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NEW MINERAL NAMES*

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Georgbokiite*

L.P. Vergasova, T.F. Semenova, S.K. Filatov, S.V. Krivovichev, R.R. Shuvalov, V.V. Ananev (1999) Georgbokiite $Cu_5O_2(SeO_3)_2Cl_2$ — a new mineral from volcanic exhalations. Doklady Akad. Nauk, 364(4), 527–531 (in Russian).

S.V. Krivovichev, R.R. Shuvalov, T.F. Semenova, S.K. Filatov (1999) Crystal chemistry of inorganic compounds based on chains of oxocentered tetrahedra. Part 3. Crystal structure of georgbokiite, $Cu_5O_2(SeO_3)_2Cl_2$. Zeits. Kristallogr., 214(3), 135–138.

The average of 13 electron microprobe analyses gave CuO 58.17, ZnO 0.22, SeO_2 33.09, Cl 10.96, O ≡ Cl 2.47, sum 99.97 wt%, corresponding to $(Cu_{4.92}Zn_{0.02})_{\Sigma 4.94}O_{1.91}(Se_{2.01}O_6)Cl_{2.08}$. Occurs as brown to black-brown, equant to short prismatic crystals, some elongate and striated [101], typically 0.1–0.2 mm and up to 0.3 mm in length. Best developed are {100}, {$\bar{1}11$}, and {131}, with {011}, {031}, {$\bar{6}11$}, {$\bar{1}21$} less so. Adamantine luster, yellowish brown streak, weakly brittle or weakly plastic, highly perfect {010} and perfect {100} cleavages, VHN_{10} = 215 (190–240), D_{calc} = 4.84 g/cm^3 for Z = 2 and the empirical formula. In transmitted light, thin grains are transparent and bright brown; optically biaxial negative, $\alpha = 2.06(2)$, $\beta = 2.11(2)$, $\gamma = 2.15(2)$, $2V_{calc} = 70°$, no dispersion, $Y = b$, $X \wedge \alpha = 24°$; distinct pleochroism X = yellowish brown, Y = straw yellow, Z = dark brown, $Z > X > Y$. Single-crystal X-ray structure study (R = 0.043) indicated monoclinic symmetry, space group $P2_1/c$; a = 6.045(2), b = 13.778(2), c = 5.579(5) Å, β = 95.76(4)° as refined from an X-ray powder pattern (diffractometer, Cu$K\alpha$ radiation) with strongest lines of 6.88(68,020), 5.511(50,110), 2.990(100,140), 2.963(94,131), 2.566(67,$\bar{2}21$), and 2.296 (95,060). The results are in good agreement with data for synthetic $Cu_5Se_2O_8Cl_2$.

The mineral is associated with ilinskite and an unidentified selenide in fumarolic incrustations at the southern part of the Great Tolbachik Fissure Eruption, Kamchatka Peninsula, Russia. The new name is for Russian crystal-chemist Georgii Borisovich Bokii. Type material is in the Museum of Mineralogy, Saint Petersburg University, and in the Museum of the Saint Petersburg Mining Institute, Russia. **J.P.**

Seidite-(Ce)*

A.P. Khomyakov, G. Ferraris, E. Belluso, S.N. Britvin, G.N. Nechelyustov, S.V. Soboleva (1998) Seidite-(Ce), $Na_4SrCeTiSi_8O_{22}F\cdot 5H_2O$ — a new mineral with zeolite properties. Zapiski Vseross. Mineral. Obshch., 127(4), 94–100 (in Russian, English abs.).

