One disadvantage of the device is related to the absorption characteristics of Polaroid film which shows a slight residual color by transmitted light. This feature is discussed in detail by Grabau[4] who shows the transmission to be nearly constant between 4800 and 6700 Å, the range within which the eye is most sensitive. It is possible to compensate for a part of the differential absorption outside this range by the use of certain Jena optical glass color filters, but this is not thought to be necessary because of the satisfactory results obtained with Type II Polaroid alone. Another possible objection is that the color seen in each quadrant is produced by light passing through different parts of the mineral or cut stone. This is of no practical importance, however, since four pieces of Polaroid are in contact, and by slightly moving the dichroscope in relation to the mineral during observation, any effects due to reflection from facets, or unequal thickness, are quickly observed.

For use with the microscope in a manner similar to the Leiss dichroscope ocular, the reoriented Polaroid disc described above could be mounted in the cross-hair position in a low power Huygens ocular, or set into a plate to be inserted beneath a Ramsden or positive ocular. As stated in connection with the Leiss ocular, both polarizer and analyzer must be removed, and the light should be received directly instead of from the mirror.

[4] Grabau, M., The optical properties of Polaroid for visible light: *Jour. Opt. Soc. Amer.*, **27**, 420–424 (1937).

BOOK REVIEW

THE GEOLOGY OF THE ANORTHOSITES OF THE MINNESOTA COAST OF LAKE SUPERIOR. Frank F. Grout and George M. Schwartz. *Bull.* **28,** Minnesota Geological Survey, University of Minnesota Press, 1939, 119 pp., 49 figs., 6 pls.

This report is based primarily on a detailed study of the geology of an area of about 200 square miles along the north shore of Lake Superior. The rocks comprise a series of Keeweenawan volcanics, mostly basalts but with rhyolites and minor sediments, the whole intruded by diabase sills. With the latter there is locally closely associated a red granite. They dip about 10° SE and overlie the great differentiated Duluth gabbroic sheet, forming part of the north limb of the Lake Superior geosyncline.

The anorthosite of the area has proven to have a rather peculiar origin. It occurs widely distributed in the olivine diabase sills, as fragments varying in size from single plagioclase crystals up to over a quarter of a mile across. Most are a few yards across. Subordinate amounts of other rocks, gabbros, rhyolite, and basalt are locally associated but are not abundant. Anorthosite fragments are also found in red granite and in amygdaloidal basalt flows. They are interpreted as picked up by the magma during its rise from the depths and are referred to a probable source in the anorthosite facies of the Dultuh gabbro sheet, which dips at depth beneath the area. Many anorthosite fragments are near the top of the diabase sheet and some are near the bottom. The authors conclude that the specific gravities of anorthosite, if included without being much heated, would be heavier than the liquid diabase, but if immersed for a long time, or immersed in the depths where all rocks are hot, might be lighter. This is an interesting sidelight on the much mooted problem of whether early plagioclase crystals sink or float in diabasic magma. Data are given on the composition of the plagioclases of diabase and of anorthosite.

A short chapter is devoted to possible economic uses of the anorthosite fragments.

The report sheds little light on the general problem of the origin of anorthosite as such but gives an excellent and detailed description of a most unusual development of a somewhat perplexing petrologic phenomenon.

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