

NEW MINERAL NAMES

Iron-alabandite

PAUL RAMDOHR. Eisenalabandin, ein merkwürdiger natürlicher Hochtemperaturmischkristall. *Neues Jahrb. Mineral., Abhandl. (Festband Hans Schneiderhöhn)* 91, 89–93 (1957).

The mineral is cubic, with perfect cubic cleavage, and has the halite structure with $a_0 = 5.15 \text{ \AA}$. It appears to be a solid solution, (Mn, Fe)S, with Mn slightly predominant over Fe. It resembles tetrahedrite in polished section, but is harder. It was found in pyrrhotite in the wollastonite-bearing phonolite quarry at Fohberg near Oberschaffhausen, Kaiserstuhl, Germany. Chalcopyrite and a little sphalerite were associated minerals. It was also found with pyrrhotite in the native iron from the basalt at Bühl, Germany. The composition is close to the limit of solubility of FeS in MnS.

MICHAEL FLEISCHER

Sborgite

CURZIO CIPRIANI. *Un nuovo minerale fra i prodotti boriferi di Larderello. Atti acad. nazl. Lincei, Rend. classe sci. fis., mat. e nat.* 22, 519–525 (1957).

Two analyses are given of incrustations formed in 1930 and in 1948 at the well-known soffioni in Tuscany. They contain mainly Na_2SO_4 plus sodium borates, but the ratios $\text{Na}_2\text{O} : \text{B}_2\text{O}_3$ (after deducting Na_2SO_4) were 1:3.17 and 1:3.81, indicating the presence of a borate other than borax. X-ray powder data of the mixture, after deducting the lines of thenardite and borax, agreed with the pattern of the well-known synthetic compound $\text{NaB}_3\text{O}_8 \cdot 5\text{H}_2\text{O}$.

Synthetic crystals had $G. 1.713$ and were optically biaxial, positive, with $\alpha 1.431$, $\beta 1.438$, $2V 35^\circ$, $\gamma 1.507$ (calcd.). Grains isolated from the crusts had $\alpha' 1.435$, $\gamma' 1.450$ – 1.460 . Unindexed x-ray powder data are given for the synthetic compound; the strongest lines are 4.60 (100), 3.30 (77), 3.20 (76), 2.572 (39), 3.56 (38), 3.54 (36), 6.88 (36).

Solubility data on the compound and on thenardite indicate that the temperature of formation was between 32° and 60° .

The name is for Umberto Sborgi (1883–1955), Italian chemist, who published solubility data on the system $\text{Na}_2\text{O}-\text{B}_2\text{O}_3-\text{H}_2\text{O}$.

M. F.

Uranium minerals from U.S.S.R.

Two Russian monographs on uranium minerals have become available recently: M. V. SOBOLEVA and I. A. PUDOVKINA (S. and P.), *Mineraly Urana, Spravochnik (Uranium Minerals Handbook)*, Moscow, 1957, 404 pp., and R. V. GETSEVA and K. T. SAVEL'eva (G. and S.), *Rukovostvo po opredeleniiu uranovykh mineralov (Handbook for the determination of uranium minerals)*, Moscow, 1956, 260 pp. The following information is from these books; most of the minerals were listed without any information except formula in *Am. Mineral.* 41, 816 (1956), 42, 307 (1957).

It is worthy of note that no locality names are given in either book. Nor are any references given to the original descriptions.

Ufertite

S. and P., p. 350–352, G. and S., p. 132.

Analyses by P. N. Dorofeev gave TiO_2 59.12, 50.00; FeO 14.0,—; Fe_2O_3 11.00, 32.96; Cr_2O_3 1.2, 0.8; Al_2O_3 0.2,—; rare earths 11.58, n.d.; ThO_2 0.16, 0.20; UO_2 2.61,—; PbO 0.20, 0.21; V_2O_5 0.37,—; SiO_2 1.2, 0.3; sum 101.64%,—. A semiquantitative spectral analysis gave also Zn 0.8, Zr 0.05–0.1, Nb, Ta none, Mn 0.8, Cu 1.0, K 1.0, La 2.5, Ce 3.5, Y 1.3, and less Pr, Nd, Gd, Dy.

The formula deduced is $20\text{FeO} \cdot 8\text{Fe}_2\text{O}_3 \cdot 4\text{TR}_2\text{O}_3 \cdot \text{UO}_2 \cdot 74\text{TiO}_2$. The mineral is slightly soluble in H_2SO_4 . Fusible with KOH or KHSO_4 . The DTA curve shows a broad endothermal effect near 200° and an exothermic effect at 530 – 670° .

Color black with brownish tint, luster resinous. G. 4.33 (pycnometer), hardness 6.6–7.2. Non-magnetic. Fracture conchoidal. Optically isotropic, translucent only in fine splinters, n (melts) 2.11, but 2.16 after being heated at 800° . Reflecting power 19–21, somewhat less in altered material.

An unindexed x -ray pattern is given of material heated at 700° . The strongest lines are 1.452 (10), 1.616 (9), 2.892 (7), 2.772 (from the position in the table, perhaps this should be 2.272 M. F.) (6), 1.821 (6).

