

ore which costs \$2.50 per ton, or \$6.25 for the quantity required for one ton of iron.

The Carbonate of Iron in the Coal basins are next to be noticed. They occur in the three coal fields in Maryland, but have been little explored, except in that nearest Cumberland which is accessible by the Valleys of Jennings's Run, Braddock's Run, George's Creek and the Potomac River. I have abundant material for a full account of this coal field and its ores, but the plan of the present report does not permit me to embrace these details.

I may state, however, that the carbonate of iron of the coal regions consists of

1. Flattened nodules, called *balls* by the miners. These are embedded in shales and sometimes in fire-clays.
2. Regular strata, varying in thickness from an inch or two to several feet. These are intercalated either between beds of shale or of coal.

I have a complete section made from actual measurement of the whole thickness of the Potomac Coal Field, showing the position and thickness of each bed of sandstone shale, coal, limestone, iron ore, &c. This was made whilst professionally engaged in surveys some years since and will be availed of in a subsequent report.

Whilst many of the strata contain ores in too small quantity to be profitably mined, there are others possessing a high industrial value. One of these, about one hundred and fifty feet below the main coal, contains three courses of nodules and one band of ore, which have been extensively used, and proved to produce about 33 per cent. of foundry iron of the best quality.

About forty feet below this is a very important stratum of ore of the variety called *black band*, so much prized in England and Scotland. The result of very careful surveys which I made in that region several years ago indicated that this band of ore will prove highly valuable for iron manufacture. It rests upon a seam of coal three inches thick which will enable the miner to take it out for seventy-five cents per ton. As mined it contains a sufficient amount of coal to roast it, when the fire has been started.

It requires $3\frac{1}{2}$ tons of raw ore or $2\frac{1}{2}$ of roasted ore to produce one ton of iron.

The only points at which it was developed were on Koontz's Run and Mill Run, which head in the Savage Mountain and flow into George's Creek.

At no great distance below this I found upon Koontz Run a solid stratum of ore, five feet thick, containing 25 per cent. of iron. Still lower in the series are numerous strata containing both bands and balls of very superior ore which have not yet been brought into use.

It is from ores of this kind that nine-tenths of the iron of Great Britain is made, and a good deal is also made from them in Pennsylvania and Ohio. The day is probably not distant when they will be largely used to increase the products of iron in Maryland.

I have as yet had no opportunity to examine the ores of the Meadow Mountain, or of the Youghiogheny coal field. From the latter I have specimens of the richest ores of this kind.

Iron Pyrites.—(Sulphuret of Iron.)

This material occurs at several points in the cretaceous clays, (No. 21.) At Cape Sable, on the Magothy river, in Anne Arundel county, it was formerly used as a material for the manufacture of alum and copperas. It also occurs, in apparently large quantity, near Oxon creek, in Prince George's county, south of Washington. An improvement, called the *Monier process*, has been recently brought into use, by which sulphuric acid is readily produced from iron pyrites more cheaply than from sulphur. It is not improbable that the pyrites in this range will be brought into use for this purpose.

ORES OF COPPER, LEAD, ZINC, CHROME, MANGANESE AND GOLD.

There are certain portions of our State containing copper and other ores, (exclusive of *deposits* of iron ores,) and which are termed metalliferous districts. Some of these occupy small isolated areas, whilst others constitute long ranges.