Electron microprobe analysis (H_2O and F by wet methods) gave Na_2O 9.38, K_2O 1.20, CaO 1.04, SrO 5.20, BaO 1.56, MnO 0.34, FeO 0.10, La_2O_3 4.62, Ce_2O_3 6.52, Pr_2O_3 0.54, Nd_2O_3 1.60, Sm_2O_3 0.16, ThO_2 2.96, SiO_2 45.62, TiO_2 6.54, Nb_2O_5 0.78, F 1.52, H_2O 10.80, O ≡ F 0.64, sum 99.84 wt%, corresponding to $[Na_{3.19}Ca_{0.19}(H_3O)_{0.62}]_{\Sigma 4.00}[Sr_{0.53}K_{0.27}Ba_{0.11}(H_3O)_{0.09}]_{\Sigma 1.00}(Ce_{0.42}La_{0.30}Nd_{0.10}Pr_{0.04}Sm_{0.02}Th_{0.012})_{\Sigma 0.99}(Ti_{0.86}Nb_{0.06}Mn_{0.05}Fe_{0.02})_{\Sigma 0.99}Si_8O_{21.90}[F_{0.84}(OH)_{0.16}]\cdot 5.26H_2O$, simplified as $Na_4(Sr,K,Ca,Ba)(Ce,La,Th)(Ti,Nb)Si_8O_{22}(F,OH)\cdot 5H_2O$. The mineral forms bright yellow, pinkish yellow, or cream-colored spherulites, to 1 cm, in which individual fibers are up to 0.05 mm thick, elongate [010], and flattened {100}. Vitreous to silky luster, resinous or dull in some specimens; translucent, fibrous or splintery fracture, perfect {100} cleavage and less perfect {001}, H = 3–4, D_{meas} = 2.76, D_{calc}= 2.75 g/cm^3 for Z = 4, nonfluorescent, readily soluble in 10% HCl or HNO_3, reacts with H_2O. The DTA curve has a strong endotherm at 180 °C (dehydration) and weak ones at 650, 740, and 840 °C (incongruent melting). Weight loss between 20 and 200 °C is 8.2%, and total loss to 1000 °C is 11.1 wt%. The mineral readily rehydrates after heating to 300 °C, and at that temperature the IR spectrum has not changed. Optically biaxial negative, α = 1.542(2), β = 1.569(2), γ = 1.571(2), $2V_{meas}$ = 28(1), $2V_{calc}$ = 31°, positive elongation, $X \approx a$, $Y \approx c$, $Z \approx b$. Electron diffraction and X-ray powder patterns indicate monoclinic symmetry, space group $C2/c$, a = 24.71(1), b = 7.186(3), c = 14.47(2) Å, β = 95.25(10)°; strongest lines of the diffractometer pattern (Cu$K\alpha$ radiation) are 12.32(100,200), 3.104(24,420), 3.081(16,800), 3.058(12 broad, $\bar{4}21$), and 2.705(10,620). The mineral has a miserite-type Si:O ratio of 8:22 and has a structural similarity to b = 7.2 Å pyroxenoids. The substitution $Na^+ = (H_3O)^+$ is assumed by comparison of natural and artificially hydrated specimens.

The mineral occurs sparingly in cavernous natrolite in the Yubileynaya ultraagpaitic pegmatite vein at the Lovozero alkaline massif, Kola Peninsula, Russia. Associated minerals are belovite, vitusite, sazhinite-(Ce), steenstrupine, manganneptunite, serandite, leucosphenite, and pale yellow sphalerite. The new name is for the locality, the Seidozer massif. Type material is in the Museum of the Saint Petersburg Mining Institute, Russia. **J.P.**

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

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Shibkovite*

L.A. Pautov, A.A. Agakhonov, E.V. Sokolova (1998) Shibkovite $K(Ca,Mn,Na)_2(K_{2-x}\square_x)Zn_3Si_{12}O_{30}$ — a new mineral of the milarite group. Zapiski Vseross. Mineral. Obshch., 127(4), 89–94 (in Russian, English abs.).

