

## NEW MINERAL NAMES\*

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### Bjarebyite\*

P. B. MOORE, D. H. LUND, AND K. L. KEESTER (1973) Bjarebyite,  $(\text{Ba,Sr})(\text{Mn,Fe,Mg})_2\text{Al}_2(\text{OH})_2(\text{PO}_4)_2$ , a new species. *Mineral. Rec.* **4**, 282-285.

Microprobe analysis by G. Z. Zechman gave (av. 60 area scan) Ba 21.81, Sr 0.79, Ca 0.06, Mn 7.15, Fe 6.95, Mg 0.84, Al 7.01, giving the formula above with  $\text{PO}_4$  and OH on the basis of the structure. The ratio Mn/Fe is variable, indicating the likelihood of the occurrence of an  $\text{Fe}^{2+}$  analogue.

Weissenberg and rotation photographs show the mineral to be monoclinic, space group  $P2_1/m$ ,  $a$  8.930,  $b$  12.073,  $c$  4.917 Å,  $\beta$  100.15°,  $Z = 2$ ,  $G$ . measured (Berman balance)  $3.95 \pm 0.02$ , calc. for  $\text{Fe} = \text{Mn}$  4.02. The strongest X-ray lines (41 given) are\*\* 8.81 **7 100**, 4.97 **4 120**, 4.47 **4 011**, 2.91 **4 211**, 2.681 **7 221,311**, 2.010 **10 060,232**, 1.495 **5 033,601**.

The mineral occurs as highly faceted, complex spear-shaped crystals, usually pitted and etched, up to 3 mm in greatest dimension. Forms noted  $c$  {001},  $a$  {100},  $b$  {010},  $m$  {110},  $d$  {120},  $r$  {111},  $f$  {121},  $e$  {131},  $h$  {141},  $w$  {411},  $l$  {211},  $t$  {021},  $q$  {011},  $v$  {031}. All negative forms are missing. Cleavages {010} and {100} perfect. Color emerald-green with a faint bluish tinge, luster subadamantine, streak white.  $H.4+$ . Optically biaxial, positive,  $2V \sim 35^\circ$ ,  $n_s \alpha$  1.692,  $\beta$  1.695,  $\gamma$  1.710 (all  $\pm 0.003$ ),  $r > v$ , strong, weakly pleochroic from grayish-tan to pale yellow-green.

The mineral occurs in the Palermo No. 1 pegmatite, near North Groton, New Hampshire, as rare crystals in open cavities along the contact between amblygonite-scorzalite remnants and Fe-Mn oxides. Associated minerals include amblygonite, augelite, childrenite, siderite, scorzalite, quartz, and palermoite.

The name is for the late Gunner Bjareby of Boston, Massachusetts, who collected the sample. Mr. Bjareby, an amateur mineralogist, had studied Palermo minerals for many years. It is for the Mn end-member and for samples with  $\text{Mn} > \text{Fe}$  and  $\text{Ba} > \text{Sr}$ .

### Discussion

If more material becomes available, better chemical data are highly desirable, including determination of  $\text{H}_2\text{O}$ ,  $\text{P}_2\text{O}_5$ ,  $\text{FeO}$ , and  $\text{Fe}_2\text{O}_3$ , DTA study, and infra-red absorption spectrometry.

\* Minerals marked with an asterisk after the name were approved before publication by the Commission on New Minerals and Mineral Names, International Mineralogical Association.

\*\* Intensities are in boldface; reflection indices are in italics.

### Borovskite\*

A. A. YALOVOI, A. F. SIDOROV, N. S. RUDASHEVSKII AND I. A. BUD'KO (1973) Borovskite,  $\text{Pd}_3\text{SbTe}_4$ , a new mineral. *Zapiski Vses. Mineral. Obshch.* **102**, 427-431 (in Russian).

