

strata. The ores occur in this way at Lake Superior. Such masses of ore are almost always in crystalline metamorphic rocks. They have been heated—probably subjected to the action of hot water.

There is another species of iron ore very commonly associated with these. It is *magnetite*. This is composed partly of peroxide of iron and partly of *protoxide* of iron—that is, iron with only one proportion of oxygen combined with it. Magnetite is richer, therefore, than hæmatite—ton for ton of ore it contains more iron. While powdered hæmatite is red, and powdered limonite, brownish yellow, powdered magnetite is black. Magnetite attracts the magnetic needle. “Lode-stone” is magnetite—so-called, probably, because it *leads* by its attraction. Now, magnetite is often found in great imbedded masses, like hæmatite, and is regarded one of the most desirable of ores. Often hæmatite and magnetite are mingled together in the same bed; and the indication is, that one is capable of conversion into the other.

We often find, also, considerable formations in which much iron ore exists in a disseminated state, imparting a highly ferruginous character to the rock, but constituting only a very “lean ore.” It may be a hæmatitic quartzite or a silicious hæmatite. We find all stages of transition from pure ore masses to simple rock. The theory is often suggested to me by the conditions under which these metamorphic ores exist, that they are simply accumulations of ores gathered together from wide contiguous regions in the rock. It seems settled that ores of lead, zinc, and silver are thus eliminated from the country rock, as was explained in the last Talk. Hot, alkaline waters are supposed to have had principal agency in the work. But where the native metals occur, as gold, silver, or copper, we must suppose that a dry fusing heat has been present to reduce the ores previously formed, or drive together metallic particles disseminated through the rock; or we must suppose that an electro-chemical deposition has taken place from a metalliferous solution, as in the electro-plating process. In some way, at least, particles of a particular kind become