

New Mineral Names*

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AGARDITE-(Ce)*

K. Walenta, T. Theye (2004) Agardite-(Ce) of the Clara mine in the central Black Forest. *Aufschluss*, 55, 17–23 (in German, English abs.).

The mineral occurs as light green to yellowish green acicular crystals, up to 0.5 mm long and 0.01 mm thick, commonly in radial aggregates. Electron microprobe analysis gave CaO 1.21, CuO 42.91, Fe₂O₃ 0.39, Ce₂O₃ 4.99, La₂O₃ 2.32, Nd₂O₃ 2.38, Sm₂O₃ 0.56, Gd₂O₃ 0.52, Eu₂O₃ 0.26, Dy₂O₃ 0.18, Y₂O₃ 0.91, As₂O₅ 30.91, SO₃ 0.40, SiO₂ 0.96, H₂O (by difference) 11.10, sum 100 wt%, corresponding to (Ce_{0.33}Ca_{0.23}La_{0.15}Nd_{0.15}Y_{0.09}Sm_{0.03}Gd_{0.03}Eu_{0.02}Dy_{0.01})_{Σ1.04}(Cu_{5.78}Fe_{0.05})_{Σ5.83}(As_{2.88}Si_{0.17}S_{0.05})_{Σ3.10}O₁₂(OH)₆·3.6H₂O for 12 O and 6 (OH), ideally CeCu₆(AsO₄)₃(OH)₆·3H₂O, which is the Ce-dominant analog of agardite-(La) and agardite-(Y). Vitreous to silky luster, transparent to translucent, greenish to pale yellow streak, *H* = 3, no cleavage, conchoidal fracture, forms {100} and {001}, *D*_{meas} = 3.70(5), *D*_{calc} = 3.775 g/cm³ for *Z* = 2, easily soluble in HCl and HNO₃. Optically uniaxial positive, ω = 1.725(3), ε = 1.810(3), pleochroism *O* = yellowish green, *E* = green. Indexing of the X-ray powder pattern (57 mm camera, FeKα radiation) gave *a* = 13.59(2), *c* = 5.89(1) Å, hexagonal space group *P*6₃/*m* by analogy with other members of the mixite group. Strongest lines of the powder pattern are 11.88(100,100), 4.47(80,111,120), 3.56(80,211), 2.95(80,002,221,400), and 2.46(90,212,321).

The mineral is associated with goethite and cornwallite as oxidation products that formed on barite and quartz at the Clara mine, near Oberwolfach in the central Black Forest, Germany. Type material is in the Staatlichen Museum für Naturkunde, Stuttgart, Germany. **J.L.J.**

ALMARUDITE*

T. Mihajlović, C.L. Lengauer, T. Ntaflou, U. Kolitsch, E. Tillmanns (2004) Two new minerals, rondorfite, Ca₈Mg[SiO₄]₄Cl₂, and almarudite, K(□,Na)₂(Mn,Fe,Mg)₂(Be,Al)₃[Si₁₂O₃₀], and a study of iron-rich wadalite, Ca₁₂[(Al₈Si₄Fe₂)O₃₂]Cl₆, from the Bellerberg (Bellberg) volcano, Eifel, Germany. *Neues Jahrb. Mineral. Abh.*, 179, 265–294.

* 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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The mineral forms euhedral tabular crystals, flattened on {0001} and up to 1.5 mm in diameter and 0.2 mm thick; additional forms are {100}, {102}, and {110}. Electron microprobe (average of 7) and laser-ablation ICP-MS (for Li, Be, B) analyses gave SiO₂ 72.31, B₂O₃ 0.018–0.0618, Al₂O₃ 4.09, BeO 5.18, MgO 1.51, CaO 0.12, MnO 7.31, FeO 4.48, ZnO 0.24, Li₂O 0.0075–0.018, Na₂O 0.66, K₂O 4.05, sum 99.98–100.03 wt%, corresponding to K_{0.86}Na_{0.21}(Mn_{1.03}Fe_{0.62}Mg_{0.37}Zn_{0.03}Ca_{0.02})_{Σ2.07}(Be_{2.07}Al_{0.80}Li_{0.01}B_{0.01})_{Σ2.89}[Si_{12.04}O₃₀], simplified as K(□,Na)₂(Mn,Fe,Mg)₂(Be,Al)₃[Si₁₂O₃₀] for 30 O. Translucent, color yellow to orange, streak light orange, brittle, no cleavage, irregular fracture, vitreous luster, *D*_{calc} = 2.714 g/cm³ for *Z* = 2. Optically uniaxial negative, ω = 1.560(1), ε = 1.559(1) at λ = 589 nm, but anomalous extinction, biaxial optics, and zoning are common. Dichroism strong: *O* = orange, *E* = colorless. X-ray structure study (*R*₁ = 0.0185) gave hexagonal symmetry, space group *P*6/*mmc*, *a* = 9.997(1), *c* = 14.090(1) Å. Strongest lines in a powder pattern (35 lines, CuKα radiation, 114 mm Gandolfi camera): 7.047(40,002), 5.000(40,110), 4.076(80,112), 3.522(40,004), 3.187(90,211), 2.882(100,300,114), and 1.826(40,315,412).

The mineral occurs in cavities in a silicate-rich xenolith in Quaternary leucite tephritic lava in a quarry at the Bellerberg volcano lava field near Ettringen, 2 km north of Mayen, Laacher See region, Eifel, Germany. Associated minerals are tridymite, sanidine, clinopyroxene, amphibole, quartz, hematite, and braunite. The new mineral name is from *Alma Mater Rudolphina*, the proper name for the Universität Wien. Type material is in the Naturhistorisches Museum Wien, Vienna, Austria.

