

## NEW MINERAL NAMES\*

JOHN L. JAMBOR,<sup>1</sup> NIKOLAI N. PERTSEV,<sup>2</sup> AND ANDREW C. ROBERTS<sup>3</sup>

<sup>1</sup>Department of Earth Sciences, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada

<sup>2</sup>IGREM RAN, Russian Academy of Sciences, Moscow 10917, Staromonetnii 35, Russia

<sup>3</sup>Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario K1A 0G1, Canada

### Benauite\*

K. Walenta, W.D. Birch, P.J. Dunn (1996) Benauite, a new mineral of the crandallite group from the Clara mine in the central Black Forest, Germany. *Chem. Erde*, 56, 171–176.

Electron microprobe analysis gave SrO 12.35, PbO 2.79, BaO 4.32, CaO 0.07, K<sub>2</sub>O 0.07, CuO 0.03, ZnO 0.07, Al<sub>2</sub>O<sub>3</sub> 0.26, Fe<sub>2</sub>O<sub>3</sub> 40.85, P<sub>2</sub>O<sub>5</sub> 18.53, As<sub>2</sub>O<sub>5</sub> 0.78, SO<sub>3</sub> 6.79, H<sub>2</sub>O by difference 13.09, sum 100 wt%, corresponding to (Sr<sub>0.67</sub>Ba<sub>0.16</sub>Pb<sub>0.07</sub>Ca<sub>0.01</sub>K<sub>0.01</sub>)<sub>Σ0.92</sub>(Fe<sub>2.90</sub>Al<sub>0.03</sub>)<sub>Σ2.93</sub>[(PO<sub>4</sub>)<sub>1.48</sub>(SO<sub>4</sub>)<sub>0.48</sub>(AsO<sub>4</sub>)<sub>0.04</sub>]<sub>Σ2.00</sub>(OH,H<sub>2</sub>O)<sub>8.3</sub>. Occurs as yellow to brown radial aggregates, up to 3 mm in diameter, consisting of scaly crystals flattened on (0001) and >1 mm in length. Transparent to translucent, vitreous to resinous luster, yellowish streak, brittle, perfect {0001} cleavage, conchoidal fracture,  $H = 3\frac{1}{2}$ ,  $D_{\text{meas}} = 3.65(5)$ ,  $D_{\text{calc}} = 3.648 \text{ g/cm}^3$ . Optically uniaxial negative or biaxial with  $2V$  up to  $20^\circ$ ,  $\epsilon = 1.862(5)$ ,  $\omega = 1.872(5)$ ,  $E =$  nearly colorless,  $O =$  yellow. Trigonal symmetry, space group probably  $R\bar{3}m$  by analogy with beudantite;  $a = 7.28(2)$ ,  $c = 16.85(4) \text{ \AA}$  as calculated from an X-ray pattern (57 mm, FeK $\alpha$  radiation) with strongest lines of 5.88(100,101), 3.06(90,113), 2.96(50,105,202), 2.81(50,006), 2.53(50,204), 2.25(60,107), 1.969(50,303), and 1.820  $\text{\AA}$  (50,118,220,216).

The mineral is associated with fluorite, goethite, and kidwellite. The new name is for a locality near the Clara mine. Type material is in the Institut für Mineralogie und Kristallchemie der Universität Stuttgart, Germany, and in the Museum of Victoria, Melbourne, Australia.

**Discussion.** Although the authors give the simplified formula as SrFe<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>(OH,H<sub>2</sub>O)<sub>6</sub> and the mineral was approved by the CNMMN on this basis, the composition is not sufficiently PO<sub>4</sub> rich to fall within the field appropriated for such compositions by Scott's IMA-approved nomenclature system (*Am. Mineral.*, 72, 178–187, 1987). Benauite thus is an intermediate member, analogous to corkite and beudantite, and is compositionally the Sr analog of corkite, i.e., ideally SrFe<sub>3</sub>(PO<sub>4</sub>,SO<sub>4</sub>)<sub>2</sub>(OH,H<sub>2</sub>O)<sub>6</sub>.  
**J.L.J.**

### Dusmatovite\*

L.A. Pautov, A.A. Agakhanov, E.V. Sokolova, K.I. Ignatenko (1996) Dusmatovite, a new mineral of the mi-

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

larite group. *Vestnik Moscow Univ., Ser. 4 Geol.*, No. 2, 54–60 (in Russian).