The average of four electron microprobe analyses gave SiO_2 61.33, Al_2O_3 0.04, FeO 0.04, MnO 2.43, ZnO 20.80, CaO 6.00, K_2O 8.83, Na_2O 1.03, sum 100.50 wt%, corrresponding to $K_{1.00}(Ca_{1.26}Mn_{0.40}Na_{0.39}Fe_{0.01})_{\Sigma 2.06}(K_{1.20}\square_{0.80})_{\Sigma 2.00}Zn_{3.01}(Si_{12.01}Al_{0.01})_{\Sigma 12.02}O_{30}$, simplified as $K(Ca,Mn,Na)_2(K_{2-x}\square_x)_2Zn_3Si_{12}O_{30}$. Occurs as white to colorless equant grains, to 0.5 mm, resembling quartz. Vitreous luster, white streak, no cleavage, brittle, $H = 5\frac{1}{2} – 6$, $VHN_{50} = 609$, $D_{meas} = 2.89(2)$, $D_{calc} = 2.90(5)$ g/cm^3 for $Z = 2$, insoluble in water and 1:1 HCl, bright red fluorescence in short-wave ultraviolet light. The IR spectrum has bands at 495, 530, 575, 700, 790, 920, 940, 1000, 1048, and 1105 cm^{-1}. Colorless in transmitted light, uniaxial or weakly biaxial positive, $\omega = 1.561(2)$, $\varepsilon = 1.563(2)$. Single-crystal X-ray structure study ($R = 0.0245$) indicated hexagonal symmetry, space group $P6/mcc$; $a = 10.505(1)$, $c = 14.185(3)$ Å as refined from the powder pattern, for which the strongest lines are 7.11(35,002), 3.830(100,022), 3.345(60,121), 3.304(40,014), 2.940(50,114), 2.795(85,024), and 2.627(35,220).

The mineral is associated with reedmergnerite, aegirine, polylithionite, sogdianite, albite, pyrochlore, pectolite, eudialyte-group minerals, and turkestanite that occur in coarse-grained microcline-quartz rocks in the moraine deposits of the Dara-i-Pioz glacier, northern Tadjikistan. The new name is for Russian geologists V.S. Shibkov (1926–1992) and N.V. Shibkov (1951–1991). Type material is in the Museum of the Ilmensky National Park at Miass, Russia, and in the Fersman Mineralogical Museum, Moscow. **J.P.**

Strontiomelane*

N. Meisser, E.-A. Perseil, J. Brugger, P.-J. Chiappero (1999) Strontiomelane, $SrMn^{4+}_6Mn^{3+}_2O_{16}$, a new mineral species of the cryptomelane group from St. Marcel–Praborna, Aosta Valley, Italy. Can. Mineral., 37, 673–678.

The most Sr-rich of six listed electron microprobe analyses has MnO_2 58.71, Mn_2O_3 16.51, Fe_2O_3 6.27, TiO_2 0.70, SiO_2 0.45, K_2O 0.83, Na_2O 0.17, BaO 1.39, SrO 12.77, sum 97.80 wt%, corresponding to $(Sr_{1.01}K_{0.14}Ba_{0.07}Na_{0.04})_{\Sigma 1.26}$ $(Mn^{4+}_{5.52}Mn^{3+}_{1.71}Ti_{0.07}Si_{0.06})_{\Sigma 8.00}$ for octahedral cations = 8, ideally $SrMn^{4+}_6Mn^{3+}_2O_{16}$. Occurs as black, elongate inclusions, to 200 μm, commonly aggregated with braunite in quartz, or rarely in pyroxene or strontiopiemontite, and as veinlets in these and other minerals. Submetallic luster, opaque, brittle, sepia streak, $VHN_{100} = 398$ (309–450), cleavage rarely observed, no internal reflection, $D_{calc} = 4.66$ g/cm^3 for the above analytical formula and $Z = 2$. In reflected light in oil, gray color and strong gray-white pleochroism similar to that of hollandite; moderate anisotropism, with colors from gray-blue to a white tint. Maximum and minimum reflectance values in air (WTiC standard) are 34.2, 26.0 (470 nm), 31.7, 24.4 (543), 30.6, 23.4 (587), and 29.7, 22.3 (657). Indexing of the X-ray powder pattern (114 mm Gandolfi, Fe$K\alpha$ radiation) indicated monoclinic symmetry, possible space group $P2_1/n$, $a = 10.00(1)$, $b = 5.758(7)$, $c = 9.88(1)$ Å, $\beta = 90.64(6)°$. Strongest lines of the pattern are 3.15(100,103), 3.13(80,103), 2.409(80,122), 2.170(60,320), and 1.556 (50,225).

