The ore has been found as much as 175 feet below the surface, which was approximately the maximum depth of the mountain ore mines, owing to the difficulty of keeping them free from water and also owing to the tendency for the shafts and drifts to be closed or rendered dangerous on account of the squeezing action of the clay associated with the deposits, which slowly moved downhill when saturated with water. It is probable that few of the bodies of limonite ore extend much below the ground-water level and that they scarcely exceed a maximum depth of 300 feet, which is deeper than any of the mines of the region. In many of the valley-ore mines the limonite occupied shallow basins in the limestones and solid limestone was found at depths less than fifty feet. Rock in place is now exposed in many of the old limonite pits. In the mountain-ore mines the ore became leaner or changed to ore high in sulphur in lower levels but still continued to the greatest depths reached.

The iron ore is almost invariably associated with quantities of white, yellow, or bluish-black clay formed by the decomposition of shaly strata which are interbedded with Cambrian sandstones and quartzites and the Cambrian and Ordovician limestones. Besides the clay, masses of jasperoid quartzite are commonly encountered in the mountain-ore mines, and small and large rounded segregations of black chert occur in the valley ores. The fragments of jasper represent portions of the original Cambrian sandstone that have undergone less alteration.

Within the clay the iron ore occurs either in the form of isolated masses or in rather definite veins that have a maximum width of forty feet. Even in the best ore bodies, considerable clay and ocher are present, ranging from one-third to one-fourth of the material removed from the mine. In the average mine the clay washed from the ore constituted from 50 to 75 percent of the product. The ore in the veins invariably is cavernous and contains considerable clay within the cavities.

Yellow ocher is almost everywhere associated with the ore, as would be expected, for ocher is an intermediate product between the clay and the iron ore. In the ocher the limonite has not been segregated but occurs in the form of finely disseminated particles intimately mixed with the clay.

**PHYSICAL CHARACTER**

The limonite ore occurs in several different forms, some of which have received distinctive names by the miners, such as bombshell or pot ore, pipe ore, and wash ore.

The bombshell or pot ore consists of more or less spherical masses of limonite that range in diameter from one inch to two feet. They are geodes of limonite; many of them are hollow or filled with water and others are fairly well filled with white or drab clay or fine white to pink sand. The interior of these geodes almost invariably presents a black lustrous botryoidal surface, which in some specimens is markedly iridescent. The dark color of the interior suggests the presence of considerable manganese, and analyses commonly show this metal to be present, although the lacquer-like surface is mainly, if not en-