NEW MINERAL NAMES*

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Alluaivite*


Microprobe analysis (average of three grains, H₂O by coulometry) gave Na₂O 18.6, K₂O 0.2, CaO 8.6, SrO 1.0, BaO 0.6, MnO 3.6, La₂O₃ 0.2, Ce₂O₃ 0.8, SiO₂ 53.3, TiO₂ 6.0, ZrO₂ 0.2, Nb₂O₅ 3.9, Cl 0.8, H₂O 1.7, O = Cl, 0.2, sum 99.3 wt%, corresponding to (Na₀.₅₋₀.₇K₀.₁₋₀.₃Sr₀.₀₁₋₀.₂Ba₀.₃₋₀.₄La₀.₀₁₋₀.₀₆Ce₀.₀₁₋₀.₁₂)₃₋₄(Ca₀.₄₋₀.₅Mn₀.₄₋₀.₆₂O₃₀.₀₋₀.₂0.₁₋₀.₃)₂₋₃(Ti₂₋₀.₃Zr₀.₁₋₀.₂Nb₀.₈₋₀.₅)₂₋₃Si₂₆₋₁₂O₇₋₁₂Cl₀.₂₋₀.₄H₂O. The mineral slowly leaches in 10% HCl, lowering refraction indices. Occurs as irregular accumulations up to 1 mm, closely intergrown with eudialyte. Transparent, colorless, in places weak pink-brownish tint, vitreous lustre, conchoidal fracture, brittle, H = 5–6, D = 2.76(5), D = 2.78 g/cm³ with Z = 6. Vivid red-orange fluorescence in ultraviolet light. Optically uniaxial positive, ω = 1.618(2), ε = 1.626(2). The infrared pattern is similar to that of eudialyte, with weak extinctions at 1600 and 3400–3500 cm⁻¹. Single-crystal X-ray study showed trigonal symmetry, space group R3m; a = 14.046(2), c = 60.60(2) Å. Groups of [Si₃O₉] and two types of [Si₃O₉] are present in the structure. The powder pattern is almost identical to that of eudialyte; strongest lines (35 given) are: 7.81(35,001,010), 3.888(51,002,111,020), 3.481(24,012,021), 2.937(100,112,120), 2.750(25,022,121), and 1.948(26,123,222,040), from which a = 8.996(3), c = 7.799(3) Å. The mineral occurs in ultra-aquatic pegmatites at Alluaiv Mountain, Lovozerko alkaline massive, Kola Peninsula, USSR. The pegmatites consist of nepheline, sodalite, and potassium feldspar plus arvedsonite, aegirine, a cancrinite-like mineral of composition Na₂Al₂Si₂O₈(SiO₃CO₃), alkaline silicates, and Ti-, Nb-, and Zr-silicates. The name is formed for the place of occurrence. Type material is at the Fersman Mineralogical Museum, Moscow, USSR.

Discussion. The X-ray structural study is reported in Doklady Akad. Nauk SSSR, 312(6), 1379–1383, 1990.

Belkovite*

JAMBO AND PUZIEWICZ: NEW MINERAL NAMES

reous luster, white streak, nonfluorescent, uneven fracture, $VHN_{2S} = 300(50), D_{max} = 3.85$, $D_{calc} = 3.898$ g/cm$^3$ with $Z = 2$. Optically biaxial negative, $\alpha = 1.4326(2), \beta = 1.4360(2), \gamma = 1.4389(2)$ for $\lambda = 589$ nm, $2V_{meas} = 87.05^\circ, 2V_{calc} = 85(6)^\circ, a = c, \beta = a, \gamma = b$, optic-axis plane (010). X-ray single-crystal studies gave orthorhombic symmetry, space group $Pmn21$ or $Pn21n, a = 7.110(3), b = 19.907(10), c = 5.347(3)$ Å as refined from a Guinier-Hagg powder pattern (CuK$\alpha$ radiation) with strongest lines of $9.9681(40,020), 6.6886(40,110), 3.2403(100,141), 3.1945(50,051), 2.9241(50,021), 2.6681(40,002), 2.3758(40,251),$ and $2.1158(50,152,321,190)$. The mineral occurs with jarlrite, ralstonite, barite, K-mica, quartz, and a kaolinite-like mineral in the cryolite deposit at Ivigtut, Greenland. The new name is for Richard Bogvad (deceased 1952), former chief geologist for the company that mines the cryolite deposit.

Discussion. A repository for type material is not given. J.L.J.

Calcian mottramite


The average of seven electron-microprobe analyses gave 4.82 wt% CaO (range 3.98–5.94 wt%) and the average formula (Pb$_{0.67}$Ca$_{0.33}$)$_{30.94}$(Cu$_{0.91}$Zn$_{0.09}$)$_{1.02}$($V_{0.93-P_{0.06}}$)$_{21.06}$(OH)$_{4}$. “The mineral ... is an intermediate member of a new mottramite-tangeite series. Since our mineral is closer to mottramite, we designate it as calcium mottramite.”

Discussion. The approved name for tangeite is calciocolvornite (Am. Mineral., 75, p. 1214, 1990); the mineral described is calcian mottramite or, as the authors also state in their concluding paragraph, a calcic variety of mottramite. J.L.J.