Ufertite is known from one locality where it occurs in irregular masses and elongated crystals in biotite-gneisses and quartz-biotite schists, cut by veins of albite. It is associated with albite, sericite, calcite, hematite, and sulfides. Discovered by N. I. Balashov (S. and P.), by P. V. Veinerman and N. P. Balazhev in 1950 (G. and S.).

DISCUSSION.—This appears to be a variety of davidite. The x -ray pattern is close to, but differs slightly from the variable patterns given by others for davidite.

M. F.

Iriginite

S. and P., p. 249–251; G. and S., p. 197.

Chemical analysis by V. A. Iskuyil, 1951, gave MoO_3 38.62, UO_3 41.91, UO_2 none, CaO 0.46, loss on ignition 9.7, insol. 9.04, sum 99.73%, corresponding to $\text{UO}_3 \cdot 2\text{MoO}_3 \cdot 4\text{H}_2\text{O}$. The formula is given by G. and S. as $\text{U}_2^{+6}(\text{MoO}_4)(\text{OH})_4 \cdot 4\text{H}_2\text{O}$.

The mineral occurs as very fine-grained dense yellow aggregates, sometimes forming pseudomorphs after brannerite. Luster dull. Hardness 4–5. G. 3.84. Fracture conchoidal to uneven. Indices of refraction, α 1.82, γ 1.93, birefringence very high. Gives a sharp x -ray pattern (57 lines are given) with strongest lines 3.222 (10), 1.129 (8), 2.625 (6), 2.142 (6), 1.836 (6), 1.249 (6), 1.206 (6), 1.188 (6), 1.165 (6), 6.390 (5), 1.693 (5), 1.533 (5). It is monoclinic according to G. and S.

The mineral was found by G. Yu. Epshtein in 1951, studied by Yu. V. Kazitsyn in 1954. It occurs in one deposit in granulated albitite, associated with brannerite and with other U-Mo minerals. One of the latter occurs in yellow-green radial aggregates, weakly pleochroic, α 1.775, birefringence high, extinction parallel, H. 1–2.

M. F.

Lermontovite

S. and P., p. 181–182; G. and S., p. 199–200.

Analysis by A. Ya. Sheskolskaya, 1952, gave P_2O_5 20.40, UO_3 14.53, UO_2 36.53, CaO 1.00, R_2O_3 (apparently rare earth oxides M. F.) 1.67, SiO_2 2.38, F none, sum 85.03%. The sample contained admixed molybdenum sulfate. G. and S. give the same analysis and also Te_2O ($\text{Te}_2\text{O}?$ M. F.) 1.55, sum 86.61% (adds to 86.58 M. F.).

Assuming quadrivalent uranium, the formula is given as $(\text{U}, \text{Ca}, \text{TR})_3(\text{PO}_4)_4 \cdot 6\text{H}_2\text{O}$.

The mineral occurs in botryoidal aggregates of radial fibrous needles. Color grayish-green, luster dull, silky in fractures. G. 4.50. Very brittle. Under the microscope transparent grassy-green, pleochroic in greenish and greenish-brown hues. Extinction parallel. Indices of refraction variable, even in a single sample, α 1.562–1.574, γ 1.702–1.726 (S. and P.), α 1.562–1.702, γ 1.574–1.726 (G. and S.). No x -ray data are given.

Occurs under sharply reducing conditions in the zone of cementation of hydrothermal deposits, associated with molybdenum sulfate, marcasite, hydrous silicates, and "thallium ochre."

The mineral was first described by V. G. Melkov in 1952.

DISCUSSION.—Needs further study.

M. F.

Lodochnikite

S. and P., p. 347–350; G. and S., p. 131–132.

Analysis by A. P. Bocherov, 1948, gave TiO_2 42.05, UO_3 35.41, UO_2 16.45, ThO_2 3.96, $(\text{Nb}, \text{Ta})_2\text{O}_5$ 0.14, CaO none, MgO 0.68, PbO 0.13, Fe_2O_3 0.25, Al_2O_3 0.12, SiO_2 0.21, H_2O 0.04, loss on ignition 0.55, CO_2 0.12 (G. and S. give S 0.12 instead), sum 100.11%, corresponding to $2(\text{U}, \text{Th})\text{O}_2 \cdot 3\text{UO}_3 \cdot 14\text{TiO}_2$. Difficulty soluble in HCl and HNO_3 , slightly soluble in H_2SO_4 , readily fusible with KHSO_4 .

The mineral is black, with strong resinous luster. Opaque except in thin splinters. Streak black, slightly brownish. n (melts) = 2.16, after being heated, $n = 2.19$. Reflecting power 19%. Fracture conchoidal. Hardness 5–6. G. (pycnometric) 5.48, after being heated at 800° the mineral has G. 5.55. (The table of analytical data gives G. 5.88 M. F.) A DTA curve gave a sharp exothermal effect at 620 – 650° , and weak endothermal effects at about 700° and 860° .

X-ray powder data are given for material heated one hour at 900 – 1000° . The strongest lines are 2.017 (7), 1.979 (7), 1.650 (7), 2.419 (6), 3.079 (5), 1.749 (5); 34 others are given.

