

## NEW MINERAL NAMES\*

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### Bentorite\*

Shulamit Gross (1980) Bentorite, a new mineral from the Hatrurim area, west of the Dead Sea, Israel. *Israel Journal Earth Sci.* 29, 81-84.

Analysis by S. Erlich of a sample weighing 58 mg, which contained about 20% calcite and truscottite, gave CaO 29.90, MgO none, Cr<sub>2</sub>O<sub>3</sub> 7.48, Al<sub>2</sub>O<sub>3</sub> 1.01, Fe<sub>2</sub>O<sub>3</sub> 0.10, SO<sub>3</sub> 14.99, SiO<sub>2</sub> 2.50, CO<sub>2</sub> 6.70, H<sub>2</sub>O ±37.70, sum 100.38%. After deducting CO<sub>2</sub> and CaO as calcite, and SiO<sub>2</sub>, CaO, and H<sub>2</sub>O, as truscottite, calculation gave Ca<sub>5.88</sub>(Cr<sub>1.61</sub>Al<sub>0.32</sub>Fe<sub>0.02</sub>)S<sub>3.06</sub>O<sub>18</sub> · 34.04H<sub>2</sub>O, or Ca<sub>6</sub>(Cr,Al)<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>(OH)<sub>12</sub> · 28H<sub>2</sub>O. The DTA curve shows a large endothermic peak at 155°. The mineral loses 34.5% of its weight from 60 to 225°. At 110° it is dehydrated to 7H<sub>2</sub>O and turns gray and dull; at 200°, it is dehydrated to 2H<sub>2</sub>O. At 250° the mineral turns green and becomes amorphous; at 950° it becomes emerald-green and gives the X-ray pattern of CaO, anhydrite, and a mayenite-like phase, probably Ca<sub>12</sub>(Cr,Al)<sub>14</sub>O<sub>33</sub>.

The X-ray pattern was indexed on a hexagonal cell with  $a = 22.35$ ,  $c = 21.41$  Å. The strongest lines (32 given) are 9.656 (100)(200), 5.592 (40)(220,302), 1.942 (20)(10 · 0 · 0). The mineral occurs as hexagonal prisms, max. length 0.25 mm, arranged in parallel growths and as fibrous masses. Forms present {10 $\bar{1}$ 0}, {10 $\bar{1}$ 1}, rarely {0001}. Twinning with composition plane (10 $\bar{1}$ 0) was observed.

Color bright violet, luster vitreous, streak very pale violet. Cleavage {10 $\bar{1}$ 0} perfect, {0001} distinct. D 2.025 meas., 2.021 calc. H=2. Optically uniaxial positive,  $\omega$  1.478,  $\epsilon$  1.484 (both ±0.002), absorption E > O, faintly dichroic, E pale violet, O nearly colorless, elongation positive, slightly anomalous interference colors in anomalous gray with a reddish-violet tint.

The mineral occurs rarely as fracture fillings cutting calcite-spurrite marble containing brownmillerite, mayenite, calcite, truscottite, jennite, tobermorite, awillite, and thaumasite, at two localities in the Hatrurim Formation, southern Israel. It was found by Gary Weingarten, curator of mineralogy, Fairleigh-Dickinson University.

The name is for Y. K. Bentor, geologist, University of California, San Diego. Type material is preserved at the Geological Survey of Israel, Jerusalem, and at Fairleigh-Dickinson University, Madison, New Jersey.

### Discussion

Authors give formula with 26 H<sub>2</sub>O and 12(OH) by analogy to ettringite. MF.

### Ferrarisite\*

Hubert Bari, Francois Permingeat, Rolland Pierrot, and Kurt Walenta (1980) Ferrarisite, Ca<sub>5</sub>H<sub>2</sub>(AsO<sub>4</sub>)<sub>4</sub> · 9H<sub>2</sub>O, a new mineral species, dimorphous with guerinite. *Bull. Mineral.* 103, 533-540 (in French).

Michele Catti, Giacomo Chiari, and Giovanni Ferraris (1980) The structure of ferrarisite, Ca<sub>5</sub>(HAsO<sub>4</sub>)<sub>2</sub>(AsO<sub>4</sub>)<sub>2</sub> · 9H<sub>2</sub>O, disorder, hydrogen bonding, and polymorphism with guerinite. *Bull. Mineral.* 103, 541-546 (in English).