Discussion. The mineral is the Mn-dominant analog of milarite, but structural study found no evidence for significant H₂O, the absence of which is common in other members of the osumilite group. **E.S.G.**

ALUMINO-MAGNESIOHULSITE*

N.N. Pertsev, W. Schreyer, T. Armbruster, H.-J. Bernhardt, O. Medenbach (2004) Alumino-magnesiohulsite, a new member of the hulsite group, in kotoite marble from east of Verkhoyansk, Sakha-Yakutia, Russia. *Eur. J. Mineral.*, 16, 151–161.

The mineral forms euhedral to subhedral prisms up to 90 μm long parallel to *b*. Electron microprobe analyses (average of 4) gave TiO₂ 0.75, SnO₂ 11.88, B₂O₃ 17.07 (calculated from stoichiometry), Al₂O₃ 15.86, MgO 33.94, CaO 0.11, MnO 0.42, FeO 15.97, sum 96.00 wt%, corresponding to (Mg_{1.55}Fe_{0.45})_{Σ2.00}(Al_{0.63}Mg_{0.17}Mn_{0.01}Ti_{0.02}Sn_{0.16})_{Σ0.99}O₂(BO₃), ideally Mg₂(Al_{1–2x}

Mg,Sn_x)₂O₂(BO₃) for 5 O. Transparent, blue-green to brown in thin section, $D_{\text{calc}} = 3.84 \text{ g/cm}^3$ for $Z = 2$, twin lamellae parallel to $\{h0l\}$. Optically biaxial positive, $\alpha' = 1.78$, $\gamma' = 1.805$ from reflectance data at $\lambda = 546 \text{ nm}$, $2V'_{\text{meas}} = 33(5)^\circ$. Pleochroism strong, $X = \text{brown}$, $Y = \text{brown}$, $Z = \text{blue-green}$, orientation $X = b$. X-ray structure study ($R_1 = 0.0617$) gave monoclinic symmetry, space group $P2/m$, $a = 5.3444(7)$, $b = 3.0300(5)$, $c = 10.506(1) \text{ \AA}$, $\beta = 94.46(1)^\circ$, $V = 169.29(4) \text{ \AA}^3$. No powder pattern given.

The mineral occurs in Paleozoic kotoite marble in the contact zone of a Mesozoic granosyenite massif near the mouth of Kebirin'ya Creek, a northern tributary of the Dogdo River ($\sim 67.5^\circ \text{ N}$, $\sim 139^\circ \text{ E}$), some 250 km east of Verkhoysk, Republic of Sakha-Yakutia, Russia. The mineral is almost always intergrown with ludwigite; other associated minerals are calcite, spinel, löllingite, pertsevite, clinohumite, and forsterite; szaibelyite and brucite are secondary after kotoite. The new mineral name is for the composition and relationship to hulsite. Type material is in the Mineralogical Collection of the Institut für Geologie, Mineralogie und Geophysik, Ruhr-Universität Bochum, Germany.

Discussion. The recognition of the mineral as a distinct species in the hulsite group is based on the formula $(\text{MI})_2(\text{MII})^{2-4+} \text{O}_2\text{BO}_3$ (Aleksandrov et al., *Geochem. Internat.*, 38, 772–787, 2000) wherein MI is Fe^{2+} and Mg, and wherein MII includes all other cations, as well as Mg or Fe^{2+} not accommodated in MI, so that the average valence for MII is +3. For aluminomagnesiophulsite, $\text{Mg} > \text{Fe}$ in MI, and Al is the most abundant cation in MII. The mineral was accepted by CNMMN IMA on these purely stoichiometric criteria.

As discussed by the authors, recognition of mineral species in the hulsite group could be based on a structural formula, $\text{MI}^{2+}_{1.5}\text{MII}^{2-4+}_{1.5}\text{O}_2\text{BO}_3$, wherein MI' corresponds to the M4 and M5 sites, and MII' corresponds to the M1, M2, and M3 sites, for which the average valence of MII' is $2\frac{2}{3}$. This would allow definition of proper end-member compositions as advocated by Hawthorne (*Can. Mineral.*, 40, 699–710, 2002), an approach consistent with the usual CNMMN IMA criteria for distinguishing species on the basis of site occupancy (Table 1). That is, aluminomagnesiophulsite is distinct from magnesiophulsite because Al is the most abundant cation at M1, M2, and M3 taken together, $\text{Al}_{0.65}\text{Mg}_{0.5}\text{Fe}_{0.2}\text{Sn}_{0.15}$, and the end-member $[\text{Mg}_{1.5}(\text{AlMg}_{0.5})_{21.5}\text{O}_2\text{BO}_3]$ is the dominant component. Tin seems to be an essential constituent of hulsite-group minerals. “Stanno-magnesiophulsite,” potentially a distinct mineral species, is the dominant component in two compositions reported by Aleksandrov et al. (op. cit.). **E.S.G.**