Lodochnikite was discovered by Ya. D. Gotman in 1948 as veinlets in nepheline-microcline-muscovite rock, the veins also containing barite, siderite, hematite, and calcite.

The name is for the Soviet petrographer V. N. Lodochnikov.

DISCUSSION.—The editors of Soboleva and Pudovkina remark that “separation of lodochnikite as an independent mineral is of uncertain expediency. It might be considered as a variety of brannerite with increased content of uranium.” I agree. The x-ray powder pattern resembles that of heated brannerite, but there are considerable differences in the intensities.

M. F.

Moluranite

S. and P., p. 252–253; G. and S., p. 196.

Analysis by V. A. Iskuyil, 1951, gave MoO_3 37.5, U_3O_8 42.32, SiO_2 4.56, H_2O 15.4, sum 99.78% (U^4 and U^6 not determined), according to S. and P.; MoO_3 38.50, UO_3 42.32, SiO_2 4.56, loss on ignition 14.03, sum 99.41%, according to G. and S. Formula $\text{UO}_2 \cdot 2\text{UO}_3 \cdot 5\text{MoO}_3 \cdot 12\text{H}_2\text{O}$ (?) (S. and P.), $2\text{UO}_2 \cdot 3\text{MoO}_3 \cdot 11\text{H}_2\text{O}$ (?) (G. and S.). When heated to 500° , gives off water, turns yellow, and is transformed into iriginite. “Dissolves very poorly in acids.”

Color black, translucent brown in thin fragments. Luster resinous. Hardness 3–4, brittle. Isotropic, n 1.97–1.98 (G. and S.), “approximately 1.79–1.98” (S. and P.) (misprint?). Under x-ray study, it is stated that the mineral has no crystal structure (G. and S.).

Occurs in fine fissures in granulated albitite, associated with molybdenite, chalcopyrite, and galena, which are incrustated on fissures, moluranite forming colloform accumulations in the central part with brannerite and with other U-Mo compounds. Known from one deposit.

The name is from the composition.

M. F.

Obrucheveite

G. and S., 1956, p. 140.

Found by Nefedov in 1941 and referred to ellsworthite. Analysis gave N_2O (presumably Na_2O) 4.42, K_2O 0.48, CaO 2.86, FeO 3.85, SiO_2 1.78, UO_2 5.98, Ce_2O_3 0.13, Y_2O_3

19.14, TiO_2 0.40, ThO_2 0.80, Ta_2O_5 10.25, Nb_2O_5 (should be Nb_2O_5 ?) 10.06, H_2O 8.90, sum 69.05%. (The sum is given as 99.04; presumably either Ta_2O_5 should be 40.25 or Nb_2O_5 40.06% M. F.) The formula is given as $3\text{Na}_2\text{O} \cdot 4(\text{Ca}, \text{Fe})\text{O} \cdot 3\text{Y}_2\text{O}_3 \cdot (\text{U}, \text{Th})\text{O}_2 \cdot 5(\text{Ta}, \text{Nb})_2\text{O}_5 \cdot 20\text{H}_2\text{O}$.

Forms dense masses without crystal form. Isotropic. Metamict, gives a cubic pattern after being heated. Color light brown, luster greasy to adamantine. Fracture conchoidal. G. 3.96–4.80.

A rare mineral, found in granitic pegmatites, associated with allanite, garnet, feldspar, and unstudied niobates.

DISCUSSION.—This is evidently a variety of the pyrochlore-microlite group, which has the highest yttrium content yet found in this group.

M. F.

Orlite

S. and P., pp. 129–130; G. and S., p. 239.

Analysis by L. A. Kuznetsova, 1952, gave SiO_2 12.08, UO_3 43.57, P_2O_5 0.65, As_2O_5 0.25, PbO 32.45, CaO 0.76, BeO 0.22, MgO 0.84, Al_2O_3 2.54, Fe_2O_3 0.80, H_2O^- 2.97, H_2O^+ 2.25, insol. 1.44, sum 100.82%. Of the H_2O^+ , 1.11% is lost at 200° , 0.85% to 300° , 0.29% to 1000° . The formula is given as $3\text{PbO} \cdot 3\text{UO}_3 \cdot 4\text{SiO}_2 \cdot 6\text{H}_2\text{O}$. The mineral is soluble in HCl with separation of PbCl_2 and gelatinous silica.

The mineral is in radiating aggregates of fine acicular crystallites, measuring tenths of a mm. Color light creamy yellow, luster waxy. G. 5.307. Non-luminescent in ultra-violet light. Crystal system and optical character not determined. Extinction parallel, elongation negative, $n_s \gamma$ 1.793, β 1.788. The x-ray powder pattern (34 lines) has the strongest lines 3.226 (10), 1.678 (7), 6.356 (5), 1.967 (5), 1.849 (5).

Orlite is known from one locality where it is associated with uranophane and kasolite in the middle horizon of the oxidation zone of uranium deposits in liparite. It was found by V. G. Melkov and A. M. Sergeev in 1951.

The name is for the locality.