Microprobe analyses, using pure metals and  $\text{Bi}_2\text{Te}_3$  as standards, on 4 grains gave Pd 32.94, 31.90, 32.37, 32.37, av. 32.39; Pt. 1.21, 1.25, 1.23, 1.20, av. 1.23; Ni 0.26, 0.24, 0.26, 0.25, av. 0.25; Fe 0.04, 0.04, 0.06, 0.02, av. 0.04; Sb 10.92, 10.97, 11.01, 11.00, av. 10.98; Bi 3.35, 3.34, 3.34, av. 3.34; Te 51.86, 52.39, 51.70, 51.93, av. 51.97; sum 100.58, 100.14, 99.98, 100.11, av. 100.21 percent, corresponding to  $(\text{Pd}_{2.98}\text{Pt}_{0.06}\text{Ni}_{0.04}\text{Fe}_{0.01})(\text{Sb}_{0.87}\text{Bi}_{0.15})\text{Te}_{3.93}$ , or  $\text{Pd}_3\text{SbTe}_4$ .

The mineral is cubic, with  $a$  5.794  $\pm$  0.008 Å. The strongest X-ray lines (12 given) are 2.902 **10 200**, 2.041 **6 220**, 1.550 **5 123**, 1.295 **4d 420**, 1.183 **4d 422**.\*\* This is close to the pattern of  $\text{AgSbSe}_2$ , in which Sb is statistically distributed.

Color dark gray, luster metallic. In polished section white, isotropic to slightly anisotropic, hardness 88.3 kg/sq mm (10g load), reflectance: 480 nm 53.3; 520 nm, 55.0; 600 nm, 59.6; 640 nm, 61.2 percent. The mineral is not etched by standard reagents.

Borovskite occurs as irregular grains 0.01-0.2 mm in size, embedded in pyrrhotite, less often in chalcopyrite, sometimes intergrown with altaite, in massive pentlandite-chalcopyrite-pyrrhotite ores of the Khautovaarsk Cu-Ni ore, Karelian A.S.S.R.

The name is for Igor Borisovich Borovskii, a pioneer in electron microprobe analysis.

### Calcjarlite

A. D. NOZHKIN, V. A. MOLEVA, AND T. P. CHUBKOVA (1970) First find of jarlite in the U.S.S.R. *Zapiski Vses. Mineral. Obshch.* **99**, 458-462 (in Russian).

A. S. POVARENENYKH (1973) The new mineral species calcjarlite. *Konst. Svoistva Mineral.* **7**, 131-135 (in Russian).

Jarlite was described by Bøgvad in 1933 from Ivigtut, Greenland, as  $\text{NaSr}_3\text{Al}_2(\text{F,OH})_{10}$ , but as pointed out in *Dana's System*, 7th Ed., v. 2, p. 118-119, this formula cannot be reconciled with the unit cell. The paper by Nozhkin *et al* gives an analysis of a calcium-bearing variety of jarlite from the Yenisei district. Povarennykh points out that this is actually the Ca analogue of the strontium mineral jarlite and therefore renames it calcjarlite. The following data are by Nozhkin *et al* except when stated otherwise.

Analysis by V. A. Moleva gave CaO 17.40, SrO 11.33, BaO 4.46, MgO 4.21 K<sub>2</sub>O 0.97, Na<sub>2</sub>O 4.78, Al<sub>2</sub>O<sub>3</sub> 26.46, F 47.50, H<sub>2</sub>O<sup>-</sup> none, H<sub>2</sub>O<sup>+</sup> 3.10, sum 120.21 - (O = F<sub>2</sub>) 19.95 = 100.26 percent. This corresponds to the formula  $(\text{Na}_{0.87}\text{K}_{0.11})(\text{Ca}_{1.75}\text{Sr}_{0.61}\text{Ba}_{0.16}\text{Mg}_{0.58})\text{Al}_{2.04}(\text{F}_{14.06}\text{OH}_{1.04})$ , con-

firing the original Greenland formula. Spectrographic analysis showed Pb,Cu,Mn 0.003 percent, Sn,Fe,Be 0.001 percent. The DTA curve shows a large endothermic break at 730° (fusion) and a small exothermic one at 340°. Total loss of weight to 1000° = 8.85 percent.