The new mineral, which is the Sr analog of cryptomelane and hollandite, occurs as a hypogene phase with braunite, hollandite, and cryptomelane in the Praborna Mn deposit, about 5 km south of the village of Saint-Marcel, northwestern Italy. The new name alludes to the composition and the color, the latter from the Greek *melas, -anos*, black. Type material is in the Geological Museum of Lausanne, Switzerland, and in the Laboratoire et Galerie de Minéralogie, Muséum National d'Histoire Naturelle, Paris, France. **J.L.J.**

Zn-Cu-Fe-In sulfide

N. Tsushima, H. Matsueda, S. Ishihara (1999) Polymetallic mineralization at the Nakakoshi copper deposits, central Hokkaido, Japan. Resource Geol., 49, 89–97.

Among the polymetallic sulfides that occur in fracture-fill veins near the town of Kamikawa, central Hokkaido, is a mineral for which electron microprobe analysis gave Cu 13.06, Ag 0.33, Fe 6.98, Zn 28.59, Sn 3.70, In 16.30, S 30.12, sum 99.08 wt%, corresponding to $(Zn_{1.86}Cu_{0.87}Fe_{0.53}Ag_{0.01})_{\Sigma 3.27}(In_{0.60}Sn_{0.13})_{\Sigma 0.73}S_{3.99}$ for 8 atoms. The grains, about 10 μm across, occur with chalcopyrite in sphalerite, and also in sharp contact with kesterite-sakuraiite solid solution.

Discussion. As is noted by the authors, the composition is similar to that of an unidentified mineral reported previously (*Am. Mineral.*, 80, p. 407, 1995). **J.L.J.**

$Cu_6(Fe,Cu,Zn)Sn_3S_{10}$

A. Imai, H. Matsueda, R. Yamada, K. Masuta (1999) Polymetallic mineralization at the Shin-Ohtoyo deposit, Harakayama district, Hokkaido, Japan. Resource Geol., 49, 75–88.

Among the various assemblages occurring in the Shin-Ohtoyo Cu-Au deposit, which is 20 km west of Sapporo, is a Sn-bearing suite consisting mainly of tetrahedrite, disseminated pyrite, colusite-series minerals, emplectite, and stannoidite in silicified volcanic rocks containing abundant kaolinite. Electron microprobe analyses ($n = 27$) of an associated unidentified sulfide gave Cu 35.88, Fe 2.03, Zn 1.51, Sb 0.36, Bi 0.35, Sn 31.72, S 28.23, Se 0.18, sum 100.26 wt%, which for 20 atoms corresponds to $Cu_{6.35}Fe_{0.41}Zn_{0.25}Sb_{0.03}Bi_{0.02}Sn_{3.01}S_{9.90}Se_{0.03}$, simplified as $Cu_6(Fe,Cu,Zn)Sn_3S_{10}$. In reflected light the mineral is gray, isotropic, and has a reflectance lower than that of tetrahedrite. The X-ray powder pattern, after deletion of lines assigned to impurities, has d values of 3.347, 3.136, 1.919, 1.551, 1.242, and 1.230 Å. The mineral is distinct from kuramite and mohite. **J.L.J.**

$Pb_3Ag_2Bi_2S_7$

Yingchen Ren (1998) Restudy of bismuth sulfosalt minerals in the Pangushan tungsten quartz vein deposit, Jiangxi Province.

Dizhi Zhaokuang Luncong, 13(4), 1–17 (in Chinese).