Analysis by B. Reynier from Sainte Marie aux Mines by atomic absorption gave As<sub>2</sub>O<sub>3</sub> 49.3, CaO 30.6, MgO 0.52; H<sub>2</sub>O (thermogravimetric) 20.7, Penfield (18.1) = 101.1 or 98.9%. The DTA curve shows endothermic breaks at 90°, 150°, and 280°, and an exothermic break at 650°. The mineral dehydrates rapidly in air; dehydration to Ca<sub>5</sub>As<sub>4</sub>O<sub>15</sub> was complete at 560°. The mineral dissolves readily in dilute HCl. Both the dimorphs has been synthesized by Guerin in 1941.

Ferrarisite is triclinic, space group  $P\bar{1}$ ,  $a = 8.294$ ,  $b = 6.722$ ,  $c = 11.198$  Å,  $\alpha = 106.16$ ,  $\beta = 92.94$ ,  $\gamma = 99.20$ ,  $Z = 1$ , D calc. 2.57, meas. 2.63 ± 0.05 (by flotation). The strongest lines (31 and 33 given) from the 2 localities are 10.81 (10), 10.84 (10)(001); 3.17 (8), 3.17 (7)(210,  $\bar{1}20$ ); 2.831 (9), 2.84 (8)(121,  $\bar{1}2\bar{2}$ ). Cleavage (001) perfect.

Colorless, transparent, becomes white on dehydration. Optically biaxial, positive  $ns$   $\alpha = 1.562$ ,  $\beta = 1.572$ ,  $\gamma = 1.585$  (all ±0.002),  $2V = 83$ °,  $X \wedge c = 17$ °,  $Z \perp (110)$ .

The mineral occurs at the Gabe Gottes and the Gift mine (type locality), Sainte Marie-aux-Mines, Alsace, France, associated with picropharmacolite and raenthalite, also at the Anton mine, Wittichen, Baden, Germany, described without a name by Walenta (*Am. Mineral.* 58, 561 (1973)).

Type material (Gift mine) is at the Ecole Natl. Supérieure des Mines, Paris; from Wittichen at the University of Stuttgart. M.F.

### Lanthanite-(Nd)\*

A. C. Roberts, G. Y. Chao, and F. Cesbron (1980) Lanthanite-(Nd), a new mineral from Curitiba, Parana, Brazil. *Geol. Survey Canada Paper 80-1C*, 141-142.

Analysis gave Nd<sub>2</sub>O<sub>3</sub> 21.84, La<sub>2</sub>O<sub>3</sub> 19.44, Pr<sub>2</sub>O<sub>3</sub> 5.18, Sm<sub>2</sub>O<sub>3</sub> 4.10, Gd<sub>2</sub>O<sub>3</sub> 1.69, Eu<sub>2</sub>O<sub>3</sub> 1.64, Dy<sub>2</sub>O<sub>3</sub> 0.44, Y<sub>2</sub>O<sub>3</sub> 0.22, Ce<sub>2</sub>O<sub>3</sub> 0.03, ThO<sub>2</sub> 0.03, CO<sub>2</sub> 22.15, H<sub>2</sub>O 22.75, sum 99.51%, corresponding to (Nd,La)<sub>2</sub>(CO<sub>3</sub>)<sub>3</sub> · 8H<sub>2</sub>O with Nd:La:Pr = 0.40:0.365:0.096. The mineral is decomposed with effervescence by dilute HCl. The DTA shows endothermic breaks at 119° (loss of H<sub>2</sub>O), 500° (loss of 2CO<sub>2</sub>), and 766° (loss of 1CO<sub>2</sub>).

X-ray study showed it to be orthorhombic, space group  $Pbnm$ ,  $a = 9.476$ ,  $b = 16.940$ ,  $c = 8.942$  Å,  $Z = 4$ , D calc. 2.82, meas. (Bern balance) 2.81. The strongest X-ray lines (47 given) are 8.50

\* Minerals marked with asterisks were approval before publication by the Commission on New Minerals and Mineral Names of the International Mineralogical Association.

(100)(020), 4.741 (52)(200), 4.473 (56)(002), 3.252(63)(202), 3.038 (58)(222).

The mineral occurs as bright pink crystals, luster vitreous to pearly, H 2.5–3, not fluorescent. Cleavage {010} perfect, {101} very good, crystals are twinned on {101}. Optically biaxial, negative,  $ns \alpha = 1.532$ ,  $\beta = 1.590$ ,  $\gamma = 1.614$ ,  $2V = -61^\circ$ ,  $X = b$ ,  $Y = c$ ,  $Z = a$ .