X-ray powder data agree closely with that for the Greenland sample. Strongest lines (33 given) are\*\* 3.51 5 311, 3.16 6 420,401, 3.04 7 312,421, 2.96 10 202,511,022, close to those for jarlite.

Color white. No cleavage, fracture uneven. H.4, G. 3.51 (pycnometer). Optically biaxial, positive,  $2V$  72°,  $n_s \alpha$  1.425,  $\beta$  1.428,  $\gamma$  1.432 (all  $\pm 0.001$ ),  $Z \wedge c = 10-15^\circ$ ; rarely grains are optically biaxial neg. The mineral occurs with fluorite and usovite in the Yenisei region, U.S.S.R.

Povarennykh gives infrared absorption spectra for the two minerals.

#### Discussion

The name is a reasonable one.

#### Lovdarite\*

YU. P. MEN'SHIKOV, A. P. DENISOV, E. I. USPENSKAYA, AND E. A. LIPATOVA (1973) Lovdarite, a new hydrous berylliosilicate of alkalis. *Dokl. Akad. Nauk SSSR*, **213**, 429-432 (in Russian).

Analyses by E.I.U. gave SiO<sub>2</sub> 56.13, TiO<sub>2</sub> 0.15, Al<sub>2</sub>O<sub>3</sub> 1.77, Fe<sub>2</sub>O<sub>3</sub> 0.18, MgO 0.06, MnO 0.003, CaO 0.49, BaO 0.20, Na<sub>2</sub>O 14.95, K<sub>2</sub>O 6.28, BeO 6.90, H<sub>2</sub>O<sup>+</sup> 10.85, H<sub>3</sub>O<sup>-</sup> 1.44, F 0.07, Cl none, P<sub>2</sub>O<sub>5</sub> 0.05, sum 99.52 - (O = F<sub>2</sub>) 0.02 = 99.50 percent. This corresponds to (Na<sub>3.05</sub>K<sub>0.85</sub>Ca<sub>0.58</sub>Ba<sub>0.01</sub>)(Be<sub>1.78</sub>Al<sub>0.20</sub>Ti<sub>0.01</sub>Fe<sub>0.01</sub>Mg<sub>0.01</sub>)(Si<sub>5.97</sub>Al<sub>0.02</sub>P<sub>0.01</sub>)O<sub>18.14</sub> · 4H<sub>2</sub>O + 0.37 aq., simplified to (Na,K,Ca)<sub>4</sub>(Be,Al)<sub>2</sub>Si<sub>6</sub>O<sub>18</sub> · 4H<sub>2</sub>O. The mineral fuses readily before the blowpipe to a colorless glass (at 1100°). Insoluble at 20° in dilute HCl, HNO<sub>3</sub>, or H<sub>2</sub>SO<sub>4</sub>.

When heated, lovdarite loses water steadily to about 400° (about 10 percent). Material heated to 300° is resorbed at room temperature in about 2 hours. After heating to 500°, the water is taken up more slowly, requiring a day in distilled water at room temperature. The DTA curve shows a double endothermic effect at about 250°, and endothermic effects at 390° and 640°. The infrared spectrum indicates the presence of hydroxyl and H<sub>2</sub>O groups.

Lovdarite is orthorhombic, space group  $P2_12_12$ , with  $a_0$  38.789,  $b_0$  6.776,  $c_0$  7.012 Å,  $Z = 4$ ,  $G$  calc 2.32, meas 2.33  $\pm$  0.01. The strongest X-ray lines (88 given) are\*\* 6.56 6, 110,210, 4.96 9 510,111, 3.288 10 320, 3.136 10 11·1·0, 012, 2.477 6b 921, 11·0·2, 1.785 5 21·1·0, 13·1·3.

Lovdarite occurs mainly as white to yellowish masses that replace chkalovite, rarely as colorless prismatic crystals 1-2 mm long on walls of cavities. Cleavages distinct on (100), (010), and (001), poor on (110). Brittle, H. of aggregates 5-6. Optically biaxial,  $2V$  90°, main area positive, extinction parallel to elongation,  $n_s \alpha$  1.513,  $\beta$  1.516,  $\gamma$  1.518.