Flame photometry (Li<sub>2</sub>O, K<sub>2</sub>O, Na<sub>2</sub>O) and electron microprobe analyses gave SiO<sub>2</sub> 64.40, ZrO<sub>2</sub> 1.55, FeO 0.45, MnO 8.78, Mn<sub>2</sub>O<sub>3</sub> 1.13 (Mn<sup>2+</sup>/Mn<sup>3+</sup> from the crystal structure determination), ZnO 15.51, Y<sub>2</sub>O<sub>3</sub> 1.51, Yb<sub>2</sub>O<sub>3</sub> 0.54, K<sub>2</sub>O 6.16, Na<sub>2</sub>O 0.61, Li<sub>2</sub>O 1.10, sum 101.74 wt%, corresponding to K<sub>1.00</sub>(K<sub>0.56</sub>Na<sub>0.24</sub>Ca<sub>0.20</sub>)<sub>Σ1.00</sub>(Mn<sup>2+</sup><sub>1.38</sub>Mn<sup>3+</sup><sub>0.16</sub>Y<sub>0.18</sub>Zr<sub>0.18</sub>Fe<sub>0.10</sub>)<sub>Σ2.00</sub>(Zn<sub>2.25</sub>Li<sub>0.75</sub>)<sub>Σ3.00</sub>Si<sub>12.00</sub>O<sub>30</sub>. Occurs as aggregates to 40 × 50 mm, and as single grains; dark blue, dirty blue, or violet-brown color, translucent, vitreous luster, brittle, light blue streak, no cleavage, basal parting,  $H = 4.5$ ,  $VHN_{100} = 423$ ,  $D_{\text{meas}} = 2.96(2)$ ,  $D_{\text{calc}} = 2.978 \text{ g/cm}^3$  for  $Z = 2$ ; insoluble in hot HCl but readily soluble in warm HF. Optically uniaxial negative  $\omega = 1.590$ ,  $\epsilon = 1.586$ ; strongly pleochroic, from light blue ( $E$ ) to light violet ( $O$ ). The infrared spectrum has an intense absorption band at 1030 cm<sup>-1</sup> attributable to Si-O bonds, and a narrow band at 795 cm<sup>-1</sup> characteristic for ring silicates. Single-crystal X-ray structure study ( $R = 0.036$ ) indicated hexagonal symmetry, space group  $P6/mcc$ ,  $a = 10.218(4)$ ,  $c = 14.292(3) \text{ \AA}$ . The powder pattern (diffractometer, CuK $\alpha$  radiation, 35 lines given) has strongest lines of 4.15(45,112), 3.75(50,202), 3.25(100,211,203), and 2.545 (52,220).

The mineral was found in a boulder of pegmatite in glacial moraine at the Dara-i-Pioz alkaline massif, Tien Shan, Tajikistan. The boulder consists of quartz and microcline with minor aegirine, tadhikite-(Y), cesium kupletskite, hyalotekite, betafite, and polyolithionite. The new name is for V.D. Dusmatov, in recognition of his geological and mineralogical work on the relevant massif. The mineral is in the osumilite group and has a compositional similarity to darapiosite, differing notably in the lower Li content and predominance of Zn over Mn. Dusmatovite may be the unnamed mineral of Nadezhina et al. (*Am. Mineral.*, 77, 451–452, 1992). Type material is in the Museum of the Ilmen State Preserve, Miass, Russia. **N.N.P.**

### Ferriphlogopite

M.F. Brigatti, L. Medici, L. Poppi (1996) Refinement of the structure of natural ferriphlogopite. *Clays Clay Minerals*, 44(4), 540–545.

Electron microprobe and single-crystal X-ray structure study of two mica crystals from an alkali-carbonatic com-

plex near Tapira, Minas Gerais, Brazil, gave compositions of  $(K_{0.99}Na_{0.01})_{\Sigma 1.00}(Mg_{2.73}Fe_{0.17}^{2+}Fe_{0.08}^{3+}Ti_{0.01})_{\Sigma 2.99}[(Fe_{0.95}^{3+}Si_{3.05})_{\Sigma 4.00}O_{10.17}](OH)_{1.79}F_{0.04}$  and  $K_{1.02}(Mg_{2.68}Fe_{0.20}^{2+}Fe_{0.11}^{3+}Mn_{0.01})_{\Sigma 3.00}[(Fe_{0.95}^{3+}Si_{3.05})_{\Sigma 4.00}O_{10.18}](OH)_{1.75}F_{0.07}$ . The respective crystals are of the 1M polytype, space group  $C2/m$ ,  $a = 5.362$ ,  $5.3649$ ,  $b = 9.288$ ,  $9.2924$ ,  $c = 10.321$ ,  $10.3255$  Å,  $\beta = 99.99$ ,  $99.988^\circ$ ,  $R = 0.031$ ,  $0.025$ .  $Fe^{3+}$  substitutes for Si within the tetrahedral sites, and the Fe distribution is fully ordered.

