zone [102] is not a P.B.C. vector. Hence it follows that if a very small crystal of olivine is oriented on (111) of the diamond as described by Mitchell and Giardini, it can easily grow in the direction [101], but not in other directions. The zones [001] and $[\bar{1}01]$ do not fit well on the substrata and although these directions are represented by P.B.C. vectors, the growth velocity in these directions is relatively small. Therefore, the crystals are elongated only parallel to the zone [101]. As the olivine crystals are included in the diamond, this process has occurred during the growth of the diamond. It is not possible that the olivine crystal settled down in full-grown state on the diamond, because in that case the direction of elongation would presumably have been [001], certainly not [101]. (Conclusion that the diamond grew at a temp. $<$ melting point of olivine?)

Similar deviations from the normal habit have been reported in the literature. Frondel and Ashby (1937) mention hematite crystals that have grown as needles on muscovite. Recently Watanabe and Ueda (1953) showed an electron micrograph of octahedral antimony oxide formed on a cleavage surface of stibnite, in which the senarmontite is elongated parallel to the zone [110].

REFERENCES

FRONDEL, C., AND ASHBY, G. E. (1937): *Am. Mineral.*, **22**, 104.

HARTMAN, P., AND PERDOK, W. G. (1952): *Proc. Kon. Ned. Akad. Wetensch.*, Ser. B, **55**, 134.

MITCHELL, R. S., AND GIARDINI, A. A. (1953): *Am. Mineral.*, **38**, 136.

NEUHAUS, A. (1943): *Z. Krist.*, **105**, 162.

WATANABE, M., AND UEDA, R. (1953): *Acta Cryst.*, **6**, 95.

A SECOND LOCALITY OF NOVACEKITE

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Novacekite, $Mg(UO_2)_2(AsO_4)_2 \cdot nH_2O$, recently described by Frondel (1951, p. 680) from Schneeberg, Saxony, has been identified from the Woodrow area, Laguna Reservation, Valencia County, New Mexico. This member of the torbernite group was collected in August 1952 by L. B. Riley, E. S. Erickson, Jr., and T. W. Stern, of the U. S. Geological Survey, who had been conducted to the locality by R. M. Coudray of the Anaconda Copper Mining Co. The novacekite, straw yellow in color, coats a somewhat iron-stained friable sandstone in the Westwater Canyon sandstone member of the Morrison formation of Jurassic age.

Novacekite forms a series with saléeite, $Mg(UO_2)_2(PO_4)_2 \cdot 10H_2O$, its phosphate analogue. Frondel divides this phosphate-arsenate series and applies the species name novacekite to the half in which As $>$ P in atomic per cent and the species name saléeite to the half in which P>As in atomic per cent. A specimen near the phosphate end of the series has been analyzed (Thoreau and Vaes, 1932, p. 96; Mrose, 1950, p. 528), but no specimens near the arsenate end of the series have been analyzed. A semiquantitative spectrographic analysis of the New Mexico material (by C. S. Annell, of the U. S. Geological Survey) indicated As_2O_5 in the greater-than-10-per cent bracket, but P_2O_5 was not observed in any bracket down to a sensitivity limit of 0.1 per cent. The amount of material present in this specimen was not sufficient for a quantitative chemical analysis.

The *x*-ray powder pattern of novacekite differs from the patterns of saléeite and arsenian saléeite only by its slightly larger unit-cell dimensions. The unit-cell dimensions of arsenian saléeite are $a_0=7.05$Å, $c_0=19.87$ Å and of novacekite, $a_0=7.20$ Å, $c_0=20.22$ Å.

Optically this material is anomalously biaxial negative with $\alpha=1.625$, $\beta=1.641$, $\gamma=1.641$, and 2V 5 to 20°. This specimen is pleochroic with X colorless, Y pale yellow green, and Z pale yellow green. Its specific gravity is 3.7. The mineral fluoresces bright lemon yellow in both short and long wavelength ultraviolet radiation.

This work was completed as part of a program undertaken by the U. S. Geological Survey on behalf of the Division of Raw Materials of the Atomic Energy Commission.

REFERENCES

FRONDEL, CLIFFORD (1951), Studies of uranium minerals (IX): Saléeite and novacekite: *Am. Mineral.*, **36**, 680–686.

MROSE, M. E. (1950), Studies of uranium minerals (III): Saléeite from Schneeberg, Saxony: *Am. Mineral.*, **35**, 525–530.

THOREAU, J., AND VAES, J. F. (1932), La saléeite, nouveau minéral uranifère: *Soc. belge géologie Bull.*, **42**, 96–100.

ARROJADITE IS A FERROAN DICKINSONITE

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While working on classifying my *x*-ray powder films of the pegmatite phosphate minerals, it was recently noted that arrojadite from the Black Hills and dickinsonite from Branchville, Conn., yielded substantially identical results. In her recent paper (3) Mrs. Lindberg compared the powder photos of arrojadite with those from a number of other pegmatite phosphates, but not with dickinsonite. Figure 1 shows prints from my two films.