Calcio-ancylite-(Nd)*


Electron-microprobe and CO$_2$ analyses (H$_2$O by difference) gave La$_2$O$_3$, 3.16, Ce$_2$O$_3$, 14.18, Pr$_2$O$_3$, 3.23, Nd$_2$O$_3$, 20.23, Sm$_2$O$_3$, 7.63, Eu$_2$O$_3$, not detected, Gd$_2$O$_3$, 6.68, Dy$_2$O$_3$, 1.74, Tb$_2$O$_3$, 0.83, Y$_2$O$_3$, 3.93, CaO 9.05, CO$_2$, 23.47, H$_2$O 5.87, sum 100 wt%, corresponding to (Nd$_{0.90}$Ce$_{0.06}$Sm$_{0.03}$Gd$_{0.03}$Y$_{0.26}$Pr$_{0.15}$La$_{0.14}$ Dy$_{0.07}$Tm$_{0.03}$)$_{30.92}$Ca$_{1.20}$CO$_3$(OH)$_2$2H$_2$O1.01H$_2$O, ideally (Nd, Ca)$_2$Ca(CO$_3$)$_2$(OH)$_2$. H$_2$O. Occurs as pine cone-like aggregates, up to 1 mm long, in which individuals have a dipymidal pseudohorombic habit; pale pink color, white streak, vitreous luster, $H = 4–4.5$, brittle, irregular fracture, nonfluorescent. $D_{max} = >4.02, D_{calc} = 4.08$ g/cm$^3$ with $Z = 1$. Optically biaxial negative, nonpleochroic, $\alpha = 1.660(1), \beta = 1.725(1), \gamma = 1.761(1), 2V_{max} = 70^\circ, 2V_{calc} = 74^\circ$, weak $r < v$ dispersion, $Z = c$, optically biaxial negative, $a = 1.660(1), (3 = 1.725(1),')' = 1.761(1)$.

The mineral was found atop pinkish orthoclase in a mialaritic cavity in granite in a quarry at Baveno, Piedmont, Italy. The repository for type material is not given. J.L.J.

Grechishchevite*


The average of 11 electron-microprobe analyses (nine for material from the Arzak deposit, two from Kadyrel) gave Hg 73.00, Br 9.85, Cl 5.86, S 7.83, Se 0.02, sum 98.61 wt%, corresponding to Hg$_2$(S$_{0.67}$Br$_{0.00}$Cl$_{0.33}$)$_{31}$O$_{10}$.3I$_{0.39}$, ideally Hg$_2$(Br,Cl)$_3$. Occurs on fracture walls as films consisting of minute prisms and groups of equant to slightly elongate grains to 0.2 mm (Arzak deposit); also as powdery masses and as concretions of short prismatic crystals to 0.5 mm (Kadyrel occurrence). Color variably bright or dark orange, slowly darkening to brown-orange, then black. Streak deep yellow to yellow with a slight orange tint, luster vitreous to adamantine, brittle, $H_{35} = 106 (88–116)$ kg/mm$^2$ (Mohs ≈ 2.5), distinct cleavage parallel to prism elongation. Fragments blacken in 40% KOH; unaffected by HCl or HNO$_3$. In transmitted light, transparent, parallel extinction, uniaxial positive, refractive indices $>2$, pleochroic from straw-yellow ($E$) to yellow ($O$). Gray-white and anisotropic in reflected light, distinctly bireflectant from gray-white ($R_\pi$) to gray ($R_\sigma$) with corresponding reflectance values (nm, %) 436, 22.8, 19.2; 460, 24.5, 22.2; 500, 21.4, 18.9; 546, 19.8, 17.3; 590, 18.8, 16.5; 620, 18.9, 16.7; 656, 18.1, 15.9. Strong light orange and orange internal reflection. The X-ray powder pattern is in good agreement with results from pyrosynthetic material for which single-crystal study indicated tetragonal symmetry, space groups $P42_m$ (given as $P42_2$, $P4m2$, $P4mm$, or $P4/mmm$. Strongest lines of the mineral from the Arzak deposit (57.3-mm camera, Cu radiation) are 3.95(60,112), 3.02(60,132), 2.65(100,023,340,050), 2.60(40,123,150), 2.341(40,440), 2.180(30, wide, diffuse), 0.43, and 1.873(30,253,550); calculated cell dimensions are $a = 13.208(6), c = 6.698(9)$ Å. For synthetic material with $a = 13.225, c = 8.685,$ and the composition Hg$_2$(Br$_{0.30}$Cl$_{0.22}$I$_{0.32}$)$_{32}$. $D_{calc} = 7.23$ g/cm$^3$ with $Z = 8, D_{meas} = 7.16$ g/cm$^3$ was obtained for synthetic material.

The mineral occurs in mercury ores at the Arzak deposit and Kadyrel occurrence, Tuva, ASSR. The new name is
for Oleg K. Grechishchev, who has studied the Tuva mercury deposits extensively. The mineral occurs sporadically in oxidized cinnabar ores at the Arzak deposit and less frequently in leached voids at Kadyrel, in association with numerous other mercury minerals that include calomel, kuzminite, cordierite, kadyrelite, lavrentievite, and eglestonite. Specimens containing grechishchevite have been deposited in the Central Siberian Geological Museum of the Institute of Geology and Geophysics, Novosibirsk, and at the Institute's Mining Museum in Leningrad.

