PLATE 9.

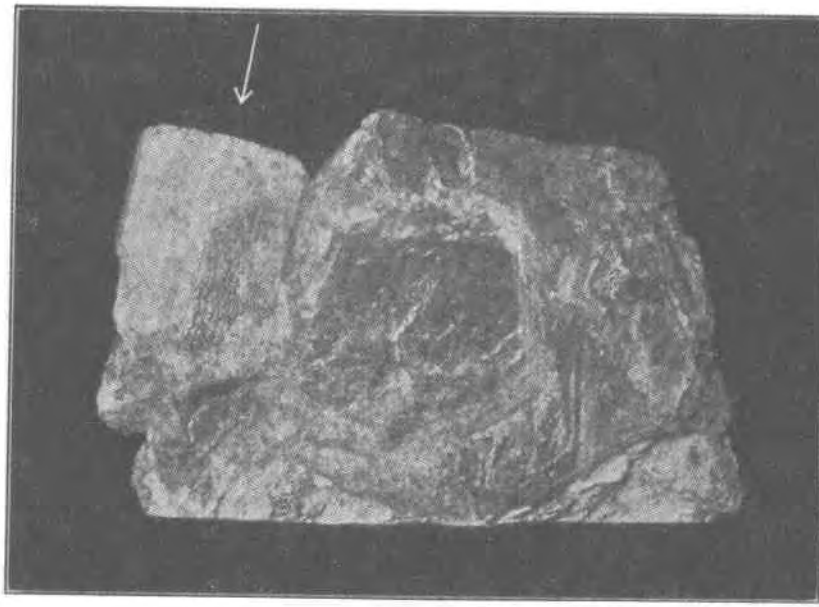

FIG. 1. GREEN BERYL. ($\frac{1}{2}$ size.)

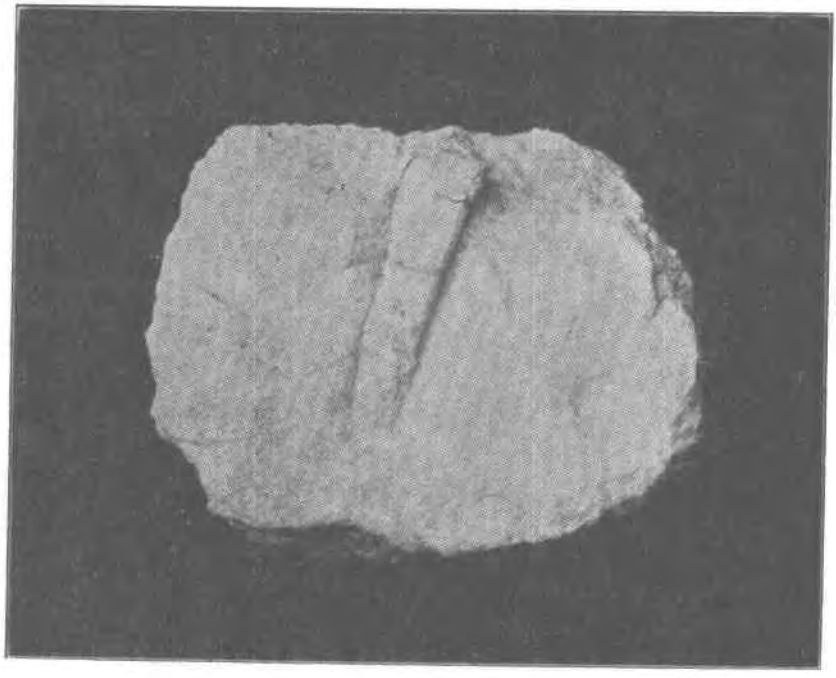

FIG. 2. PYROXENE VAR. MALACOLITE. ($\frac{3}{4}$ size.)

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LINARITE AND LEADHILLITE FROM IDAHO

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The specimens described below were found included in a miscellaneous collection of minerals made by the writer in the Caledonia Mine, near Wardner, Idaho in 1910. They came from some of the stopes above the 150 meter level and were supposed when collected to be azurite and were labeled as such. No particular attention was paid to the specimens at the time, as azurite was common about the mine, and it was not until after this portion of the mine was worked out and abandoned that the specimens received any more minute examination. The first specimen consists of a rosette of flat-bladed blue crystals about a centimeter in diameter implanted upon a joint in a mass made up of quartzite fragments cemented by cerussite and covellite. The crystals are somewhat brighter in color and more adamantine in luster than azurite. This showy rosette first attracted attention to the specimen and the mineral was found upon examination to have the blowpipe characteristics of linarite.

This discovery led to a more detailed examination of specimens of supposed azurite from this mine. Of nine additional specimens thus examined eight were azurite and the ninth consisted of massive cerussite colored dark by included unoxidized galena, encrusted by linarite, limonite and a mineral subsequently found to be leadhillite. The linarite is implanted both upon the cerussite and the limonite in the form of minute prismatic crystals of fine deep blue color and adamantine luster. Examined under the microscope they are seen to be flat prisms elongated on the *b* axis and flattened parallel to the basal pinacoid, giving parallel extinction between crossed nicols, which at first suggests orthorhombic symmetry. They are transparent, bright blue by transmitted light and non-pleochroic. The crystals are too small to permit the planes forming the termina-

tion to be identified. Approximate measurement of the angles in the zone perpendicular to the elongation determined the forms to be $a(100)$, $c(001)$, and $s(\bar{1}01)$. If we may assume that, since 20 per cent. of the material collected as azurite turned out to be linarite, one fifth of all blue minerals in the deposit was linarite, it must have been present in considerable amount, as blue minerals were of widespread and abundant occurrence in the oxidized lead-copper ores of this mine.

Attention was next directed to some greenish to brownish white grains or masses on the second specimen. This mineral, which is dull and appears as tho somewhat etched and altered in its outward portion, might readily be mistaken for cerussite except that when broken open the grains show a very perfect cleavage in one direction with pearly luster on the cleavage face. Before the blowpipe on charcoal with sodium carbonate this mineral gives a lead oxide coating and a button of metallic lead. In the closed tube it turns first red and then yellow and decrepitates, yielding a small amount of water. It is soluble in hot hydrochloric acid with evolution of carbon dioxide and the resulting solution reacts for sulfate with barium chloride. The very perfect basal cleavage makes it an easy matter to obtain thin oriented plates of the mineral by simply crushing a fragment gently on a glass slide. Small scales thus obtained when embedded in balsam and examined under the microscope were found to be transparent and colorless. They laid upon a face of the perfect cleavage and did not show any crystal outline or any additional cleavages. The mineral is biaxial, negative; mean index of refraction very high, birefringence high; acute bisectrix normal to the perfect cleavage; optic axial angle (2V) very small. The interference figure looks like that of muscovite and its behavior, when the stage is rotated, is the same. These properties show that the mineral is, beyond question, leadhillite.

Linarite has previously been found by Umpleby in the Dome District[1] so that the above is the second observed occurrence of the mineral in the state. Leadhillite has not previously been found in Idaho.

[1] Umpleby, J. B., "Lead-Silver Deposits of the Dome District, Idaho," *U. S. G. S. Bull. 540 E*, p. 59, 1913.