DISCUSSION.—Needs further study. Orlite corresponds very closely in composition and physical properties to kasolite, $\text{PbO} \cdot \text{UO}_3 \cdot \text{SiO}_2 \cdot \text{H}_2\text{O}$. The x-ray pattern given for orlite is very close to that given for kasolite by Frondel, Riska, and Frondel, *U. S. Geol. Survey Bull.* 1036-G (1956), but differs from that given for kasolite by S. and P. The n_s given for orlite are very different from those of kasolite.

M. F.

Przhevalskite

S. and P., p. 203–205; G. and S., p. 213.

Analysis by A. Ya. Sheskol'skaya, 1947, gave P_2O_5 11.47, UO_3 46.55, PbO 21.06, H_2O 6.69, Al_2O_3 3.48, and SiO_2 4.10, sum 93.35%. (G. and S. omit the Al_2O_3 , add "insol. 1.99%" and give also PbO 21.66, but their sum is 0.6% too high.) This gives after deducting meta-halloysite, the formula $\text{Pb}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot 2\text{H}_2\text{O}$. The mineral has been synthesized at pH 4.2. It is readily soluble in acids.

Orthorhombic. G. and S. state that synthetic przhevalskite has the crystal structure of torbernite. The mineral occurs in foliated aggregates of tabular crystals, ranging in size from 0.1 to 1 mm. Cleavage (001), "clearly expressed." Color bright yellow with a faint greenish tint. Luster adamantine, pearly (S. and P.), strong, vitreous (G. and S.). G. and hardness not given. Optically biaxial, negative, with $n_s \alpha$ 1.739, β 1.749 ± 0.002 , γ 1.752 ± 0.002 , $\gamma - \alpha$ 0.013–0.014, $2V$ about 30° (S. and P.); α 1.739, β 1.749 – 1.750 , γ 1.752 – 1.753 , $2V$ medium (G. and S.). Extinction parallel, elongation negative. Pleochroic with X colorless, Y pale yellow, Z deep yellow.

Przhevalskite gives a sharp x -ray pattern; 55 lines are listed. The strongest are 3.610 (10), 9.080 (9), 1.619 (6), 1.530 (6), 9.490 (5), 2.629 (5), 1.960 (5), 1.349 (5), 1.148 (5), 1.138 (5).

The mineral is rare, occurring in the oxidation zone of a pitchblende-sulfide deposit with torbernite, autunite, dumontite, renardite, uranophane, metahalloysite, hydrous oxides of iron and manganese, and wulfenite.

The mineral was first described by V. G. Kruglov in 1946. It was named for N. M. Przhevalsk.

DISCUSSION.—The x -ray pattern differs from those of the other lead uranium phosphates, and the optical data differ from all of these except renardite. The x ray pattern has some resemblance to those of members of the metatorbernite group.

M. F.

Sogrenite

S. and P., p. 257–259; G. and S., p. 250–251.

An organo-uranium complex. Two analyses gave C 18.27, 20.46; H 2.40, 2.32; S not detd., 1.18, ash 59.27, 59.26%. Microchemical analyses of the inorganic part by L. A. Kuznetsova, 1949, gave CaO 7.57, 8.16; MnO 0.09, 0.07, MgO 0.89, 0.30; PbO 0.48, 0.19; Al₂O₃ 12.70, 4.59; Fe₂O₃ 13.48, 2.98; UO₃ 11.80, 19.99; SO₃ 3.42,—; S—, 1.96; SiO₂ 4.01, 1.72; ThO₂ none, none; P₂O₅ 6.27, 13.88; As₂O₅ none, not detd.; V₂O₅ none, not detd.; H₂O[−] 6.04,—; H₂O⁺ 10.82, 16.70 (total H₂O), ignition loss 19.93, 28.75, sum 97.50, 99.29 (given as 98.75%). Dry distillation gave gases and water 20.8, coke 49.2%, tar none.

Color black, luster strongly resinous, streak brownish-gray, brownish-black. Brittle, fracture conchoidal. Hardness (Vickers) 335 kg./mm.²=4.9. G. (pycnometer) 2.0–2.2. Poorly wet by water. Opaque. Isotropic. The x -ray pattern, after heating at 850°, is that of a cubic mineral with strongest lines at 3.028 (8), 2.125 (7), 1.854 (7), 2.802 (6), 1.302 (6).

In the air tarnishes, cracks, and turns to a brown friable mass. If then moistened, it swells and again shows a strong luster.

Sogrenite was discovered by E. A. Nachaev and A. A. Arsen'ev in 1949. It occurs in ankerite-calcite veins cutting Proterozoic limestones and is associated with chlorite, chalcidony, pyrite, sphalerite, and galena.

DISCUSSION.—The editor of the monograph by S. and P. remarks, "Sogrenite, like thucholite and carburan, is not a mineral, but is referred to the series of organic materials adsorbing different inorganic materials."

M.F.

Ferutite

G. and S., pp. 126–128.

A note on this name was printed in *Am. Mineral.* **41**, 163–164 (1956); the name applies to the davidite-like mineral from Mozambique described by Bannister and Horne, *Mineralog. Mag.* **29**, 101–112 (1950). It is not clear from the data given which measurements are on Mozambique, which on Russian material.