**Discussion.** The new name is for the mineral with Br > Cl, but the authors note that two of the analyses show Cl > Br [the maximum is (Cl0.82Br0.75I0.39)]. The mineral is susceptible to decomposition under the microscope beam, and the authors express the opinion that the “average” analytical results with Br > Cl > I best express the composition in view of the analytical uncertainties. The mineral apparently is the tetragonal polymorph of arzakite. J.L.J.

**Lintisite*  

Microprobe analysis combined with flame spectrophotometry (Li) and IR spectroscopy/DTG (H2O) gave SiO2 44.03, TiO2 27.68, Nb2O5 1.10, FeO 0.28, MnO 0.05, Na2O 16.72, K2O 0.03, Li2O 2.68, H2O 6.55, sum 99.12 wt%, corresponding to (Na0.27K0.003)1.275Li0.989(Ti1.987Nb0.046-Fe0.677)2.97Si4.015O14.001·2.001H2O. All iron was assumed to be divalent. Readily dissolves in 10% HCl, leaving a siliceous residuum. Forms fibrous or parallel-columnar aggregates, 0.1–0.5 mm thick and 1–5 mm long, that replaced lorrenzenite on cleavages and crystal surfaces. Individual crystals are elastic, acicular, up to 0.1 × 0.5 × 5 mm, elongate [001] and flattened on [100]; macroscopically similar to vinogradovite. Colorless or pale-yellow, transparent, vitreous on fracture and pearly on cleavage surfaces, twinned on {001}, excellent {100}; microscopically similar to vinogradovite. Colorless or pale-yellow, transparent, vitreous on fracture and pearly on cleavage surfaces, twinned on {001}, excellent {100} and perfect (010) cleavages, splintery fracture, H = 5–6, Dmeas = 2.77(5), Dcalc = 2.825 g/cm³ with Z = 4. Weak yellow fluorescence in ultraviolet light. Optically biaxial negative, 2V = 85(1), strong dispersion r < v, α = 1.672(2), β = 1.739(2), γ = 1.802, positive elongation, Z = 2n, Y = β. Extinction straight to very slightly oblique as result of flattening of the needles on {010}. The mineral occurs at the outer contact of rare-metal pegmatites in the Eastern Ghats mountains at the border between the states of Madhya Pradesh and Orissa, India.

**Discussion.** Requires additional data and submission to the CNMMN. J.L.J.

**Magnesium zinnwaldite**  

Chemical analyses of a yellow mica and a brown one gave, respectively, SiO2 43.98, 41.57, TiO2 0.08, Al2O3 24.43, 19.60, Fe2O3 2.18, 1.72, FeO 3.07, 5.12, MnO 0.16, 0.14, MgO 6.22, 9.80, CaO 1.36, 1.50, Li2O 1.06, 1.76, Na2O 0.54, 0.40, K2O 8.00, 11.00, Rb2O 0.70, 1.82, Cs2O 0.01, 0.26, H2O 5.35, 2.64, F 3.96, 5.14, O = F = 1.66, 2.16, sum 99.44, 100.31 wt%, corresponding to (K0.724Na0.074Rb0.032)20.85Sn0.82Si3.118O10(OH)1.16F0.888·F1.179·H2O, ideally (KLiMgAl2Si3O10)(O1H·F2)2·H2O. Properties (given only in a single table, without amplification) are D = 2.90 g/cm³, refractive indices α = 1.532, γ = 1.568, cell dimensions a = 5.22, b = 9.02, c = 10.04 Å, α = β = 90°, IM polytype. The mineral occurs at the outer contact of rare-metal pegmatites in the Eastern Ghats mountains at the border between the states of Madhya Pradesh and Orissa, India.

**Discussion.** Requires additional data and submission to the CNMMN. J.L.J.

**Pengzhizhongite-6H*  

Electron-microprobe analysis and an H2O determination gave SnO2 8.23, Al2O3 56.00, FeO 8.38, MgO 8.03, MnO 0.40, ZnO 4.73, SiO2 1.48, H2O* 1.88, sum 99.63 wt%, corresponding to (Mg1.99Zn0.01Fe2.27Al9.99Mn0.01-Si3.00)2·H2O(Sn1.22Fe6.78)2·H2O(Al1.78Li4.25)2·H2O(OH)2·H2O, simplified as (Mg2.12Fe2.61Al1.91Si1.95)2·H2O(Sn1.22Fe6.78)2·H2O(OH)2·H2O. Occurs as light yellowish brown to light yellow tabular crystals, occasionally colorless, 0.5–1.0 mm long, 0.4–0.8 mm wide, 0.02–0.2 mm thick; white streak, vitreous luster, transparent, H ≥ 8, Dmeas = 4.22(3), Dcalc = 4.16 g/cm³ for the chemical formula and Z = 1. Insoluble in hot HCl or hot solvents at 400–500°C. The mineral occurs in pegmatites of nepheline-sodalite syenite at Alluvai Mountain in the Lovozero alkaline massif, Kola Peninsula, USSR. Associated minerals are lorenzenite, nepheline, sodalite, potassium feldspar, arvedsonite, aegirine, and eudialyte. The name is for the composition [Li, Na (natrium), Ti, silicium). Typematerial is at the Fersman Mineralogical Museum, Moscow, USSR. J.P.
HN03. Optically uniaxial positive, ω = 1.802(2), ε = 1.814(2). X-ray single-crystal structural study (R = 0.10) indicated trigonal symmetry, space group P3m1, a = 5.692(5), c = 13.78(2) Å. Strongest lines of the X-ray powder pattern (15 lines listed) are 2.846(90,110), 2.423(100,021,113), 1.639(30,124), 1.545(40,033,125), 1.414(50,221,028), and 1.050(30).

