

MIARGYRITE AND TETRAHEDRITE FROM THE  
FLINT DISTRICT, IDAHOEARL V. SHANNON,<sup>1</sup> *U. S. National Museum.*

The silver-antimony sulphide, miargyrite, has the formula  $\text{Ag}_2\text{S} \cdot \text{Sb}_2\text{S}_3$  and is monoclinic in crystallization. It commonly has a red streak and, in silver ores, is confused with pyrargyrite ( $3 \text{Ag}_2\text{S} \cdot \text{Sb}_2\text{S}_3$ ), the common antimonial or dark red ruby silver ore. Although it was known from several European silver mines as well as from localities in South America and Mexico, until recently the only reported locality in the United States for this mineral was the Henrietta mine in the Silver City District, Owyhee County, Idaho. A specimen in the University of California collection was labeled as having come from the Rising Star Mine, in the Flint district.<sup>2</sup> Although Penfield described the mineral from the Henrietta mine, no description of the material from the Flint district has appeared. The present short paper is intended to furnish a description of certain specimens from this locality which were received in March 1925, by the U. S. National Museum from Mr. Victor C. Heikes which contain miargyrite crystals of unusually large size (U. S. N. M. Cat. No. 95143) and two additional specimens received a little later from Dr. W. W. Jones of Jordan Valley, Oregon (Cat. 86571).

The specimens, which are evidently from the center of an open vein, consist of coarsely crystalline quartz which forms loosely aggregated terminated prismatic crystals up to 5 cm. long and 2 cm. thick. These contain a small proportion of metallic minerals, but chiefly sphalerite and miargyrite. The quartz and miargyrite are approximately contemporaneous in age, and large miargyrite crystals, deposited in interstices between crystals of quartz, are partially concealed by continued growths of quartz crystals.

The sphalerite forms honey yellow to rich golden brown crystal grains averaging 3 mm. in diameter. These are a little older than the first generation of miargyrite crystals.

The miargyrite crystals reach a length of 2 cm. with a breadth of 1 cm. They are partly concealed by the overgrown quartz crys-

<sup>1</sup> Published by permission of the acting Secretary of the Smithsonian Institution.

<sup>2</sup> Minerals of Idaho. *U. S. Nat. Museum, Bull.* 131, pp. 144-150.

tals. There were none of these suitable for goniometric measurement. They are elongated along the *b* axis and show the usual habits with prominently striated and rounded faces of two zones—(100)  $\wedge$  (001) and (100)  $\wedge$  (111) as is usual for the mineral. In color it is iron black with a reddish tinge but assumes a bluish or bronze tarnish on exposure. It is soft with vitreous metallic lustre, conchoidal fracture and dark red streak. Mr. M. N. Short of the U. S. Geological Survey has examined the material metallographically and very kindly furnished the following properties for it.

Color:	Gray with red internal reflections in places.
Anisotropism:	Strong.
Color in powder:	Dark ruby red—distinctly darker than pyrrargyrite.
1:1 HNO <sub>3</sub> :	Negative.
1:1 HCl:	Fumes tarnish; in places negative.
20% KCN:	Slowly stains brown.
20% FeCl <sub>3</sub> :	Negative.
40% KOH:	Stains iridescent.
5% HgCl <sub>2</sub> :	Negative.

The sections of miargyrite were found homogeneous, pure and free from intergrowth with other minerals.

Where not covered by the later quartz the miargyrite crystals are spangled with brilliant, equidimensional, small iron black or iridescent metallic crystals which at first were thought to be a second generation of miargyrite but which were later found to be tetrahedrite. These little crystals average hardly 0.25 mm. in diameter and are oriented at all angles with reference to each other and to the miargyrite on which they rest. These crystals, somewhat highly modified, were placed on the goniometer and measured. They show faces of the tetrahedron *p* (111), the hemi-tetragonal trisoctahedron *q* (112) and the rhombic dodecahedron *d* (110). The habit is as shown in figure 1. In the clinographic projection the faces have been lined and stippled in an endeavor to show the characteristics which mark the faces of the several forms. These are of greatest value in orienting crystals of tetrahedrite, the symmetry of which is at times not apparent. The faces of *p* (111) are smooth and brilliant. The faces of *q* (112), although brilliant, are striated parallel to the edges *q*  $\wedge$  *d* and the faces of *d* (110) are etched to dullness and have a bronzy sheen. The angles measured on crystals of the type figured identify the forms as follows:

FORM		SYMBOL Miller	QUALITY		MEASURED		CALCULATED	
No	Letter		Gdt.	Description	$\varphi$	$\rho$	$\varphi$	$\rho$
1	<i>d</i>	{ (011) (110)	01	Very dim, etched	1°49'	46°22'	0°00'	45°00'
			$\infty$	" " "	45°51'	90°53'	45°00'	90°00'
2	<i>q</i>	{ (112) (121)	$\frac{1}{2}$	Striated, multiple	44°26'	35°15'	" "	35°16'
			12	" "	26°50'	68°55'	26°34'	65°54'
3	<i>p</i>	(111)	1	Brilliant, good	45°17'	56°26'	45°00'	54°44'

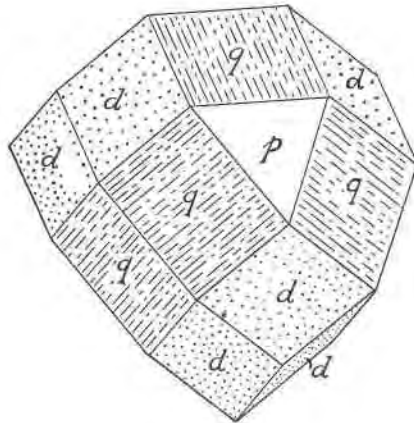
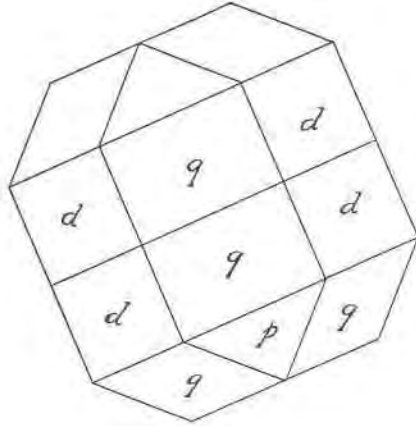


FIG. 1

The tetrahedrite is covered in places with a thin loose shell of fine-grained quartz. The order of deposition in the ore is:

- 1—quartz
- 2—sphalerite
- 3—miargyrite
- 4—quartz
- 5—miargyrite
- 6—tetrahedrite
- 7—quartz

The Flint district in which these specimens were found is not far from the mines in which miargyrite was found in the Silver City District. This is the only region in the United States where the mineral occurs except the Randsburg district in California where, within the past few years, very fine both massive and crystallized miargyrite has been found as the most abundant silver mineral of the ore. The crystallography of this California material is now being studied and will shortly be described by the present writer.

## THE IMPORTANCE OF POLLUCITE

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### INTRODUCTION

Pollucite,  $2\text{Cs}_2\text{O} \cdot 2\text{Al}_2\text{O}_3 \cdot 9\text{SiO}_2 \cdot \text{H}_2\text{O}$ , the principal source of caesium, was named in 1846 by Breithaupt from Pollux (the genitive form of which is Pollucis) of heathen mythology. Breithaupt found two minerals constantly associated in the cavities of the Isle of Elba granite, hence the fitness of his choice in applying the names of Castor and Pollux, famous for their fraternal affection and inseparable companionship. Castorite, the associated mineral, is now known as petalite,  $\text{Li}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 8\text{SiO}_2$ .

The writer prepared a brief paper (which he did not publish) about three years ago on the occurrence of caesium. Since that time he has changed his views regarding the abundance of pollucite. Quarrying pollucite has commenced since that time and the writer visited the quarry from which this mineral was being obtained during the summer of 1927.

### COMMERCIAL APPLICATION OF CAESIUM

The application of caesium was for several years practically limited to the use of its compounds as reagents in the rapidly developing field of chemical microscopy. Owing to its habit, possessed in common with rubidium, of forming salts of marked