**Discussion.** The composition corresponds to the  $Fe^{3+}$  analog of biotite or the  $Mg^{2+}$  analog of ferri-annite. The name tetraferriphlogopite has also been used to indicate the presence of  $Fe^{3+}$  in micas in this compositional range, but neither ferriphlogopite nor tetraferriphlogopite is an approved name. See also the discussion, concerning tetraferriphlogopite, in *Am. Mineral.*, 81, 1517–1518, 1996. **J.L.J.**

#### Frankamenite\*

L.V. Nikishova, K.A. Lazebnik, I.V. Rozhdestvenskaya, N.N. Emelyanova, Yu.D. Lazebnik (1996) Frankamenite  $K_3Na_3Ca_3(Si_{12}O_{30})F_3(OH)\cdot H_2O$ —A new mineral, the triclinic analog of canasite from charoitites. *Zapiski Vseross. Mineral. Obshch.*, 125(2), 106–108 (in Russian).

Twelve electron microprobe analyses, with F and  $H_2O$  by wet chemistry, gave a mean and range of  $Na_2O$  6.93 (6.15–7.60),  $K_2O$  10.53 (9.83–11.11),  $CaO$  21.62 (20.90–22.23),  $SrO$  0.23 (0.05–0.40),  $MgO$  0.07 (0.02–0.12),  $MnO$  0.38 (0.20–0.54),  $FeO$  0.13 (0.04–0.22),  $SiO_2$  55.06 (54.11–55.71),  $H_2O$  2.00 (1.98–2.10), F 4.10 (3.72–4.20), sum 101.05 wt%, corresponding to  $K_{2.93}Na_{2.93}(Ca_{5.05}Mn_{0.07})(Si_{12}O_{30})F_{2.83}(OH)_{1.35}\cdot 0.79 H_2O$ . Occurs as laths typically 1 cm and rarely to 15 cm in length, elongate [001], showing prismatic {100}, {010}, and {110}. Grayish lilac, bluish gray, or light green color, white streak, vitreous luster, perfect {010} and {100} cleavages, microtwinning on (010). Single-crystal X-ray structure study ( $R = 0.059$ ) indicated triclinic symmetry, space group  $P1$ ,  $a = 10.0941(3)$ ,  $b = 12.6913(2)$ ,  $c = 7.2405(1)$  Å,  $\alpha = 90.00(2)$ ,  $\beta = 111.02(2)$ ,  $\gamma = 110.20(2)^\circ$ .

The mineral occurs in charoitic rocks of the Murun alkaline massif, Sakha Yakutiya, Russian Federation. The higher F content, presence of  $H_2O$ , and symmetry distinguish the mineral from canasite, which is monoclinic. The new name is for mineralogist-crystallographer V.A. Frank-Kamenetsky (1915–1994). Type material is in the Museum of the Saint Petersburg Mining Institute, Russia, and in the Central Siberian Geological Museum, Novosibirsk, Russia. The mineral was described previously as triclinic canasite (Evdokimov and Regir, *Zapiski Vseross. Mineral. Obshch.*, 123(1), 104–118, 1994; Nikishova et al., *Mineral. Zhurnal*, 14(1), 71–77, 1992; Rozhdestvenskaya et al., *Mineral. Zhurnal*, 10(4), 31–44, 1988).

**Discussion.** Optical properties, hardness, and density are not given but are similar to those of canasite; for calculation of density, however,  $Z = 1$  for frankamenite.

Strongest lines of the X-ray powder pattern (Nikishova et al., 1992) are 5.88(37,020), 470(54,210), 4.21(40,130), 3.01(25,246), 2.915(100,330), and 2.354(30,420). Numerous weaker lines, the most intense of which are at 2.946(14,040) and 2.878(6,141), distinguish the pattern from that of canasite. Data published for mineral IMA No. 94–050 indicate that frankamenite is biaxial negative,  $\alpha = 1.536$ ,  $\beta = 1.539$ ,  $\gamma = 1.542$ ,  $2V_{meas} = 70$ ,  $2V_{calc} = 89.8^\circ$ . **N.N.P.**

#### Gottardiite\*

E. Galli, S. Quartieri, G. Vezzalini, A. Alberti (1996) Gottardiite, a new high-silica zeolite from Antarctica: The natural counterpart of synthetic NU–87. *Eur. J. Mineral.*, 8, 687–693.

