

A NOTE

on the

PARAGENESIS OF OTTENSITE

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INTRODUCTION

During the Denver mineral show of 2005, the senior author noticed a specimen of stibnite with red and yellow encrustations, identified as "cetinite" and "cervantite," respectively. The specimen owner, Guanghua Liu, could not supply a specific locality, nor provide analytical data supporting the identifications. Rather than let this specimen slip away into oblivion, the senior author purchased it (see Fig. 1 of the previous article).

Initial X-ray powder diffraction of the red encrustation yielded a pattern generally consistent with cetinite. Cetinite is a rare antimony mineral originally described from the Cetine mine, Italy (Sabelli and Vezzalini, 1987) and not apparently recognized elsewhere (Anthony *et al.*, 1997). To check the internal consistency of the results, these diffraction data were indexed as cetinite, and the unit cell dimensions were refined. The unit cell dimensions, however, appeared significantly smaller than those reported for cetinite, but closely matched those of the synthetic Na analog of cetinite (Sabelli *et al.*, 1988). Based on the indication that the mineral might represent a natural equivalent of the Na analog of cetinite, further work began. In June 2006, however, a notice on the web site of the International Mineralogical Association listed new mineral IMA 2006-014 (Burke and Ferraris, 2006). The authors realized that the presently labeled "cetinite" material and the new mineral were indeed the same. In this issue, this mineral is described as the new species ottensite (Sejkora and Hyršl, 2007).

X-RAY STUDY

X-ray diffraction data were collected on a Philips X'Pert MDP diffractometer located in the Department of Chemistry, University of Arizona. The unit cell parameters were calculated using in-house software developed by the authors (TAL, RTD), using non-linear least squares regression. The ottensite unit cell dimensions found here were $a = 14.1788(2) \text{ \AA}$ and $c = 5.5736(2) \text{ \AA}$. These data more closely approximate those of the sodium analog of cetinite ($a = 14.152 \text{ \AA}$, $c = 5.5758 \text{ \AA}$) rather than cetinite ($a = 14.2513 \text{ \AA}$, $c = 5.5900 \text{ \AA}$) (Sabelli *et al.*, 1988).

Certain peaks in the indexed X-ray powder diffraction data for ottensite did not fit the expected positions. Assuming an admixture

of another mineral, another search matched NaSb(OH)_6 . This natural phase has been previously described as the mineral mopungite (Williams, 1985).

OCCURRENCE

While visiting Guilin in April 2006, the senior author asked many dealers for information about the red encrustations on stibnite. One dealer indicated that perhaps five beer flats of material had been produced in 2004, and distributed. Sejkora and Hyršl (2007) give the type locality as the Qinglong district in Qinglong County, Guizhou. Liu (2006) cites more specifically the Dachang antimony mine in the Qinglong district (see Wu and Zhao, 1990) as the source for what he believed to be cetinite. The specimen examined in this study is among those sold by Liu as cetinite, and has subsequently proven to be ottensite. Therefore it seems possible that all of what had previously been identified as cetinite from China is actually ottensite.

PARAGENESIS

The sequence of deposition begins with the deposition of well-formed stibnite crystals, followed by encrustation by fluorite. Many such specimens, without further alteration of the stibnite, have appeared on the mineral market. There are attractive examples of this occurrence from another occurrence in Guizhou Province, specifically the Banpo mine, Dushan County (Ottens, 2005: Fig. 18).

In the case of the ottensite specimens from the Qianlong deposit, the stibnite crystals have been partially leached away, leaving hollow void space between the fluorite encrustation and the underlying stibnite. Ottensite develops subsequently, sometimes completely filling the void, but often forming in open space as spherical aggregates somewhat reminiscent of red caviar (see p. 78, Fig. 2). X-ray diffraction analysis confirms these botryoidal aggregates as ottensite. An unidentified amorphous antimony oxide stains the fluorite coatings yellow on some specimens (Fig. 1, p. 78). These yellow coatings have previously been labeled "cervantite," an identification which remains unconfirmed.

Mopungite, tetragonal NaSb(OH)_6 , was originally described from

Nevada (Williams, 1985) and subsequently found with cetineite in Italy (Anthony *et al.*, 1997). This new material apparently represents a third world occurrence for mopungite, and the first occurrence of the mineral in China. The mopungite is not distinctly visible under the microscope and is apparently finely intermixed with the ottensite.

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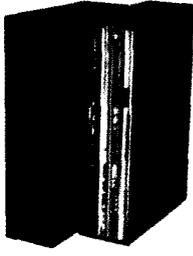
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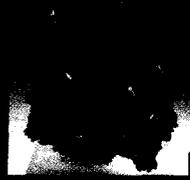
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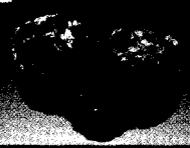
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OTTENSITE
 $\text{Na}_3(\text{Sb}_2\text{O}_3)_3(\text{SbS}_3) \cdot 3\text{H}_2\text{O}$, hexagonal
 forming red encrustations on stibnite from Qianlong,
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