

CONTRIBUTIONS TO MINERALOGY,  
No. 46.

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*On a new occurrence of Corundum, in Patrick Co., Va.*

IN the fall of 1888, Mr. W. B. Rucker, of Stuart, Patrick County, Va., discovered a highly interesting occurrence of corundum, and kindly communicated the following details of his find and the locality, and presented me with a box of specimens for examination, consisting of corundum with its associ-

ated rocks and minerals, andalusite, cyanite, chloritoid, mica, etc., all of which were collected on the surface of not over six acres of ground on the side of a hill, 1,800 to 1,900 feet above the level of the sea. Its continuation leads to a mountain about 3,000 feet in height and is the outlying knob of Bull Mountain, being connected with the latter by a high ridge. Bull Mountain runs parallel with the Blue Ridge and is about as high. The knob mentioned above is between  $1\frac{1}{2}$  to 2 miles from Stuart.

The rocks of Bull Mountain are mostly mica schists, so-called talco-mica schists, chloritic schists and slates, resembling roofing slate (not over two miles from Stuart). Some of the talco-mica schists near the corundum resemble gneiss and are highly garnetiferous and in places contain crystals of magnetite; then again, on a ridge near by, they are full of crystals of staurolite. *No serpentine or chrysolite rocks* have been observed in connection with the corundum. These rocks are intersected by several granite dikes and the corundum and its associated minerals are found on the surface, generally between the outcrops of the dikes, and probably belong to them.

*Corundum.*—Only a small quantity of corundum has been found; the largest piece which I have seen is 25<sup>mm</sup> in diameter. All the crystals and crystalline masses appear to be *remnants* of the alteration of larger masses, into other minerals. Some of the crystals are hexagonal prisms, or, tapering at the ends, perhaps very acute pyramids with the basal plane; mostly they cluster together and form rounded masses, much intermixed with mica; on breaking they show the characteristic striation and, occasionally, are asteriated. Their color is mostly deep blue, sometimes intermixed with white, grayish and brownish white. Sometimes only microscopic grains are left, disseminated in the materials, resulting from the alteration of the corundum, viz: andalusite, cyanite, mica and chloritoid.

*Andalusite.*—The alteration of corundum into andalusite has never been observed before. Only a very small portion of the andalusite still exists unaltered. The andalusite crystals very closely resemble those from Lienz in Tyrol, but only a few pieces show the common prism and basal plane. Color grayish and reddish white to flesh red. The best crystal is nearly 40<sup>mm</sup> long and 20<sup>mm</sup> thick and is coated with a thin film of muscovite; other masses, the largest about 80<sup>mm</sup> in length, are largely mixed with muscovite and cyanite, and, occasionally, enclose some quartz.

The analyses of the purest, carefully picked out with the aid of a good lens have been made, of the grayish white variety by me (1) and of the reddish white by Mr. James S. de Benneville (2 and 3):

	1.	2.	3.
Spec. Grav. ....	3.154		3.151
Loss by ignition ----	1.80	1.97	2.42
SiO <sub>2</sub> .....	36.98	36.36	36.22
Al <sub>2</sub> O <sub>3</sub> .....	60.50	61.00	60.76
Fe <sub>2</sub> O <sub>3</sub> .....		0.72	0.88
MgO .....	0.10		
Corundum .....	1.12	trace	trace
	<hr/>	<hr/>	<hr/>
	100.50	100.05	100.28

*Cyanite and Rhætizite.*—Both the typical blue, bladed cyanite and the so-called rhætizite occur pseudomorphous after andalusite, some of the specimens indicating that the latter has occurred in stout crystals, the largest from 70 to 80<sup>mm</sup> in size.

The blades of the cyanite are of a bluish white to sky-blue color and often from 10 to 25<sup>mm</sup> broad, in many specimens, however, much smaller, sometimes radiating and gradually becoming masses of interwoven fibers. Associated are small quantities of quartz and muscovite which latter especially lines the cavities. Blue corundum in small grains is disseminated through the mass.

The rhætizite of a grayish brown color and a more or less fibrous structure is the more frequent form of alteration of the andalusite, and, in breaking the masses, many show in the interior the prismatic forms of the original andalusite. It is often intermixed with a large quantity of grains of blue corundum, muscovite and rarely of chloritoid.

*Muscovite.*—There is hardly a specimen of the andalusite, rhætizite and cyanite in which muscovite could not be observed as a direct alteration of these minerals. In the rhætizite it is frequently found in somewhat larger quantity and, together with chloritoid, often with a nucleus of blue corundum. This muscovite has a brownish white color. A partial analysis of it gave:

Loss by ignition .....	6.49
Na <sub>2</sub> O .....	0.87
K <sub>2</sub> O .....	9.23

*Margarite* (in part).—No crystallized variety of margarite has been found, but some of the andalusite, still retaining the original form, has been altered into a soft, fine-grained, or compact mineral, in some portions discolored by ferric hydrate, and mixed with some fine scales which are probably muscovite. After purification with dilute hydrochloric acid, it was analyzed by Mr. Jas. S. de Benneville (*a*) and me (*b*) with the following results:

	<i>a.</i>	<i>b.</i>
Loss by ignition .....	5.56	5.40
SiO <sub>2</sub> .....	33.38	35.79
Al <sub>2</sub> O <sub>3</sub> .....	46.49	45.95
Fe <sub>2</sub> O <sub>3</sub> .....	1.43	1.03
CaO .....	6.02	5.49
Na <sub>2</sub> O .....	2.47	2.27
K <sub>2</sub> O .....	2.33	2.82
Corundum .....	1.70	2.07
	99.38	100.82

The analyses indicate a mixture of several micas, margarite predominating.

*Chloritoid*.—This mineral which has been so frequently observed with corundum, as at Mramorskoi in the Ural, at Gumugh Dagh in Asia Minor and elsewhere, is also found with the corundum of Bull Mountain. In the bladed cyanite it is found in small quantity, but in the rhætizite, associated with muscovite it surrounds a nucleus of blue corundum, from which it originated.

The foliated masses have a blackish green color, the largest is 30<sup>mm</sup> in diameter. The sp. gr. I found = 3.614. My analyses gave:

	1.	2.
Loss by ignition .....	6.64	6.58
SiO <sub>2</sub> .....	25.03	25.53
Al <sub>2</sub> O <sub>3</sub> .....	39.75	39.23
FeO .....	22.92	---
MnO .....	1.30	1.14
MgO .....	3.32	3.32
CaO .....	0.21	---
Na <sub>2</sub> O .....	0.07	---
K <sub>2</sub> O .....	0.07	---
	99.31	

The pure mineral contains no ferric oxide.

A short distance from the locality where these minerals have been found, indications of the occurrence of the same species have been observed in several places.

This occurrence of corundum is entirely different from any previously described.

Some specimens of blue corundum in grayish brown rhætizite, discovered several years ago by Mr. J. A. D. Stephenson, of Statesville, N. C., at Hunting Creek, north of Statesville are very similar; there was also a mass, consisting of crystals of andalusite, altered into a micaceous mineral which, however, was not further investigated.