ore," is common also in beds of shale, in layers of a few inches to a foot or more in thickness, and sometimes forms beds beneath the fire clay that underlies a coal-bed. Another kind of clay-ironstone is hematite or iron-sesquioxide, looking usually as stone-like as the preceding, but distinguished by its affording a red powder. These ore-masses are often siliceous, from disseminated silica, and therefore very hard.

These ores, but especially the first two, are a very important source of iron in coal regions. The nodules are of concretionary origin; that is, were made by the concreting together of iron oxide from iron-bearing salts carried down into marshes, and are not transported stones rounded by friction.

3. **Clay-beds.** — A bed of fire clay has been mentioned as usually underlying a coal-bed. The clay varies in purity on one side down to sandy clay, or to carbonaceous shales, and on the other to the purest of white clays, valuable for making pottery, fire-brick, and tile (see page 81). The thickness of the beds varies from a few inches to sometimes half a dozen feet. They are apt to be more or less discolored by iron-oxide, so as to make cream-colored instead of white pottery; and sometimes the bed overlies a bed of iron ore, and is pure white only at top.

The very common presence of pure white clays in the Coal-measures is a consequence of the production of carbonic acid, and also of organic acids, by the vegetable decomposition that goes on indefinitely in the plant beds. The sediments, whether of sand or mud, contain more or less feldspar; and the action of these acids on the feldspar removes the alkali and produces the clay (page 129). The clay so made will be at first colored by iron oxide, if any iron-bearing mineral is present (the common fact); but the vegetable decomposition going forward results in partly deoxidizing the iron oxide (reducing it to FeO); and then the iron in this state is taken up by the acids and carried off in solution (page 124) until the blanching in many cases is complete through part or all of a thick bed. The abundance of carbonic acid, set free under the conditions described, accounts also for the very frequent occurrence of iron-carbonate (or siderite) mentioned above.

The presence of potash or soda in the clay is probable evidence of the presence of undecomposed feldspar, and of over 7 per cent of it to 1 per cent of the alkali — a point of geological as well as economical interest; for such clays are fusible and not properly fire clays, and therefore are not suitable for fire brick. The presence also of lime and iron gives the clays fusibility. On Ohio clays, see *Ohio G. Rep.*, v., 656.

4. **Salt.** — Saline waters have been obtained in many regions from borings down to the Carboniferous strata, but usually they are only saline enough to be spoilt water. In Michigan, strong brines are supplied from the Sub-carboniferous beds, and they are used for the manufacture of salt in the Saginaw valley. The same beds contain extensive deposits of gypsum. In Ohio, productive brines come partly from the same horizon. Those of Kanawha in West Virginia are from the lower part of the Coal-measures; and Kansas beds of the same period have been found to afford brines.