NOTES AND NEWS

APPEARANCE OF TOURMALINE IN SEDIMENTS

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Through central Oklahoma the strike of the Permo-Pennsylvanian contact is nearly north and south. The regional dip is gently westward, exposing the Permian strata to the west of the contact. The basal Permian is here known as the Enid group, which comprises six formations. Of these, the lowest three, in order, are the Stillwater, the Wellington, and the Garber.

These are typical red beds. They are described simply as alternating red sandstones and shales. In specific character there is little to distinguish one formation from the other.

Recently a detailed microscopic study of the Stillwater, Wellington, and Garber formations was undertaken, looking to the establishment of some means of discrimination. The results, reported elsewhere, cannot be said to have yielded any information of specific value in this regard.

However, the "heavy" mineral fractions exhibited numerous species, including tourmaline as a fairly important constituent. Though not abundant, the mineral was present, nevertheless, in considerable variety, and its varied appearance frequently interrupted prompt recognition and counting.

The brief description of tourmaline in sediments as here observed is intended only to assist in its prompt recognition in the examination of sediments in which it may occur. The variety of form and color observed in these sediments seemed to offer a very favorable opportunity for the more complete description of its sedimentary facies. Characters described are those only of ready observation or most facile determination.

Color. The colors of tourmaline grains observed in these sediments include blue, light purple, deep golden brown, jet black, and colorless. This selection of colors is somewhat more limited than may be illustrated by macroscopic specimens, due, in part, to the fact that the pink variety, rubellite, is colorless in thin slices or microscopic grains. Sedimentary grains also rarely display the odd or zonary distribution of colors so frequently found in macroscopic specimens.

The jet black tourmaline is practically opaque, except in very thin flakes, and these transmit light but feebly. This variety is the one of most difficult recognition. Sedimentary grains of sizes usually dealt with are opaque, but may be demonstrated to be translucent by fracturing to very thin flakes. Luster usually serves to distinguish black tourmaline from other dark, black, or opaque mineral grains. Rotation of the microscope stage will afford some position in which the luster may be seen to advantage. It is very brilliant, giving the appearance of black obsidian. It may be distinguished from that of a truly opaque mineral by its apparent softness, or depth, as contrasted with the flat reflection seen from truly opaque surfaces.

Absorption and Pleochroism. Absorption of the "O" ray is very strong in the light purple and brown varieties, weak for the blue, unobservable in the colorless, and difficultly observable in the black. Pleochroic formulae are as follows:

Variety	"O" Ray	"E" Ray
Light purple	Dark purplish black	Light lilac purple
Blue	Sky blue	Very pale yellow
Brown	Deep golden brown	Light orange
Black	Jet black	Greenish black

Exterior Form. There are three principal types of sedimentary tourmaline grains, as to external form; first, the somewhat elongated prismatic type, usually with fairly rounded terminations, and the two equidimensional types, one being wellrounded, and the other showing a rough and hackly fractured surface, fracture sub-conchoidal. Prismatic cleavage (Dana, $11\bar{2}0$) is infrequently exhibited by the prismatic type, but much more commonly is this type associated with dark rod-like inclusions arranged parallel to the elongation.

Orientation. The equidimensional grains are often "basal" grains, interesting in the absence of basal cleavage. Milner states the mineral to possess a basal parting. Dana records neither parting nor cleavage in the basal direction, but observes a difficult rhombohedral cleavage, ($10\bar{1}1$). In this form the angle between ($10\bar{1}1$) and (0001) is 27° 20.′ This is a rather flat rhombohedron, and evidently a fragment originally cleaved thus might easily lie nearly in a basal orientation.

Supplementary to the above observations of cleavage and orientation, small hand specimens of several tourmalines were gently fractured. The material obtained was screened, and that passing the 100-mesh and caught on the 200-mesh critically examined. The fracturing produced evidently did not conform to any cleavage or parting, prismatic, basal, or rhombohedral. The fractured surfaces were irregular, both in form and orientation, but it is worthy of note that an important percentage of the grains were basal flakes, showing good interference figures. Accurate estimation of this ratio is difficult for the entire specimen, but of the size examined from 15% to 25% of the separate grains were thus oriented.