TABLE 1. Members of the hulsite group

Mineral	MI'	MII'	End-member
Hulsite	$\text{Fe}^{2+} > \text{Mg}$	$\text{Fe}^{3+} > \text{Fe}^{2+} > \text{Sn} > \text{Mg}$	$\text{Fe}_{1.5}^{2+}(\text{Fe}^{3+}\text{Fe}_{0.5}^{2+})_{21.5}\text{O}_2\text{BO}_3$
Magnesiophulsite	$\text{Mg} > \text{Fe}^{2+}$	$\text{Fe}^{3+} > \text{Mg} > \text{Fe}^{2+}, \text{Sn}$	$\text{Mg}_{1.5}(\text{Fe}^{3+}\text{Mg}_{0.5})_{21.5}\text{O}_2\text{BO}_3$
Aluminomagnesiophulsite	$\text{Mg} > \text{Fe}^{2+}$	$\text{Al} > \text{Mg} > \text{Fe}^{2+} > \text{Sn}$	$\text{Mg}_{1.5}(\text{AlMg}_{0.5})_{21.5}\text{O}_2\text{BO}_3$
“Stanno-magnesiophulsite”	$\text{Mg} > \text{Fe}^{2+}$	$\text{Mg} > \text{Sn}$	$\text{Mg}_{1.5}(\text{Sn}_{0.5}\text{Mg})_{21.5}\text{O}_2\text{BO}_3$

K-DOMINANT AMPHIBOLES

F.K. Mazdab (2003) The diversity and occurrence of potassium-dominant amphiboles. *Can. Mineral.*, 41, 1329–1344.

New analyses and a review of high-quality published analyses of the amphibole group reveal that, in addition to the seven approved species for which K is the dominant A-site cation, 14 others correspond to new end-members. In accordance with the nomenclature system in place, the as-yet-unapproved new minerals would be “potassichastingsite,” “potassic-chlorohastingsite,” “potassic-ferropargasite,” “potassic-chloro-ferropargasite,” “potassic-aluminosadanagaite,” “potassic-chlorosadanagaite,” “potassic-chloro-ferro-edenite,” “potassicrichterite,” “potassic-ferrichterite,” “potassic-fluoro-magnesiokataphorite,” “potassic-ferritaramite,” “potassic-magnesiio-arfvedsonite,” “potassic-fluoro-magnesiio-arfvedsonite,” and “potassickornite.” **J.L.J.**

ANSERMETITE*

J. Brugger, P. Berlepsch, N. Meisser, T. Armbruster (2003) Ansermetite, $\text{MnV}_2\text{O}_6 \cdot 4\text{H}_2\text{O}$, a new mineral species with V^{5+} in five-fold coordination from Val Ferrera, eastern Swiss Alps. *Can. Mineral.*, 41, 1423–1431.

The mineral forms crusts up to $\sim 500 \mu\text{m}$ thick and several square centimeters in area; rare single crystals up to $100 \mu\text{m}$ across have a monoclinic habit. Electron microprobe analysis (average of 8 and recalculated to 100% because of dehydration under microprobe beam) gave V_2O_5 53.80, As_2O_5 0.44, MnO 20.85, SrO 0.14, H_2O 24.77 (calc., from stoichiometry on the basis of crystal-structure refinement), sum 100 wt%, corresponding to $(\text{Mn}_{0.988}\text{Sr}_{0.004})_{\Sigma 0.992}(\text{V}_{1.989}\text{As}_{0.013})_{\Sigma 2.002}\text{O}_6 \cdot 4\text{H}_2\text{O}$, ideally $\text{MnV}_2\text{O}_6 \cdot 4\text{H}_2\text{O}$ for 8 O and 4 H. Crusts are “bordeaux”-colored, single crystals are carmine red, transparent, streak orange, brittle, $H \approx 3$, good $\{110\}$ cleavage, fracture uneven, luster adamantine, nonfluorescent, $D_{\text{meas}} = 2.57(2)$, $D_{\text{calc}} = 2.49 \text{ g/cm}^3$ for $Z = 4$. Optically biaxial, $n_{\text{min}} = 1.797$, $n_{\text{max}} = 1.856$ at $\lambda = 589 \text{ nm}$, strong yellow-orange (X) to ruby-red (Z) pleochroism. X-ray structure study ($R_1 = 0.0701$) gave monoclinic symmetry, space group $C2/c$, $a = 13.171(2)$, $b = 10.1280(10)$, $c = 6.9830(10) \text{ \AA}$, $\beta = 111.572(2)^\circ$. Strongest lines in a powder pattern (17 lines, $\text{FeK}\alpha$ radiation, 114 mm Gandolfi camera) are 7.82(100,110), 5.69(20,111), 5.06(20,020), 4.51(30,111), 3.91(30,220,311), and 3.029(70,131,312).

The mineral fills thin fractures in a Fe-Mn deposit of syngenetic to diagenetic origin in Triassic carbonates at the Fianel mine near Ausserferrera, Ferrara Valley, Canton Graubünden, Switzerland. Associated minerals in the fractures are fanelite and Fe oxyhydroxides; minerals in veinlets cut by the fractures are quartz, aegirine, rhodonite, palenzonaite, saneroite, and pyrobelonite. The new mineral name is for Stefan Ansermet (b. 1964), Swiss mineralogist specializing in Alpine minerals. Holotype material is in the Musée Géologique Cantonal, Lausanne, Switzerland.

Discussion. The mineral is isotypic with synthetic $\text{MnV}_2\text{O}_6 \cdot 4\text{H}_2\text{O}$, which was prepared hydrothermally at atmospheric pressure (J.H. Liao et al. 1996; *Chem. Abs.* 125: 74536a). **E.S.G.**

FLUORVESUVIANITE*

S.N. Britvin, A.A. Antonov, S.V. Krivovichev, T. Armbruster, P.C. Burns, N.V. Chukanov (2003) Fluorvesuvianite, $\text{Ca}_{10}(\text{Al}, \text{Mg}$,

Fe^{2+}]₁₃[SiO₄]₁₀[Si₂O₇]₄O(F,OH)₉, a new mineral species from Pitkäranta, Karelia, Russia: description and crystal structure. *Can. Mineral.*, 41, 1371–1380.