Electron microprobe analysis gave  $SiO_2$  69.23,  $Al_2O_3$  9.40,  $Fe_2O_3$  0.10,  $MgO$  1.24,  $CaO$  2.67,  $SrO$  0.04,  $BaO$  0.03,  $Na_2O$  0.77,  $K_2O$  0.08,  $H_2O$  (TGA) 16.44, sum 100.00 wt%, corresponding to  $(Na_{2.53}K_{0.17})_{\Sigma 2.70}Mg_{5.13}(Ca_{4.84}Sr_{0.04}Ba_{0.02})_{\Sigma 4.90}(Si_{117.17}Al_{18.75}Fe_{0.13})_{\Sigma 136.05}O_{272}\cdot 92.80H_2O$ , simplified as  $Na_3Mg_3Ca_5Si_{117}Al_{19}O_{272}\cdot 93H_2O$ . The DTG curve shows a broad band with two peaks at 127 and 175 °C, suggesting almost continuous loss of  $H_2O$ , and complete rehydration occurs spontaneously in samples after heating to at least 800 °C. The mineral occurs as thin lamellae, elongate [100] or pseudohexagonal, typically in subparallel (001) or wedge-shaped aggregates. Transparent, colorless to light straw, brittle,  $H$  not determinable, conchoidal to irregular fracture, perfect {001} cleavage, nonfluorescent,  $D_{meas} = 2.14(4)$ ,  $D_{calc} = 2.16$  g/cm<sup>3</sup> for  $Z = 1$ . Maximum crystal size is  $0.3 \times 0.2 \times 0.02$  mm; observed forms are {001} and minor {010}, {140}, and {110}. Optically biaxial negative,  $\alpha = 1.480(2)$ ,  $\beta = 1.485(2)$ ,  $\gamma = 1.486(2)$ ,  $2V_{meas} < 60$ ,  $2V_{calc} = 48^\circ$ ,  $X = b$ ,  $Y = a$ ,  $Z = c$ . Single-crystal X-ray study indicated orthorhombic symmetry, space group  $Cmca$ ,  $a = 13.698(2)$ ,  $b = 25.213(3)$ ,  $c = 22.660(2)$  Å. Strongest lines of the powder pattern (114 mm Gandolfi,  $CuK\alpha$  radiation) are 11.34(100,002), 10.64(31,111), 4.64(35,151), 4.37(79,311,204), 4.01(57,153), 3.938(36,062), and 3.282 (68,206,155).

The mineral, which is the analog of synthetic zeolite NU–87, occurs in cavities and small fractures in basaltic rocks at Mt. Adamson, Northern Victoria Land, Antarctica. The new name is for crystallographer Glauco Gottardi (1928–1988). Type material is in the British Museum of Natural History, London. **J.L.J.**

#### Jentschite\*

P. Berlepsch (1996) Crystal structure and crystal chemistry of the homeotypes edenharterite ( $TiPbAs_3S_6$ ) and jentschite ( $TiPbAs_2SbS_6$ ) from Lengenbach, Binntal (Switzerland). *Schweiz. Mineral. Petrog. Mitt.*, 76, 147–157.

One of numerous electron microprobe analyses gave Tl 23.94, Pb 24.45, As 21.69, Sb 7.68, S 22.29, Cu

<0.04, Ag <0.05, Zn <0.05, sum 100.1 wt%, corresponding to  $\text{Ti}_1\text{Pb}_{1.01}\text{As}_{2.25}\text{Sb}_{0.83}$  to  $\text{As}_{2.83}\text{Sb}_{0.18}$ . Single-crystal X-ray structure study ( $R = 0.049$ ) indicated monoclinic symmetry, space group  $P2_1/n$ ,  $a = 8.0958(5)$ ,  $b = 23.917(2)$ ,  $c = 5.8876(5)$  Å,  $\beta = 108.063(8)^\circ$ ,  $Z = 4$ . The structure has ordered Sb and As, and edenharterite and jentschite belong to two different solid solution series. Jentschite occurs in Triassic marble at the Lengenbach quarry, Binnental, Switzerland.

**Discussion.** A complete description of jentschite has not been published, and the prior usage of the name is regrettable. Additional partial data are available in abstracts in *Terra*, 7, p. 290 (1995), and in IMA proposal No. 93-025. **J.L.J.**

#### Natroxalate\*

A.P. Khomyakov (1996) Natroxalate,  $\text{Na}_2\text{C}_2\text{O}_4$ , a new mineral. *Zapiski Vseross. Mineral. Obshch.*, 125(1), 126–132 (in Russian).