Mineralogical data, including reflectances and electron microprobe analyses, are given for heyrovskyite, Ag-rich xilingolite, bursaite, cannizzarite, ustarasite, schirmerite, kobellite, and an unidentified sulfosalt which occur at the Pangushan deposit, Huang sha mining region. For the unidentified sulfosalt, which is present in grains up to 0.05 × 0.10 mm, the average of four listed electron microprobe analyses is Pb 42.32, Ag 15.83, Cu 0.25, Fe 0.14, Bi 26.18, Sb 0.20, S 15.14, sum 100.06 wt%, corresponding to $Pb_{3.02}(Ag_{2.19}Cu_{0.05}Fe_{0.04})_{\Sigma 2.28}(Bi_{1.85}Sb_{0.02})_{\Sigma 1.87}S_7$. Lead gray color, metallic luster, slightly malleable, VHN_{10} = 57.2 – 59.9. In reflected light, grayish white with a bluish tint, anisotropic with polarization colors from grayish yellow to grayish black. Maximum and minimum reflectance percentages are given in 10 nm steps from 410 to 700 nm; representative values are 42.25, 35.75 (470), 38.08, 36.52 (540), 37.10, 35.59 (550), 38.29, 36.51 (590), and 38.22, 35.95 (650). No X-ray data are given. The mineral is associated with chalcopyrite, sphalerite, and a Pb-Ag-Bi sulfosalt in the sulfide-rich part of the quartz-W vein.

Discussion. An X-ray powder pattern of the synthetic analog is illustrated by Wang (*Neues Jahrb. Mineral. Mon.*, 1999, 223–240), who also notes a previous report of a natural occurrence. **J.L.J.**

New Data

Tourmaline group, aenigmatite group

F.C. Hawthorne, D.J. Henry (1999) Classification of the minerals of the tourmaline group. Eur. J. Mineral., 11, 210–215.

T. Kunzmann (1999) The aenigmatite-rhönite mineral group. Eur. J. Mineral., 11, 743–756.

An unofficial, i.e., not CNMMN-approved, classification of the tourmaline group is proposed on the basis of the general formula $XY_3Z_6[T_6O_{18}][BO_3]_3V_3W$. The 13 approved species fall into three groups, as in the accompanying table wherein the end-member formulas of olenite, liddicoatite, and foitite have been modified from those suggested originally, and "hydroxy-feruvite" is a modification of feruvite. Also tabulated in the paper are the formulas of hypothetical end-member species, and it is noted that some published compositions correspond to these species. The recommendation is that, as for the amphibole group, new root names not be used to designate a new member whose distinguishing feature is homovalent substitution within a root species; such a member can be named by use of an appropriate prefix.

The aenigmatite group is reviewed in terms of the general formula $\{X_2\}[Y_6](Z_6)O_{20}$, where X = Na or Ca. Although the group contains only eight approved minerals, the theoretical number of end-members is immense because {Y} contains six-fold-coordinated Mg^{2+}, Fe^{2+}, Fe^{3+}, Ti^{4+}, Al^{3+}, Mn^{2+}, Cr^{3+}, Ti^{3+}, Ca^{2+}, Sb^{5+}, Nb^{5+}, and As^{5+}, and (Z) has fourfold-coordinated Si^{4+}, Al^{3+}, Fe^{3+}, Be^{2+}, and B^{3+}. The proposed nomenclature system would require several redefinitions. **J.L.J.**

Choloalite

A.E. Lam, L.A. Groat, J.D. Grice, T.S. Ercit (1999) The crystal structure of choloalite. Can. Mineral., 37, 721–729.

Single-crystal X-ray structure study (R = 0.053) of choloalite from the type locality established the space group as $P4_132$, and confirmed the anhydrous ideal formula $CuPbFe^{4+}_6O_6$ that had been obtained from synthetic material (*Am. Mineral.*, 80, p. 634, 1995). **J.L.J.**

Fullerite

M.I. Novgorodova (1999) What are fullerenes and fullerites in the mineral world? Geochem. Internat., 37, 896–904.

