Reports

Significance of Diaspore at Magnet Cove, Arkansas

Abstract. The Magnet Cove magmas developed essentially monometallic phases during the later stages of crystallization. The finding of diaspore indicates that an aluminum-rich phase was present. Barium- and titanium-rich phases have already been reported.

The Magnet Cove alkalic intrusive masses near Hot Springs, Arkansas, have been collecting grounds for unusual rocks and minerals for over 150 years. The only published comprehensive study of these igneous rocks is the report of Williams (*1*). Several reports have been written about certain features of the cove complex (*2*), but no outstanding additions to Williams' work were made until data became available from a detailed study initiated by the U.S. Geological Survey in 1952. A rock-distribution map (*3*) has been published, but a wealth of geochemical (*4*) and petrographic data must be assimilated before a complete report is released.

The U.S. Geological Survey, through cooperative agreement with the Arkansas Geological and Conservation Commission, allowed the use of geochemical data which pertained to a study of the origin of the barite ($BaSO_4$) in the Ouachita Mountain area (*5*). One of the contributive discoveries was that the feldspars of some rock types within the cove complex were saturated ionically with barium. The fact that these rocks are also supersaturated with titanium is well documented (*2*).

Diaspore was found on a joint face of a quartzite bed in the lower part of the Stanley formation about 80 feet above the channel of Stone Quarry Creek in the southeast quarter of section 29, T. 3 S., R. 17 W. The nearest exposure of igneous rock is upslope 180 feet to the north. The diaspore occurs as small scattered grains on subhedral quartz. Patches of yellow- to light-brown hydrous iron oxides are associated with the diaspore.

Against the quartz background the highly lustrous diaspore grains appear to be black and closely resemble the brookite (TiO_2) on the northeast rim of the cove. However, under the hand lens and microscope the diaspore grains are blue and translucent. Except for the rather deep blue color, the physical properties are in excellent agreement with published descriptions. The optical properties vary somewhat from published data, but x-ray diffraction patterns made by R. F. Kruh at the University of Arkansas confirmed the diaspore identification. The deep blue color and slightly anomalous optics are caused, at least in part, by spectrographically detectable quantities of titanium in the diaspore.

The available evidence indicates that the fluids from which the diaspore was deposited escaped from the intrusive body along joints in the country rock. The titanium in the diaspore was expected because all the late-stage rock and mineral aggregates, including the barite, of the cove complex contain appreciable amounts of titanium. The subhedral quartz associated with the diaspore shows preferred growth direction along the joint face. This indicates that the egressing fluids flowed long enough and were of sufficiently high temperature to cause selective recrystallization and growth of the formless quartz grains of the quartzite. The diaspore is concentrated on the sides away from the intrusives of the larger quartz grain aggregates. The iron oxides were the last to form and are attached to both the quartz and diaspore. The egress of the aluminum-bearing fluids, like that of the barium-bearing and titanium-bearing fluids from which the barite and brookite were deposited, was through fractures and joints in the country rock. These deposits were formed from concentrations developed in the later stages of crystallization of the Magnet Cove magmas (*2, 5*).

The igneous rocks of Magnet Cove are chiefly medium- and coarse-grained nepheline syenites and fine-grained or aphanitic syenite equivalents. The syenitic rocks are cut by mafic (Mg-Fe rich) dikes. The granites are oversaturated with silica and therefore contain quartz, the syenites are saturated, and the silica is bound in the feldspars; the nepheline syenites are silica-deficient. In silica-deficient systems aluminum excesses are ordinary and aluminum oxides, mostly corundum (ruby, sapphire), are characteristic in the mineral assemblages.

The discovery of diaspore shows that the crystallizing Magnet Cove magmas in some phases did have an excess of aluminum. The aluminum-bearing fluids escaped through the fractured wall rock. There may have been much more diaspore formed than was found, but the possible host rocks have been removed by the erosion activity of Stone Quarry Creek. The minor amount of diaspore on the joint face is the only known trace of the aluminum-bearing fluids.

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Instructions for preparing reports. Begin the report with an abstract of from 45 to 55 words. The abstract should *not* repeat phrases employed in the title. It should work with the title to give the reader a summary of the results presented in the report proper. (Since this requirement has only recently gone into effect, not all reports that are now being published as yet observe it.)

Type manuscripts double-spaced and submit one ribbon copy and one carbon copy.

Limit the report proper to the equivalent of 1200 words. This space includes that occupied by illustrative material as well as by the references and notes.

Limit illustrative material to *one* 2-column figure (that is, a figure whose width equals two columns of text) or to *one* 2-column table or to *two* 1-column illustrations, which may consist of two figures or two tables or one of each.

For further details see "Suggestions to Contributors" [*Science* 125, 16 (1957)].

Tryptophan Loading and Excretion of 5-Hydroxyindoleacetic Acid in Normal and Schizophrenic Subjects

Abstract. In contrast to the findings of Zeller *et al.* (*1*), schizophrenic patients did not differ from normal control subjects in the rate of 5-hydroxyindoleacetic acid (5-HIAA) excretion either before or after oral administration of L-tryptophan. The excretion of 5-HIAA may be directly related to dietary tryptophan since feeding-problem schizophrenic patients excreted less 5-HIAA than either of the well-fed groups. This was not related to pyridoxin deficiency.

The suggestion by Woolley and Shaw (*2*) that an abnormal metabolism of serotonin may be of etiological importance in mental disease has inspired many attempts to demonstrate abnormalities in the metabolism of this com-

Table 1. Effect of 5 g of L-tryptophan on the rate of urinary excretion of 5-HIAA (micrograms per hour).

