

## NEW MINERAL NAMES

### Johachidolite

EIICHI IWASE AND NOBUFUSA SAITO, Johachidolite: a new mineral, a hydrous fluoborate of sodium, calcium, and aluminum. *Sci. Papers Inst. Phys. Chem. Research Tokyo*, **39**, 300–304 (1942); through *Chem. Abs.*, **41**, 6173 (1947) and private communication of authors to W. F. Foshag.

CHEMICAL PROPERTIES: Analysis gave  $\text{SiO}_2$  0.34,  $\text{Al}_2\text{O}_3$  28.34,  $\text{Fe}_2\text{O}_3$  0.09,  $\text{MnO}$  0.23,  $\text{CaO}$  24.77,  $\text{Na}_2\text{O}$  8.27,  $\text{P}_2\text{O}_5$  0.03,  $\text{B}_2\text{O}_3$  24.21, Cl none, F 12.21,  $\text{H}_2\text{O}-$  0.07,  $\text{H}_2\text{O}+$  6.52, sum 105.08 less ( $\text{O}=\text{F}_2$ ) 5.14=99.94%. Rare earths are present, see below. The empirical formula deduced is  $\text{H}_6\text{Na}_2\text{Ca}_3\text{Al}_4\text{F}_5\text{B}_6\text{O}_{20}$  (this does not balance—M.F.)

PHYSICAL AND OPTICAL PROPERTIES: Colorless, transparent. H.  $6\frac{1}{2}$ –7, G. slightly below 3.4. Optically biaxial, negative,  $n_D$ , alpha 1.715, beta 1.720, gamma 1.729 (Chem. Abs.), 1.726 (note to Foshag),  $2V=72^\circ$  (calcd.), dispersion strong,  $r > v$ . Fluoresces an intense blue under ultraviolet excitation, shows sharp luminescence bands and a diffuse band under cathode-ray bombardment. These are attributed to trivalent rare earths and bivalent europium.

OCCURRENCE: In grains and in lamellar masses 1 mm. thick in nepheline dikes with associated phlogopite and plagioclase. The dikes cut limestone in the Johachido district, Kenkyohokudo Prefecture, Korea.

DISCUSSION: The specific gravity and indices of refraction are astonishingly high for a mineral of this composition. Presumably the structure must be one of very close packing.

MICHAEL FLEISCHER

### Nigerite

R. JACOBSON AND J. S. WEBB, The occurrence of nigerite, a new tin mineral in quartz-sillimanite-rocks from Nigeria. *Mineralog. Mag.*, **28**, 118–128 (1947).

F. A. BANNISTER, M. H. HEY AND H. P. STADLER. Nigerite, a new tin mineral. *Mineralog. Mag.*, **28**, 129–136 (1947).

CRYSTALLOGRAPHY: Hexagonal, rhombohedral, occurring as hexagonal plates up to  $5 \times 2$  mm. in size, but mostly smaller. All crystals examined had a brilliantly reflecting basal plane. Other forms observed include  $(10\bar{1}1)$ ,  $(10\bar{1}3)$  and a doubtful form  $(3.0.3.16)$ . Rotation photographs gave  $a=5.71$ ,  $c=13.83$  kX. Six space groups are possible, but as tests for piezoelectricity were negative, perhaps only the non-polar groups  $C\bar{3}m$  or  $C\bar{3}1m$  need be considered. The structure is hexagonal close-packed, as shown also by oriented overgrowths with  $(0001)$  of nigerite on  $(111)$  of gahnite. X-ray powder data are given.

CHEMICAL PROPERTIES: Analysis by Hey of a 2 g. sample that contained very little quartz and sillimanite gave PbO 0.94, MnO 0.09, FeO 2.65, ZnO 4.51, SnO<sub>2</sub> 25.33, TiO<sub>2</sub> 0.17, MgO 1.28, Fe<sub>2</sub>O<sub>3</sub> 11.90, Al<sub>2</sub>O<sub>3</sub> 50.91, H<sub>2</sub>O 1.57, SiO<sub>2</sub> 0.48; sum 99.83%. Spectrographic traces of Li and P were found in some samples. The H<sub>2</sub>O is very firmly held, 0.11% is lost at 200°, 0.38% at 900°C. The analysis gives (Zn, Mg, Fe'') (Sn, Zn)<sub>2</sub>(Al, Fe''')<sub>12</sub>O<sub>22</sub>(OH)<sub>2</sub>.

Nigerite is insoluble in acids, imperfectly attacked by fusion with Na<sub>2</sub>CO<sub>3</sub> or NaOH, readily gives clear fusions with borax and Na<sub>2</sub>S<sub>2</sub>O<sub>7</sub>.

PHYSICAL AND OPTICAL PROPERTIES: Color dark brown. Density (corrected for quartz)  $D_4^{16}=4.51$ . Hardness between 8 and 9, brittle. Weakly magnetic. Optically positive, approximate indices of refraction  $n_O=1.80$ ,  $n_E=1.81$ .

OCCURRENCE: Nigerite occurs at four localities in the Egbe district, Kabba province, central Nigeria. It occurs in quartz-sillimanite rocks closely associated with cassiterite-bearing granitic pegmatites. Associated minerals are quartz, sillimanite, andalusite, muscovite, gahnite, garnet, cassiterite, columbite-tantalite, chrysoberyl, and apatite.

M.F.

## Eulite

ARIE POLDERVAART, The relationship of orthopyroxene to pigeonite. *Mineralog. Mag.* **28**, 164-172 (1947).