The mineral formed with high-temperature, metamorphic tungsten ore in the Anhua area, Hunan Province, China. Associated minerals are quartz, scheelite, muscovite, magnetite, rutile, nigerite, casserite, zircon, and taaffeite. The new name is for Peng Zhizhong (one of the authors, since deceased), who initially determined the crystal structure of the mineral in 1981. The mineral is the magnesium analogue of nigerite-6H.

Discussion. No repository for type material is given. The authors report that penzhizhongite-24R also has been found and will be described separately. J.L.J.

Rorisite*


Chemical analysis gave Ca 38.94, Mg 3.63, Cl 34.24, F 23.29, sum 100.10 wt%, corresponding to (Ca0.89-Mg0.11)F0.22Cl0.88F0.12. Soluble in H2O, hygroscopic; in moist air colorless plates become turbid and covered with colorless drops of CaCl2 solution; the turbid plates consist of fine-grained flourite. Slowly soluble in HCl and HNO3; dissolves glass when mixed with H2SO4. Fusibility 1.5; red flame coloration. In closed tube, fuses and forms a colorless liquid that crystallizes into a white transparent substance three seconds after removing the flame. The mineral forms tabular crystals up to 1 mm in diameter, flattened on {001}, with {111} and {110} and occasionally {100}. Some crystals have orthogonal or square shapes; most crystals have “fused” surfaces without well-expressed flat surfaces. Transparent, colorless, vitreous luster; white streak, H = 2, excellent {001} and perfect {110} cleavages, conchoidal fracture. Brittle, thin leaves exhibit little elasticity. Dme = 2.78(1), Dcalc = 2.94 g/cm3. Optically uniaxial negative, ω = 1.668(2), ε = 1.635(2). Weak violet fluorescence in ultraviolet light (360 nm). X-ray powder study showed the mineral to be tetragonal, a = 3.890(1), c = 6.810(1) Å, Z = 2. The mineral is isostructural with matlockite (PbFCl), and the X-ray pattern is analogous to that of synthetic tetragonal CaFCl. Space group by analogy with the latter is P4/mmm. Strongest lines (21 given) are: 6.814(45,001), 2.557(100,102), 2.267(35,003), 2.138(32,112), and 1.560(32,104).

The mineral occurs within carbonitized wood fragments in old burnt dumps at Kopeysk, Chelyabinsk Coal Basin, Ural Mountains, USSR. Associated minerals are fluorite, periclase, and troilite. The name is from the Latin roris (dew), alluding to the transparent drops that cover the mineral in moist air. The type specimen is at the Fersman Mineralogical Museum, Moscow, USSR. J.P.

Szymańskiite*


The average of three electron-microprobe analyses gave MgO 2.0, NiO 7.9, HgO 75.8, CO2 6.0-10.7 wt%. From the microprobe-determined Ni/Mg ratio of 2.125/1 and with CO2 and H2O derived from crystal-structural analysis, the formula is Hg12(Ni,0.42Mg,0.58(CO3)12(OH)12·(H2O)2·3H2O, which requires MgO 1.67, NiO 6.57, HgO 72.14, CO2 11.42, H2O 8.18 wt%. The infrared spectrum shows the presence of structural H2O (1650 cm-1), OH and H2O (3308 cm-1), and strong absorptions for carbonate groups (1094, 844, 1452, 1350, and 669 cm-1). The anomalously high microprobe-determined values for Ni, Mg, and Hg are attributed to emission of H2O and CO2 as a consequence of heating by the microprobe electron beam. The mineral occurs as millimeter size sprays and disseminated euhedral crystals, up to 0.4 mm long and 0.05 wide, elongate [001], showing major {1010} and minor {0001}; striated parallel to [001] on {1010}. Transparent blue-gray to blue-green, darkening on long exposure to light. Pale blue streak, irregular to conchoidal fracture, poor {1010} cleavage, vitreous luster, brittle, nonfluorescent; whitens in cold dilute HCl and reacts similarly but with minor effervescence in concentrated HCl.

Dcalc = 4.86 g/cm3 for the ideal formula with Ni/Mg = 2.125/1 and Z = 1. Optically uniaxial negative, ω = 1.795(3), ε = 1.786(3), O = yellowish green, E = bluish green, E > O. X-ray single-crystal study (R = 3.49%) showed hexagonal symmetry, space group P63; cell dimensions calculated from a 114.6-mm Debye-Scherrer pattern (CuKα radiation) are a = 17.415(5), c = 6.011(4) Å. Strongest lines of the pattern are 14.9(100,100), 5.60(100,101), 3.299(80,410), 3.201(50,401), 2.704(60,501), 2.665(60,212), 2.476(50,222), and 1.751(50,702,532).

The mineral occurs in massive quartz at a prospect pit near the former Clear Creek mercury mine, New Idria district, San Benito County, California. Among the most closely associated minerals are cinnabar, montroydite, native mercury, and edgarbaileyite. The new name is for J. T. Szymański, of CANMET, Ottawa, Canada, who solved the crystal structure. Only three small specimens, containing an estimated 20 mg of the mineral, are known. Type material is in the Systematic Reference Series portion of the National Mineral Collection housed at the Geological Survey of Canada, Ottawa. J.L.J.