The mineral forms radiating aggregates of acicular prisms, 5–30 μm thick and up to 1.5 cm long; the faces are probably {100} and {110}. Electron microprobe analyses (average of 4) gave SiO₂ 36.6, Al₂O₃ 17.9, MgO 1.9, FeO 2.8, MnO 0.1, CaO 36.1, F (ion-selective electrode) 4.6, H₂O (TGA) 0.5, F ≡ O 1.94, sum 98.56 wt%, corresponding to Ca_{19.03}(Al_{10.38}Mg_{1.39}Fe_{1.15}Mn_{0.04})_{Σ12.96}Si_{18.01}O₆₈(F_{7.16}OH_{1.64}O_{0.60})_{Σ9.60} for 50 cations, ideally Ca₁₉(Al,Mg,Fe²⁺)₁₃[SiO₄]₁₀[Si₂O₇]₄O(F,OH)₉. Transparent, colorless, streak presumably white, brittle, *H* = 6, no cleavage, vitreous silky luster, nonfluorescent, *D*_{meas} = 3.46(3), *D*_{calc} = 3.40 g/cm³ for *Z* = 2. Optically uniaxial negative, ω = 1.702(1), ε = 1.699(1) at λ = 589 nm. No pleochroism. The IR spectrum includes a feature at 3170 cm⁻¹ attributed to a hydrogen bond; additional bands are at 3625, 3555, 3400, 1650, 1575, 1420, 1080, 1021, 983, 905, 870, 800, 710, 636, 605, 577, 490, 444, 411, 395, and 375 cm⁻¹. X-ray structure study (*R*₁ = 0.043) gave tetragonal symmetry, space group *P4/nnc*, *a* = 15.5295(10), *c* = 11.7808(11) Å. Strongest lines in a powder pattern (65 lines, CuKα radiation, diffractometer): 3.465(30,420), 3.040(30,510), 2.945(35,004), 2.743(90,432,440), 2.589(50,224,522), 2.453(100,620), and 1.619(30,526,922).

The mineral occurs on vesuvianite in calcite in a coarse-grained chloritized diopside skarn at the Lupikko mine, Pitkäranta ore field, which is on the northeastern coast of Ladoga Lake, Karelia, Russia. Other associated minerals include clinocllore and sphalerite. The new mineral name alludes to the relationship as the F-dominant analog of vesuvianite. The holotype specimen is in Mineralogical Museum, Department of Mineralogy, Saint Petersburg State University, Russia. **E.S.G.**

PERTSEVITE*

W. Schreyer, T. Armbruster, H.-J. Bernhardt, O. Medenbach (2003) Pertsevite, a new silicatic magnesioborate mineral with an end-member composition Mg₂BO₃F, in kotoite marble from east of Verkhoyansk, Sakha-Yakutia, Russia. *Eur. J. Mineral.*, 15, 1007–1018.

The mineral forms anhedral grains up to 150 μm in diameter. Electron microprobe analysis of the grain used for structural and optical measurements gave SiO₂ 8.25, B₂O₃ 22.44, MgO 57.39, FeO 3.71, MnO 0.65, CaO 0.24, Al₂O₃ 0.10, F 7.81, H₂O 1.67 (calculated for charge balance), F ≡ O 3.29, sum 98.97 wt%, corresponding to (Mg_{1.88}Fe²⁺_{0.07}Mn_{0.01}Ca_{0.01})_{Σ1.97}(B_{0.85}Si_{0.18})_{Σ1.03}O_{3.21}(F_{0.54}OH_{0.24})_{Σ0.78}, simplified as Mg₂(B_{0.8}Si_{0.2})O_{3.2}(F,OH)_{0.8} for 4 (O,F,OH). Transparent, colorless in thin section, streak presumably white, no cleavage, uneven fracture, *D*_{calc} = 3.12 g/cm³ for the above composition and *Z* = 16. Optically biaxial positive, α = 1.609(1), β = 1.620(1), γ = 1.642(1) at λ = 589 nm, 2*V*_{meas} = 65(1), 2*V*_{calc} = 71(6)°. No pleochroism or dispersion. Not cathodoluminescent. X-ray structure study (*R*₁ = 0.064) gave orthorhombic symmetry, space group *Pna2*₁, *a* = 20.490(6), *b* = 4.571(1), *c* = 11.890(3) Å. Strongest lines in a powder pattern calculated for CuKα radiation and a diffractometer (112 lines calculated): 2.7425(77,313), 2.7146(32,512), 2.4737(49,114),

2.4178(32,513), 2.4137(46,711), 2.2409(100,414), 2.2344(49,810), 1.7081(92,424), 1.7053(44,820), and 1.4806(41,12 0 4).

The mineral occurs in Paleozoic kotoite marble in the contact zone of a Mesozoic granosyenite massif near the mouth of Kebirin'ya Creek, a northern tributary of the Dogdo River (~67.5° N, ~139° E), some 250 km east of Verkhoyansk, Republic of Sakha-Yakutia, Russia. The mineral replaced clinohumite and forsterite; other associated minerals are calcite, spinel, löllingite, ludwigite, and alumino-magnesioborite; szaibelyite and brucite are secondary after kotoite. The new mineral name is for Nikolai Nikolayevich Pertsev, Russian mineralogist specializing in boron minerals and deposits. Type material is in the Mineralogical Collection of the Institut für Geologie, Mineralogie und Geophysik, Ruhr-Universität Bochum, Germany.