The mineral occurs near Curitiba, Parana, Brazil, in recent carbonate-rich sediments, as described by Cesbron *et al.*, *Bull. Mineral* 102, 342–347 (1979). The name is for the composition. Type material is at the National Mineral Collection, Geological Survey Canada, Ottawa, and at Pierre and Marie Curie University, Paris. M.F.

#### Macquartite\*

S. A. Williams and Marjorie Duggan (1980) Macquartite, a new silicate-chromate from Tiger, Arizona. *Bull. Mineral* 103, 530–532 (in French).

Qualitative probe analyses showed the presence of Pb, Cu, Cr, and Si. Microchemical analyses were made by atomic absorption for Pb, Cu, and for Zn (present as willemite) in acid-soluble material, for soluble SiO<sub>2</sub> by spectrophotometry, and for H<sub>2</sub>O by the Penfield method. These gave PbO 67.6, CuO 7.8, CrO<sub>3</sub> 10.5, SiO<sub>2</sub> 4.9, H<sub>2</sub>O 7.3, total 98.1%, after deducting SiO<sub>2</sub> equivalent to the ZnO found. This corresponds to Pb<sub>3</sub>Cu(CrO<sub>4</sub>)SiO<sub>3</sub>(OH)<sub>4</sub> · 2H<sub>2</sub>O. The mineral is decomposed by 40% HClO<sub>4</sub> or concd. HCl, dissolved by HClO<sub>4</sub> + HF.

Weissenberg and rotation photographs show the mineral to be monoclinic, space group C2/m, C2, or Cm, probably C2/m. The unit cell has  $a = 20.81$ ,  $b = 5.84$ ,  $c = 9.26 \text{ \AA}$ ,  $\beta = 91^\circ 48'$ ,  $Z = 4$ , D calc. 5.58, meas. 5.49. The strongest X-ray lines (34 given) are 4.822 (9)(11 $\bar{1}$ ), 4.628 (9)(002), 3.156 (10)(511), 3.090 (6)(003), 2.925 (5)(020, 203), 2.768 (5) (5 $\bar{1}\bar{2}$ ).

Color orange cadmium (RHS 23A), streak pale orange, H. 3.5. Cleavage {100} good. Optically biaxial, negative,  $ns \alpha = 2.28$ ,  $\beta = 2.31$ ,  $\gamma = 2.34$ ,  $2V = 85^\circ$ ,  $Y = b$ ,  $X/\lambda c = +35^\circ$ . Readily mistaken for mimetite.

The mineral occurs on diopside from Tiger, Arizona, in euhedral crystals up to 1 mm long, usually enclosed in quartz.

The name is for Louis Charles Henri Macquart, French chemist (1745–1803), who brought to France from Russia the samples of crocoite in which the element chromium was discovered. Type material is at the British Museum and the Geological Museum, University Arizona, Tucson. M.F.

#### Nagashimalite\*

Satoshi Matsubara and Akira Kato (1980) Nagashimalite, Ba<sub>4</sub>(V<sup>+3</sup>,Ti)<sub>4</sub>(O,OH)<sub>2</sub>ClSi<sub>8</sub>B<sub>2</sub>O<sub>27</sub>, a new mineral from the Mogurazawa mine, Gumma Prefecture, Japan. *Mineralog Journal* (Tokyo) 10, 122–130.

Satoshi Matsubara (1980) The crystal structure of nagashimalite, Ba<sub>4</sub>(V<sup>+3</sup>,Ti)<sub>4</sub>(O,OH)<sub>2</sub>ClSi<sub>8</sub>B<sub>2</sub>O<sub>27</sub>. *Mineralog Journal* (Tokyo) 10, 131–142.

Analysis by electron microprobe, except for B<sub>2</sub>O<sub>3</sub> (chemical) and H<sub>2</sub>O (calculated) gave BaO 41.36, V<sub>2</sub>O<sub>5</sub> 16.65, TiO<sub>2</sub> 2.75,

MnO 0.48, SiO<sub>2</sub> 32.37, B<sub>2</sub>O<sub>3</sub> 4.0, Cl 1.73, H<sub>2</sub>O (0.77), sum 100.11% – (O = Cl 0.39) = 99.72%, corresponding to Ba<sub>4.01</sub>(V<sub>3.30</sub>Ti<sub>0.51</sub>Mn<sub>0.10</sub>)B<sub>1.71</sub>Si<sub>8</sub>O<sub>27.64</sub>(OH)<sub>1.28</sub>Cl<sub>0.72</sub>. It is the V analogue of taramellite, see 65, 123–128 (1980). Spectroscopic analysis showed traces of Mg, Al, Pb, Fe, Sb, and Cu.