Analysis gave TiO₂ 59.11, UO₃ 6.19, UO₃ 5.24, FeO+Fe₂O₃ 26.00, PbO 3.46, Ce₂O₃ trace, sum 100.00% (recalculated? M. F.). Black with resinous to semi-metallic luster, translucent brown to reddish-brown in thin splinters. Fracture conchoidal. Hardness 5.7–6.1 (absolute microhardness 544–667 kg./mm.²). G. 4.46. Isotropic, metamict.

Two x -ray patterns are given of material heated at 1000°; these differ considerably in intensities. The strongest lines of one are 1.687 (10), 2.480 (7), 3.246 (6), 2.885 (6), 2.242 (5), 1.797 (5), 1.124 (5), 1.088 (5).

Ferutite was found in sands containing magnetite, rutile, zircon, apatite, and tourmaline.

The name is for the composition.

DISCUSSION.—Not certainly distinct from davidite.

M. F.

Unnamed Phosphate Analogue of Walpurgite

S. and P., p. 201–202.

Qualitative tests showed the presence of Bi, U, PO_4 , and H_2O , with traces of Na and K. Decomposed by nitric acid. The mineral is yellow, with vitreous luster, hardness high, brittle. Found as stellate aggregates, up to 1 mm. Extinction nearly parallel, elongation positive, n_1 1.722 ± 0.002 , n_2 1.783.

The mineral was first described by V. G. Melkov in 1946. It occurs in the near-surface part of the zone of oxidation.

M. F.

Sodium Autunite

A. A. CHERNIKOV, O. V. KRUTETSKAYA, AND N. I. ORGANOV. Sodium-autunite *Atomnaya Energiya*, 3, 135–140 (1957) (in Russian).

Analyses of 2 samples by O. V. K. and V. I. Litenskov gave UO_3 61.9, 62.53; P_2O_5 15.56, 14.69; Na_2O 5.62, 6.88; CaO 1.2, 0.14; MgO 0.43,—; SiO_2 1.6,—; CO_2 0.24,—; Al_2O_3 0.32,—; Fe_2O_3 0.97,—; H_2O^- 9.02,—; H_2O^+ 4.05, 14.84 (total H_2O), sum 100.91, 99.08%. These give the ratios $\text{UO}_3:\text{P}_2\text{O}_5:\text{Na}_2\text{O}+\text{CaO}:\text{H}_2\text{O}=1.91:1.00:1.02:6.66$ and $2.1:1.0:1.06:7.9$. The mineral is readily soluble in acids. Gives off water in the closed tube, turning straw-yellow and porous.

The mineral occurs in lemon-yellow and lettuce-yellow plates with perfect cleavage on (001) and a less perfect one on (100). Sometimes in foliated and radiating masses. Brittle, hardness 2–2½. G. 3.584, calcd. for $8\text{H}_2\text{O}$ 3.89. Luster pearly on (001), vitreous on other faces. Luminesces strongly in yellow-green under ultra-violet light. Fresh crystals are uniaxial, neg., with $ns \omega$ 1.578, ϵ 1.559, pleochroism weak, O light yellow, E pale yellow. After two days exposure at 35–40°, the ns were ω 1.585, ϵ 1.564.

X-ray study showed the mineral to be tetragonal, $P4/nmm$, with a 6.97, c 8.69 Å., $c/a = 1.245$; the unit cell contains $\text{Na}_2(\text{UO}_2)_2(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$. Data are also given for synthetic calcium- and H-autunites. Indexed x-ray powder data are given; the strongest lines are 3.67 (10), 2.675 (8), 1.566, 1.540 (8, broad), 3.23 (7), 1.639 (7), 1.364 (7).

The mineral occurs "in one of the granodiorite massifs of the U.S.S.R." A member of the meta-autunite group, well known as a synthetic compound (Fairchild, *Am. Mineral.* 14, 7–8 (1929)).

M. F.

Sodium uranospinite

E. V. KOPCHENOVA and K. V. SKVORTSOVA. Sodium uranospinite. *Doklady Akad. Nauk S.S.S.R.*, 114, 634–636 (1957) (in Russian).

Microchemical analysis gave UO_3 58.29, P_2O_5 1.65, As_2O_5 20.84, CaO 1.87, MgO trace, Na_2O 3.91, K_2O none, SiO_2 2.39, Al_2O_3 0.91, H_2O^+ 3.49, H_2O^- 6.00, sum 99.92%. Spectrographic analysis showed small amounts of Pb, Zn, Mo, Cu, Zr, and Mn. The analysis corresponds to $\text{UO}_3:\text{As}_2\text{O}_5+\text{P}_2\text{O}_5:\text{Na}_2\text{O}+\text{CaO}:\text{H}_2\text{O}=2.0:1.0:0.97:5.2$, with $\text{Na}_2\text{O}:\text{CaO}=2:1$. The mineral dissolves readily in dilute acids or in Na_2CO_3 solution. A D.T.A. curve shows a strong endothermal effect at about 200°.