Discussion. The mineral contains 9–27 mol% (Mg, Fe)₂SiO₄ and is isomorphous with synthetic α-Mg₂BO₃F, but shows no evidence for the (□F₃) = (BO₃) substitution reported in the synthetic compound (Grigor'yev and Brovkin, 1969, *Doklady Akad. Nauk*, 186, 1387–1390; Brovkin and Nikishova, 1975, *Sov. Phys. Crystallogr.*, 20, 452–455). **E.S.G.**

RONDORFITE*

T. Mihajlović, C.L. Lengauer, T. Ntaflos, U. Kolitsch, E. Tillmanns (2004) Two new minerals, rondorfite, Ca₈Mg[SiO₄]₄Cl₂, and almarudite, K(□,Na)₂(Mn,Fe,Mg)₂(Be,Al)₃[Si₁₂O₃₀], and a study of iron-rich wadalite, Ca₁₂[(Al₈Si₄Fe₂)O₃₂]Cl₆, from the Bellerberg (Bellberg) volcano, Eifel, Germany. *Neues Jahrb. Mineral. Abh.*, 179, 265–294.

The mineral forms anhedral grains up to 0.3 mm in diameter. Electron microprobe analysis (average of 8) gave SiO₂ 30.51, TiO₂ 0.13, Al₂O₃ 0.40, MgO 4.52, FeO 0.54, CaO 57.05, Na₂O 0.07, Cl (corrected for Cl ≡ O) 6.71, sum 99.93 wt%, corresponding to (Ca_{7.98}Na_{0.02})_{Σ8.00}(Mg_{0.87}Fe_{0.06}Al_{0.06})_{Σ0.99}[(Si_{3.98}Ti_{0.01})_{Σ3.99}O₁₆](Cl_{1.92}OH_{0.08})_{Σ1.00}, ideally Ca₈Mg[SiO₄]₄Cl₂ for 34 anionic charges. Color orange-brown to amber, transparent, streak light amber, brittle, no cleavage, fracture conchoidal, luster vitreous, *D*_{calc} = 3.034 g/cm³ for *Z* = 8. Optically isotropic, *n* = 1.676(1) at λ = 589 nm. X-ray structure study (*R*₁ = 0.0231) gave isometric symmetry, space group *Fd* $\bar{3}$, *a* = 15.0850(3) Å. Strongest lines in a powder pattern (28 lines, CuKα radiation, 114 mm Gandolfi camera): 2.901(40,511), 2.666(100,440), 2.549(30,531), 1.964(30,553), 1.885(30,800), 1.777(30,822), 1.540(50,844), and 1.459(30,951).

The mineral occurs in metasomatized limestone xenoliths in Quaternary leucite tephritic lava in a quarry at the Bellerberg volcano lava field near Ettringen, 2 km north of Mayen, Laacher See region, Eifel, Germany. The mineral is intergrown with Ca₂SiO₄·0.5H₂O in association with ettringite-thaumasite, mayenite, ternesite, cuspidine, larnite, “calcio-olivine,” tobermorite, portlandite, hydrocalumite, a member of the ellestadite series, carbonate, quartz, magnetite and hematite. The new mineral name is for Alice and Eugen Rondorf, mineral collectors. Type material is in the Naturhistorisches Museum Wien, Vienna, Austria.

Discussion. A compound corresponding to this mineral was synthesized by Von Lampe et al. (1986, *Chem. Abs.*, 105:

237263n) and by Ye et al. (1985, 1986, *Chem. Abs.*, 104: 13975n, and 105: 65949e). The crystal structure was refined by both groups, which reported space groups $Fd\bar{3}$ and $Fd3m$, respectively. **E.S.G.**

SCHLEMAITE*

H.-J. Förster, M.A. Cooper, A.C. Roberts, C.J. Stanley, A.J. Criddle, F.C. Hawthorne, J.H.G. Laflamme, G. Tischendorf (2003) Schlemaite, $(\text{Cu}, \square)_6(\text{Pb}, \text{Bi})\text{Se}_4$, a new mineral species from Niederschlema–Alberoda, Erzgebirge, Germany: description and crystal structure. *Can. Mineral.*, 41, 1433–1444.

