SCORZALITE FROM SOUTH DAKOTA: A NEW OCCURRENCE[1]

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Abstract

The occurrence, mineral association, chemical analysis, and physical properties of scorzalite, $(Fe'', Mg)Al_2(PO_4,)_2(OH)_2$, from the Victory mine near Custer, S. Dak., are described. Scorzalite from this locality—the second reported occurrence of this mineral—has a Fe:Mg molecular ratio of 3:1, is richer in iron and has a higher specific gravity and higher indices of refraction than the type scorzalite from Minas Gerais recently described by the same authors.

Introduction and Acknowledgments

In September 1947, during a visit with U. S. Geological Survey field parties under the direction of L. R. Page in the Black Hills of South Dakota, the senior author acquired a blue mineral specimen which he later identified as scorzalite, the ferrous-iron member of the lazulite-scorzalite isomorphous series. Because of the similarity of the material to the type scorzalite from Minas Gerais, Brazil, the authors made a detailed study of the mineral from this new locality. M. H. Staatz and J. W. Adams kindly collected a large number of specimens from the dump of the Victory mine—the source of the first specimen examined.

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Occurrence

The Victory pegmatite mine is located about 2 miles northeast of Custer, Custer County, S. Dak. In 1943–44 this mine was one of the outstanding producers of sheet muscovite in the United States. L. R. Page, who observed the mineral occurrence during mining operations, reports the following account (personal communication):

"The blue mineral now identified as scorzalite was seen in place only on the 120-foot level, about 20 feet west of the intersection with the crosscut from the mainshaft. Most of the rock containing scorzalite was excavated during mining operations for mica. The lower levels of the mine are inaccessible at the present time and specimens of the mineral can be obtained only from the dump.

"Mica-bearing pegmatite at the Victory mine is internally divided into a 'wall zone' (composed essentially of blocky plagioclase, quartz, and

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muscovite) and a 'core' (of perthite and quartz). Scorzalite was found principally in the wall zone, but some grains were also observed in the granulite developed from schist where the two main pegmatites on the 120-foot level merge discordantly. Triphylite is the only other phosphate mineral noted in the pegmatite and it is concentrated in the wall zone with black tourmaline and ruby muscovite."

Descriptive Mineralogy

In the dozens of hand specimens available, scorzalite occurs only in pegmatite with quartz, plagioclase, muscovite, tourmaline, and triphylite. The scorzalite is massive and so intimately intergrown with tourmaline, triphylite, and muscovite that small fragments, one centimeter

Table 1. Chemical Analyses and Physical Properties of Scorzalite from South Dakota and Minas Gerais
(Analyses by J. J. Fahey)

	Victory mine South Dakota	Corrego Frio Minas Gerais[1]
Al_2O_3	30.80	30.87
Fe_2O_3	0.13	0.54
TiO_2	0.10	0.10
FeO	17.06	14.74
MgO	2.93	4.23
MnO	0.10	0.11
ZnO	—	0.17
CaO	0.03	0.02
P_2O_5	42.67	42.90
H_2O+	6.10	5.86
Totals	99.92	99.54
Mol. ratio, Fe'':Mg.	76:24	66:34
Sp. gr.[2] (± .005)	3.327	3.268
α (colorless)	1.636	1.633
β (blue)	1.666	1.663
γ (blue)	1.676	1.673
2V (calculated)	61° (−)	62° (−)
Cleavage	(110); good	(110), good
Orientation	Z=*b*; X near *c*	Z=*b*; X near *c*
Twinning	multiple	multiple

[1] For original description see Pecora and Fahey, *Am. Mineral.*, 34, 83–93 (1949).
[2] Determined with a fused quartz Adams-Johnston pycnometer.

across, are rarely free from admixed minerals. Powdered scorzalite can be purified using a heavy liquid (methylene iodide) and the electromagnetic separator.

The chemical analysis and physical properties of scorzalite from the Victory pegmatite are listed in Table 1, where they are compared with those of scorzalite from Minas Gerais. The Victory scorzalite has a higher molecular ratio of Fe″:Mg, higher specific gravity, and higher indices of refraction. *X*-ray powder patterns of scorzalite and lazulite are identical.

A brief description of the associated minerals is given below:

Tourmaline: massive and stubby, faceted crystals; color, black; $\omega = 1.655$; O = dark-gray green; specific gravity, 3.16.

Triphylite: massive; color, dark green; $\beta = 1.690$; 2V, very large; Y = blue green.

Plagioclase: massive, coarsely twinned; composition almost pure albite; $\beta = 1.533$.

Muscovite: two conspicuous varieties, ruby and yellow; in zoned plates, the ruby mica forms the core; the yellow mica also forms aggregate plates that are younger in age sequence than the ruby variety and the scorzalite; β (ruby) = 1.592; β (yellow) perceptibly lower than that of the ruby variety.