The mineral occurs in fine, tabular to elongated crystals with lengths up to 1.5–2 cm., as radial fibrous aggregates, and as square crystals pseudomorphous after metazeunerite (sometimes with a core of metazeunerite). Crystal faces are corroded and could not be measured. Color yellow-green to lemon- and straw-yellow. Luster vitreous, pearly on (001). Cleavage (001) perfect, (010) and (100) distinct. Hardness $2\frac{1}{2}$. G. (pycnometer) 3.846. Optically anomalously biaxial, neg., 2V very small, with $ns \alpha$ 1.585, γ 1.612. Sometimes weakly pleochroic with X colorless, Y and Z yellowish. Luminesces strongly yellow-green in ultra-violet light. X-ray study shows the mineral to be tetragonal with $a_0=7.12$, $c_0=8.61$ (not stated whether A. or KX), $c/a=1.2092$. Unindexed x-ray powder data are given and compared with those of Mrose. The strongest lines are 8.48 (10), 3.68 (10), 3.292 (9), 1.837 (9), 1.987 (8), 1.634 (8), 5.45 (7), 2.673 (7).

The mineral occurs in the oxidation zone of a primary hydrothermal deposit containing pitchblende, arsenopyrite, pyrite, and galena in carbonatized Devonian felsite-porphry and tuffaceous breccia. Oxidation caused the formation of realgar, orpiment, scorodite, mansfieldite, metazeunerite, troegerite, and arseniosiderite. Sodium uranospinite is the most abundant secondary U mineral. It is sometimes replaced by uranophane. Arseniosiderite forms pseudomorphs after the uranium micas. The locality is not given, as usual.

A member of the meta-autunite group, known as a synthetic compound (Mrose, *Am. Mineral.* **36**, 322 (1951), **38**, 1157 (1953)).

M. F.

NEW DATA

Anthoinite

ERNST NIGGLI AND EMILIE JÄGER. Untersuchungen an Anthoinit. *Neues Jahrb. Mineral., Abhandl. (Festband Hans Schneiderhöhn)* **91**, 35–40 (1957).

Anthoinite was described in 1947 as $Al_2O_3 \cdot 2WO_3 \cdot 3H_2O$ (*Am. Mineral.* **33**, 385 (1948)). Study of type material shows it to be a valid mineral. Electron microscope pictures show tabular crystals up to 3 microns in size. Birefringence was noted under high magnification, n 1.81–1.82. A D.T.A. curve shows a large endothermic reaction at 515°, a large and sharp exothermic reaction at 620°, and a small exothermic reaction at 820°. The powder pattern has many lines, including strong ones (in A.) at 4.195, 3.070, 3.052, medium ones at 5.66, 3.979, 1.936, 1.862. These could not be indexed on an orthorhombic cell, but were indexed, not entirely satisfactorily, as monoclinic, with a_0 9.33, b_0 8.17, c_0 13.68 Å, beta 95° 40'. The mineral may be triclinic.

M. F.

Scarbroite

W. J. DUFFIN AND J. GOODYEAR. X-ray study of scarbroite. *Nature* **180**, No. 4593, p. 977 (1957).

Scarbroite was described by Vernon (*Phil. Mag.* **5**, 178 (1829)) as a soft white material with G. 1.48 containing Al_2O_3 42.75, SiO_2 7.90, H_2O 48.55, Fe_2O_3 0.80%. It has since been generally considered to be a mixture of clays with an aluminum oxide. Material from vertical fissures in sandstone at South Bay, Scarborough, was re-examined. It is white, compact, fine-grained, and quite soft. Spectrographic analysis shows aluminum and silicon (the latter shown by x-ray to be present largely as quartz) and only traces of other elements. G. approx. 1.85, mean n 1.509. The x-ray patterns are slightly variable and somewhat diffuse. The strongest lines are 8.64 (10) (broad), 4.32 (8), 1.430 (8) (broad), 6.52 (7), 5.97 (7), 4.72 (7), 3.71 (7), 2.219 (7), 1.450 (7), 8.30 (6), 5.00 (6), 4.44 (6), 4.29 (6), 3.48 (6), 2.816 (6), 2.443 (6), 2.360 (6); 27 other lines are given. The pattern is tentatively indexed with a

hexagonal cell with $a_0=34.5$, $c_0=17.3$ Å, the 8.74 Å line being 0002. Heating to 120° for 2 days or dehydration over P_2O_5 changed the pattern slightly, probably due to a small reduction in c . On heating to 130–140° a different pattern is obtained which is indexed as hexagonal, with $a_0=31.0$, $c_0=12.8$ Å. Further heating causes the x -ray reflections to become more diffuse and fainter, and the c -axis shrinks to 11.3 Å at 228°. Heating at higher temperatures breaks down the structure completely, no x -ray pattern being obtained up to 900°, where a diffuse pattern of gamma- Al_2O_3 was obtained.

Further work on this apparently new aluminum oxide hydrate is in progress.

M. F.

Kettnerite

LUBOR ZAK AND VL. SYNEČEK. Bismuth minerals from Krupka (Graupen) in the Krušné Hory (Erzgebirge). *Univ. Carolina, Geol.* **3**, No. 1, 1–46 (1957) (in Czech with English summary).