Wet-chemical analysis gave  $\text{Na}^+ 34.29$ ,  $\text{K}^+ <0.015$ ,  $\text{Ca}^{2+} <0.015$ ,  $\text{C}_2\text{O}_4^{2-} 65.63$ , sum 99.92 wt%, corresponding to  $\text{Na}_{2.00}\text{C}_{2.00}\text{O}_4$ . Occurs as granular nodules to 1–2 cm, as veinlet-like segregations, as columnar crystals 3–5 mm long and up to 1 mm thick, and as radiating aggregates of the crystals. Light yellow color with a pink or greenish tint, creamy in fine-grained aggregates; transparent, vitreous luster, brittle,  $H = 3$ , perfect {100} and distinct {001} and {221} cleavages, step-like fracture,  $D_{\text{meas}} = 2.32(3)$ ,  $D_{\text{calc}} = 2.338$  g/cm<sup>3</sup> for  $Z = 2$ . Crystals are prismatic, elongate [001], showing {110}, {001}, {010}, {100}, and {221}; some crystals are twinned on (110). Readily soluble in weak acids and in water. The infrared spectrum has strong absorption bands at 520, 775, 1320, 1340, and 1640 cm<sup>-1</sup>, characteristic of oxalates. DTA gave an exothermic effect at 550 °C (24.1 wt% loss versus 20.1 wt% calculated) corresponding to oxidation to form sodium carbonate and CO<sub>2</sub>; an endothermic peak at 880 °C represents melting and partial vaporization of the sodium carbonate. Optically biaxial negative,  $\alpha = 1.415(2)$ ,  $\beta = 1.524(2)$ ,  $\gamma = 1.592(2)$ ,  $2V_{\text{meas}} = 72^\circ$ , moderate dispersion  $r < v$ ,  $b = Z$ ,  $c \wedge X = 20^\circ$  in obtuse angle  $\beta$ , optic axial plane normal to (010). Monoclinic symmetry, space group  $P2_1/a$  by analogy to synthetic  $\text{Na}_2\text{C}_2\text{O}_4$ ;  $a = 10.426(9)$ ,  $b = 5.225(5)$ ,  $c = 3.479(3)$  Å,  $\beta = 93.14(8)^\circ$  as calculated from the powder pattern (diffractometer,  $\text{CuK}\alpha$ , 45 lines given) with strongest lines of 2.898(27,001), 2.826(100,111), 2.602(56,400), and 2.334(33,410).

The mineral occurs as a hydrothermal phase in ultra-aggpaitic pegmatites and hydrothermalites of the Lovozero alkaline massif, Kola Peninsula, Russia. Associated minerals are albite, aegirine, elpidite, nenadkevichite, taeniolite, natron, pyrite, sphalerite, and galena. The new name alludes to the chemical composition of the mineral. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **N.N.P.**

#### Shkatulkalite\*

Yu.P. Menshikov, A.P. Khomyakov, L.I. Polezhaeva, R.K. Rastsvetaeva (1996) Shkatulkalite  $\text{Na}_{10}\text{MnTi}_3\text{Nb}_3(\text{Si}_2\text{O}_7)_6(\text{OH})_2\text{F}\cdot 12\text{H}_2\text{O}$ —A new mineral. *Zapiski Vseross. Mineral. Obshch.*, 125(1), 120–126 (in Russian).