Yingjiangite*

The average of four electron-microprobe analyses gave 
K₂O 2.46, CaO 1.57, Ce₂O₃ 0.34, Y₂O₃ 0.11, ThO₂ 0.51, 
UO₂ 76.54, P₂O₅ 11.10, H₂O 7.37 (by difference?), sum 
100.00 wt%, corresponding to (K₀.₄₅Ca₀.₃₄REE₀.₀₁-
Th₀.₀₂)₂₋₁(PO₄)₀.₈₈(OH)₂·4H₂O, simplified as 
(K₀.₆₃Ca₀.₃₇)(PO₄)₀(OH)₁₋ₓ·4H₂O where x = 0.35. Occurs 
as compact microcrystalline aggregates in which grain 
size is 0.01 to 0.015 mm. Golden yellow to yellow color, 
transparent to translucent, subadamantine to resinous 
lustre, H = 3-4, Dmeas = 4.15, Dcalc = 4.17 g/cm³ with 
Z = 8. Weak yellowish green fluorescence in ultraviolet light.

Optically biaxial negative, length slow, a = 1.669 (almost 
colorless), β = 1.692 (light yellow), γ = 1.710 (yellow), 
2V = 83°. The infrared spectrum shows strong absorptions 
from 3600-3200 cm⁻¹ (H₂O and OH); absorptions at 
1085, 1040, 990, 540, and 260 cm⁻¹ and beyond 
are attributed to PO₄ groups, and a peak at 910 cm⁻¹ 
is attributed to (UO₂)³⁺. The DTA curve shows major 
endothermal peaks at 190 and 269 °C related to evolution 
of H₂O. The X-ray powder pattern shows similarities to 
that of phosphanite, and by analogy the symmetry is 
orthohombic, space group C222₁, a = 13.73(1), b = 
15.99(1), c = 17.33(2) Å. Strongest lines of the diffrac-
tometer pattern (CuKa radiation) are 8.03(100,020), 
5.90(40,022), 3.99(90,040), 3.88(40,223), 3.45(40,240), 
3.17(70,025), 3.10(70,421), 2.886(60,006), 2.494(40,245), 
2.172(40), 1.903(40), and 1.547(40).

The mineral is a secondary product in an oxidized zone 
containing uraninite and uranothorite in an occurrence at 
Tongbigan Village, Yingjiang County, Yunnan Province, 
China. Associated minerals are stutite, calcurmolite, 
tengchongite, and autunite. The new name is for the 
locality. Type material is in the National Geological Mu-
seum [Beijing]. J.J.L.

Zanazziite*

P.B. Leavens, J.S. White, J.A. Nelen (1990) Zanazziite, a 
new mineral from Minas Gerais, Brazil. Mineral. Rec-
ord, 21, 413-417.

Electron-microprobe analysis (Be determined by AAS 
and H₂O by CHN analyses) gave CaO 10.65, MgO 11.66, 
FeO 9.63, MnO 1.77, SiO₂ 0.36, Al₂O₃ 1.54, Fe₂O₃ 0.76, 
BeO 9.81, P₂O₅ 39.27, H₂O 13.32, sum 98.77 wt% (Fe²⁺: 
Fe³⁺ partitioned on the basis of titrimetric analysis); the 
results correspond to (Ca₀.₉₇Mn₀.₀₃)₂₋₁(Mg₀.₄₁Fe₀.₅₉)₂₋₁-
(Mg₀.₃₈Fe₀.₀₂)₂₋₁(Al₁₀₅3)₁₀₋₇(Mn₀.₃₅Fe₀.₃₅)₂₋₁Be₂₋₁(PO₄)₀.₈₈(Al₃₀₋₇)₁₀(OH)₁₋ₓ·6.6H₂O, ideally 
Ca₂Me²⁺Me³⁺Be₂⁺(PO₄)₀(Al₃₀₋₇)(OH)₁₋ₓ·6H₂O where Me²⁺ indicates Mg > Fe²⁺ or Mn²⁺. The mineral 
occurs as pale to dark olive-green, compositionally 
zoned, barrel-shaped crystals and crystal rosettes up to 
4 mm. Crystals typically show major 〈100〉 and 〈110〉 with 
〈001〉 irregular and rounded; less commonly bladed, 
showing major 〈100〉, minor 〈110〉, and irregular, rounded 
〈001〉. Streak white, luster vitreous to slightly pearly on 
cleavage surfaces, good 〈100〉 and distinct 〈010〉 cleavage,
H = 5, nonfluorescent in ultraviolet light, Dmeas = 
2.76, Dcalc = 2.77 g/cm³ with Z = 2. Optically biaxial 
positive, α = 1.606(2), β = 1.610(2), γ = 1.620(2), 2V 
= 72°, 2V calc = 65°, X = b, Z[100] = 3° in obtuse β. X-ray 
single-crystal structural study indicated monoclinic sym-
metry, space group C2/c, a = 15.874(4), b = 11.854(3), c 
= 6.605(1) Å, β = 95.35(3)°. A Gandolfi X-ray pattern 
(CuKa radiation) is similar to the pattern of roscherite 
and gave strongest lines of 9.50(90,110), 5.91(100,020), 
3.17(70,330), 3.05(50,510), 2.766(50,240), 2.682- 
(40B,600), 2.20(40,151,710), and 1.642(50B) Å.