Subject	No.	Rate		Increase
		Before tryptophan	After tryptophan	
National Institutes of Health				
Normal	6	229 ± 68	448 ± 53	219 ± 110
Schizophrenic	16	190 ± 91	373 ± 164	183 ± 93
Spring Grove State Hospital				
Schizophrenic*	8			
Before pyridoxine		128 ± 85	300 ± 159	172 ± 104
After pyridoxine		143 ± 106	299 ± 161	156 ± 132

* Feeding problem patients.

pound in schizophrenia. L-Tryptophan is the normal dietary precursor of serotonin, and 5-hydroxyindoleacetic acid is the major urinary metabolite of this amine. Zeller *et al.* (*1*) have reported that schizophrenic patients differ from normal control subjects in failing to excrete an increased amount of 5-HIAA after oral administration of large doses of L-tryptophan. Layton (*3*) found that 20 percent of a hospitalized group of schizophrenics excreted less 5-HIAA than any of the normal subjects he encountered. He suggested that 5-HIAA excretion might be used as a biochemical basis for separating a subgroup of schizophrenics.

We have attempted to repeat these findings of Zeller (*1*) and Layton (*3*) in 16 healthy male schizophrenic patients who had been living in the wards of the National Institutes of Health for at least 2 months under the same conditions and on approximately the same diet as six nonschizophrenic volunteers who served as controls. Five grams of L-tryptophan suspended in 200 ml of orange juice were administered orally. The amounts of 5-HIAA excreted in the urine (*4*) during the following three 2-hour intervals (total of 6 hours) were compared with the amounts excreted over the same time intervals during the previous day, when only orange juice had been fed. No significant differences in the rate of 5-HIAA excretion were noted between the schizophrenic and control groups before or after administration of tryptophan. Both groups showed similar increases in the rate of 5-HIAA excretion after administration of tryptophan (Table 1).

Weissbach *et al.* (*5*) demonstrated that serotonin levels in tissue are decreased in pyridoxine-deficient chicks. 5-Hydroxytryptophan decarboxylase activity is reduced in the vitamin B_6 deficient rat (*6*). An attempt was therefore made to relate pyridoxine deficiency to 5-HIAA excretion. Eight male schizophrenic patients who had been long-term feeding problems were studied at the Spring Grove State Hospital (*7*). The rate of 5-HIAA excretion was determined before and after tryptophan loading in the same manner as described for the first study. Following this the patients received 50 mg of pyridoxine hydrochloride orally, three times daily for 5 days. The rate of 5-HIAA excretion before and after tryptophan loading was again determined (Table 1). The rate of excretion of 5-HIAA before tryptophan loading in the feeding-problem group seemed lower than that in the well-fed group of patients and was possibly related to protein and tryptophan ingestion ($p = .10$). Dietary deficiency of protein or tryptophan may therefore explain the findings of Layton (*3*). The increase in excretion of xanthurenic acid following the tryptophan load was used in the estimate of the degree of pyridoxine deficiency (*8*). This was not related ($r = .144$) to the rate of 5-HIAA excretion, and pyridoxine administration did not affect this rate. After administration of tryptophan, the rate of excretion of 5-HIAA by the feeding-problem group of schizophrenic patients increased, just as it did in the well-fed schizophrenic and control groups.

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References and Notes

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Seasonal Growth Periodicity of Tissue Explants from Woody Perennial Plants in vitro

Abstract. Secondary phloem explants removed to standard aseptic culture in the spring proliferate most extensively. Explants taken successively through the growing season proliferate less. The decreasing growth trend reverses some months before bud break, and the increasing growth in winter is not dependent on the breaking of dormancy in the terminal buds.

The growth of perennial plants is markedly periodic. Growth activity in the meristems of the shoot, which commences in the spring with the onset of warmer weather, ceases in the summer while external conditions are still favorable for growth. Developmental periodicity is accompanied by changes in auxin or growth-inhibitor content and can be regulated to some extent by variations of day length. Explanations of periodic growth activity have noted such changes (*1*). However, the physiological basis of growth periodicity remains obscure.

Sterile culture techniques which have been applied so successfully to problems of tissue and organ growth have scarcely been used in the study of growth periodicity (*2*), and the study described in this report was an attempt to apply such methods to this problem (*3*). The approach adopted was that differences in growth potential of tissues excised from donor plants at different times of the year should be reflected either as quantitative or qualitative differences of growth in sterile culture.

Data on the growth of tissue explants in culture are being accumulated for 11 species. These are: *Ginkgo biloba,* four diffuse-porous dicotyledons (*Salix babylonica, Populus nigra* var. *italica, Syringa vulgaris,* and *Acer rubrum*), and six ring-porous dicotyledons (*Ailanthus glandulosa, Fraxinus americana, Catalpa bignonioides, Robinia pseudoacacia, Quercus alba,* and *Q. borealis* var. *maxima*). Secondary phloem was selected as the test tissue because of its functional and morphological uniformity and its known ability to proliferate in sterile culture.

The experimental procedure was as follows. At intervals of about 6 weeks a branch 2 to 3 cm in diameter was collected from each species. Short pieces of the branches were surface sterilized, an aseptic surface of secondary phloem was exposed, and rectangular explants were removed. The average-sized explant was 4 by 12 mm, and the fresh weight was between 30 and 100 mg for most species. Twelve explants from each species were inoculated apical end down, to take ad-