Electron microprobe analyses of three grains gave a mean and range of  $\text{Na}_2\text{O}$  16.14 (15.60–16.84),  $\text{CaO}$  0.44 (0.40–0.52),  $\text{SrO}$  0.46 (0.26–0.60),  $\text{MnO}$  1.70 (1.54–1.81),  $\text{Fe}_2\text{O}_3$  0.07 (0.05–0.08),  $\text{Al}_2\text{O}_3$  0.24 (0.21–0.28),  $\text{SiO}_2$  35.70 (35.58–35.84),  $\text{TiO}_2$  11.12 (11.03–11.23),  $\text{Nb}_2\text{O}_5$  21.93 (21.72–22.22), F (wet chemistry) 0.94, H<sub>2</sub>O (Penfield method) 11.26, H<sub>2</sub>O by difference 11.66, O = F 0.40, sum 100 wt%, corresponding to  $\text{Na}_{10.38}(\text{Mn}_{0.48}\text{Ca}_{0.15}\text{Sr}_{0.09})_{\Sigma 0.72}\text{Ti}_{2.77}\text{Nb}_{3.29}(\text{Si}_{11.84}\text{Al}_{0.09}\text{Fe}_{0.02}^{3+})_{\Sigma 11.95}\text{O}_{42.03}(\text{OH})_{1.99}\text{F}_{0.99}\cdot 11.90\text{H}_2\text{O}$ . Occurs as rectangular lamellae and tabular grains to 1.0 mm, as mica-like aggregates to 3 cm, and as cryptocrystalline partial pseudomorphs of vuonnemite and masses on it. Colorless, silvery white, or light pink in thin plates, creamy or yellowish in thick plates; transparent to translucent, brittle,  $H = 3$ , pearly luster on cleavage planes, waxy luster on fractured surfaces, perfect {100} and perfect micaceous {001} cleavages,  $D_{\text{meas}} = 2.70(2)$ ,  $D_{\text{calc}} = 2.72$  g/cm<sup>3</sup> for  $Z = 1$ . Unreactive with 10% HCl or HNO<sub>3</sub>. DTA showed endothermic effects at 190 °C (dehydration) and 710 °C (melting). The infrared spectrum shows absorption bands at 3435, 1650, 1050, 970, 890, 555, and 450 cm<sup>-1</sup>. Optically biaxial positive,  $\alpha = 1.608(2)$ ,  $\beta = 1.630(2)$ ,  $\gamma = 1.660(2)$ ,  $2V_{\text{meas}} = 82(1)^\circ$ ,  $r < v$ ,  $b = Y$ ,  $a \wedge Z = 7^\circ$  in obtuse angle  $\beta$ . Single-crystal X-ray study indicated monoclinic symmetry, space group  $P2$ ,  $Pm$ , or  $P2/m$ ,  $a = 5.468(9)$ ,  $b = 7.18(1)$ ,  $c = 31.1(1)$  Å,  $\beta = 94.0(2)^\circ$ . Strongest lines of the powder pattern (114 mm camera,  $\text{FeK}\alpha$ , 71 lines given) are 15.56(90,002), 3.11(100,019), 2.850(70,123), 2.665(70,125), and 2.627(70,0.1.11).

The mineral occurs in ultra-aggpaitic pegmatite at Mount Alluaiv, Lovozero alkaline massif, Kola Peninsula, Russia. The new name is derived from the locality, the Shkatulka vein, which in Russian denotes a small box for jewelry. Type material is in the Mineralogical Museum of the Saint Petersburg Mining Institute, Russia. **N.N.P.**

#### Sigismundite\*

F. Demartin, C.M. Gramaccioli, T. Pilati, E. Sciesa (1996) Sigismundite,  $(\text{Ba,K,Pb})\text{Na}_3(\text{Ca,Sr})(\text{Fe,Mg,Mn})_{14}\text{Al}(\text{OH})_2(\text{PO}_4)_{12}$ , a new Ba-rich member of the arrojadite group from Spluga Valley, Italy. *Can. Mineral.*, 34, 827–834.

Electron microprobe analysis gave  $\text{BaO}$  5.68,  $\text{K}_2\text{O}$  0.26,  $\text{PbO}$  0.76,  $\text{SrO}$  1.09,  $\text{Na}_2\text{O}$  4.44,  $\text{CaO}$  2.09,  $\text{FeO}$  27.64,  $\text{MgO}$  10.85,  $\text{MnO}$  0.70,  $\text{Al}_2\text{O}_3$  2.45,  $\text{SiO}_2$  0.02,  $\text{P}_2\text{O}_5$  40.50, H<sub>2</sub>O by crystal structure 0.86, sum 97.34 wt%, corresponding to  $(\text{Ba}_{0.78}\text{K}_{0.12}\text{Pb}_{0.07}\text{Sr}_{0.02})_{\Sigma 0.99}\text{Na}_{3.02}(\text{Ca}_{0.79}\text{Sr}_{0.20})_{\Sigma 0.99}(\text{Fe}_{8.12}\text{Mg}_{5.68}\text{Mn}_{0.21})_{\Sigma 14.01}\text{Al}_{1.01}(\text{OH})_2(\text{PO}_4)_{12}$ . The mineral occurs as a grayish green mass, 4 cm across, in the only specimen known. Crystals within the mass are imperfect to elongate, intensely microfractured, straight

borders, brittle, white streak, greasy luster,  $H$  not determined, nonfluorescent, possibly two cleavages intersecting at  $110^\circ$ ,  $D_{\text{calc}} = 3.544 \text{ g/cm}^3$  for  $Z = 4$ . Greenish yellow color in transmitted light, nonpleochroic, extinction  $\sim 25^\circ$  to elongation, biaxial, average  $n = 1.65$ . Single-crystal X-ray structure study ( $R = 0.066$ ) indicated monoclinic symmetry, space group  $C2/c$ ,  $a = 16.394(4)$ ,  $b = 9.932(2)$ ,  $c = 24.437(7) \text{ \AA}$ ,  $\beta = 105.78(2)^\circ$  as refined from the powder pattern (diffractometer,  $\text{CuK}\alpha$  radiation) with strongest lines of 4.519(23,114), 3.181(51,206), 3.010(0,424), 2.805(25,318), 2.678(42,226), and 2.523(27,606).