The new name is for Dr. Pier F. Zanazzi of the Uni-
versita degli Studi di Perugia, who has studied the struc-
tural crystallography of many minerals, including that of 
zanazziite. The mineral occurs with colorless quartz, rose 
quartz crystals, and eshoptite in pockets in the Lavra da 
Ilha pegmatite near Taquaral, northeastern Minas Gerais, 
Brazil. Type material is in the Smithsonian Institution, 
Washington, DC.

Discussion. A microprobe analysis of Fe-dominant tri-
clinic “roscherite” also is given. The formula differs sub-
stantially from that given for roscherite in Fleischer’s 
Glossary of Mineral Species (1987); as is noted by the 
authors, details of the relationship of zanazziite to ros-
cherite are uncertain, and the roscherite-group minerals 
require further study. The principal question seems to be 
“What exactly is roscherite?” J.L.J.

Znucalite*

P. Ondruš, F. Veselovský, R. Rybka (1990) Znucalite, 
Zn₁₂(UO₂)₂Ca(CO₃)₂(OH)₁₂·4H₂O, a new mineral from 
393-400.

The average range of 15 electron-microprobe analyses 
(H₂O and CO₂ by thermal analyses) gave ZnO 56.75 (56.25-
57.00), CaO 4.06 (3.83-4.13), UO₂ 17.42 (17.18-17.66), 
CO₂ 8.25 (7.0-9.5), H₂O 15.37 (14.8-16.1), sum 101.85 
wt%, corresponding to Zn₁₂(UO₂)₂Ca(CO₃)₂(OH)₁₂-
(H₂O)₁₂·4H₂O. Occurs as porous coatings of saucer-
shaped aggregates, up to 10 cm³, some consisting of thin 
plates averaging 15 × 8 × 0.4 mm. Color white, light 
yellow, grayish yellow; translucent, silky luster, perfect 
〈010〉 cleavage, yellow-green fluorescence in short- 
and long-wave ultraviolet light; readily soluble in acid, 
with evolution of CO₂; Dmeas = 3.01(3), Dcalc = 3.09 g/cm³ with 
Z = 4. Optically biaxial negative, α = 1.563(2), β = 
1.621(2), γ = 1.621(4), 2V calc = ∼0°, negative elongation, 
extinction inclined about 9°. TG analysis shows losses of 
2.1 wt% between 20 and 150 °C (absorbed H₂O), 16.05 
wt% between 180 and 430 °C (H₂O and OH), and 7.68 
wt% between 450 and 960 °C (CO₂). The infrared spec-
trum shows absorption bands typical of carbonate and 
H₂O. X-ray powder patterns show some variations in in-
tensities, attributable to selective orientation of the plates. 
Strongest lines of a Guinier–de Wolff pattern (CoKa ra-
diation) are 25.10(62,010), 6.141(78,210), 5.650-
(54,201,220), 3.165(70,143), 2.728(90,281,182,253),

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2.708(100,182), 2.682(56,204), 1.5820(77), 1.5600(62), and 1.5561(67). Triclinic cell dimensions calculated from the powder pattern are \( a = 12.692(4), b = 25.096(6), c = 11.685(3) \AA, \alpha = 89.08(2), \beta = 91.79(2), \gamma = 90.37(3) \)°.

The new name is derived from the main constituents: Zn-U-Ca. The mineral occurs with gypsum, hydrozincite, aragonite, sphalerite, galena, pyrite, and other minerals as an oxidation product on uraninite-bearing dump material from the Lill mine, which operated in the second half of the 19th century at Pribram, Central Bohemia, Czechoslovakia. Type material is at the National Museum and at the Mineralogical Museum of the Faculty of Natural Sciences of Charles University, both in Prague, and at The Regional Museum, Pribram, Czechoslovakia. J.J.J.

**FeRh\(_2\)S\(_4\), Pd\(_3\)(Te,As), Pd\(_2\)Rh\(_3\)As\(_4\)**


Platinum-group minerals (PGM) occur as nuggets about 2 mm in size in placer at Fifield, 380 km west-northwest of Sydney, Australia. The nuggets consist of isoferrplatinum with small inclusions of Os-Ir-Pt alloys, bowite-kashinite, and unidentified minerals.

**FeRh\(_2\)S\(_4\),** Electron-microprobe analysis of the only grain found, about 20 μm across, gave Rh 42.60, 41.95, Ir 10.44, 10.48, Pt 1.96, 1.73, Pd 0.20, 0.03, Fe 6.78, 7.04, Cu 7.38, 7.54, Co 0.10, 0.18, As --, 0.05, S 31.12, 32.14, sum 100.57, 101.19 wt%, corresponding to (Rh, Ir, Pd, Pt, Os, Ir, Os, Cu, Co, As, S)\(_{2.399(3)}\)2S\(_{0.99(2)}\)2O\(_{1.01(2)}\)2[(As, S), Te]\(_{0.049(3)}\)S\(_{0.032(2)}\)2O\(_{0.079(2)}\)2, ideally Pd\(_2\)Rh\(_2\)S\(_4\), which is the iron analogue of cuprorhodsite, CuRh\(_2\)S\(_4\).

