

[From the PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Vol. XXXVIII.]

PETROGRAPHICAL DIFFERENTIATION OF CERTAIN DYKES OF THE RAINY LAKE REGION. By Dr. A. C. LAWSON and F. T. SHUTT, M. A., F. C. I., Ottawa, Ont.

[ABSTRACT.]

One of the writers has described in a former paper certain diabase dykes of the Rainy Lake region. The present paper is the result of a more critical investigation of the same dykes, with others since discovered, having special reference to the petrographical differentiation of the dyke rock in passing from the contact walls to the centre of the dyke. The fact that dykes are very commonly fine grained at their margins and coarse grained in their middle parts is familiar to all geologists. On examination of the dykes in question, it became apparent that this variation in the physical appearance of the dykes is not simply one of *texture* or degree of coarseness of the constituent minerals, but that it is rather the incidental concomitant of important *structural*, *mineralogical* and *chemical* variations which appear very constantly in the same way in different dykes. These variations are chiefly as follows: *Structural* — the passage from the structure of a very fine textured diabase-porphyrite at the contact walls through the characteristic ophitic structure of diabase at a few feet from the contact to the granular structure of gabbro in the middle part of the dyke. (Illustrative drawings were submitted.) *Mineralogical* — the passage from a quartzless rock at the contact to a quartzose one towards the middle of the dyke. *Chemical* — the passage from a more basic rock near the contact to a more acid towards the middle. The results of complete or partial analyses by Mr. Shutt of series of specimens taken across a number of dykes were given in tabular form.

The principal object of the paper is to adduce specific evidence that from a rock mass which is a geological unit of very limited extent, there may be taken specimens which under current methods of classification would receive different names and be relegated to different classes. The fact that a series of specimens, in any given locality, differ from one another texturally, structurally, mineralogically and chemically, is no proof that they are not geologically the same rock crystallized from the same magma. The regular textural and structural differentiation of the dykes from wall to middle is inferred to have been caused by the different rate of cooling under constant pressure. The chemical differentiation is probably due to a selective crystallization of the more basic minerals in the earlier stages of solidification accompanied by the transference of acid residues from the sides to the middle by the agency of included water.