

which might contain cavities. The origin of the Lanikai minerals can only be determined, therefore, by further study of the breccia and the flows.

Attention was directed to the somewhat altered condition of the Lanikai basalts in the article (page 379). The alteration takes the form of rather feeble chloritization. Providing that it can be convincingly demonstrated that this effect is confined to the vicinity of the latest eruption center, and is not due to superficial alteration, then it will be necessary to agree with Dr. Stearns' hypothesis that it is due to hydrothermal activity. Since it is hardly likely that zeolites and minerals associated with them could survive hydrothermal alteration, it is necessary to grant either that they were produced from the solutions which brought about the alteration, or were introduced later.

Turning in conclusion to the general question of the genesis of zeolites in basaltic lavas, there can be little doubt that at least two modes of origin are possible. They may represent the last residual products of the flow magma, as at Moilliili and Alexander Dam; or they may be produced during the hydrothermal alteration of the lavas by solutions from some source outside the lavas, as in the Michigan copper region, where this process has been convincingly demonstrated. In the one case their substance is derived from the magma which produced the rock in which they are found; in the other, it came for the most part from the rock itself.

THE OCCURRENCE OF SPHALERITE AT  
ELLSWORTH, OHIO

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Ellsworth, Ohio, is renowned for the selenite crystals which were formerly found there. Small selenite crystals are still to be had, but unfortunately most of them have the crystal faces corroded to such an extent that they are indistinguishable. While seeking for selenite the writer noticed numerous ironstone concretions lying in the bed and along the banks of the small stream which flows past the clay bank in which the selenite crystals are found. A short journey up-stream disclosed the source of part of the concretions. They were found, in situ, in a bed of shale near the water's edge. This bed is evidently not the only source since they are found in the stream above the point where this particular bed is exposed. Upon breaking a few of the concretions the writer was astonished

to find sphalerite in the shrinkage cracks in the center. A few were found to contain barite alone, others contained barite and sphalerite. Still others contained calcite and sphalerite. The calcite is generally sandy although a few very small crystals were found on a drusy surface; in others, under a microscope, small rhombs were apparent. Small crystals of pyrite were found in a few of the concretions, generally in the interstitial fillings, but in one case, they were in the walls of the concretion.

Apparently when the concretions were formed they contained considerable moisture. As they gradually dried, the shrinkage cavities developed and cracks formed reaching to the surface. Then the waters bearing calcite and some zinc compound, probably the sulphate, seeped into the crevices. The calcite deposited when  $\text{CO}_2$  was lost and the zinc may have been precipitated by the hydrogen sulphide formed in the shale, or possibly by reduction of the sulphate in solution by reducing gases from the shale.

Samples of the shale were tested for sulphates and for zinc but neither were found present. The stream in which these concretions occur is about 1 mile south of Ellsworth and may be reached from that place by following Highway No. 45 south from Ellsworth until the road crosses a bridge over the stream. The concretions may then be found by following the stream for a short distance east of the road.

### BOOK REVIEW

THE ARCHITECTURAL, STRUCTURAL AND MONUMENTAL STONES OF MINNESOTA. GEORGE A. THIEL AND CARL E. DUTTON. The University of Minnesota Press, Minneapolis, Minnesota, 1935. Price \$2.50. IV+160 pages 12 plates and 78 figures.

This attractive and well illustrated book on the stone industry in Minnesota, which now has grown to such proportions that it is the second in value in the mineral products of the State, is a welcome contribution to this field of geology. The purpose, apparently, was to draw the attention of architects and building contractors to the fact that more than fifty distinct varieties of architectural and monumental stones are quarried and fabricated in Minnesota. As earlier reports have described in detail the geological structures and history of the State, these portions are not stressed, emphasis being placed on the descriptions of the various types of stone and the location of the quarries. Chapters also are included on the physical properties of building stones in general and the various methods employed in preparing the material for the market. Numerous chemical analyses and physical data of the stones described increase the scientific value, while the twelve colored plates which reveal in a striking manner the textural and color variations, greatly enhance the general appearance of the text.

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