**Pd\(_3\)(Te,As),** Electron-microprobe analyses of subhedral, elongate grains, 4–5 μm long and associated with iridiosmine, gave Pd 71.42, 71.80, Pt 2.58, 2.43, Rh 1.08, 0.85, Ir 0.27, 0.03, Os 0.01, 0.10, Fe 0.08, 0.01, Ni 0.09, --, Cu 0.09, 0.01, Te 16.28, 16.30, As 6.63, 6.47, Sb 0.47, 0.38, S 0.02, --, sum 99.91, 98.37 wt%, corresponding to (Pd\(_{2.29(2)}\)Pt\(_{0.04(2)}\)Rh\(_{0.03(2)}\)Te\(_{0.06(2)}\)As\(_{0.38(2)}\)Sb\(_{0.02(2)}\)O\(_{2.07(2)}\)2, ideally Pd\(_3\)Te. Close in composition to keithconnite (Pd\(_3-x\)Te) and analogous to atheneite (Pd\(_{3-x}\)Hg)As.

**Pd\(_2\)Rh\(_3\)As\(_4\),** Electron-microprobe analyses of platy, elongate crystals, up to 30 μm long, associated with iridiosmine, gave Pd 71.42, 71.80, Pt 2.58, 2.43, Rh 1.08, 0.85, Ir 0.27, 0.03, Os 0.01, 0.10, Fe 0.08, 0.01, Ni 0.09, --, Cu 0.09, 0.01, Te 16.28, 16.30, As 6.63, 6.47, Sb 0.47, 0.38, S 0.02, --, sum 99.91, 98.37 wt%, corresponding to (Pd\(_{2.29(2)}\)Pt\(_{0.04(2)}\)Rh\(_{0.03(2)}\)Te\(_{0.06(2)}\)As\(_{0.38(2)}\)Sb\(_{0.02(2)}\)O\(_{2.07(2)}\)2, ideally Pd\(_3\)Te. Close in composition to keithconnite (Pd\(_3-x\)Te) and analogous to atheneite (Pd\(_{3-x}\)Hg)As.

**Pb\(_2\)O\(_5\)(Cl\(_2\)SO\(_4\)),**


The mineral occurs as pink, glassy blebs of 1–2 mm and aggregates intimately intergrown with mendipite partly altered to hydrocerussite on a specimen from the Kubert mine near Brilon, Nordhein-Westfalen, Germany. Electron-microprobe analysis gave Pb\(_2\)O\(_2\)Cl\(_2\), SO\(_4\), Cl 5.6, O = Cl 1.3, sum 100.0 wt%, corresponding to Pb\(_{2.84}(O_4)_{4.44}Cl\(_{1.58}\). Normalized to 4Pb, the formula is Pb\(_{2.84}(Cl\(_2\)SO\(_4\))\(_{0.22(2)}\)4S\(_{0.60(2)}\), ideally Pb\(_2\)O\(_5\)(Cl\(_2\)SO\(_4\)). Optically biaxial, possibly negative. Perfect (011) cleavage. Single-crystal X-ray study indicated monoclinic symmetry and a pronounced pseudotetragonal subcell; \( a = 3.945(3), b = 3.933(5), c = 13.119(5) \AA, \beta = 91.11(4) \)° as refined from the powder pattern (114-mm Gandolfi camera, CuKα radiation). True cell and space group not known. The strongest lines of the powder pattern are 3.77(80, slightly broad, T01, 011, 101), 2.952(100,103), 2.897(100,013,103), 2.785(100,110), 1.743(40,121,1121), and 1.701(40,116,107,204,017). The pattern has similarities to that of synthetic Pb\(_3\)O\(_5\)Cl\(_6\) (PDF 21-473). The type specimen is in the Smithsonian Institution, Washington, DC. J.J.J.

**Se-bearing minerals**


**Mineral A**

Microprobe analysis gave Cu 17.71, Fe 15.20, Pb 37.31, Bi 11.84, Ag 0.27, S 7.51, Sn 19.83, sum 99.67, corresponding to (Cu\(_{0.38}\)Fe\(_{0.37}\)Pb\(_{0.18}\)Bi\(_{0.01}\)Ag\(_{0.01}\)Sn\(_{0.02}\)S\(_{0.88}\)Se\(_{0.11}\))\(_{20(0.25)}\). In reflected light, creamy white, weak pleochroism, anisotropic effects in air reddish brown to bluish gray. In immersion oil, brown to bluish gray. Reflectance (nm, R%): 450 31; 500 38; 550 40; 600 41; 650 40; 700 38. \( H_2o = 290 \) kg/mm\(^2\). The mineral occurs as an aggregate, 6 × 20 μm, of crystals 1–3 mm.

**Mineral B**

Microprobe analysis gave Cu 7.33, Fe 20.67, Pb 7.15, Bi 21.34, Ag 9.13, Se 7.69, Sn 8.00, sum 81.30 wt%; the ratios are Fe/Cu/Bi (Ag + Pb)/(S + Se) = 3/1/1/1/3 with Ag/Pb = 2.48/1 and S/Se = 2.3/1. In reflected light, pleochroic from gray to dark gray in air, dark gray to brownish gray in immersion oil (sections perpendicular to grain elongation). Anisotropic effects in air bluish gray to bright yellow, in immersion oil dark gray to yellowish gray. Relief higher than those of mineral A and Se-bearing bismuthinite. The mineral occurs as elongate grains, 1 × 1
μm in diameter, that form a 2–4 μm rim around mineral A. Both minerals occur in the Kenkuduk deposit, Kazakhstan, USSR. J.P.