The mineral occurs in phengitic quartzite and is associated with quartz, albite, apatite, ferrous carbonates, and mica at Madesimo, Spluga Valley, northern Italy. The new name is for mineral collector Pietro Sigismund (1874–1962). Type material is in the Civic Museum of Natural History, Morbegno, Sondrio, Italy. **J.L.J.**

#### Bafertisite-like

T.C. Birkett, W.E. Trzcinski Jr., J.A.R. Stirling (1996) Occurrence and compositions of some Ti-bearing minerals in the Strange Lake intrusive complex, Quebec-Labrador boundary. *Can. Mineral.*, 34, 779–801.

Electron microprobe analysis gave  $\text{K}_2\text{O}$  0.84, 0.51,  $\text{Na}_2\text{O}$  0.41, 0.48,  $\text{ZnO}$  0.31, 0.14,  $\text{CaO}$  0.23, 0.16,  $\text{BaO}$  25.21, 28.13,  $\text{MgO}$  —, 0.02,  $\text{MnO}$  0.92, 0.65,  $\text{FeO}$  12.78, 10.30,  $\text{Ce}_2\text{O}_3$  2.97, 3.06,  $\text{Al}_2\text{O}_3$  0.46, 0.42,  $\text{Nb}_2\text{O}_5$  0.51, 0.88,  $\text{SnO}_2$  0.08, 0.07,  $\text{TiO}_2$  20.61, 29.84,  $\text{ZrO}_2$  —, 0.12,  $\text{SiO}_2$  26.24, 21.83,  $\text{F}$  2.25, 1.96,  $\text{O} \equiv \text{F}$  0.95, 0.83, sum 92.87, 97.74 wt%, corresponding to  $\text{K}_{0.47}\text{Na}_{0.35}\text{Zn}_{0.10}\text{Ca}_{0.11}\text{Ba}_{4.34}\text{Mn}_{0.34}\text{Fe}_{4.69}\text{Ce}_{0.48}\text{Nb}_{0.10}\text{Sn}_{0.02}\text{Ti}_{6.81}\text{Al}_{0.24}\text{Si}_{11.52}\text{F}_{3.12}\text{O}_{48}$  and  $\text{K}_{0.28}\text{Na}_{0.39}\text{Zn}_{0.04}\text{Ca}_{0.07}\text{Ba}_{4.66}\text{Mg}_{0.01}\text{Mn}_{0.23}\text{Fe}_{3.65}\text{Ce}_{0.47}\text{Nb}_{0.17}\text{Sn}_{0.01}\text{Ti}_{9.50}\text{Zr}_{0.03}\text{Al}_{0.21}\text{Si}_{9.24}\text{F}_{2.62}\text{O}_{48}$ . Optical properties are similar to those of bafertisite. The mineral and bafertisite occur as rims on ilmenite grains in the Strange Lake peralkaline granite. **J.L.J.**

#### Nb-dominant baotite

A.F. Cooper (1996) Nb-rich baotite in carbonatites and fenites at Haast River, New Zealand. *Mineral. Mag.*, 60, 473–482.

Electron microprobe analysis gave  $\text{BaO}$  35.73,  $\text{TiO}_2$  14.28,  $\text{FeO}$  6.76,  $\text{CaO}$  0.03,  $\text{Nb}_2\text{O}_5$  26.98,  $\text{SiO}_2$  13.40,  $\text{Al}_2\text{O}_3$  0.37,  $\text{Cl}$  1.96,  $\text{O} \equiv \text{Cl}$  0.44, sum 99.07 wt%, corresponding to  $\text{Ba}_{3.890}(\text{Nb}_{3.389}\text{Ti}_{2.984}\text{Fe}_{1.571}^{2+}\text{Ca}_{0.009})_{\Sigma 7.953}(\text{Si}_{3.723}\text{Al}_{0.121})_{\Sigma 3.844}\text{Al}_{0.923}\text{O}_{28}$ , simplified as  $\text{Ba}_4(\text{Nb,Ti,Fe})_3\text{Si}_4\text{O}_{28}\text{Cl}$ . Compositions extend from Ti dominant to Nb dominant. The Nb-dominant mineral occurs as rare granules, to 0.5 mm in diameter, in sulfide-rich, siderite carbonatite. The grains have a blotchy appearance attributable to irregular patches that vary from pale to dark brown, and which are

