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Epidote supergroup nomenclature: The names hancockite, niigataite and tweddillite reinstated

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ABSTRACT

The epidote-group nomenclature report by Armbruster *et al*. (2006) provides a clear and concise definition of the epidote group, and a set of consistent rules and naming conventions for establishing new subgroups and mineral species within what is now the epidote supergroup (Mills *et al*., 2009). In order to comply with these rules, it was decided to rename the already approved minerals hancockite, niigataite and tweddillite to epidote-(Pb), clinozoisite-(Sr) and manganipiemontite-(Sr), respectively. These names were already well established within the mineral community, and the renaming caused some controversy. Recent International Mineralogical Association guidelines (Hatert *et al*. 2013) have given priority to the historical provenance of names over nomenclature consistency. Hatert *et al*. (2013) state as a main principle that "retroactivity will not be applied", but that "Every change in nomenclature has to go through the CNMNC, and is examined on its own merit", thus establishing a mechanism for re-instating historical names on a case by case basis. The CNMNC (Commission on New Minerals, Nomenclature and Classification Committee of the International Mineralogical Association) has therefore decided, as an exception to the main principle, to re-instate hancockite, niigataite and tweddillite. In part to maintain the historical names but, more importantly, re-establish the link between the mineral names and their structural and chemical definitions.

Keywords: Commission on New Minerals, Nomenclature and Classification Committee, CNMNC, epidote supergroup nomenclature, hancockite, niigataite, tweddillite.

Introduction

Armbruster *et al*. (2006) made significant advances in the epidote group nomenclature and provided unambiguous definitions of the individual species in addition to clear principles and guidelines for how to name new minerals in the group. Unfortunately, these advances in epidote group nomenclature have been overshadowed by a few decisions made in the preparation of the report and, as pointed out by Burke (2008*a*), *"The 2006 renaming of hancockite into epidote-(Pb) was greeted with considerable acrimony and was called 'an eternal insult from the IMA' in one editorial in a collector publication."*

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Epidote supergroup nomenclature principles

Epidote-supergroup minerals are monoclinic in symmetry and have a topology consistent with space group $P2_1/m$ and the general formula $A_2M_3[T_2O_7][TO_4](O,F)(OH,O)$, where Si is the dominant element in the T position.

The individual epidote-supergroup species are defined by their dominant elements in the $A1$, $A2$, $M1$, $M2$ and $M3$ positions, and by the content in the O and (OH) positions. These positions are indicated by the corners of the geometrical figures illustrating the tetrahedral and octahedral elements of the structure (Fig. 1).

Armbruster *et al.* (2006) also provided clear principles for naming mineral species in the epidote group, aligned with and based upon the generic guidelines of Nickel (1992), Nickel and Grice (1998) and Bayliss *et al*. (2005): (1) a group is

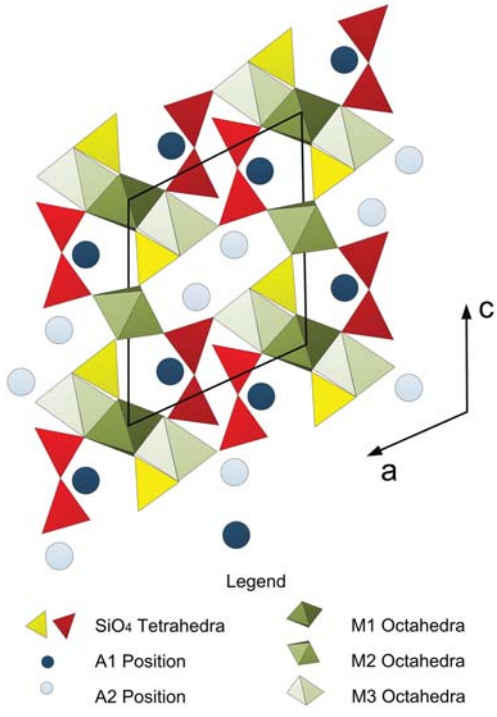

FIG. 1. Epidote-supergroup structure, after Dollase (1968, 1971) and Armbruster *et al*. (2006)

defined when a species can only be derived from other species with a coupled heterovalent substitution; (2) a new root name is defined when a species can be derived by a homovalent substitution in the *M*3 position or by a homovalent substitution in the *A*1 position; (3) a suffix is added when a species can be derived by a homovalent substitution in the *A*2 position; and (4) a prefix is added when a species can be derived by a homovalent substitution in the *M*1 position.

The use of prefixes and suffixes by Armbruster *et al*. (2006) is quite elegant in that there will be a maximum of one prefix and one suffix for each mineral, e.g. epidote-(Sr), piemontite, piemonite-(Sr) and manganipiemontite-(Sr). There is an obvious semantic benefit, as clinozoisite-($SrMn^{3+}Mn^{3+}$) would be quite a mouthful. The use of suffixes (Levinson suffixes) has been encouraged by several workers and has been implemented for several groups, with the amphibole supergroup as a notable exception (Leake, 1978; Leake *et al*., 1997; Hawthorne *et al*., 2012).

The names hancockite, niigataite and tweddillite did not meet the requirements for root names as established by Armbruster *et al*. (2006), in that they can be derived from older and established root names via homovalent substitutions in the *A*2 and *M*1 positions. Armbruster *et al*. (2006) therefore decided to rename these minerals to epidote-(Pb), clinozoisite-(Sr) and manganipiemontite-(Sr), respectively, in order to comply with the naming principles they had established.