New Data

Berborite polytypes


Berborite, Be₂(BO₃)(OH)·H₂O, from nepheline syenite pegmatites in quarries in larvikite in the Tvedalen district, southern Oslo region, Norway, occurs as the 1T, 2T, and 2H polytypes, each of which has a distinct X-ray powder-diffraction pattern. Berborite-1T has \(a = 4.434(1), c = 5.334(2)\) Å, space group P3; berborite-2T has \(a = 4.431(1), c = 10.663(3)\) Å, space group P3c1; berborite-2H has \(a = 4.433(2), c = 10.638(5)\) Å, space group P6₃. Structures of the polytypes were refined to \(R = 0.014, 0.019,\) and 0.029, respectively. The Be atoms and the O(2) apical O atoms of Be tetrahedra are split into two nonequivalent sites, and H₂O and OH oxygen atoms are ordered on separate O(2) positions. J.L.J.

Dewindtite


X-ray crystal-structural study (\(R = 0.063\)) of cotyde dewindtite showed the mineral to be orthorhombic, space group Bnmn, \(a = 16.031(6), b = 17.264(6), c = 13.605(2)\) Å, \(D_{\text{calc}} = 5.12 \text{ g/cm}^3\) with \(Z = 4\) for the ideal formula cited in the title; the formula corresponds to 3PbO-6UO₃-2P₂O₅-13H₂O, requiring PbO 23.06, UO₃ 9.78, H₂O 8.06 wt%. J.L.J.

Lazurite


In lazurite from deposits in the southwestern Baikal region, USSR, three structural modifications of lazurite were found: (1) triclinic, \(a = 9.091, b = 12.857, c = 25.719\) Å, \(\alpha = \beta = \gamma = 90^\circ\), space group P1 or P̅1, optically biaxial positive, strongly pleochroic from blue to pale blue or colorless, \(\alpha = 1.503, \beta = 1.510, \gamma = 1.514\); (2) monoclinic, \(a = 36.36, b = c = 51.40\) Å, \(\alpha = \beta = \gamma = 90^\circ\), space group P2₁/b, optically negative, no pleochroism, \(\gamma \approx \beta = 1.512–1.514, \alpha = 1.511–1.513\); (3) cubic, \(a = 9.072\) Å, space group P6₃m, optically isotropic, \(n = 1.498–1.512\).

Discussion. The triclinic and monoclinic modifications are new polymorphs of lazurite. J.P.

Höggbomite-24R


Lamellae of höggbomite, 0.01 to 0.1 μm thick and oriented parallel to the (111) faces of the spinel host, occur in gem-quality octahedral spinel crystals free of host rock and thought to have been derived from the Morogoro area of Tanzania. Energy-dispersion analyses, calculated for \((\text{MgO} + \text{Al}_2\text{O}_3 + \text{TiO}_2) = 100\) wt%, revealed compositions of two types, one with MgO 18.19, Al₂O₃ 67.03, TiO₂ 14.78 wt% and the other with MgO 23.31, Al₂O₃ 69.56, TiO₂ 7.13 wt%. Selected-area electron-diffraction patterns revealed no differences, with both compositional types giving unit cells of \(a = 5.7, c = 12 \times 4.65 = 55.8\) Å. The lamellae correspond to höggbomite-24R, the first natural occurrence of this polymorphic type. J.L.J.

Hotsonite


One of three similar wet-chemical analyses done at different laboratories gave SiO₂ 0.16, TiO₂ 0.01, Al₂O₃ 39.60, Fe₂O₃ 0.18, MgO 0.41, CaO 0.89, P₂O₅ 9.06, SO₃ 13.73, H₂O 31.29, H₂O⁺ 4.28, insoluble residuum 0.33, sum 99.94 wt%, corresponding to Al₅(PO₄)(SO₄)(OH)₁₀·4PO₄·2H₂O·10H₂O, ideally Al₅(PO₄)(SO₄)(OH)₁₀·28H₂O rather than previously proposed Al₅(PO₄)(SO₄)(OH)₁₀·28H₂O. J.P.

Perialite


Structural analysis of perialite by synchrotron X-ray powder methods gave hexagonal symmetry, space group P6/mmm, \(a = 18.5432(4), c = 7.5310(3)\) Å, composition K₄Tl₄Al₆Si₆O₁₄·20H₂O. The formula is new, but Tl is considered to have entered the larger cavities of the zeolite framework as a consequence of the use of thallium malonate during mineral separation. J.L.J.

Phosphuranylite

X-ray structural study ($R = 0.089$) of phosphuranylite gave orthorhombic symmetry, space group $Bmnb$, $a = 15.835(7)$, $b = 17.324(6)$, $c = 13.724(4)$ Å, $D_{calc} = 4.58$ g/cm$^3$ with $Z = 4$. The gross composition is CaO·7UO$_3$·2P$_2$O$_7$·14H$_2$O, with $U/P = 7/4$. The formula is new. J.L.J.

**Vinogradovite**


Semi-quantitative laser-probe analysis indicated the presence of about 1 wt% Be in vinogradovite, and micro-probe analysis led to the proposed formula $\text{Na}_4\text{Ti}_6\text{O}_{17}·(\text{Si}_3\text{O}_{10})_4[\text{Si}_3\text{O}_{10}]_2·[(\text{H},\text{O}),\text{(Na,K)}_2]$. Mineral X of Karup-Møller [Am. Mineral., 73, p. 445, 1988] is vinogradovite. J.L.J.