

when it approaches an isolated pole; the north end of the needle pointing to the pole if it be a south one, and the south end doing the same if it be a north one. In other words, along these dotted lines there appears to be an infinite number of poles, which are called *Lines of Polarity*. They are easily traced out by moving the compass over the surface.

Hand specimens of lava from Mts. Etna and Vesuvius, and of obsidian, from Mt. Ararat, in our possession, show magnetism and polarity. Observers have noted the same upon the lava of Mt. Ararat, 7,280 feet above the ocean. Bischoff, in his "Chemical and Physical Geology," has pointed out a large number of cases; but nowhere, save in the cases that have fallen under our own observation, have we seen described the phenomena of opposite poles in close proximity, and of lines of poles.

*Theoretical Suggestions.*—The existence of magnetic iron ore in so many rocks, and the fact that it often possesses polarity, leads naturally to the conclusion that this must be the cause of the magnetism and polarity of rock, and probably it is so. Yet some of the phenomena seem not fully explained on this supposition. Bischoff says, that in basalt "the magnetic polarity bears no definite proportion to the density of the rock, and consequently to the greater or less amount of magnetic iron ore, or hornblende; and further, that when the surface of the rock is decomposed, and the magnetic iron ore converted into hydrated peroxide of iron, the magnetic action of the rock is not weakened," although the peroxide is not magnetic. Nor does this explanation account for the production of opposite poles on the same surface, confusedly mixed together; nor for lines of polarity, extending over many feet of surface. But if the phenomena are not produced by magnetic iron ore, we have no theory to offer.

*Relative Age of the Unstratified Rocks.*—In the stratified fossiliferous rocks the relative age of the different groups is determined by their position; that is, the oldest are at the bottom, and the newest at the top; unless we can prove disturbance and inversion subsequent to their original formation. It has been usual to regard the unstratified rocks as lying in a reverse order; that is, the highest is the oldest, and they become newer as we go downward. This is undoubtedly true, if we suppose these rocks to be the result of melted matter, which has continued to cool deeper and deeper, so as to form a thicker crust, and some of which has been thrust up through the fissures in the stratified