The mineral occurs as black, opaque, anhedral grains up to several hundred micrometers long, and as aggregates of that size. Electron microprobe analysis gave Cu 38.86, Ag 2.57, Au 0.07, Hg 0.09, Pb 13.75, Bi 9.12, Se 35.11, sum 99.57 wt%, corresponding to $(\text{Cu}_{5.50}\text{Ag}_{0.21})_{\Sigma 5.71}(\text{Pb}_{0.60}\text{Bi}_{0.39})_{\Sigma 0.99}\text{Se}_4$, simplified as in the title, and with Cu_6PbSe_4 the end-member. Metallic luster, black streak, brittle, uneven fracture, no cleavage, $VHN_{25} = 106$ (92–116), $D_{\text{calc}} = 7.54 \text{ g/cm}^3$ for $Z = 2$. Gray in reflected light, no internal reflection, nonpleochroic, very weak birefractance and anisotropy, rotation tints of pale metallic orange and blue. Reflectance percentages (WTiC standard) are given in 20 nm steps from 400 to 700 nm for R_1 and R_2 in air and in oil; the respective representative values are 36.6, 38.1, 21.1, 23.0 (470), 36.45, 38.1, 20.7, 22.8 (546), 36.6, 38.3, 20.95, 22.9 (589), and 36.6, 38.5, 21.0, 23.2 (650). Single-crystal X-ray structure study ($R = 0.048$) indicated monoclinic symmetry, space group $P2_1/m$; $a = 9.529(4)$, $b = 4.115(2)$, $c = 10.237(5) \text{ \AA}$, $\beta = 100.29(5)^\circ$ as refined from a powder pattern (114 mm Debye–Scherrer, $\text{CuK}\alpha$ radiation) with strongest lines of 3.189(100,012), 3.123(100, $\bar{1}12$), 2.788(70, $\bar{2}12$), 2.601(70, $\bar{1}13$), 2.151(60,014), and 2.058(80,020).

The mineral is associated and commonly intergrown with clauthalite, eucairite, and berzelianite in a dolomite-ankerite matrix at the Niederschlema–Alberoda vein-type uranium deposit near the town of Hartenstein, western Erzgebirge, Saxony, Germany. The new mineral name refers to the type locality, which is the Schlema–Alberoda ore field. Type material is in The Natural History Museum, London, U.K., and in the Mineralogical Institute of the Technische Universität Bergakademie Freiberg, Germany. **J.L.J.**

SODIC-FERRI-FERROPEDRIZITE*, FERRI-CLINOFERROHOLMQUISTITE*

R. Oberti, F. Cámara, J.M. Caballero, L. Ottolini (2003) Sodic-ferri-ferropedrizite and ferri-clinoferroholmquistite: mineral data and degree of order of the A -site cations in Li-rich amphiboles. *Can. Mineral.*, 41, 1345–1354.

The two new amphiboles occur in an episyenite that was formed by desilication and albitization of a cordierite-bearing porphyritic granite. Both minerals form intergranular granoblastic aggregates of subhedral to euhedral grains associated with albite and pyroxene, or occur as inclusions in albite, quartz, and titanite. Black color, vitreous luster, brittle, gray streak, uneven fracture, $\{110\}$ cleavage, twinning not observed, nonfluorescent.

Optically biaxial. Electron- and ion-probe analyses for SFFP (sodic-ferri-ferropedrizite) and FCFH (ferri-clinoferroholmquistite) gave, respectively, SiO_2 56.25, 56.11, TiO_2 1.19, 0.07, Al_2O_3 1.24, 1.51, Fe_2O_3 13.92, 15.63, FeO 13.04, 12.98, MnO 0.60, 0.14, MgO 4.48, 5.04, ZnO 0.15, 0.21, Li_2O 4.20, 3.80, CaO 0.20, 0.13, Na_2O 2.47, 1.29, K_2O 0.17, 0.01, F 1.15, 0.54, H_2O 1.53, 1.88, $\text{O} \equiv \text{F}$ 0.48, 0.23, sum 100.11, 100.11 wt%, which for 24(O,OH,F) and 8 Si correspond to $(\text{Na}_{0.53}\text{K}_{0.03})_{\Sigma 0.56}(\text{Li}_{1.82}\text{Na}_{0.15}\text{Ca}_{0.03})_{\Sigma 2.00}(\text{Fe}_{1.55}^{3+}\text{Fe}_{1.49}^{2+}\text{Mg}_{0.95}\text{Li}_{0.58}\text{Al}_{0.21}\text{Ti}_{0.13}\text{Mn}_{0.07}\text{Zn}_{0.01})_{\Sigma 4.99}\text{Si}_8\text{O}_{22}(\text{OH})_{1.45}\text{F}_{0.52}$ and to $\text{Na}_{0.28}(\text{Li}_{1.90}\text{Na}_{0.08}\text{Ca}_{0.02})_{\Sigma 2.00}(\text{Fe}_{1.68}^{3+}\text{Fe}_{1.55}^{2+}\text{Mg}_{1.06}\text{Li}_{0.28}\text{Al}_{0.26}\text{Mn}_{0.14}\text{Zn}_{0.02}\text{Ti}_{0.01})_{\Sigma 5.00}\text{Si}_8\text{O}_{22}(\text{OH})_{1.79}\text{F}_{0.24}$, $D_{\text{calc}} = 3.21, 3.24 \text{ g/cm}^3$ for $Z = 2$. The respective ideal formulas are $^A\text{Na}^B\text{Li}_2^C(\text{Fe}_2^3\text{Fe}_3^2\text{Li})^D\text{Si}_8\text{O}_{22}^X(\text{OH})_2$ and $^A\text{Li}_2^C(\text{Fe}_2^3\text{Fe}_3^2\text{Li})^D\text{Si}_8\text{O}_{22}^X(\text{OH})_2$. Single-crystal X-ray structure study of SFFP and FCFH ($R = 0.016, 0.022$) gave monoclinic symmetry, space group $C2/m$, $a = 9.496(4)$, $b = 17.883(8)$, $c = 5.297(2) \text{ \AA}$, $\beta = 102.06(3)^\circ$, and $a = 9.462(6)$, $b = 17.898(9)$, $c = 5.302(3) \text{ \AA}$, $\beta = 101.88(4)^\circ$. Strongest lines of the calculated powder pattern for SFFP are 8.241(100,110), 4.471(33,040), 3.416(39,131), 3.050(60,310), 2.714(72,151), and 2.494(36, $\bar{2}02$); those for FCFH are 8.224(100,110), 4.474(30,040), 3.420(30,131), 3.042(54,310), 2.717(69,151), and 2.492(32,202).

