tion of the section in process without removing it from the holder. In the place of the alignment platform, a shelf 0.03 inch deep, $1\frac{7}{8}$ inch long, and $\frac{1}{16}$ inch wide was milled into the edge of the rectangular hole to grip the slide. Four $\frac{1}{8}$-inch D brass pins help in holding the section by preserving a sharp shoulder edge on this shelf.

The holder is used in much the same manner as the boron-carbide holder except that the thickness and uniformity are not controlled. During grinding the slide is periodically checked with a petrographic microscope in the conventional manner. The slide is not removed from the holder during inspection.

Summary

The amount of skill required for the first grinding stage is less than that required when the thin section is processed in the conventional manner. The process is accelerated due to the elimination of many inspection steps during coarse grinding. Because a uniform section results from using the automatic thickness holder during coarse grinding, the finishing stage can be accomplished with less corrective measures. Holders used for finishing aid in ease of handling the sections as they are ground. Both of these holders have been used in practice and aid materially in the preparation of petrographic thin sections.

GENTHELVITE FROM COOKSTOVE MOUNTAIN, EL PASO COUNTY, COLORADO*

Glenn R. Scott, *U. S. Geological Survey, Denver, Colorado.*

In February 1951 a small but highly modified crystal of genthelvite $Zn_4Be_3Si_3O_{12}S$, (Fig. 1) was found on a northeast-trending spur of Cookstove Mountain in the NE$\frac{1}{4}$ NW$\frac{1}{4}$ NW$\frac{1}{4}$ sec. 4, T. 15 S., R. 67 W. (U. S. Geological Survey Manitou $7\frac{1}{2}$-minute quadrangle), El Paso County, Colo. Another occurrence of genthelvite from El Paso County was recently reported (Glass and Adams, 1953), but because of the rarity of genthelvite, further discussion on the mode of occurrence and crystallography is thought to be warranted.

The genthelvite crystal was taken from a pegmatite in the Pikes Peak granite. The pegmatites on the northeast-trending spur of Cookstove Mountain crop out in a narrow north-northwest-trending belt that seems to be part of a larger system of pegmatite dikes. Three places along this north-northwest-trending system, that are well known to mineralogists

* Publication authorized by the Director, U. S. Geological Survey.

for the rare and well-crystallized minerals described in more than 40 articles since 1876, are St. Peter's Dome, Cookstove Mountain, and Crystal Park.

Several generalizations can be made about the structure and mineralogy of the pegmatite dikes in the dike system. The pegmatites in this system follow an arch-like joint structure described by Stevens (1949, p. 268) as his second group of joints. Individual dikes strike slightly west of north and dip gently to the east. Most of the dikes near St. Peter's Dome contain subhedral crystals that are tightly bound together or "frozen-in" with little or no intercrystal space. Very few of the pegmatite dikes in that area contain miarolitic cavities. Thorium-bearing minerals are common in the "frozen-in" dikes, but are rare in the miarolitic cavities. Toward the north, pegmatites with miarolitic cavities become more common and possibly make up one-half the total number of pegmatites around Fairview (Manitou quadrangle 1:48,000). Correspondingly, thorium-bearing minerals are rare and consist mostly of tabular crystals of metamict thorite in miarolitic cavities. The form of the thorite crystals suggests that they may have been the monoclinic variety huttonite. Topaz, phenakite, and amazon stone are rare near Fairview, but become more common north of Bear Creek and are most abundant at Crystal Park where the miarolitic cavities are larger. Con-

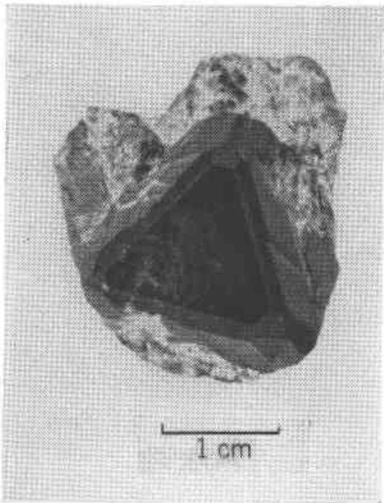

FIG. 1. Photograph of genthelvite crystal from El Paso County, Colo.; looking at the negative tetrahedral face $(1\bar{1}1)$, (×1.55).

versely, "frozen-in" pegmatites are rare north of Bear Creek and thorium-bearing minerals are unknown to the author from the pegmatite dikes of that area.

The miarolitic cavities in the larger pegmatite dike system seem, from preliminary reconnaissance, to range in altitude from 7,600 feet to 9,000 feet above sea level. Within this vertical range near Fairview there are two broadly defined zones; the lower zone with pegmatites containing bastnaesite, siderite altered to hematite, quartz, microcline-perthite, zircon, huttonite(?), and columbite; and the upper zone with pegmatites containing bastnaesite, siderite altered to limonite, quartz, microcline-perthite, fluorite, topaz, phenakite, and genthelvite. Mineral deposition seems to have followed approximately the order in which the minerals are listed.

The pegmatite from which the genthelvite was taken is a collapsed miarolitic cavity 3 feet long, 6 inches wide at the widest part, and about 4 inches deep. The walls of the pegmatite consist of a 2-inch thick graphic intergrowth of quartz and microcline-perthite, set here and there with small, brown, opaque zircon crystals. Interstices in the walls are filled with limonite. Well-formed crystals of smoky quartz and microcline-perthite project from the walls. Penetrating them are crystals of bastnaesite and siderite altered to limonite. The genthelvite crystal was emplanted on a quartz-microcline-perthite-biotite intergrowth.

