Johnkoivulaite, Cs(Be₂B)Mg₂Si₆O₁₈, a new mineral of the beryl group from the gem deposits of Mogok, Myanmar

AARON C. PALKE1,*, LAWRENCE M. HENLING2, CHI MA3,†, GEORGE R. ROSSMAN4, ZIYIN SUN1, NATHAN RENFRO1, ANTHONY R. KAMPF4,‡, KYAW THU5, NAY MYO4, PATCHAREE WONRAWANG7, and VARARUT WEERAMONKHONLERT7

1Gemological Institute of America, Carlsbad, California 92008, U.S.A.
2Beckman Institute, California Institute of Technology, Pasadena, California 91125, U.S.A.
3Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, California 91125, U.S.A.
4Mineral Sciences Department, Natural History Museum of Los Angeles County, Los Angeles, California 90007, U.S.A.
5S Gemmological Institute, Yangon 11201, Myanmar
6Greatland Gems and Jewelry, Mogok 11101, Myanmar
7Gemological Institute of America, Bangkok 10500, Thailand

ABSTRACT

A new mineral of the beryl group, johnkoivulaite, Cs(Be₂B)Mg₂Si₆O₁₈, was recovered from the gem gravels in the Pein Pyit area of the Mogok region in Myanmar. Thus far, only a single crystal has been identified. It has dimensions of about 5.8 × 5.7 × 5.5 mm. This specimen has an irregular shape but still has discernible crystal form with geometric growth patterns observed on the crystal faces. The crystal of johnkoivulaite is grayish-violet in color and strongly pleochroic, going from nearly colorless with E⊥c to dark bluish-violet with E∥c. Johnkoivulaite has a Mohs hardness of about 7½ and a measured density of 3.01(10) g/cm³. It is uniaxial (−) with ω = 1.607(1) and ε = 1.605(1) (white light). Electron microprobe analyses gave the empirical formula of (Cs0.35K0.65Na0.1)(Be1.46B1.12)(Mg0.4Fe0.2Mn0.1Al0.1)Si₅O₁₈ with Be calculated by stoichiometry and confirmed by LA-ICP-MS measurements. Johnkoivulaite is hexagonal, P6/mmc (no. 192) with a = 9.469(2), c = 9.033(2) Å, V = 701.5(3) Å³, and Z = 2. Johnkoivulaite is isomorphous with beryl and exhibits partial substitution of B for Be at the distorted tetrahedral site, Mg for Al at the octahedral site, and Cs in the channel sites within the stacked Si₅O₁₈ rings. This substitution can be written as (CsMg₂B)Al₆O₁₈. Johnkoivulaite, the seventh member of the beryl group, is named in honor of gemologist John Koivula in recognition of his contributions to mineralogy and gemology.

Keywords: Beryl group, new mineral, gemology, johnkoivulaite, Mogok, Myanmar

INTRODUCTION

Mogok, Myanmar, is one of the most geologically diverse locales in the world. Not only does Mogok produce some of the finest quality rubies, but it is also the source of some of the finest blue sapphire, spinel, peridot, gem feldspar, and numerous other gems. The geological processes that created the gemstone deposits in Mogok also created an assortment of rare minerals found nowhere else in the world, such as painite and kyawthuite. Additionally, ~50 km northeast of Mogok, near the Momeik township, another rare mineral, avdeevite, of the beryl group was recently found, further adding to the geological diversity of this region. Another rare member of the beryl family, pezzottaite, has also been found in this region, being found in the Molo quarter of the Momeik township and east of Let Pan Hla, Pyin Gy Taung between the cities of Mandalay and Mogok.

In this contribution, we describe another rare mineral unique to Mogok, johnkoivulaite, also a member of the beryl group. The new mineral was named in recognition of the lifetime work of John Koivula of the Gemological Institute of America and his many achievements and contributions to the fields of mineralogy and gemology. The new mineral and name were approved by the IMA Commission on New Minerals, Nomenclature and Classification on September 6, 2019, under the number 2019-046. The holotype specimen of johnkoivulaite is permanently deposited in the collection of the Gemological Institute of America Museum under its catalog number 41653, and the co-type consisting of several tiny fragments from the holotype is deposited in the collections of the Natural History Museum of Los Angeles County, California, U.S.A., under catalog number 75133.

LOCATION AND GEOLOGICAL BACKGROUND

The Mogok gem deposits are found within the Mogok metamorphic belt stretching approximately north-south from southern Myanmar in the Andaman Sea up into northern Myanmar near the eastern Himalayan syntaxis (Searle et al. 2007). The Mogok metamorphic belt was produced by compressive and transensational deformation during the Himalayan orogeny in the late...