LEPIDOLITE, RAMONA, CALIFORNIA, STEVENS NO. 15

	M. E. Jefferson[9]	M. L. Lindberg
α	1.533	1.532
β	—	1.550
γ	1.555	1.554

[9] *Ibid.*, p. 758.

AN OCCURRENCE OF PYROMORPHITE IN ILLINOIS

ROBERT M. GROGAN, *Illinois State Geological Survey.**

Pyromorphite has been identified in a lead ore concentrate from the Alco Lead Company mine in the fluorspar-lead-zinc district of southern Illinois. This mineral has not previously been reported from southern Illinois despite the relatively common occurrence of galena in the ore and the considerable oxidation of parts of some deposits. Failure to recognize the mineral earlier may be due to its scarcity, an inconspicuous mode of occurrence, or insufficient opportunities for a geological examination of the weathered portions of deposits.

The mineral, however, has been reported from the fluorspar district of western Kentucky by W. S. Tangier Smith,[1] who states that pyromorphite "occurs in minute or microscopic green translucent crystals, as individuals or small aggregates. It is comparatively rare, but was noted in small amount on fluorite at the Tabor and Wheeler mines and in druses in a cavity once occupied by galena at the Kentucky No. 4 shaft."

Occurrence

The lead ore containing the pyromorphite came from the open-pit Patrick mine of the Alco Lead Company in the SW $\frac{1}{4}$, NW $\frac{1}{4}$, NW $\frac{1}{4}$, sec. 16, T. 12 S., R. 9 E., Hardin County, about 8 miles northeast of Rosiclare. The presence of an unusual mineral in the ore was indicated by the appearance of a broad fringe of green material at the upper margin of the lead concentrate on a Deister table in the company's mill. A sample of the green material was sent to the State Geological Survey by Mr. W. L. Skinner, Superintendent, in May 1945 and identified as pyromorphite. Later the writer visited the mill and observed a few minute grains of pyromorphite in the finer-grained Deister table concentrates, but was unable to find the mineral in place in the ore deposit. There can

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[1] Ulrich, E. O., and Tangier Smith, W. S., The lead, zinc, and fluorspar deposits of western Kentucky: *U. S. Geol. Survey, Prof. Paper* **36**, 122 (1905).

be no doubt, however, that the mineral observed on the concentrating tables came from the Patrick mine.

The ore at the Patrick mine is principally a mixture of galena, cerussite, and anglesite in a gangue of red-brown clay and weathered silicified limestone. A small amount of fluorspar is occasionally observed in the ore. The deposit occurs from 15 to at least 50 feet below the surface, and apparently has been produced by the weathering of a primary deposit of galena along a minor fracture zone in cherty Fredonia limestone (Mississippian).

Identification

Examination of the sample of ore concentrate with the binocular microscope showed that about one-fourth of the mineral grains were colored various shades of green, and that most of the other grains were light gray to pinkish gray in color and subsequently identified as cerussite. Rough fragments of chert and crystal fragments of galena, quartz, and anglesite were observed in minor amounts. Practically all of the grains were less than 100-mesh in size, and many passed a 200 mesh sieve.

An essentially complete separation of the pyromorphite from the cerussite was accomplished by taking advantage of the differential solubility of the two minerals in cool dilute nitric acid.[2]

The quartz and chert which survived the acid treatment were removed by a bromoform separation. The resulting concentrate was estimated to contain over 95 per cent pyromorphite and less than 5 per cent impurities, chief among which were galena and anglesite. The specific gravity of this concentrate was 6.87 as determined with a micropycnometer.[3]

Many of the pyromorphite grains are minute prismatic hexagonal crystals, others are rounded. Their color ranges from pale yellowish green to strong bluish green. The crystals are uniaxial and optically negative, and are length-fast. In ordinary light ω is approximately 2.058 and ϵ somewhat less, but greater than 2.035. The birefringence appears to be slightly greater than that of quartz. The more strongly colored crystals are weakly pleochroic with X = colorless to pale yellow-green, Z = stronger yellow-green or blue-green.

The *x*-ray diffraction pattern obtained by the powder method is un-

[2] A portion of the original sample was gently heated in concentrated nitric acid and then rapidly diluted with cold distilled water, whereupon the cerussite dissolved with vigorous effervescence. Quick decantation of the acid followed by immediate washing with distilled water preserved most of the pyromorphite for further study.

[3] Clark, H. S., Micro-analyst, Illinois State Geological Survey, personal communication.

mistakably that of pyromorphite.[4] Chemical tests on the pyromorphite concentrate from the bromoform separation showed the presence of abundant chlorine and phosphorus, and the absence of vanadium and arsenic,[5] thus eliminating the possibility of the presence of the closely related minerals, vanadinite or mimetite.

[4] Bradley, W. F., *x*-Ray Technologist, Illinois State Geological Survey, personal communication.

[5] McVicker, L. D., Analyst, Illinois State Geological Survey, personal communication.

RUTILE IN HARFORD COUNTY, MARYLAND

W. Harold Tomlinson, *Springfield, Pennsylvania.*

On the geological map of Harford County, published by the Maryland Geological Survey, there is shown a narrow belt of serpentine rocks starting from a point about a mile northwest of Pylesville and extending about five miles in a direction south of west. The ultrabasics are intruded into Wissahickon schist. On the north side of this belt, in a field on the east side of the road, a mile north of Clermont Mills, several prospect pits have been opened for rutile.

The formation carrying the rutile is a chlorite rock, probably an altered pyroxenite. It has a slightly schistose structure, much more noticeable in some of the samples collected than in others, but always sufficiently strong to indicate a shearing movement during metamorphism. Little can be learned from the meager outcrop as to the extent of the rutile-bearing formation. A porous talc rock was found in place just east of the pits and again as float southeast of the pits. North of the pits chloritic schist carrying a little rutile is exposed. Except for a few weathered samples found in place, the material examined was collected from the dump of the main pit.

The only mineral that can be considered as a main constituent of the rock is a chlorite with positive optical sign, β index 1.589, birefringence about .008, and weak dispersion. The accessory minerals are magnetite, rutile, apatite, ilmenite, talc, biotite, pyrite and zircon. The first seven of these are distributed unevenly or in pockets. The zircon, which constitutes only a fractional percentage of the rock is rather evenly distributed. It occurs in small and crushed crystals and is probably an original mineral that has remained unchanged during metamorphism.

Of the accessory minerals, magnetite is most abundant. It occurs in well developed octahedrons up to 6 mm. in diameter. These are sparsely distributed all through the formation but are abundant in pockets. No trace of titanium could be found in the mineral. In this district magnetite