The characters above noted are those that may be quickly noted in routine examination of numerous sedimentary specimens. As to the use of the mineral in the correlation attempted in this case, little is to be said. No distinctive features or amounts appeared in any horizon. The variety of form and color is believed to indicate a blending of different sediments in the last of several cycles of erosion and re-deposition. This being the case it would be interesting to determine the original sources of the various species, by tracing the stratigraphic units laterally, and this is to be attempted in a later investigation.

An interesting booklet on the Economic Outlook for the Basic Industries of Pennsylvania has recently been prepared by the School of Mines and Metallurgy of the Pennsylvania State College. The purpose and contents of this pamphlet are briefly summarized in the following paragraph taken from the Foreword. "This booklet has been prepared to promote the mining and the mineral industries of Pennsylvania with a view of cultivating more favorable public opinion. The first part covers the great economic importance of the mining and the mineral industries of the State, and the urgent need for more technical application; the second part tells of the advisory board program which serves as a connecting link between state industry and state education; and the third part outlines the service that the Pennsylvania State College is rendering to the mining and the mineral industries and to the people of Pennsylvania." Copies of this bulletin can be secured by writing the Dean, School of Mines and Metallurgy, State College, Pa.

Dr. Max von Laue, professor of theoretical physics in the University of Berlin, and Dr. Arnold Sommerfeld, professor of theoretical physics in the University of Munich, have been elected honorary members of the Leningrad Academy of Sciences.

On March 21 the U. S. Geological Survey celebrated its fiftieth anniversary. Clarence King was appointed the first director on March 21, 1879. The appropriations for the work of the Survey have increased from $100,000 for the fiscal year 1880 to over $2,000,000 for the fiscal year 1930.

The Council of the Geological Society of America has decided to hold the next annual meeting in Washington, D. C., Thursday to Saturday, December 26–28, 1929. The Mayflower Hotel will be the headquarters of the Society, and the regular scientific sessions, as well as the annual dinner, will be held in the same place. The Mineralogical Society of America will hold its meetings at the same time.

REVIEWS

ÜBER DIE RAUMGRUPPE DES STAUROLITHS UND SEINE GESETZMÄSSIGE VERWACHSUNG MIT CYANIT. GABRIEL MARTIN CARDOSO. *Berichte über die Verhand. d. Säch. Akad. d. Wissenschaften z. Leipzig, math.-phys. Klasse.* Vol. **80,** pp. 165–199, 1928. Price 2.80 R.M. Verlag von S. Hirzel.

The dimensions of the unit cell of staurolite are given as $a_0=7.81$Å, $b_0=16.59$Å, $c_0=5.64$Å. They correspond to an axial ratio of 0.4726:1:0.3400. The value for the *c* axis is, therfore, half of that usually given. Two molecules of Niggli's formula $(SiO_6)_4Al_9Fe_2H$ can be accomodated in the unit cell. The formula $Si_2Al_5FeHO_{13}$ gives no satisfactory values. C. Gottfried's space group V_h^{11} is probably wrong. V_h^{17} seems to be correct. The well known crystallographic intergrowth of staurolite and cyanite is explained by the pseudo-orthorhombic character of cyanite. Intergrowth takes place along the plane (010) of staurolite and (100) of cyanite. This causes the *b* axis of cyanite to be nearly parallel (difference 5 1/2′) to the *a* axis of staurolite. A normal to the plane of the *b* and *c* axes of cyanite almost coincides with the crystallographic direction [411]. X-ray study shows that this direction is a relatively short primitive translation or, in other words, a line of relatively close atomic spacing. By using this direction as the *a* axis in the pseudo-orthorhombic unit cell of cyanite we have $a_0=[411]=26.87$Å, $b_0=[010]=7.88$Å, $c_0=[001]=5.65$Å.

Comparison with staurolite shows that the translations along the *c* axes are almost identical and that the translation of staurolite along the *a* axis is almost the same as along the *b* axis in cyanite. The two minerals, then, have almost identical primitive translation in the plane which is common to both when intergrown.

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