The new minerals are from the Arroyo de la Yedra valley in the eastern sector of the Pedriza massif, Sierra de Guadarrama, Spain. The new mineral names conform with the CNMMN-approved nomenclature system for the amphibole group. Type material is in the Museo di Mineralogia, Dipartimento di Scienze della Terra, Università delgi Studi di Pavia, Italy. **J.L.J.**

TELYUSHENKOITE*

A.A. Agakhanov, L.A. Pautov, D.I. Belakovskiy, E.V. Sokolova, F.C. Hawthorne (2003) Telyushenkoite $\text{CsNa}_6[\text{Be}_2(\text{Si}, \text{Al}, \text{Zn})_{18}\text{O}_{39}\text{F}_2]$: a new cesium mineral of the leifite group. *New Data on Minerals*, 38, 5–8.

E. Sokolova, D.M.C. Huminicki, F.C. Hawthorne, A.A. Agakhanov, L.A. Pautov, E.S. Grew (2002) The crystal chemistry of telyushenkoite and leifite, $A\text{Na}_6[\text{Be}_2\text{Al}_3\text{Si}_{15}\text{O}_{39}\text{F}_2]$, $A = \text{Cs}, \text{Na}$. *Can. Mineral.*, 40, 183–192.

The mineral occurs as white to colorless equant anhedral grains up to 2 cm across. Electron microprobe analysis gave Na_2O 13.53, K_2O 0.47, Cs_2O 6.76, Rb_2O 0.15, BeO (colorimetric) 3.53, ZnO 1.71, Al_2O_3 7.26, SiO_2 64.32, F 2.84, $\text{O} \equiv \text{F}$ 1.20, sum 99.37 wt%, corresponding to $(\text{Cs}_{0.69}\text{Na}_{0.31}\text{K}_{0.14}\text{Rb}_{0.02})_{\Sigma 1.16}\text{Na}_{6.00}[\text{Be}_{2.04}(\text{Si}_{15.46}\text{Al}_{2.06}\text{Zn}_{0.30})_{\Sigma 17.82}\text{O}_{38.84}\text{F}_{2.16}]$, generalized as in the first title. Vitreous luster, transparent, white streak, distinct cleavage, $VHN_{100} = 714$ (696–737), $H = 6$, dim dark purple fluorescence under short-wave ultraviolet light, $D_{\text{meas}} = 2.73$, $D_{\text{calc}} = 2.73 \text{ g/cm}^3$ for $Z = 1$. Optically uniaxial positive, $\omega = 1.526(2)$, $\epsilon = 1.531(2)$. The IR spectrum is similar to that of leifite but differs in the absence of bands for OH and H_2O . Single-crystal X-ray structure study ($R = 0.024$) indicated trigonal symmetry, space group $P\bar{3}m1$, $a = 14.3770(8)$, $c = 4.8786(3) \text{ \AA}$. Strongest lines of the X-ray powder pattern (diffractometer, $\text{FeK}\alpha$ radiation) are 6.226(35,020), 4.149(50,030), 3.456(40,130), 3.382(75,121), 3.162(100,031), and 3.113(36,040).

The new mineral, which is the Cs-dominant analog of leifite, is associated with reedmergnerite, microcline, pectolite, hya-

lotekite, shibkovite, nordite-(Ce), leucophanite, kentbrooksit, polyolithionite, and albite in moraine boulders of the Dara-i-Pioz glacier, South Tien-Shan Mountains, Tajikistan. The reedmergn-erite forms grains up to 15 cm in diameter and makes up 85–90% of the rock. The new mineral name is for petrographer and teacher Tamara M. Telyushenko (1930–1997). Type material is in the Fersman Mineralogical Museum, Moscow, Russia. Published chemical data indicate that the K-dominant analog also exists but has not been described as a new species. **J.L.J.**

ZINCONIGERITE-6N6S

T. Armbruster, A. Feenstra (2004) Lithium in nigerite-group minerals. *Eur. J. Mineral.*, 16, 247–254.

The mineral forms golden-brown hexagonal plates, roughly 0.5–1 mm in diameter. Electron microprobe analysis (average of 23) of material from the type locality of nigerite gave SiO₂ 0.05, TiO₂ 1.51, SnO₂ 18.63, Al₂O₃ 54.13, Cr₂O₃ 0.01, FeO 9.76, MgO 0.74, MnO 0.17, ZnO 11.81, NiO 0.01, CoO 0.02, Li₂O (ion microprobe) 0.61, [H₂O (calc.) 1.28], sum 98.72 wt%, corresponding to Sn_{5.22}Ti_{0.80}Li_{1.73}(Zn_{6.13}Fe_{5.74}Mn_{0.10})_{Σ11.97}(Al_{44.84}Mg_{0.78})_{Σ45.62}O₉₀(OH)₆ for O = 90 and OH = 6. X-ray structure study (*R*₁ = 0.0201) gave hexagonal symmetry, space group *R* $\bar{3}m$, *a* = 5.716(1), *c* = 55.444(8) Å.