Precession studies showed the mineral to be orthorhombic, space group Pmmm,  $a = 13.937$ ,  $b = 12.122$ ,  $c = 7.116 \text{ \AA}$ ,  $Z = 2$ , D calc. 4.14, meas. (Berman balance) 4.08. The strongest X-ray lines (77 given) are 3.854 (25)(221), 3.030 (60)(040, 411), 3.020 (100)(420), 2.791 (20)(041), 2.592 (28)(501, 241).

Color greenish-black, streak green, luster submetallic to vitreous. No cleavage. Microhardness (100g load) 606–681kg/sq. mm ~6 Mohs. Optically biaxial, positive,  $2V$  about  $30^\circ$ ,  $ns \alpha = 1.750$ ,  $\beta = 1.753$ ,  $\gamma = 1.780$ ,  $X = a$ ,  $Z = b$ ,  $Y = c$ , pleochroism strong, X greenish-yellow, Y green, Z greenish-brown, abs.  $Z > Y > X$ , dispersion  $r > v$ , strong.

The mineral occurs as crystals, tabular or {001}, elongated  $b$ , and as subparallel aggregates in bedded Mn ore at the Mogurazawa mine, Kiryu City, Gumma Prefecture, Japan, in massive rhodonite ore, associated with rhodochrosite, barite, barian roscoelite, an unnamed Ba-analogue of haradaite, and alabandite.

The name is for Otokichi Nagashima (1890–1969), “the pioneer of Japanese amateur mineralogists”. Type material is at the National Science Museum, Tokyo. M.F.

#### Putoranite\*

A. A. Filimonova, T. L. Evstigneeva, and I. P. Laputina (1980) Putoranite and nickel-bearing putoranite, new minerals of the chalcopyrite group. *Zap. Vses. Mineral. Obshch.* 109, 335–341 (in Russian).

Microprobe analyses (using Ni and chemically analyzed chalcopyrite) of seven different samples of putoranite gave Cu 34.99–36.17 (35.68 ± 0.30), Fe 30.76–32.29 (31.22 ± 0.30), Ni 0.37–0.70 (0.51 ± 0.07), S 32.01–33.17 (32.49 ± 0.24), sums 99.5–100.99% (99.90) and 12 different samples of nickeloan putoranite gave Cu 32.25–33.96 (32.99 ± 0.37), Fe 31.63–32.89 (32.11 ± 0.36), Ni 1.47–1.98 (1.63 ± 0.08), S 32.14–33.75 (33.14 ± 0.31), sums 98.83–100.85% (99.87). These correspond to Cu<sub>18</sub>(Fe,Ni)<sub>18</sub>S<sub>32</sub> and Cu<sub>16</sub>(Fe,Ni)<sub>19</sub>S<sub>32</sub>, respectively, or to Cu<sub>16–18</sub>(Fe,Ni)<sub>18–19</sub>S<sub>32</sub>.

Putoranite and the nickeloan variety give identical powder X-ray patterns ( $a = 5.30 \text{ \AA}$ ), also identical with that of the primitive cubic synthetic phase (Cabri, L. J., 1973, *Econ. Geol.*, 68, 443–454). Strongest X-ray lines (9 given) are 3.05(10)(111), 1.873–1.875(9)(220), 1.596–1.597(6)(311), 1.081(5)(422). The patterns include a weak line at 3.74 $\text{ \AA}$ , required for the primitive cubic cell, representing a partly ordered phase derived from a completely disordered solid solution with a face-centered cubic cell, known to occur in the central part of the Cu–Fe–S system at high temperatures.

The mineral occurs in the massive mooihoeckite ores of the Oktyabr deposit, Noril'sk district, in close association with mooihoeckite (often in excess thereof) and talnakhite, and had been first described under the provisional names “cubic chalcopyrite” and “anomalously anisotropic cubic chalcopyrite” (Filimonova *et al.*, 1974, *Geol. Rudn. Mestorozhd.*, No. 5, 36–46). Macroscopically the mineral is similar to mooihoeckite and talnakhite; and nickeloan putoranite oxidizes quickly in air, like talnakhite, producing a variegated tarnish. In reflected light the mineral is similar in color and reflectance to mooihoeckite. Reflectances (percent), on freshly polished sections, for putoranite and nickeloan putoranite are: 440

