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A Note on Rynersonite from Uganda

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Abstract

This paper describes a new find of the rare mineral rynersonite, $Ca(Ta,Nb)_2O_6$, in the Wampewo pegmatite, Mengo, Uganda. The mineral occurs in association with microlite and wodginite.

In its habit, properties and chemistry the Wampewo mineral is quite similar to the original rynersonite from the Himalaya pegmatite, San Diego County, California. However, the Wampewo rynersonite is more Ta-dominant and shows a slightly larger unit cell.

INTRODUCTION

In a recent paper FOORD and MROSE (1978) described a new species isostructural with synthetic $CaTa_2O_6$ and named it rynersonite. The mineral comes from the famous Himalaya pegmatite, San Diego County, California, and ranges in composition from $Ca(Ta_{1.21}Nb_{0.77})O_6$ to $Ca(Ta_{1.44}Nb_{0.51})O_6$. As a personal communication from Dr. Stefan Graeser, of Basle, Switzerland, they also report the occurence of a Nb-dominant analogue of rynersonite from Valle Vigezzo, Novara province, northern Italy.

From the Wampewo pegmatite in Mengo, Uganda, known for its Bi and Ta compounds, the first author found in 1975 small amounts of a brown mineral which could not be identified and was put aside for later investigation. After the paper by FOORD and MROSE became available, it was discovered that the Wampewo mineral resembles closely the Californian rynersonite, indicating that the two minerals might represent varieties of the same species. The Wampewo material was sent to the second author who confirmed its identity with rynersonite.

Because rynersonite is now known from three localities (Californian, Italian, Ugandan), the identification and properties of the Ugandan mineral will be reported in this paper.

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OCCURRENCE AND MORPHOLOGY

The Wampewo pegmatite (32° 10' E, 0° 30' N) also known as Nampeyo and Gamba Hill, Mengo district of Uganda, came into prominence when WAYLAND and SPENCER (1929) described a new mineral bismutotantalite from this locality. The pegmatite consists of an irregular quartz-muscovite-feldspar body intruded into mica schists. The feldspar is largely kaolinized or altered to a fine-grained muscovite greisen and close to the quartz core, pods of lithian mica and nodules of amblygonite (montebrasite) were observed.

A closer examination of the lithian mica revealed numerous pseudomorphs of bismuthian microlite (westgrenite) after bismutotantalite (VON KNORRING and MROSE, 1962). Some of these pseudomorphs, however, were quite different in appearance, consisting of fibrous, brown sprays of rynersonite in a matrix of crumbly pink microlite together with some wodginite and zircon.

The rynersonite occurs in scanty amounts; some 200 mg only of the impure material was available for study. The mineral forms felted masses of prismatic, slightly bladed crystals, up to 2 mm in diameter. Single crystals in these masses range up to 0.2 mm in length and, exceptionally, to 0.03 mm in thickness. The habit of the crystals matches that illustrated in Fig. 2 of the paper by FOORD and MROSE. According to X-ray precession photographs, the crystals are elongated in the direction of the a-axis and flattened on (010). No crystal faces with $h \neq 0$ were detected by scanning electron microscopy. Traces of {011}, {001} and {010} could be identified in the 0kl zone. No cleavage is detectable.

The Wampewo rynersonite is intimately intergrown with octahedral microlite and black wodginite (both identified by X-ray powder pattern). These two associates are especially concentrated on the ends of the prism masses and are found also in the interstices between the single prisms. Some lepidolite and quartz are enclosed in the rynersonite masses.

X-RAY CRYSTALLOGRAPHY

A single prism, 0.02×0.03×0.09 mm in size, was detached for X-ray precession work. A series of photographs made of this crystal indicate orthorhombic symmetry with systematic extinctions of the space group Pmnb. The X-ray powder pattern was recorded with the Philips wide-angle goniometer. Silicon was used as an internal standard. The unit cell dimensions measured from the precession photographs were refined by a least-squares analysis of the powder pattern data. The refined cell data for the Wampewo rynersonite are slightly larger than those for the Californian mineral (uncertainties of the last decimals in parentheses):

	Wampewo, Uganda	Himalaya, California
a (Å)	7.550 (4)	7.505 (1)
b	11.131 (6)	11.063 (2)
c	5.380 (2)	5.370 (1)
Vol. (Å^3)	452.1	445.86

CHEMISTRY

The available amount of the Wampewo rynersonite did not allow analysis by wet chemical methods. The mineral was analyzed by GEOSCAN microprobe. The analysis was kindly performed by Mrs. Kirsti Hämäläinen, of the Exploration Dept., Outokumpu Mining Co., Espoo, Finland, for which the authors are grateful. Cr-diopside was used as a standard for Ca and Si, rhodonite for Mn and pure metals for the other constitutents. The EMPADR VII program of John Rucklidge and E.L. Gasparrini of the University of Toronto was used for the correction calculations.

Table 1. Chemical composition of rynersonite from Wampewo, Uganda.

	Dark brown		*Pale yellowish brown*	
	Wt. %	*Cations 0=6*	*Wt. %*	*Cations 0=6*
Ta_2O_5	74.6	Ta 1.67	83.3	Ta 1.89
Nb_2O_5	10.23	Nb 0.38	3.63	Nb 0.14
Bi_2O_3	0.43	Bi 0.00_9	0.18	Bi 0.00_4
Sb_2O_3	0.07	Sb 0.00_2	0.17	Sb 0.00_6
CaO	8.50	Ca 0.75	9.41	Ca 0.84
MnO	0.35	Mn 0.02	0.05	Mn 0.00_4
FeO†	1.43	Fe 0.10	0.94	Fe 0.07
SiO_2	1.01		0.70	
Total	96.62		98.38	
Nb/Ta+Nb		0.19		0.07

Microprobe analysis. † Total iron.

As is indicated by the color of the mineral, its chemistry is variable. Dark brown and pale yellowish brown varieties were analyzed. Their compositions are reproduced in Table 1. This table illustrates the fact that the Wampewo rynersonite is more Ta-dominant than the Californian mineral. Together with the Italian rynersonite, the Ta/Ta+Nb ratio is now known to vary from 0.41 to 0.93.

DENSITY AND OPTICAL PROPERTIES

The intimate intergrowth of rynersonite with the associated minerals made it impossible to prepare pure material for a density determination with the Berman balance. The calculated densities are: 6.94 for the dark brown variety and 7.20 for the pale yellowish brown variety.

The color of the Wampewo rynersonite is a variable shade of brown. The refractive indices and the birefringence are very high. The optical orientation agrees with that of the Californian mineral: $a \| \gamma$, $b \| \beta$, $c \| \alpha$. Pleochroism is not observable. Twinning absent.

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