Most of the pegmatites in the upper zone contain fluorite; however, fluorite was not noted in either of the genthelvite-bearing pegmatites (Glass and Adams, *op. cit.*, p. 858). Another peculiarity of the two genthelvite-bearing pegmatites concerns the elongated form of the smoky quartz crystals (Adams, personal communication). The prism tapers very gradually to an almost microscopic pyramid. This type of quartz crystal has not been observed in any other pegmatite in the area.

The genthelvite crystal (Fig. 2) is a combination of the positive (o) and negative (o_1) tetrahedra, thus having the appearance of a slightly distorted octahedron. The crystal is further modified by the rhombic dodecahedron (d), the cube (a) (on the negative tetrahedral face only), the deltoid dodecahedron (p), the and trigonal tristetrahedron (n). One of the tetrahedral faces is dull and is sculptured parallel to the edges of the tetrahedral face; the other face is lustrous and unsculptured. The lustrous face was chosen arbitrarily as the negative tetrahedron for the purpose of this discussion. The length of the vertical axis is about 2.6 cm. and the lateral axes about 2.9 cm.

Crystallographic, chemical, and x-ray tests show that the crystal is unquestionably genthelvite. The negative tetrahedral faces of the crystal are grayish red, but the other faces are black. In transmitted light small

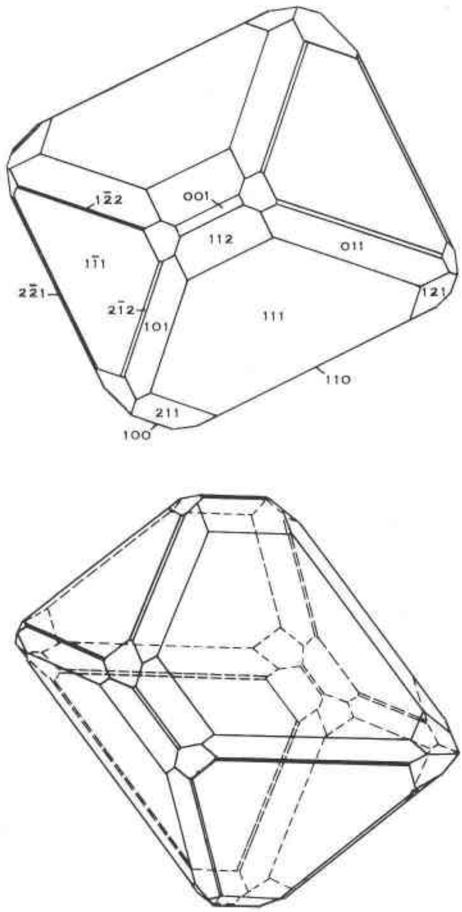

FIG. 2. Orthographic and clinographic projections of genthelvite crystal from El Paso County, Colo.

chips are pale pink. The fracture is uneven, the luster vitreous. The hardness is about 6.5.

The mineral is isotropic and transparent. The index of refraction $n = 1.745$.

Microchemical tests by J. W. Adams of the U. S. Geological Survey confirmed the presence of zinc, beryllium and sulfur.

An *x*-ray film prepared by R. P. Marquiss of the U. S. Geological Survey was compared by F. A. Hildebrand, also of the Survey, with the unit cell measurements of the original genthelvite sample from West

Cheyenne Canyon near St. Peter's Dome, El Paso County, Colo., and he finds that the unit cell measurements of the two correspond.

REFERENCES

Glass, J. J., and Adams, J. W. (1953), Genthelvite crystal from El Paso County, Colorado: *Am. Mineral.*, **38**, 858–860.

Steven, T. A. (1949), Geology and fluorspar deposits of the St. Peter's Dome district, Colorado: *Colo. Sci. Soc. Proc.*, **15**, no. 6, 259–284.

THE CRYSTALLOGRAPHY OF CERITE

P. Gay, *Department of Mineralogy and Petrology, Cambridge, England.*

In a recent note (Glass, Evans, Carron and Rose, 1956) the crystallography of the rare earth silicate, cerite, from the Mountain Pass district of California has been described as monoclinic with cell dimensions $a=17.81$, $b=10.85$, $c=14.10$ Å, $\beta=109°\ 10'$, and space group $I2/n$ or In. During the course of investigations of some rare earth silicates, the present author has examined a number of cerite specimens from the Mountain Pass and other localities. It has been found that all specimens are trigonal with slightly variable cell dimensions $a\sim 10.8$, $c\sim 37.7$ Å and probable space group $P312$, $P31m$ or $P\bar{3}1m$, etc. There is, however, a marked pseudocell in which the c-axis length is halved, giving a pseudo-space group $R32$, $R3m$ or $R\bar{3}m$; the true primitive cell is denoted by weak reflexions midway between the strong 19 Å layer lines on c-axis oscillation photographs.

It is of interest to see how these conflicting observations may be reconciled. Obviously the monoclinic b-axis is identical with the trigonal a-axis (i.e., $b_M=a_T$). If the trigonal description is correct it requires that in the (010) section of the monoclinic reciprocal net (Fig. 1) there shall exist two perpendicular row lines, along one of which the repeat distance is a_T^* and along the other the repeat is c_T^*; this latter direction must be a triad symmetry axis. The angle $201_M \wedge \bar{1}01_M$ is exactly 90° and the dimensions are such that the 201_M face normal is the direction of a_T^* and the $\bar{1}01_M$ face normal is the direction of c_T^* (Fig. 1). The trigonal character of the $\bar{1}01_M$ direction may be confirmed by suitable x-ray photographs. Although the body-centered monoclinic description of the cerite lattice may be reconciled with a trigonal cell of the correct dimensions, it implies that the true lattice is not primitive but rhombohedral. In the present work, no detailed examination of the Mountain Pass cerite was