

the theory; and it must be owned that the direction of veins in different mining districts varies so entirely that it seems to depend on lines of fracture, rather than on the laws of voltaic electricity. Nevertheless, as different kinds of rock would be often in different electrical conditions, we may readily believe that electricity must often govern the arrangement of metallic precipitates in a rent.

“I have observed,” says Mr. R. Fox, “that when chloride of tin in solution is placed in the voltaic circuit, part of the tin is deposited in a metallic state at the negative pole, and part at the positive one, in the state of a peroxide, such as it occurs in our Cornish mines. This experiment may serve to explain why tin is found contiguous to, and intermixed with, copper ore, and likewise separated from it, in other parts of the same lode.”\*

*Relative age of the different metals.* — After duly reflecting on the facts above described, we cannot doubt that mineral veins, like eruptions of granite or trap, are referable to many distinct periods of the earth's history, although it may be more difficult to determine the precise age of veins; because they have often remained open for ages, and because, as we have seen, the same fissure, after having been once filled, has frequently been re-opened or enlarged. But besides this diversity of age, it has been supposed by some geologists that certain metals have been produced exclusively in earlier, others in more modern times, — that tin, for example, is of higher antiquity than copper, copper than lead or silver, and all of them more ancient than gold. I shall first point out that the facts once relied upon in support of some of these views are contradicted by later experience, and then consider how far any chronological order of arrangement can be recognised in the position of the precious and other metals in the earth's crust. In the first place, it is not true that veins in which tin abounds are the oldest lodes worked in Great Britain. The government survey of Ireland has demonstrated, that in Wexford veins of copper and lead (the latter as usual being argentiferous) are much older than the tin of Cornwall. In each of the two countries a very similar series of geological changes has occurred at two distinct epochs, — in Wexford, before the Devonian strata were deposited; in Cornwall, after the carboniferous epoch. To begin with the Irish mining district: We have granite in Wexford, traversed by granite veins, which veins also intrude themselves into the Silurian strata, the same Silurian rocks as well as the veins having been denuded before the Devonian beds were superimposed. Next we find, in the same county, that elvans, or straight dikes of porphyritic granite, have cut through the granite and the veins before mentioned, but have not penetrated the Devonian rocks. Subsequently to these elvans, veins of copper and lead were produced, being of a date certainly posterior to the Silurian, and anterior to the Devonian; for they do not enter the latter, and, what is still more decisive, streaks or layers of

\* R. W. Fox on Mineral Veins, p. 38.