Hancockite, niigataite and tweddillite

Hancockite

This mineral originally was described from Franklin, New Jersey by Penfield and Hyde (1899) and consequently had a provenance of 107 years before it was renamed in 2006. Further research, analyses and descriptions on material from Franklin has been published by Palache (1935) and Dunn (1985, 1995). The structure was solved by Dollase (1971). Hancockite has also been described from Jakobsberg (Holtstam and Langhof, 1994) and Långban, Sweden (Christy and Gatedal, 2005) and Nežilovo, Macedonia (Jančev and Bermanec, 1998).

Hancockite was named in honour of Elwood P. Hancock [May, 1835 New Jersey, USA – November 5, 1916 Burlington, Burlington County, New Jersey, USA], a landscape artist. Hancock began mineral collecting about 1854 and his collection was bequeathed to Harvard University in 1916.

Niigataite

This mineral was submitted as IMA2001–055 and the name niigataite was published together with its chemical and structural data by Miyajima *et al*. (2003). The name derives from the Niigata Prefecture, Japan, where it was first found.

Tweddillite

Tweddillite was submitted as IMA2001–014 and the name was published together with its chemical and structural data by Armbruster *et al*. (2002). The mineral was named in honour of the first curator of the Museum of the Geological Survey at Pretoria, Republic of South Africa, Samuel Milbourn Tweddill, FGS (Fellow of the Geological Society, London), who ran the Museum from 1897 to 1916.

Reinstating hancockite, niigataite and tweddillite

Our proposal to reinstate the names hancockite, niigataite and tweddillite instead of the names

epidote-(Pb), clinozoisite-(Sr) and manganipiemontite-(Sr) introduced by Armbruster *et al*. (2006) has been approved by the CNMNC based on the following arguments:

Reinstating the original names will maintain the history of the names, respecting both those naming and publishing data on the minerals, but also those being honoured by the name. Hatert *et al*. (2013), in their guidelines, put strong emphasis on maintaining historical names: *"When possible, the CNMNC recommends to avoid changing names, especially for grandfathered species. Well established mineral names or names dedicated to localities or persons have to be preserved, except if the species is shown to be not valid. In this case, a renaming, redefinition or discreditation procedure has to be submitted to the CNMNC. Historical names cannot be changed in order to standardize the nomenclature of a group or supergroup, since mixed nomenclature systems are accepted by the CNMNC. However, modern reorganisation of a group or supergroup may require re-examination of incompletely or ambiguously characterised type material, so that its associated historical name can be redefined to fit with a particular species composition field in the new classification scheme. If this cannot be done, then the name may need to be discredited as a species name, although it may be retained as a group name."* Renaming the three minerals in question will comply with the guidelines for preservation of historical names as outlined by Hatert *et al*. (2013).

These guidelines are generally not retroactive but Hatert *et al*. (2013) opens for changes in nomenclature following the standard CNMNC procedures: *"Authors of nomenclature or new mineral species proposals are asked to follow these recommendations, but retroactivity will not be applied. Every change in nomenclature has to go through the CNMNC, and is examined on its own merit."* Hatert *et al*. (2013) further specifically mention hancockite and the apatite supergroup as examples where the suffix-based nomenclature has been applied to the dismay of the mineral communities: *"However, strict applications of these new guidelines have sometimes been negatively understood by the mineralogical community, particularly when historical or well-established names were modified, as for example when hancockite was renamed epidote-(Pb) (*Armbruster *et al.*, *2006), or when the nomenclature of the apatite-supergroup minerals was modified (Burke, 2008[b]). The latter was revisited in considerable detail for this and several other reasons as outlined by Pasero et al. (2010)."*

Introducing the names epidote-(Pb), clinozoisite-(Sr) and manganipiemontite-(Sr) caused a break in literature traceability for the species in question. Hancockite has been used for more than a century and the vast majority of literature refers to hancockite alone. The structure was solved by Dollase (1971), using the name hancockite, and the majority of chemical analyses have been published as hancockite, e.g. Palache (1935), Dollase (1971), Dunn (1985, 1995), Holtstam and Langhof (1994), Jančev and Bermanec (1998) and Christy and Gatedal (2005). Even though epidote-(Pb) has been the valid name for this mineral since 2006, hancockite is still commonly used by authors, and Chukanov (2013) provides a typical example for how the two names are used: *"Epidote-(Pb) (formerly 'hancockite')"*, thus maintaining the traceability to earlier literature and complying with the nomenclature of Armbruster *et al*. (2006).

Additionally for the two other minerals, the type description, including structure and chemical analyses are published for niigataite (Miyajima *et al*., 2003) and tweddillite (Armbruster *et al.*, 2002), respectively, not clinozoisite-(Sr) and manganipiemontite-(Sr). Consequently, the chemical and structural definitions of the three minerals are for hancockite, niigataite and tweddillite, not epidote-(Pb), clinozoisite-(Sr) and manganipiemontite-(Sr).

Conclusions

There have been continuous advances in how mineral groups are defined, categorized and named over the last decades. The renaming of hancockite in 2006 was controversial then and, with the guidelines provided by Hatert *et al*. (2013), it seems appropriate to revisit the epidote supergroup nomenclature.

The arguments for reinstating the names hancockite, niigataite and tweddillite have been to preserve the historical names that are still used widely and, more importantly, to reinstate the links between mineral names and the chemical and structural definitions of these minerals. These links were lost following the 2006 epidote nomenclature report by Armbruster *et al.* (2006) for the sake of a consistent naming convention.

The arguments presented in favour for the name changes have been deemed sufficient to justify a mixed nomenclature system in the epidote group.

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