nm 24.4, 25.1, 460 nm 25.1, 28.3, 480 nm 30.0, 32.2, 500 nm 31.8, 35.6, 540 nm 38.0, 37.4, 560 nm 40.0, 39.7, 580 nm 41.2, 40.8, 600 nm 41.2, 41.5, 620 nm 40.9, 41.1, 640 nm 41.9, 41.9, 660 nm 41.6, 42.4, 680 nm 42.2, 43.6, 700 nm 41.0, 43.5.  $VHN_{50} = 263(6)$  and 259(7) for putoranite and nickeloan putoranite, respectively. Putoranite is isotropic but the nickeloan variety is distinctly anisotropic with color effects from greenish-grey to rose-grey tones and has weak birefractance. The birefractance and anisotropy are stronger in oxidized sections. The mineral occurs as dense macroscopically coarse-grained aggregates (up to 1–2 cm) which consist of fine (less than 0.1 mm) intergrowths of putoranite and mooihoekite with indistinct, diffuse boundaries. Also occurs as polysynthetically twinned intergrowths and rarely as single crystals. Besides mooihoekite and talnakhite, cubanite, pentlandite and magnetite are frequently associated with the mineral. Also associated with minerals occurring more rarely such as galena, sphalerite, platinum-group minerals, native silver, alabandite and more commonly with secondary minerals such as valleriite, mackinawite, cuprian pentlandite, and more rarely manganooan shadlunite and djerfischerite.

The mineral is named after Putoran Mountain in the north-western part of the Siberian platform.

### Discussion

The data clearly indicate a new mineral species though the compositional range to  $Cu \approx Fe$  differs from that obtained in the synthetic system. It is not clear why the authors refer to the nickeloan variety as both a second mineral *and* a variety, as it is undoubtedly the latter, in spite of different optical properties. The authors do not specify preservation of a type specimen but, as usual for new minerals characterized by the group at IGEM, it is probably kept in the Mineralogical Museum of the Academy of Sciences of the USSR., Moscow. L.J.C.

### Sodium Phlogopite

W. Schreyer, K. Abraham, and H. Kulke (1980) Natural sodium phlogopite coexisting with potassium phlogopite and sodian aluminian talc in a metamorphic evaporite sequence from Der-rag, Tell Atlas, Algeria. *Contrib. Mineral. Petrol.* 74, 223–233.

The mineral occurs in a light-colored fine-grained massive, sugar dolomite that contains large euhedral, platy twins of albite up to 2 cm in length and small silvery flakes of phyllosilicates. Under the microscope are seen stubby, often nearly equidimensional books of micas about 0.1 mm in diameter, which are sodium phlogopite with very fine rims of normal (K) phlogopite. Also present are a talc-chlorite mixed-layer phase and talc, also euhedral crystals of pyrite and small rounded grains of tourmaline.

Microprobe analyses of 10 samples gave (range and average %)  $SiO_2$  41.36–44.57, 43.44;  $TiO_2$  0–0.84, 0.48;  $Al_2O_3$  12.38–13.77, 13.00;  $MgO$  28.13–29.22, 28.54;  $CaO$  0.07–0.56, 0.20;  $Na_2O$  5.43–6.52, 5.82;  $K_2O$  0.30–1.22, av. 0.49; sum 90.84 to 92.99% (to which the theoretical content of water (4.49%) should be added. The rock contained 33 ppm Li, so that it is probable that some was present in the mica. F and Cl were not detected.

The analyses average  $(Na_{1.56}K_{0.09}Ca_{0.02})(Mg_{5.99}Ti_{0.05}Al_{0.11})(Si_{6.00}Al_{2.00})O_{20}(OH)_4$ . No other data are given. M.F.

### Unnamed Alloys

V. G. Gogishvili, R. G. Chkheidze, and V. P. Domukhovskii (1980) Native metals and intermetallic compounds in high-silica zeolites of Georgia. *Soobshch. Akad. Nauk Gruz. S.S.R.*, 97, no. 1, p. 133–136 (in Russian).

Native metals and intermetallic compounds were found as thread-like wires and pellet-like forms in zeolitized tuffs containing clinoptilolite and mordenite in 4 deposits. Their compositions are stated to have been determined by microprobe analyses, which are not given. In addition to native Pb, Zn, Cu, Fe, and Sb, it is stated that  $Cu_3Zn$ ,  $Cu_{4.45}Zn$ , and  $Sb_{2.5}As_{1.5}Sn$  were found. M.F.