Lovdarite occurs in alkalic pegmatites on Karnasurt Mt., Lovozero massif, Kola Peninsula. It is a late hydrothermal mineral.

The name signifies 'gift of Lovozero.' Type material is preserved in the Mineralogical Museum, Acad. Sci. USSR, Moscow, and at its Kola Branch at Apatit.

#### Quetzalcoatlite\*

S. A. WILLIAMS (1973) Quetzalcoatlite, Cu<sub>4</sub>Zn<sub>8</sub>(TeO<sub>3</sub>)<sub>3</sub>(OH)<sub>18</sub>, a new mineral from Moctezuma, Sonora. *Mineral. Mag.* **39**, 261-263.

Microchemical and spectrographic tests showed only Cu, Zn, Te, and H<sub>2</sub>O. Microprobe analyses, using pure elements as standards, gave on 3 grains Cu 16.2, 15.1, 16.7; Zn 33.1, 30.7, 31.1; Te 23.5, 25.0, 24.5 percent. H<sub>2</sub>O was determined by the Penfield method on 2.265 mg. The average of these gives CuO 20.0, ZnO 39.4, TeO<sub>3</sub> 30.4, H<sub>2</sub>O 10.1, sum 99.9 percent, corresponding to the formula given. Variations in the contents of Cu and Zn may indicate isomorphous substitution. Dissolved by cold dilute acids, decomposed by warm 40 percent KOH.

Rotation and Weissenberg photographs show the mineral to be hexagonal, space group  $C6_22$ ,  $a$  10.097  $\pm$  0.025,  $c$  4.944  $\pm$  0.008 Å,  $Z = 1$ ,  $G$ . calc 12, meas 6.05  $\pm$  0.3 (Berman balance). The strongest X-ray lines (14 given)\*\* are 8.752 100 10 $\bar{1}$ 0, 3.531 40 11 $\bar{2}$ 1, 3.273 31 20 $\bar{2}$ 1, 2.748 70 21 $\bar{3}$ 1, 2.520 42B 22 $\bar{4}$ 0, 30 $\bar{3}$ 1, 1.766 28 22 $\bar{4}$ 2.

The mineral occurs as minute crystalline crusts or sprays of needles, probably simple prisms bounded only by {1010} and {0001}. Cleavage {1010} fair. Color Capri blue (close to that of spangolite). H. 3, brittle. Optically uniaxial, negative,  $n_s$  (Na)  $\omega$  1.802,  $\epsilon$  1.740, pleochroic with O blue-green, E nearly colorless.

The mineral was found in rich silver ore (hessite with minor galena and bornite and oxidation products) in the Bambollita mine near Moctezuma, Sonora, Mexico.

The name, in allusion to the color, is for Quetzalcoatl, Toltec god of the sea, pronounced Këtsëlkwä·tläit. Type material is at the British Museum of Natural History, London, and the University of Paris.

#### Urea\*

P. J. BRIDGE (1973) Urea, a new mineral, and neotype phosphammite from Western Australia. *Mineral. Mag.* **39**, 346-348.

A specimen from a cave at Toppin Hill, West Australia, was found to consist mainly of crystals of urea, CO(NH<sub>2</sub>)<sub>2</sub>, associated with ammonian aphtitalite, phosphammite, and weddellite. Analysis by B. Codling and P. Hewson of hand-picked crystals gave 96 percent urea by the urease reduction method, plus NH<sub>3</sub> < 1.0, Na 0.13, Ca 0.07, K 0.35, Mg 0.03, S 0.11, P 0.24, M<sub>2</sub>O 0.46; the remainder is probably H<sub>2</sub>O<sup>+</sup>.

Weissenberg photographs show the mineral to be tetragonal, space group  $P\bar{4}2_1m$ ,  $a$  5.646,  $c$  4.701, both  $\pm$  0.001 Å. The strongest lines (25 given)\*\* are 3.98 10 110, 3.61 2 101, 3.04 3 111.

