

the same mass, in different parts of its extent, will vary greatly in relative proportion of the constituent minerals.

The pyrrhotite, pyrite and copper pyrite are regular constituents of the norite occurring in small quantities all through the various masses, but like the other constituents being found more abundantly in certain places, so that a gradual passage can often be observed from the normal norite through a pyrrhotite norite to masses of pure ore. (Fig. 2.) Sometimes on the other hand the ore occurs in masses sharply separated from the Norite. (Fig. 3.) These segregations of ore are in the great majority of cases situated at or near the edge of the norite masses, and Vogt regards them as strictly comparable to the basic borders or edges so often observed about granites and other igneous rocks as before mentioned, in which the basic portions are sometimes marked by similar gradual passages and in some cases by sharp transitions. These sharp transitions are easily explicable when one considers that any part of the magma having once separated itself from the rest, being possessed of a decidedly different specific gravity, and perhaps of a different degree of fluidity, would, if the whole mass were caused to move, keep itself separated by a comparatively sharp line from the rest of the molten mass. Figs. 2, 3, 4, 5 and 6, taken from Prof. Vogt's paper, will serve to illustrate the mode of occurrence of these ores. The scale is given in each case in meters.

Furthermore Vogt states—and this is a point which has a very practical bearing with those who are interested in our deposits—that in Norway, although it is of course impossible to establish a mathematical ratio between the area of the gabbro mass and the quantity of ore in the associated ore deposits, nevertheless experience has shown that the deposits associated with the small gabbro masses are always unimportant and that all the larger ore bodies are found in connection with the larger gabbro areas, as might be expected if his explanation of the origin of the ore is a correct one.

The nickel deposits of Varallo in Piedmont, Italy, which were worked from 1860 to 1870, are very similar in almost every respect to those just described from Norway, occurring like them in Norite near the contact with the country rocks. A similar association of nickeliferous pyrrhotite with a rock of the gabbro family also occurs at the Lanchashire Gap mine in Pennsylvania and at Schweiderich in Bohemia.