NOTES AND NEWS

PHOSPHATIC CONCRETIONS NEAR JUNCTION CITY, KENTUCKY

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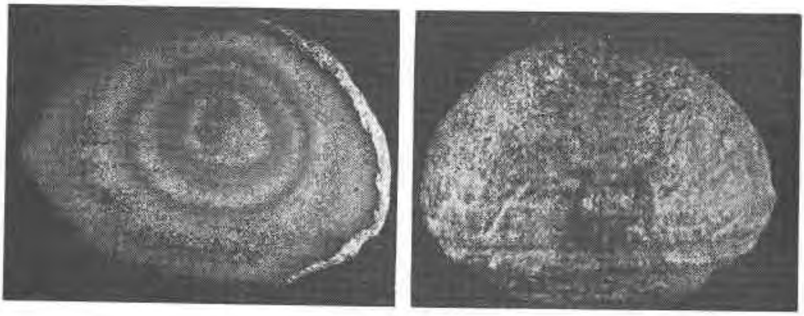
A recent paper on spherulitic concretions of dahllite[1] prompted the writer to examine some phosphatic concretions from the geology collection of Cornell University, which had been collected at the base of the New Providence shale (Mississippian), near Junction City, Kentucky.



(*a*) (*b*)

FIG. 1. (*a*) Polished cross section showing alternation of concentric light and dark bands; (*b*) External surface. Natural size.

MEGASCOPIC CHARACTERS

The shape of the phosphatic concretions resembles a thickened lens whose longest diameter averages about 4 cm. The color of the weathered surface is a light gray, except for small areas which are stained brown by iron oxide. Directly beneath the veneer of weathering and extending toward the center (Fig. 1*a*) are several alternating light and dark brown concentric rings. These color variations appear to be the result of an unequal distribution of limonite which formed from pyrite. A few minute unaltered crystals of pyrite may be seen on the polished surface.

The uniform texture of the weathered exterior (Fig. 1*b*) resembles the surface of an orange. In addition to this pitted surface, the concretions are distinctly marked by closely spaced parallel grooves which are related, probably, to the bedding in the enclosing rocks. The stratification may be traced, although poorly defined, across the polished surface.

MICROSCOPIC CHARACTERS

The concretions are composed principally of dahllite, with minor amounts of calcite and pyrite. In addition, it is possible that a part of

[1] McConnell, Ducan, Spherulitic concretions of dahllite from Ishawooa, Wyoming: *Am. Mineral.*, vol. **20**, pp. 693–698, 1935.

the groundmass may be amorphous calcium carbonate-phosphate, but since with increasing magnification more and more microcrystals are discernible, it appears reasonable to assume that the entire concretion is crystalline.

The dahllite occurs as aggregates of anhedral crystals with a maximum length estimated at .05 mm. Since the crystals forming the aggregates are poorly defined and extremely small, all of the optical properties could not be ascertained with certainty from thin sections. They were found to have moderate relief and in color varied from colorless to a pale brown. Crushed fragments were studied in more detail, and the indices, determined by the use of liquids, ranged between 1.615 and 1.624. These indices, although not representing the maximum range for dahllite, are significant for its identity. In addition, it effervesces in cold dilute acid, gives water in a closed tube, and yields chemical tests for phosphate and calcium.

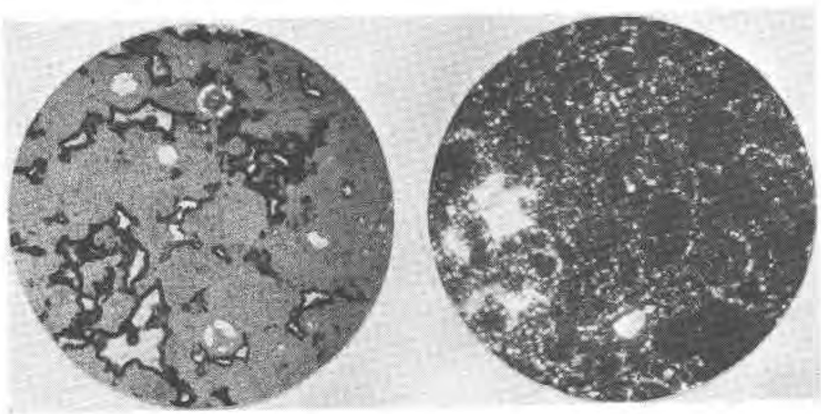


FIG. 2. FIG. 3.

FIG. 2. Photomicrograph (ordinary light) showing radiolaria, fine-grained groundmass, and irregular masses of calcite. Dark borders around calcite are iron oxide. $\times 26$

FIG. 3. Photomicrograph (crossed nicols) showing radiolaria replaced by dahllite. Note larger crystals of dahllite along borders of the fossils. Irregular white areas are calcite. $\times 42$

Calcite, comprising approximately 10 per cent, of the concretions, occurs as irregular bodies replacing the fine-grained groundmass of dahllite. An examination of polished surface and thin sections disclosed that small crystals of pyrite, most of which show alteration, were scattered through the dahllite and calcite.

The occurrence of abundant organic remains within the concretions is of special interest. These include well defined radiolaria and a few sponge spicules. With ordinary light (Fig. 2) only the larger radiolaria are visible, but with crossed nicols (Fig. 3) most of the dahllite appears to have replaced the fossils. It is also noticeable that the larger crystals of dahllite are limited to the borders of the radiolaria.

Origin

According to Rogers and Kerr,[2] "Dahllite occurs as a secondary mineral in phosphorite or so-called phosphate rock. The usual associate is collophane. The dahllite has probably been formed by the gradual crystallization of the collophane and by the migration of some of the calcium phosphate."

Nothing is known regarding the field relations of these concretions, but conclusions based on this brief study suggest the possibility that the organic remains were replaced by collophane and the dahllite represents a recrystallization of the amorphous calcium carbonate-phosphate.

A RAPID MICROSCOPIC METHOD FOR DISTINGUISHING QUARTZ FROM UNTWINNED OLIGOCLASE-ANDESINE

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The distinction between quartz and untwinned oligoclase-andesine in thin section, or powder, is difficult to make, and is a problem not infrequently encountered in petrographical work. The concurrence of the indices of these two minerals makes their separation by means of index liquids impractical. The use of interference colors is untrustworthy. Interference figures, while capable of affording a qualitative answer, can in no way be relied upon to furnish even an approximate quantitative answer without hours of work, and where the number of grains is limited (as in a thin section), or where the grain size is very small, they are useless.

An obvious method for overcoming this difficulty, but one the rapidity and accuracy of which are not generally appreciated, is to be found in the universal stage. Quartz, because of its uniaxial character, when turned to extinction, remains so with a rotation in either the plane of the polarizer or that of the analyzer. Feldspar, being biaxial, in the general case does not. It is only necessary, therefore, to turn the unknown grain to extinction on the inner vertical axis of the universal stage and then make two rotations, one on the north-south horizontal axis, the other on the east-west horizontal axis. If with either of these rotations the grain stays at extinction, it is quartz; if not, it is feldspar.

Some feldspar grains behave like quartz due to a favorable orientation. The number in any given case depends for the most part on the accuracy

[2] Rogers, A. F., and Kerr, P. F., *Thin-Section Mineralogy:* McGraw-Hill, p. 194, **1933.**