Crystals are elongated pyramidal, 1  $\times$  3 mm, color pale yellow to pale brown.  $G$ . 1.33  $\pm$  0.01 (sink-float method). Optically uniaxial, positive,  $\omega$  1.484,  $\epsilon$  1.603.

#### Discussion

In approving this, the IMA Commission on New Minerals and Mineral Names clearly rejected the restriction, commonly given in textbooks, that minerals must be of inorganic origin.

**Vuonnemite\***

I. V. BUSSEN, A. P. DENISOV, N. I. ZABAVNIKOVA, L. V. KOZYREVA, YU. P. MEN'SHIKOV, AND E. A. LIPATOVA (1973) Vuonnemite, a new mineral. *Zapiski Vses. Mineral. Obshch.* **102**, 423-426 (in Russian).

Analysis by N.I.Z. on 300 mg of pure material from Khibina gave SiO<sub>2</sub> 22.31, TiO<sub>2</sub> 8.07, Al<sub>2</sub>O<sub>3</sub> 0.46, Zr, Fe none, Nb<sub>2</sub>O<sub>5</sub> 23.16, MgO 0.14, MnO 0.53, CaO 0.25, Na<sub>2</sub>O 30.23, K<sub>2</sub>O 0.07, P<sub>2</sub>O<sub>5</sub> 13.50, loss on ign. 0.96, sum 99.68 percent. Spectrographic analysis showed traces of Ba, Sr, and rare-earth elements. The analysis corresponds to the formula Na<sub>4</sub>TiNb<sub>2</sub>Si<sub>4</sub>O<sub>17</sub>·2Na<sub>3</sub>PO<sub>4</sub>. Leaching with water removes the Na<sub>3</sub>PO<sub>4</sub> completely, leaving a residue that gives the X-ray pattern of epistolite. The DTA curve shows a small exothermic effect at 350° and an endothermic one at 870° (melting). The infrared absorption spectrum shows the presence of phosphate and the absence of (OH)<sup>1-</sup> and H<sub>2</sub>O.

X-ray study shows the mineral to be triclinic, *P*1 or *P*1̄, *a* 7.02, *b* 14.15, *c* 5.38 Å, α 93°40', β 89°30', γ 87°30', *Z* = 1. The strongest X-ray lines (58 given) are 7.14 **6 100**, 020, 5.16 **5 011**, 4.74 **5 12̄0**, 4.24 **5 10̄1**, 3.582 **6 1211**, 2.869 **10 230**, 041, 2.391 **5 23̄1**, 1.790 **6 013**, 003̄, 1.420 **5 313**, 281̄.\*\*

Color light yellow, luster vitreous. H 2-3, brittle. G. 3.13.

Cleavage {001} very perfect, 2 other perfect cleavages. Optically biaxial, positive, 2*V* 53°, α 1.639, β 1.651, 1.681 (all ± 0.002), plane of optic axis {001}, *Y*∧*c* = 4°.

The mineral occurs in albitized alkalic rocks of the Khibina and Lovozero massifs, Kola Peninsula, in plates up to 1.8 × 1.5 × 0.15 cm. Associated minerals include albite, microcline, nepheline, aegirine, lorenzenite, cancrinite, serandite, and villiaumite.

The name is for the locality, the valley of the Vuonnemi River, Khibina.

**NEW DATA****Klebensbergite**

SUZANA ANTONOVICI, AND IULIAN VANGHELIE (1972) Klebensbergite, a rare mineral. *Dari Seama Sedentelor, Inst. Geol (Romania)*, **58**, 13-19, (Romanian with French abstract).

Museum samples of klebensbergite (*Dana's System*, 7th Ed., v. 2, p. 583) were examined. Analysis by X-ray fluorescence gave Sb 61.86, by spectrograph S > 1, As 0.05, Ag 0.006, Pb 0.005, Zn 0.005, Co 0.001, Cr 0.001 percent. The X-ray pattern has lines at 6.19 **100**, 3.43 **80**, 2.47 **90**.