MINERALOGY OF THE VIRGINIA DIABASE

ARTHUR A. PEGAU, *University of Virginia.*

The diabase in Virginia is of a relatively simple composition being made up predominantly of two minerals, labradorite and augite. A careful study of the literature, however, has shown that at least forty-five other minerals have been reported as occurring in this rock type. The purpose of this article is to enumerate them and to show how diabase from various parts of the state differs in the number and variety of minerals.

The literature from which this information has been obtained has been secured from three sources.

(1) Bulletins of the *Virginia Geological Survey*, of which the one by Roberts[1] was especially helpful.

(2) Articles in journals and magazines, such as the one by Shannon.[2]

(3) Theses presented for the masters degree, by students in the School of Geology of the University of Virginia.

The occurrences of diabase in Virginia may be most conveniently discussed by grouping them into three divisions based upon the type of rock or rocks into which they have been introduced.

The three divisions or types of enclosing rocks are:

(1) Triassic sediments occurring within the boundaries of the Piedmont Province.

(2) Rocks of both igneous and metamorphic character, of Paleozoic and pre-Cambrian age, within the Piedmont Province.

(3) Paleozoic sediments in the Valley Province.

The greatest number of minerals, namely thirty-eight, have been reported as occurring in the diabase that intrude rocks of Triassic age. There are two possible explanations for the relatively greater number of minerals here.

(1) The diabase is nearest the original source and shows a greater degree of differentiation.

(2) Hydrothermal action has been more extensive here than elsewhere.

The two chief minerals here are labradorite and augite. Other primary minerals are albite, orthoclase, quartz, diopside, hypersthene, olivine, biotite, hornblende and the accessory constituents magnetite, ilmenite, apatite, and zircon. The following minerals, of hydrothermal origin, have been reported: Hornblende (variety byssolite), chlorite, diabanite

[1] Roberts, J. K., The geology of the Virginia Triassic: *Va. Geol. Surv., Bull.* **29,** pp. 43–64, 1928.

[2] Shannon, Earl V., The mineralogy and petrology of intrusive diabase at Goose Creek, Loudoun County, Virginia: *Proc. U. S. National Museum*, vol. **66,** Article 2, 1924.

(a chloritic aggregation of minerals), epidote, calcite, sericite, titanite, prehnite, datolite, chabazite, stilbite, laumontite, apophylite, thaumosite, xonotlite, opal, paragonite, axinite, kaolinite, and the sulphides pyrite, chalcopyrite, galena and sphalerite. The products of weathering include limonite and kaolin.

The next greatest number of minerals are found in those dikes that intrude rocks of igneous and metamorphic character, of Paleozoic and pre-Cambrian age occurring in the Piedmont Province. The total number of minerals found in these dikes is twenty-three. The relatively greater number of dikes intruding this class of rocks may account for the large variety of minerals occurring within them.

The chief minerals in these dikes are again labradorite and augite, usually with either olivine or quartz and orthoclase, the latter two forming intergrowths. Other primary minerals, in subordinate or accessory amounts, include biotite, magnetite, ilmenite, rutile, pyrite, pyrrhotite, apatite and graphite. The following secondary minerals have been reported: hornblende, chlorite, serpentine, epidote, zoisite, calcite, sericite, leucoxene, limonite and kaolinite.

The minerals, eighteen in number, occurring in the diabase dikes of the Valley is less than in either of the other two occurrences. The reasons for this relatively smaller number may be two:

(1) These deposits are farthest from the original source.

(2) The number of dikes is the smallest.

Labradorite and augite, here as elsewhere, are the predominant constituents. Olivine is almost universally present, while quartz is rarely so. Other primary minerals usually in small amounts include: Analcite, magnetite, ilmenite, pyrite, apatite, orthoclase and a spinel, probably pleonaste. The secondary minerals found in these dikes include: Hornblende, epidote, chlorite, serpentine, iddingsite, titanite, kaolinite and limonite.

There has been a total of forty-seven minerals reported as occurring in the diabase rock in Virginia. The three minerals, nepheline, muscovite and an unidentified zeolite have been reported as occurring in rocks of Triassic age in the Valley Province, that were not of basaltic composition. Since the diabase dikes are also of Triassic age, this makes a total of fifty minerals that occur in rocks of Triassic age in Virginia.

Fifteen minerals as reported, are common to each of the three classes of dikes. Seventeen minerals are peculiar to the diabase occurring within the areas of Triassic sediments. The minerals albite, diopside and hypersthene have been the result of a more thorough differentiation of the diabase. The other minerals are products of hydrothermal action.

Only three minerals have been reported as occurring exclusively in

dikes that intrude rocks of the second class. These three minerals, rutile, graphite and pyrrhotite, were found in diabase occurring within the rutile area near Roseland.

Analcite, iddingsite and pleonaste have been reported only from the Valley dikes. Work being done in the School of Geology at the University of Virginia at the present time has revealed the presence of pigeonite in some of the Valley diabases. Further studies may show that it is not an uncommon mineral in the Virginia diabase.

A Statement from the University of Pennsylvania, Bureau of Publicity

Establishment of a new four-year course in the Earth Sciences, made possible through a cooperative arrangement involving the University of Pennsylvania and the Academy of Natural Sciences of Philadelphia, has been announced in a joint statement issued by the two institutions.

The course will be offered for the first time with the opening of the University's academic year in the fall and will bring together two of the oldest learned foundations in America in the conduct of a program of teaching and research in geology, paleontology, and mineralogy.

Students enrolling will be registered as students of the University of Pennsylvania and the successful completion of the course will lead to the degree of bachelor of arts, granted by the University.

Instructional work will be carried on by a teaching and research staff comprising the present faculty of the Department of Geology and Mineralogy at the University, and members of the staff of the Department of Paleontology and Geology at the Academy of Natural Sciences.

In addition, it is the intention to make use of the invaluable scientific collections and other facilities of the Academy as well as those of the University's Department of Geology and Mineralogy.

The new curriculum is designed to serve students who desire opportunity for systematic study and research in one of the great groups of modern science as part of a well-balanced cultural education.

In accord with that objective a comprehensive undergraduate training in the ground work of geology, paleontology and mineralogy will be offered, as well as basic training in geological field work and mapping which is essential to prepare students for advanced survey and exploration in the field of the earth sciences.

Another phase of the instructional program now being developed will provide for advanced graduate study to be carried on through the joint facilities of the two institutions.

Thus, through its broad nature, the entire project will, it is hoped, bring about a closer coordination between fields of research such as paleo-archaeology, anthropology, and the study of early man and of human migration, which are dependent for some of their results upon research in geology, paleontology, and related subjects.

Representing the Academy of Natural Sciences on the teaching staff will be a group of widely known professional scientists now connected with that institution.

Among that group are Dr. Benjamin F. Howell, associate curator of paleontology and geology at the Academy, and associate professor of geology and paleontology at Princeton