Aggregations, up to 120 × 120 μm, of microspheres and microcrystals of fullerite, C_{60}, occur on graphite in a xenolith of peridotite in the Tuvish basaltoid pipe at South Gissar, Tajikistan. Among the 19 X-ray diffraction lines (57 mm camera, Fe$K\alpha$ radiation) stated to be characteristic of fullerite, the

Formulas of end-member species in the tourmaline group

	(X)	(Y_3)	(Z_6)	T_6O_{18}	$(BO_3)_3$	V_3	W
				alkali tourmaline			
elbaite	Na	$Li_{1.5}Al_{1.5}$	Al_6	Si_6O_{18}	$(BO_3)_3$	$(OH)_3$	(OH)
dravite	Na	Mg_3	Al_6	Si_6O_{18}	$(BO_3)_3$	$(OH)_3$	(OH)
chromdravite	Na	Mg_3	Cr_6	Si_6O_{18}	$(BO_3)_3$	$(OH)_3$	(OH)
schorl	Na	Fe^{2+}_3	Al_6	Si_6O_{18}	$(BO_3)_3$	$(OH)_3$	(OH)
olenite	Na	Al_3	Al_6	Si_6O_{18}	$(BO_3)_3$	O_3	(OH)
buergerite	Na	Fe^{3}_{3+}	Al_6	Si_6O_{18}	$(BO_3)_3$	O_3	F
povondraite	Na	Fe^{3}_{3+}	$Fe^{3+}_4Mg_2$	Si_6O_{18}	$(BO_3)_3$	$(OH)_3$	O
				calcic tourmaline			
uvite	Ca	Mg_3	Al_5Mg	Si_6O_{18}	$(BO_3)_3$	$(OH)_3$	F
"hydroxy-feruvite"	Ca	Fe^{2+}_3	Al_5Mg	Si_6O_{18}	$(BO_3)_3$	$(OH)_3$	(OH)
liddicoatite	Ca	Li_2Al	Al_6	Si_6O_{18}	$(BO_3)_3$	$(OH)_3$	F
				X-site-vacant tourmaline			
rossmanite		$LiAl_2$	Al_6	Si_6O_{18}	$(BO_3)_3$	$(OH)_3$	(OH)
foitite		Fe^{2+}_2Al	Al_6	Si_6O_{18}	$(BO_3)_3$	$(OH)_3$	(OH)
magnesiofoitite*		Mg_2Al	Al_6	Si_6O_{18}	$(BO_3)_3$	$(OH)_3$	(OH)

*IMA No. 98–037, approved.

strongest ones not overlapping with the patterns for graphite are 4.74(70,030), 4.24(90,131), 3.76(90,132), 2.56(70,234), 2.46(70,252), 2.29(70,352,161), 2.25(70,006), and 1.819 Å (70,560). The indexing gave a pseudocubic, tetragonal cell with a = 14.22, c = 13.56, c/a = 0.95, D_{calc} = 1.745 g/cm^3 for Z = 4.

Discussion. See *Am. Mineral.*, 84, p. 1686 (1999) for discussion of the use of the unapproved name. The symmetry therein is given as cubic. **J.L.J.**

Garronite

G. Artioli, M. Marchi (1999) On the space group of garronite. Powder Diffraction, 14, 190–194.

High-resolution synchrotron powder diffractometry and Rietveld refinement of garronite of composition $K_{0.05}Na_{0.10}Ca_{2.71}Al_{5.87}Si_{10.20}O_{32}\cdot14.12H_2O$, from Goble, Oregon, showed the mineral to be monoclinic, space group $I2/a$, pseudotetragonal, a = 9.8799(6), b = 10.2801(2), c = 9.8764(6) Å, β = 90.113(6)°. **J.L.J.**

Discredited Mineral

Arsenobismite

U. Kolitsch (1999) Arsenobismite discredited. Neues Jarhb. Mineral. Mon., 322–336.

Reexamination of type specimens of arsenobismite from the Mammoth mine, Juab County, Utah, showed them to be quartz-rich and to consist mainly of preisingerite accompanied by minor amounts of atelestite and beudantite–segnitite, and by lesser amounts of mixite, conichalcite, and an X-ray amorphous, brownish red Fe phase. The original analysis, which gave a formula approximating $Bi_2(AsO_4)(OH)_3$, is concluded to have been derived by analysis of a preisingerite-rich concentrate of the above minerals, including some quartz. The discreditation has been approved by the CNMMN. **J.L.J.**