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EUCLASE IN GREISEN PIPES AND ASSOCIATED DEPOSITS, PARK COUNTY, COLORADO*

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INTRODUCTION

Euclase, $AlBe(SiO_4)(OH)$, apparently was first found in Brazil, and was brought to Europe as early as 1785. The mineral was classified and named by Hauy about 1792. Several other early European mineralogists studied the crystallography of euclase from Brazil, the Austrian Alps, and the Urals. Even though euclase was recognized very early, it has remained a rare species. So far as the writer can determine the mineral has not previously been reported from North America.

Euclase was first noted by the author in the greisen deposits of Park County, Colo., during field studies in the summer of 1960. Shortly thereafter the identification as euclase was confirmed by x-ray powder patterns. Euclase had been found only in vein deposits and placer material before its present discovery in greisen. The features of the vein occurrences denote a relatively high temperature of formation for euclase. In Brazil euclase is found in clay-rich quartz lenses in phyllite, associated with topaz and rutile; euclase also occurs in pegmatites with topaz and beryl (Leonardos, 1945). The Austrian euclase accompanies pericline and rutile in vuggy quartz vein deposits in mica-schist. Euclase in granite-pegmatite is recorded for Silesia (Kolbeck and Henglein, 1908), Bavaria (Durrfeld, 1910), and Tanganyika (McKie, 1955). Euclase is associated with bertrandite in an altered beryl crystal in pegmatite at Iveland, Norway (Strand, 1953). Euclase is found in placer material in Russia and British Guiana. At all these places the mineral is relatively rare.

Euclase may, however, be more common than it appears to be, especially in beryl-bearing pegmatites. The apparent rarity may be due to the inconspicuous nature of the mineral. Euclase is colorless, whitish, blue, or green; and though it customarily occurs in well-formed crystals, these commonly are small and can be easily overlooked if associated with such minerals as quartz, calcite, or topaz.

LOCATION AND FIELD RELATIONS

Euclase in Park County, Colo., is in small pipe-shaped bodies of greisen in the Redskin Gulch area within the Pikes Peak granite mass,

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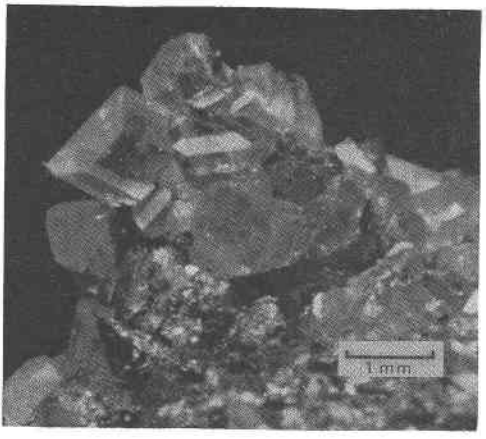
but near its western edge; and it also appears in more irregularly shaped greisen zones and closely related quartz-beryl deposits at the Boomer mine in a small outlying stock of the Pikes Peak granite (Sharp and Hawley, 1960).

In the greisen pipes of the Redskin Gulch area, euclase occurs as small well-formed crystals $\frac{1}{2}$ to 2 mm across, which commonly are on clear to milky quartz crystals in vugs in granular quartz-muscovite greisen (Fig. 1). The euclase is closely associated with quartz, fluorite, muscovite (gilbertite), and bertrandite, all of which are found in well-formed crystals. Some of the minerals in the pipes carry evidence that they are a product of the alteration of material of an earlier stage of greisen development, a stage in which a beryl-bearing rock is present. Lens-shaped parts of some beryllium-bearing pipes consist of a reddish stained, finely to coarsely textured rock made up mostly of quartz, bertrandite and muscovite. At places in this rock fine-grained muscovite and pink cryptocrystalline bertrandite form bands and zones with conspicuous hexagonal shapes as much as 1 inch across. That these aggregates were beryl crystals at one stage seems reasonable. Euclase crystals accompanied by purple and white zoned fluorite are attached to quartz crystals in small vugs, and evidently formed at a late stage.

In the Boomer mine area euclase occurs as crystal clusters and coatings on fluorite in vugs in gray quartz-muscovite-fluorite greisen. Here, as in the pipes of the Redskin Gulch area, euclase was a late-forming



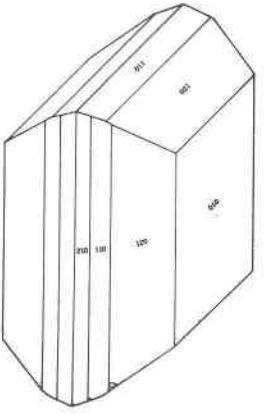


FIG. 1. (Left) Photograph of euclase crystals attached to quartz, Park County, Colorado.

FIG. 2. (Right) Crystal habit of euclase showing probable dominant forms, Park County, Colorado.

mineral. Green fluorite, which is common in the greisen, is overgrown with clear and purple-zoned fluorite crystals. Clusters and coatings of euclase crystals, together with some quartz crystals, cover both types of fluorite. Rosettes of muscovite are intergrown with the euclase. A bertrandite-bearing phase of the greisen (Sharp and Hawley, 1960), occurring in the same deposit, does not appear to contain euclase.

An altered beryl-bearing part of a quartz vein associated with greisen at the Boomer mine contains both well-formed euclase crystals as much as 2 mm across and bertrandiate crystals as much as several millimeters in size. These euclase crystals are mixed with quartz and muscovite crystals in small vugs and porous aggregates pseudomorphic after beryl. This occurrence is similar to that reported by Strand (1953) from a Norwegian pegmatite.

Mineralogy

Euclase in the greisen in Park County, Colo., appears to be consistently simpler in habit than that described from other localities. The Park County crystals are colorless thick plates on which the (010) face is dominant. Cleavage parallel to (010) is conspicuous. The habit is shown in the clinographic sketch on figure 2. Euclase is monoclinic and holohedral. Crystals previously described commonly are of elongate prismatic habit and have many faces (Meixner, 1957; Saldanha, 1939, 1941; Dana, 1914).

The crystal structure has been studied and described by Biscoe and Warren (1933) and more recently by Mrose and Appleman (oral communication, 1960). *X*-ray diffraction data for euclase from Park County, Colo., agree well with those of Mrose and von Knorring (1959) for euclase from Minas Gerais, Brazil. Powder films of the Park County euclase were compared visually with a film prepared from euclase from near Ouro Preto (Villa Rica), Brazil, that was supplied by the U. S. National Museum. The patterns of both minerals appear to be identical in *d*-spacings and intensities.

Optical measurements of the Park County euclase match closely those given by Dana (1914, p. 508–509) and Winchell (1951, p. 357–358).

Optic sign (+) Dispersion r>v
Indices
α 1.652±0.001 (Na)
β 1.655±0.001 (Na) 2V=48° meas. with
γ 1.670±0.001 (Na) spindle stage
$\gamma-\alpha$ 0.028
Optic plane is (010)
G=2.987±0.005 (by liquid immersion method)

A semiquantitative spectrographic analysis by A. T. Myers of the Park County euclase, sample S60-Bd-1, gave the following results:

Si	Major	Cu	.003 per cent
Al	Major	Ge	.15 per cent
Fe	.003 per cent	Sc	.003 per cent
Ca	.005 per cent	Sn	.015 per cent
Be	7. per cent		

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