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A NEW OCCURRENCE OF YUGAWARALITE AT OSILO, SARDINIA

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Abstract

Yugawaralite from Osilo, near Sassari, Sardinia, occurs as aggregates of well-formed, tabular crystals flattened (010) and elongate [001]. The unit-cell dimensions, chemical formula, density and optical properties are similar to those of yugawaralite from other localities.

Sommaire

La yugawaralite se rencontre à Osilo, près de Sassari, en Sardaigne, sous forme d'agrégats de cristaux bien formés, tabulaires sur (010) et allongés suivant [001]. Quant aux dimensions de maille, formule chimique, poids spécifique et propriétés optiques, ces cristaux ressemblent à ceux des autres localités.

(Traduit par la Rédaction)

Introduction

Yugawaralite, a relatively rare zeolite, was reported to occur with other zeolites both as well-formed crystals filling cavities, and as microcrystallized material produced by low-grade metamorphism of extrusive rocks. Occurrences of the first type are at Fudo-no-Taki, near Yugawara, Japan, which is the type locality (Sakurai & Hayashi 1952); at Heinabergsjökull, Iceland (Barrer & Marshall 1965); at Shimoda, Japan (Sameshima 1969); and at Chena Hot Springs area, Alaska (Eberlein *et al.* 1971). Occurrences of the second type are at Onikobe, Japan (Seki & Okumura 1968) and Tanzawa, Japan (Seki *et al.* 1969).

Occurrence and Properties

The sample was collected near Osilo, Sassari, Sardinia, from an outcrop on the slope of Mt. Crastu Muradu, above the Osilo-Sassari road (SS. 127) between Km. 117 and Km. 118.

The rock is an altered, grey-green trachyandesite belonging to an Oligocene trachyandesite formation which is found throughout this area of Sardinia. The rock has numerous cavities and fractures filled with variable amounts of yugawaralite, laumonite, heulandite, stilbite, chabazite, epistilbite, mordenite, barite, calcite, ankerite and quartz. All yugawaralite extends from a substrate of well-crystallized calcite and is associated with laumontite, heulandite and stilbite. Yugawaralite has been found with mordenite in only one geode, and has not been found with chabazite.

Yugawaralite occurs as paraliel aggregates of well-formed, clear-white, tabular crystals (Fig. 1) morphologically similar to those described by Eberlein *et al.* (1971) for material from Alaska. The most prominent form, {010}, is also the contact face of the aggregates; elongation of crystals is [001]. The crystals are set on a matrix of scalenohedral calcite; only one doubly-terminated crystal was observed. Optical properties are given in Table 1.

Powder tracings of yugawaralite were recorded on a Philips diffractometer with Ni-

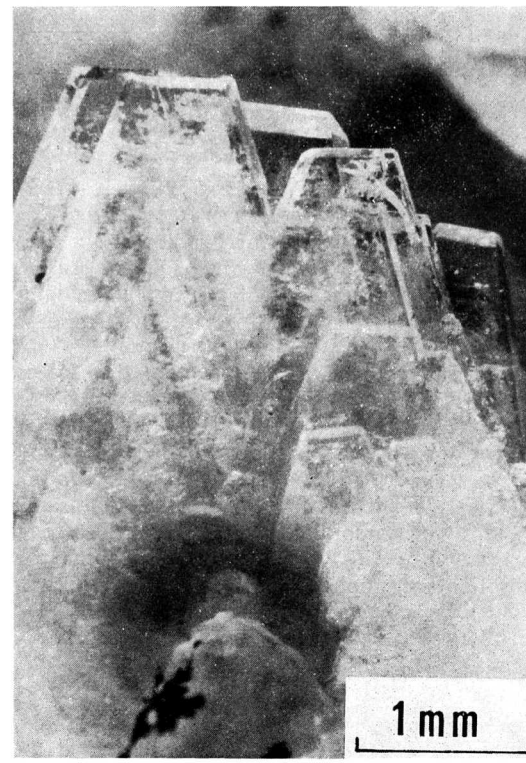

Fig. 1. Yugawaralite from Osilo, set on a matrix of calcite.

TABLE 1. YUGAWARALITE FROM OSILO

Chemical Data			
Oxide	%	Formula	
SiO_2	61.74	Si^{4+}	6.09
Al_2O_3	16.67	Al^{3+}	1.94
Fe_2O_3	0.11*	Fe^{3+}	0.01
MgO	0.08	Mg^{2+}	0.01
CaO	8.29	Ca^{2+}	0.88
SrO	tr	Sr^{2+}	0.00
BaO	tr	Ba^{2+}	0.00
Na_2O	0.11	Na	0.02
K_2O	0.17	K	0.02
H_2O	12.77	H_2O	4.20
Total	99.94	O	16

Crystallographic Data		Optical Data†	
Z	2	n_α	1.493(2)
a	6.724(4)Å	n_β	1.499(2)
b	14.003(2)	n_γ	1.502(2)
c	10.054(7)	Optical axial plane	$\perp\{010\}$
β	111° 11' (8')	$2V_\alpha$	79°±3°
V	882.7(3)Å^3	Orientation	$Y \wedge c = 12°$, $Z = b$, $X \wedge a = 9°$
D_{calc}	2.23 g/cm^3		
sp.gr.**	2.22(2)		

* Total Fe as Fe_2O_3

** Determined in toluene using a torsion microbalance

† Refractive indices for n_D at 22°C; orientation angles in the obtuse angle.

filtered Cu$K\alpha$ radiation, and cubic $Pb(NO_3)_2$ as an internal standard. The pattern agrees very well with that reported for this zeolite by Eberlein *et al.* (1971). Cell dimensions were derived by a least-squares computer program using 55 reflections between 4.65Å and 1.72Å, and indexed by a method that takes account of the structure factors when assigning the indices (Alberti 1976). With structure factors from Kerr & Williams (1969), the indices and cell dimensions do not differ from those published previously by most other investigators.

Carefully hand-picked material was analyzed by a combination of X-ray fluorescence spectrometry (Si, Al, Ca, K, Fe), atomic absorption spectrophotometry (Na, K, Mg, Ca, Sr, Ba, Mn) and TGA (H_2O). The results, given in Table 1, indicate a close analogy with those reported for the sample from Yugawara (Seki & Haramura 1966) and for that from Alaska (Eberlein *et al.* 1971).

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