The mineral occurs in sillimanite–quartz rocks in the Egbe district, Kabba Province, Nigeria (type locality for nigerite) and in the tin mine of Tsomtsaub, between Omaruru and Uis, Namibia. At the type locality, the mineral is intergrown with gahnite and the host rock is associated with cassiterite-bearing pegmatite, whereas the association at the Tsomtsaub mine is with cassiterite, columbite–tantallite, and chrysoberyl. The new mineral name indicates the mineral to be the Zn-dominant, 6N6S polysome of the nigerite group. The studied samples are in the Museum of Natural History, Bern, Switzerland.

Discussion. The calculated H₂O value has been added (E.S.G.) to the data. It is suggested in the paper that Li is an essential constituent of the -6N6S and -2N1S polysomes of the nigerite group, although only traces of Li estimated spectrographically were reported in the original description of nigerite (*Am. Mineral.*, 33, p. 98, 1948). Zinconigerite-6N6S was not fully characterized as a new species distinct from ferronigerite-6N6S (see Armbruster, *Am. Mineral.*, 88, p. 254–255, 2003) because the Zn/(Zn + Fe) ratio is only 0.50–52 in the studied material, much less than the Zn/(Zn + Fe) of 0.88 reported in an overgrowth of the 6N6S polysome around gahnite from Portugal (Neiva and Champness, *Neues Jahrb. Mineral. Monatsh.*, p. 385–409, 1997). **E.S.G.**

(Ag,Cu)₁₂Te₃S₂, (Ag,Au,Cu)₉Te₂S₃

S. Tombros, K. St. Seymour, P.G. Spry (2004) Description and conditions of formation of new unnamed Ag-Cu and Ag-Cu-Au sulfotellurides in epithermal polymetallic Ag-Au-Te

mineralization, Tinos Island, Hellas. *Neues Jahrb. Mineral. Abh.*, 179, 295–310.

The minerals occur as grains up to 13 μm long. One of three listed electron microprobe analyses for the Ag-Cu mineral has Ag 66.16, Cu 6.52, Pb 0.17, Te 22.45, S 4.07, sum 99.37 wt%, corresponding to Ag_{20.92}Cu_{3.39}Pb_{0.03}Te_{6.00}S_{4.33}, simplified as (Ag,Cu)₁₂Te₃S₂. One of four listed analyses for the Ag-Au-Cu mineral has Ag 61.42, Au 10.48, Cu 2.15, Pb 0.02, Zn 0.04, Te 18.32, Se 0.11, S 6.87, sum 99.41 wt%, corresponding to Ag_{23.79}Au_{2.22}Cu_{1.37}Zn_{0.02}Te_{6.00}S_{8.95}Se_{0.06}, simplified as (Ag,Au,Cu)₉Te₂S₃ or possibly (Ag,Cu)₂₅Au₂Te₆S₉. Both minerals are isometric and have two or three cleavages, a polishing hardness similar to that of altaite, and a reflectance of 30–50%. The Au-Cu mineral is white with a gray-brownish tint, and coexists with hessite and sylvanite; the Ag-Au-Cu mineral is white with a gray-yellowish tint, and is intergrown with petzite and kostovite. Both of the sulfotellurides also replaced hessite, petzite, tetrahedrite, and goldfieldite. The minerals occur in a stockwork of epithermal quartz veins in the Panormos Bay area of Tinos Island, Greece. **J.L.J.**

FeCr₂O₄, ORTHORHOMBIC

Ming Chen, Jinfu Shu, Ho-kwang Mao, Xiande Xie, R.J. Hemley (2003) Natural occurrence and synthesis of two new post-spinel polymorphs of chromite. *Proceed. National Acad. Sci. (USA)*, 100(25), 14651–14654.

Shock-produced veinlets in the Suizhou chondrite contain chromite and an adjacent CaTi₂O₄-structured FeCr₂O₄ polymorph; the intermediate zone between the two was previously interpreted to be zone of complex mutual intergrowth (*Am. Mineral.*, 89, p. 000, 2004), but synchrotron X-ray study of the zone *in situ* showed it to be another orthorhombic polymorph of FeCr₂O₄. Indexing of the powder pattern gave *a* = 8.954(7), *b* = 2.986(2), *c* = 9.891(7) Å, space group *Pnma*, *D*_{calc} = 5.62 g/cm³ for *Z* = 4. Of the 20 lines listed, those of strong intensity are 2.656(230), 2.166(240), 2.039(420), 1.660(440), 1.536(501), 1.425(161), and 1.267(142). Both of the orthorhombic polymorphs have been synthesized. **J.L.J.**

Gd SILICATE, OXIDES

O.A. Bogatikov, A.V. Mokhov, P.M. Kartashov, L.O. Magazina, E.V. Koporulina, N.A. Ashikhmina, A.I. Gorshkov (2004) Selectively Gd-enriched micro- and mono-sized minerals in the lunar regolith from Crisium Mare. *Doklady Earth Sci.*, 394, 39–41.

Results are listed for six normalized microbeam analyses obtained from six particles of lunar regolith, each 500 nm to 5 μm in size. The results are interpreted to correspond to the simplified formulas GdFe²⁺AlSiO₆, Ca₂GdFe₅ZrO₁₅, CaGd₃ThAlTi₃Zr₃O₂₁, (Gd,Th,La)₃Th₃Al₃Ti₃Zr₂O₂₅, (Gd,Ce)₄Zr₄Al₂O₁₇, and Gd₂ZrTiO₇. A seventh listed analysis of a micrometer-size particle, from the fumarole exhalations of Kudryavyy Volcano on Iturup Island (Kuril Islands) is interpreted to be that of GdTi₂O_{5.5}. **J.L.J.**