indicates water of comparatively little depth, moved by changing currents, bringing the sand, now from one side, now from another. The passage of such a group into one of shale points to