optically sharply defined. The mineral is optically uniaxial positive,  $\omega =$  brown or pale brown,  $\epsilon =$  dark red-brown to black; the deeper absorption tints are in the patches rich in Nb-Fe. **J.L.J.**

#### Ti-bearing minerals

T.C. Birkett, W.E. Trzcinski Jr., J.A.R. Stirling (1996) Occurrence and compositions of some Ti-bearing minerals in the Strange Lake intrusive complex, Quebec-Labrador boundary. *Can. Mineral.*, 34, 779–801.

Four electron microprobe analyses gave  $\text{Na}_2\text{O}$  0.37–6.86,  $\text{K}_2\text{O}$  0.05–1.39,  $\text{ZnO}$  0.01–0.07,  $\text{CaO}$  1.37–3.96,  $\text{BaO}$  0.08–0.23,  $\text{MgO}$  0–0.01,  $\text{MnO}$  0–0.07,  $\text{FeO}$  0.70–2.56,  $\text{Y}_2\text{O}_3$  0–1.79,  $\text{Ce}_2\text{O}_3$  0.16–0.74,  $\text{Nb}_2\text{O}_5$  0.39–1.10,  $\text{SnO}_2$  0.12–0.29,  $\text{TiO}_2$  5.42–9.30,  $\text{ZrO}_2$  8.47–16.39,  $\text{Al}_2\text{O}_3$  0.24–0.88,  $\text{SiO}_2$  48.07–59.41,  $\text{F}$  0.01–1.04,  $\text{O} \equiv \text{F}$  0–0.44, sum 75.42–90.79 wt%. The mineral may be hydrous or contain additional light elements. Maximum size, illustrated as inclusions in narsarsukite, is roughly  $20 \times 40 \mu\text{m}$ .

Electron microprobe analysis of an optically isotropic phase, possibly metamict, gave  $\text{Na}_2\text{O}$  0.06,  $\text{K}_2\text{O}$  0.13,  $\text{CaO}$  0.74,  $\text{MnO}$  0.15,  $\text{ZnO}$  0.08,  $\text{FeO}$  3.17,  $\text{BaO}$  0.24,  $\text{PbO}$  15.49,  $\text{Ce}_2\text{O}_3$  2.46,  $\text{TiO}_2$  6.52,  $\text{UO}_2$  1.51,  $\text{ThO}_2$  3.70,  $\text{ZrO}_2$  4.00,  $\text{SnO}_2$  0.07,  $\text{Nb}_2\text{O}_5$  19.44,  $\text{Al}_2\text{O}_3$  0.32,  $\text{SiO}_2$  19.15,  $\text{F}$  0.42,  $\text{O} \equiv \text{F}$  0.18, sum 77.47 wt%; indications are that C is present, and by difference  $\text{CO}_2$  would amount to 22.53 wt%. Optically resembles pyrochlore, but is distinguishable from it by the absence of internal reflections in reflected light. Illustration of an inclusion in perthite indicates a size roughly  $20 \times 25 \mu\text{m}$ . Both unidentified minerals coexist with quartz, fluorite, pyrochlore, and perthite or two feldspars; a Li-bearing mineral (polyolithionite or neptunite) is also present in the assemblages. **J.L.J.**

#### New Data

##### Iimoriite-(Y)

J.M. Hughes, E.E. Foord, J. Jai-Nhuknan, J.M. Bell (1996) The atomic arrangement of iimoriite-(Y),  $\text{Y}_2(\text{SiO}_4)_2(\text{CO}_3)$ . *Can. Mineral.*, 34, 817–820.

Single-crystal X-ray structure study ( $R = 0.019$ ) of iimoriite-(Y) has specified the space group as  $P\bar{1}$ . **J.L.J.**

##### Spiroffite

M.A. Cooper, F.C. Hawthorne (1996) The crystal structure of spiroffite. *Can. Mineral.*, 34, 821–826.

Single-crystal X-ray structure study ( $R = 0.017$ ) has defined the space group of spiroffite, previously  $Cc$  or  $C2/c$ , to be the latter. **J.L.J.**