The following new nomenclature, analogous to those used for the plagioclase and olivine series, is proposed for the orthorhombic pyroxenes (enstatite (En)—orthoferrosilite (Of) series).

Enstatite	—100-90% MgSiO <sub>3</sub>
Bronzite	—90-70
Hypersthene	—70-50
Ferrohypersthene	—50-30
Eulite	—30-10
Orthoferrosilite	—10-0

The name eulite is suggested, since the pyroxenes of this composition range occur mainly in eulysite rocks.

DISCUSSION: If six names must be used, the proposed classification is logical, but is it not easier to use the single name orthopyroxene with the composition? Thus, in place of eulite, one can write orthopyroxene (En<sub>20</sub>) or orthopyroxene (En<sub>20</sub>Of<sub>80</sub>).

M.F.

## NEW DATA

## Skutterudite Series

RALPH JEROME HOLMES, Higher mineral arsenides of cobalt, nickel, and iron. *Bull. Geol. Soc. America*, **58**, 299-392 (1947).

This paper gives the results of a detailed and thorough study of both natural and artificial materials. Microscopic, x-ray, contact-print, and mineral synthesis techniques were used, and a critical review of the nearly 200 recorded analyses is given. The results show that some changes are necessary in the present nomenclature of these minerals.

The supposed isometric biarsenides, RAs<sub>2</sub>, are shown to be structurally identical with the isometric triarsenides, RAs<sub>3</sub>, in agreement with the work of Oftedal and Peacock. This raises the question of what names to use. *Dana's System of Mineralogy*, 7th Ed., Vol. I, while recognizing the structural identity, retains the names smaltite (Co dominant), chloanthite (Ni dominant), and chathamite (Fe dominant) to designate varieties of the isometric arsenides which have ratios R:As of 2.0 to 2.5. Holmes states, "The application of special names to varieties whose analyses exhibit deviations in arsenic ratio from the theoretical composition RAs<sub>3</sub> is unnecessary since in many cases this is due to mechanical inhomogeneity. Structurally they are all triarsenides of the skutterudite type, even though the arsenic deficiency may in some cases be due in part to substitution of metal for arsenic." Holmes therefore names the skutterudite series by three names only, for the members with Co, Ni, and Fe dominant. I agree with this proposal, except that it is doubtful that a name is needed for RAs<sub>3</sub> with Fe dominant. No analyzed minerals correspond to the theoretical end-members NiAs<sub>3</sub> and FeAs<sub>3</sub>; the existence of RAs<sub>3</sub> with Ni dominant is clearly established, but the evidence for a mineral RAs<sub>3</sub> with Fe dominant is unsatisfactory.

The following names have been used in the past for these isometric arsenides: for Co dominant, skutterudite (triarsenide) and smaltite (supposedly a biarsenide); for Ni dominant, nickel-skutterudite (triarsenide) and chloanthite (supposedly a biarsenide); for Fe dominant, iron-skutterudite (triarsenide) and chathamite and arsenoferrite (both supposedly biarsenides). Holmes now discards all these names except skutterudite and proposes the names nickelian skutterudite and ferrian skutterudite for the triarsenides (RAs<sub>3</sub>) with Ni and Fe, respectively, dominant. These names are inadmissible. The uni-

form adjectival modifiers were proposed by Schaller to express "a minor and variable isomorphous replacement of an essential chemical element of a mineral by another analogous element." Their use as mineral names, as suggested by Holmes, is a radical and confusing change in the usage proposed by Schaller, adopted by the Mineralogical Society of America, and used in the 7th Edition of *Dana's System of Mineralogy*. Holmes in places also uses them correctly, as, for example, cobaltian loellingite. This use of the adjectival modifiers to mean two different things is very bad, as such a scheme can be useful only if unambiguous. Furthermore, restricting the use of the adjectival modifiers to that now generally accepted makes Holmes' terms (cobaltian) skutterudite and (ferrian) loellingite unnecessary and redundant.

For the Co-dominant mineral, the well-established name skutterudite is clearly to be preferred, and the name smaltite should be discarded, as proposed by Holmes. He also shows that the material called chathamite is orthorhombic and that the name should not be used for the isometric mineral. This leaves a choice between nickel-skutterudite and chloanthite for the Ni-dominant mineral, and between iron-skutterudite and arsenoferrite and no name at all for the Fe-dominant mineral. The choice is difficult, as there are objections of all the possibilities.

Holmes objects to the retention of chloanthite as the name for the isometric triarsenide because it has long been applied to the supposed biarsenide. Although this could lead to some confusion, hyphenated compound mineral names like nickel-skutterudite are so undesirable because of their ambiguity that it seems best to use the name chloanthite for the isometric triarsenide with Ni dominant. No name is needed for the isometric triarsenide with Fe dominant until clear evidence of its existence is brought forward.

M.F.

#### DISCREDITED MINERALS

##### Custerite (= Cuspidine)

C. E. TILLEY, Cuspidine from dolomite contact skarns, Broadford, Skye. *Mineralog. Mag.*, **28**, 90-95 (1947).

Custerite from Custer County, Idaho (type locality), and cuspidine from two localities had nearly identical optical properties and gave identical x-ray powder patterns. The formula for custerite,  $\text{Ca}_4\text{Si}_2\text{O}_7(\text{F}, \text{OH})_2 \cdot \text{H}_2\text{O}$  differs from that of cuspidine only in having an additional  $\text{H}_2\text{O}$ . The minerals are undoubtedly identical, although the Idaho material may have a lower F:OH ratio, and the name custerite should be discarded.

M.F.