Additional data (see *Am. Mineral.* **42**, 121 (1957)) are given. Microchemical analysis on about 0.1 g. gave Bi_2O_3 67.9, CaO 8.3, CaF_2 10.6, CO_2 12.6, H_2O 0.5, sum 99.9%, corresponding to $(CaF)(BiO)CO_3$. Spectrographic analysis showed very little Pb, and traces of Al, Cu, Fe, Mg, Mn, and Si. Rotation and Weissenberg photographs gave space group $P4/nmm$, a_0 3.79 ± 0.02 , c_0 13.59 ± 0.03 Å, c_0/a_0 3.59, c/a (goniometric) 3.57. The mineral occurs as 0.2–0.3 mm. plates on quartz or fluorite. The forms {001} (predominant), {111}, and {10·10} were observed. Hardness "not too high." Optically uniaxial negative, or biaxial with very small optical angle, $nO > 2.05$. The strongest x -ray lines and intensities are 2.89 10, 1.732 9, 1.589 9, 1.893 8, 1.200 8, 2.104 7, 1.278 6; 16 other lines are given. The mineral is closely related to bismutite $(BiO)_2CO_3$ and beyerite, $Ca(BiO)_2(CO_3)_2$.

M. F.

Häggite

H. T. EVANS, JR. and MARY E. MROSE. The crystal structures of three new vanadium oxide minerals. *Acta Crystallographica* **11**, 56–58 (1958).

Black crystals separated from a drill core in sandstone from Carlile, Wyoming, gave x -ray patterns corresponding to two minerals, one closely related to doloresite, the second a new mineral. It is monoclinic, space group C_{2h}^3-C2/m , $a_0=12.17 \pm 0.05$, $b_0=2.99 \pm 0.01$, $c_0=4.83 \pm 0.02$ Å., $\beta=98^\circ 15' \pm 5'$. The unit cell contains $H_6V_4O_{10}$, as deduced from the structure (no chemical analysis). The formula may be written $V_2O_3 \cdot V_2O_4 \cdot 3H_2O$ or $V_2O_2(OH)_3$.

The name is for Professor Gunnar Hägg, University of Uppsala, Sweden.

M. F.

Frolovite

E. S. PETROVA. A new hydrous calcium borate-frolovite. *Zapiski Vses. Mineralog. Obsch.*, **86**, 622–625 (1957) (in Russian).

The mineral occurs in limestones of Middle Devonian age in the Novo-Frolovsk contact-metasomatic copper deposits, Tur'insk region, northern Urals. It is associated with calciborite (*Am. Mineral.* **41**, 815 (1956)), calcite, garnet, and magnetite, and replaces calciborite.

The color is white with a grayish tint, luster dull, translucent in fine splinters. Hardness 3.5, brittle. G . 2.14, Luminesces violet in cathode rays (calciborite luminesces green). Optically biaxial, positive, n_s alpha 1.572, gamma 1.586, both ± 0.003 , $2V$ about 75° , birefringence 0.014. Extinction sometimes undulatory.

Analysis by T. A. Zvereva gave B_2O_3 34.20, CaO 28.70, MgO 0.72, H_2O (cryst.) 32.96,

SO₃ 1.78, Fe₂O₃ 0.10, SiO₂ 0.57, sum 99.03%, which corresponds, after deducting about 3% gypsum, to CaB₂O₄·2.5H₂O. Spectrographic analysis showed also about 0.1% As, Zn, Sr, and about 0.01% Mn, Ti, Nb, Cu, P, V, Yb. The mineral is insoluble in water, easily soluble in warm acids. A DTA curve showed an endothermal effect at 190°, corresponding to the loss of water of crystallization.

Unindexed x-ray powder data by G. A. Sidorenko are given. The strongest lines and intensities (A., KX?) are 6.084 (10), 3.858 (9), 3.471 (8), 2.357 (8), 2.522 (7), 2.330 (7), 2.654 (6), 2.036 (6); 15 additional lines are given.

The name is for the locality.

DISCUSSION

Petrova does not mention that J. H. van't Hoff synthesized some fifty years ago two distinct modifications of CaB₂O₄·4H₂O. The x-ray powder data given are close to those found in the laboratory of the U. S. Geological Survey on a sample synthesized at 70° by Dr. W. T. Schaller, which corresponds to van't Hoff's β—CaB₂O₄·4H₂O. Dr. Schaller informs me (private communication), that he measured alpha 1.563, beta 1.572, gamma 1.586, 2V 70°, birefringence 0.023. This suggests that Petrova's alpha was really the beta index.

The mineral is not close to any known and probably belongs in Class 25 of Dana's System, 7th Ed., Vol. II, near pinnoite.

M.F.

Smirnovskite

I. F. GRIGOR'EV and E. I. DOLOMONOVA. Smirnovskite—a new mineral of the group of hydrous fluoro-silicophosphates of thorium. *Zapiski Vses. Mineralog. Obschch.*, **86**, 607–621 (1957) (in Russian).

