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MINERALOGY.—*An occurrence of iron-cobalt bearing gersdorffite in Idaho.* EARL V. SHANNON.¹

A lot of material received for examination at the National Museum from Erwin Ploetzke contains a gray sulpharsenide of nickel, cobalt, and iron. The specimens were mailed from Burke, Idaho, and a letter accompanying them stated that they were from a prospect of Ploetzke in Idaho. Inquiries as to the exact locality met with no reply. Recently a similar lot of material was received from A. Beals of Avery, Idaho. An inquiry directed to Mr. Beals elicited the information that both lots were from the same prospect in which Mr. Ploetzke is a partner. It is located one mile above the mouth of Slate Creek, 7 miles from Avery. This is the first source of nickel minerals in Idaho. The deposits of the Blackbird district in Lemhi County are commonly referred to as cobalt-nickel deposits but, as a matter of fact, they contain almost no nickel. The Avery locality is in Shoshone County.

The specimens consist of greasy-appearing, greenish, sheared quartz containing the gersdorffite associated with pyrrhotite and chalcopyrite. The gangue contains a small amount of a grayish carbonate, probably ankerite. The quartz contains small open spaces lined with imperfect quartz crystals on which rest occasional whitish crystals of barite and minute pale-green globular or barrel-shaped aggregates of a scaly micaceous mineral. The latter is probably a chlorite. Optically, it is biaxial positive with 2V medium small, estimated at 30°, and refractive index is about 1.62. As a later deposit in the cavities there occur rose-red crusts of minute crystals of erythrite (cobalt bloom) too small to be measured but identified

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by their characteristic optical properties, and some dead-black material which may be heterogenite.

The gersdorffite appears to form masses up to several centimeters in diameter either pure or mixed with other sulphides. However, the mineral is not massive but consists of closely spaced small individual crystals, less than a millimeter in diameter, separated by quartz. Specimens may be selected which contain a large proportion of the mineral practically free from other sulphides. Several of these were crushed and sized by screening, and the quartz separated by methylene iodide. A few grains of pyrrhotite were separated with a hand magnet. Microscopic examination showed this prepared sample to be free from other sulphides. It was analyzed yielding the following results and ratios:

TABLE 1.—ANALYSIS AND RATIOS OF GERSDORFFITE FROM IDAHO

Quartz.....	3.48			
Cobalt.....	9.09	0.154		
Nickel.....	14.28	0.243	} 0.586	1.02 × 1
Iron.....	10.57	0.189		
Arsenic.....	43.80	0.584	0.584	1.02 × 1
Sulphur.....	17.70	0.552	0.552	0.96 × 1
Total.....	98.92			

The ratios indicate the formula (Ni, Fe, Co) AsS with the ratios Ni:Fe:Co = 7; 5; 2 approximately.

Several crystals, isolated from the quartz, were measured and were found to be isometric combinations of cube and octahedron.

It is evident that the mineral is a member of the pyrite group and a sulpharsenide of nickel, iron and cobalt. It is thus a 3-component isomorphous mixture of the gersdorffite and cobaltite molecules with a hypothetical iron sulpharsenide not yet recognized as a distinct mineral. Since the gersdorffite molecule is definitely predominant over the others in the present mineral it may be designated gersdorffite.

The color of the mineral is steel-gray like arsenopyrite. After exposure it becomes dull and assumes a barely perceptible reddish tinge. In the closed tube it gives, like arsenopyrite, copious sublimates of arsenic sulphide and arsenic.

Polished surfaces of the ore, examined in reflected light, disclose the angular crystals of gersdorffite which have probably replaced the quartz metasomatically. Pyrrhotite occurs in a network of fine veins forming the matrix of angular quartz grains. The only

other metallic mineral present is white in color and is unattacked by the usual etching reagents including nitric acid and acid permanganate. This may be pentlandite. It is present in very small amount and bears the same relation to the quartz as the pyrrhotite.

The gersdorffite is resistant to all reagents except that, with long etching with acid permanganate, a faint zoning becomes visible by the slight darkening of certain layers in the crystals showing, probably, slight differences in composition.

The associated pyrrhotite, when separated and purified, contains a mere trace of nickel.

GENETICS.—*Do balanced lethals explain the Oenothera problem?*¹

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It has been proposed by Muller (1917, 1918) and by Morgan (1918) that the balanced lethal explanation suggested by De Vries (1911, 1918) only to account for his double reciprocal crosses probably lies at the root of nearly all the unusual genetic phenomena of the *Oenotheras*. This view was supported by G. H. Shull, who reported at the Toronto Meetings of the American Association for the Advancement of Science in December, 1921, that he had proved the correctness of Muller's hypothesis. He stated that, with the exception of the short style of *brevistylis*, all the known genetic characters of *Oenothera* probably lie in a single chromosome pair. Since then data have been published to support this announcement (Shull, 1923-a, 1923-b).

Since the beginning of genetical studies on *Oenothera*, experimenters have been impressed with the striking correlations between various characters, and some breaks in these correlations have been noted. Emphasizing the idea that in *Oenothera* as well as in other organisms we are dealing with "unit" characters, Shull has concluded that all these characters, except the short styled condition of *brevistylis*, are associated in a single linkage group. In this group he has now located nine factors affecting visible characteristics, with which two zygotic lethals and two gametic lethals are assumed to be associated.

In reviewing the published data presented to demonstrate the behavior noted above, one finds considerable difficulty in harmonizing different portions of them, and is led to the conclusion that the proof for the balanced lethal hypothesis for the *Oenotheras* is by no means

¹ Papers from the Department of Botany, University of Michigan, No. 202.