

circumstances of change, it may become iron ore of various densities and compositions; and thus is explained the origin of iron ore of every age.

Bog manganese, or *Wad*, is almost as widely diffused through the rocks as the peroxide of iron; but its quantity is so small that it exerts but a slight influence in producing geological changes, and will therefore be passed over without description. The same remark will apply to sulphate of lime, carbonate of magnesia, chloride of calcium, etc., which occur in most natural waters, and sometimes form deposits of small extent.

*Petroleum, Asphaltum, etc.*—The great amount of bituminous matter with which certain springs are impregnated renders them deserving of notice as existing causes of geological change, capable of explaining certain appearances in the older rocks; many of which are highly bituminous. In the Burman Empire, a group of springs or wells at one locality yielded annually 400,000 hogsheads of petroleum. It is also found in Persia, Palestine, Italy, and the United States. In this country it has the name of Seneca Oil, from having been early observed on the surface of springs at Seneca, in New York. It is thrown up in considerable abundance, also, at the salt borings on the Kenawha river, in Ohio; where a few years ago a large quantity of it, floating on the surface of a small stream, took fire, and the river for half a mile in extent appeared a sheet of flame. A deposit of coal oil near Titusville, Crawford county, Pennsylvania, upon Oil Creek, is now (1860), attracting much attention.

In Palestine the Dead Sea is called the lake Asphaltites, from the asphaltum which formerly abounded there. But the most remarkable locality of bituminous matter is the Pitch Lake, in the island of Trinidad, in the West Indies. It is three miles in circumference, and of unknown thickness. It is sufficiently hard to sustain men and quadrupeds; though at some seasons of the year it is soft.

Mineral pitch was a principal ingredient in the cement used in constructing the ancient walls of Babylon, and of the temple in Jerusalem. It has lately been employed in a similar manner, and it is said very successfully, to form a composition for paving the streets of cities.

The various bitumens are produced from vegetables by the processes by which these are converted into coal in the earth.

Hence the bitumens that rise to the surface of springs, or form inspissated masses on the earth's surface, or between the layers of rocks, are supposed to be produced from vegetable matters buried in the earth; and to be driven to the surface by internal heat; and the fact that such deposits usually occur in the vicinity of active or extinct volcanos, gives probability to this theory.

*Phenomena of Springs.*—Water is very unequally distributed among the different strata; some of them, as the argillaceous, being almost impervious to it; and others, as the arenaceous, admitting it to percolate through them with great facility. Hence, when the former lie beneath the latter in a nearly horizontal position, the lower portions of the latter will become reservoirs of this fluid.