The mineral occurs in cassiterite-feldspar-quartz veins of the Etykinsk deposits, eastern Transbaikalia, in two distinct generations, associated with quartz, amazonite, topaz, zinnwaldite, fluorite, and especially with cassiterite.

Two complete and two partial chemical analyses are given:

	1	2	3	4
ThO ₂	51.20	59.0	—	53.11
TR (a)	7.90	0.84	—	2.22
CaO	3.90	4.10	1.82	2.70
MgO	0.22	0.21	0.40	none
Na ₂ O	1.00	—	—	—
K ₂ O	1.00	—	—	—
Fe ₂ O ₃	1.05	2.80	8.00	0.70
Al ₂ O ₃	0.79	2.87	—	—
SiO ₂	6.54	9.75	10.00	3.96
P ₂ O ₅	17.80	9.01	—	17.02
F	5.02	3.58	—	—
H ₂ O ⁺	6.87(b)	9.25	—	—
U ₃ O ₈	0.10	—	—	—
	<u>103.39(c)</u>	<u>101.41</u>		
—(O=2F)	<u>2.09</u>	<u>1.41</u>		
	<u>101.30</u>	<u>100.00</u>		
G.	4.68	—		

Analyst	T. L. Pokrovskaya	L. B. Tumilov	T. L. P.	A. Y. Sheskol- skaya
Color	Dirty-brown	Mixed	Dirty-brown	Pale Brown

(a) Presumably TR_2O_3 . (b) Penfield method. Another method gave 5.40 (c) Given as 102.39.

These give (Th, Ca, Ce)(P, Si, Al)(OH)(O, OH, F)₄ with P:Si=66:29 in No. 1 and 37:47 in analysis 2. These are compared with the analyses of auelrite (Dana's System, 6th Ed., p. 489, 1027); smirnovskite differs in the higher content of P_2O_5 , rare earths, and F. Spectrographic analyses showed also Ba, Pb, As, Mn, Sn, and Sr.

The mineral occurs in square to diamond-shaped (in cross-section) crystals up to 1.5 cm. in diameter. The color is mostly reddish- to dirty-brown, also orange, yellow, colorless. Luster greasy, fracture conchoidal, hardness near 5. G. 4.68 (dirty-brown). Mostly isotropic with n 1.702–1.718 (brown or red), 1.685 (colorless); anisotropic reddish-brown material had n_s 1.678, 1.682 and were uniaxial positive. The birefringence of some crystals was up to 0.015.

A D.T.A. curve shows an endothermic effect at 100–280° and a small exothermic effect at 600–700°.

The mineral is metamict, giving only a few diffuse lines. When the mineral was heated at 800° for 4 hours, it gave good pattern of thorianite with a_0 5.56 Å. A similar mineral is noted from pegmatites of eastern Kazakhstan. It is uniaxial, positive, n 1.664, birefringence 0.018. It contains no rare earths.

The name is for the late Sergi S. Smirnov.

DISCUSSION

This is apparently a phosphate-rich metamict thorite or thorogummite. The differences from auelrite do not seem to me to be sufficient to justify a new name.

M.F.

Jagoite

RAGNAR BLIX, OLOF GABRIELSON, and FRANS E. WICKMAN. Jagoite, a new lead-silicate mineral from Långban in Sweden. *Arkiv. Mineral., Geol.*, **2**, 315–317 (1957).

Jagoite is a rare mineral found around 1943 in hematite ore in the "Camberra" stope. It occurs as fine-grained micaceous aggregates of plates, commonly surrounded by a zone of black melanotekite. Other associated minerals are quartz and an unidentified mineral.

Analysis (by R. B) gave SiO_2 22.35, BeO 0.12, Al_2O_3 0.50, Fe_2O_3 7.00, TiO_2 0.10, MgO 0.60, FeO none, MnO 0.88, CaO 0.65, PbO 64.26, Na_2O 0.61, K_2O 0.37, Cl 3.25, H_2O^+ 0.17, H_2O^- 0.19, F none, active O none, sum 101.05—(O=Cl₂) 0.73, 100.32%. This corresponds to $(\text{Pb, Ca, Mn, Na, K})_{24}(\text{Fe, Al, Mg})_7(\text{Si, Al, Be})_{27}\text{O}_{84}(\text{OH, Cl})_8$.

Jagoite is yellow-green, streak yellow. Luster vitreous, shining on cleavage surfaces. H. 3, G. 5.43. Non-fluorescent in ultra-violet light. The mineral is optically uniaxial, negative, refraction around 2.0, birefringence 0.025. Non-pleochroic.

Laue photographs show jagoite to be trigonal. Oscillation, rotation, and equi-inclination photographs were of poor quality because the plates of jagoite are easily deformed. The hexagonal unit cell has $a_0=8.65 \pm 0.03$, $c_0=33.5 \pm 0.1$ Å, possible space groups $P3$ and $P\bar{3}$. Cleavage (0001) perfect. Unindexed x-ray powder data are given; the strongest lines are 3.40 (10), 2.80 (8), 4.16 (5), 2.99 (5), 2.50 (4).

The name is for John B. Jago, mineral collector, of San Francisco.

M.F.