NEW MINERAL NAMES

Kirschsteinite

TH. G. SAHAMA AND KAI HYTÖNEN. Kirschsteinite, a natural analogue to synthetic iron monticellite, from the Belgian Congo. *Mineralog. Mag.*, **31**, 698–699 (1957).

The new mineral, the iron analogue of monticellite, occurs in melilite-nephelinite lava from Mt. Shaheru, Belgian Congo, associated with melilite, nepheline, clinopyroxene, kalsilite, götzenite, combeite, sodalite, magnetite, perovskite, apatite, hornblende, biotite, and an unidentified mineral.

Analysis gave SiO_2 32.71, TiO_2 0.23, Al_2O_3 0.26, Fe_2O_3 0.66, FeO 29.34, MnO 1.65, MgO 4.95, CaO 29.30, Na_2O 0.34, K_2O 0.36, P_2O_5 0.07, H_2O^+ 0.25, H_2O^- 0.06, sum 100.18%. This corresponds (in mol %) to Ca(Fe, Mg, Mn)SiO_4 96.3 with Fe:Mg:Mn=69.4:22.6:4.3, Fe_2SiO_4 3.7. The analyzed mineral is therefore a magnesian kirschsteinite.

The mineral is slightly greenish; it is colorless in thin section. G. (pycnometer) 3.434. Optically biaxial, negative, α1.689, β 1.720, γ 1.728, 2Vα 51±; $\alpha=b$, $\beta=c$, $\gamma=a$.

X-ray powder data, indexed from the data on fayalite, are given. The strongest lines are 2.949 (100), 2.680 (85), 2.604 (80), 3.658 (70), 1.839 (60). From the powder data, the unit cell has $a=5.859$, $b=11.132$, $c=6.420$ Å, all ±0.005. These were confirmed by Weissenberg and rotation photographs. Presumably the mineral is orthorhombic.

The name is for the late Egon Kirschstein, German geologist, pioneer in geological exploration of North Kivu.

MICHAEL FLEISCHER

Götzenite

TH. G. SAHAMA AND KAI HYTÖNEN. Götzenite and combeite, two new silicates from the Belgian Congo. *Mineralog. Mag.*, **31**, 503–510 (1957).

Analysis gave SiO_2 32.50, TiO_2 9.72, Al_2O_3 4.26, Fe_2O_3 0.35, FeO 0.45, MnO 0.07, MgO 0.29, CaO 41.80, BaO 0.09, SrO none, Na_2O 4.85, K_2O 0.14, P_2O_5 0.01, CO_2 none, F 8.33, Cl 0.15, SO_3 0.19, H_2O^- 0.14, H_2O^+ 0.26, sum 103.60—($O=F_2$) 3.54=100.06%. This is said to correspond to 5Ca(Si, Ti)O_3. (Na, Ca, Al)$_2F_{3.5}$. The unit cell content is $(Ca, Na)_{6.66}$ $(Ti, Al, etc.)_{1.66}Si_4O_{15}(F, OH)_{3.49}$ (compare the rinkite group—new data). The mineral is close in chemical composition to calcium-rinkite but contains much more calcium, somewhat less sodium, and no rare-earths, compared to 2.3%. Spectrographic analysis showed no Ce, Y, Nb.

The mineral is easily soluble in hot dilute HCl. When heated, it shows decreasing birefringence and at 955±10° C. becomes isotropic; *x*-ray study shows that it has decomposed.

Götzenite occurs in colorless prismatic crystals up to 0.5 mm. long. Goniometric data (all±1/2°) gave (100):(403)=138°, (403):(001)=143°, (001):$(\bar{1}01)$=145°, $(\bar{1}01)$:$(\bar{1}00)$=113°, $(\bar{1}00)$:$(\bar{2}0\bar{1})$=147°, $(\bar{2}0\bar{1})$:$(00\bar{1})$=135°, $(00\bar{1})$:$(10\bar{1})$=146°, $(10\bar{1})$:(100)=113°. Weissenberg photographs show the mineral to be triclinic with $a=10.93\pm0.05$, $b=7.32\pm0.03$, $c=5.74\pm0.03$ Å, alpha 90°, beta 100±1°, gamma 120±1°, $a:b:c=1.493:1:0.784$. Cleavage perfect (100), good (001). Most crystals show lamellar twinning with twin axis *b* and composition plane perpendicular to (001). *X*-ray powder data (not indexed) are given and agree fairly well with those of Slepnev for the rinkite group, although the unit cell and symmetry do not agree. The strongest lines given for götzenite are 3.100 (100), 2.986 (100), 1.911 (50), 2.648 (40), 2.511 (25), 1.690 (25).

The mineral is biaxial, positive, with *n*s, alpha 1.660, beta 1.662, gamma 1.670, 2V 52° (measured), 53½° (calcd.) Dispersion strong, 2V greater for red than blue. A diagram of the optical orientation is given. D_4^{20} 3.138 (pycnometer). Hardness not given.

Götzenite occurs in a nephelinite found on the wall of Mt. Shaheru, the extinct southern tributary of the active volcano Mt. Nyiragongo, North Kiva, Belgian Congo.

The name is for the German traveller, Count G. A. von Götzen, the first white man to climb Mt. Shaheru (1894).

Discussion—I do not agree that "the entire absence of the rare earths (and Cb, Sr) and the somewhat higher fluorine content of götzenite as well as its slightly differing optical properties seem to justify the mineral being distinguished from calcium rinkite." However, the name calcium rinkite was somewhat unsuitable for a mineral with the same calcium content as rinkite and it may be abandoned in favor of götzenite, which is much closer to being an end-member.

M. F.

Combeite

Th. G. Sahama and Kai Hytönen. Götzenite and combeite, two new silicates from the Belgian Congo. *Mineralog. Mag.*, **31,** 503–510 (1957).

Analysis of combeite containing some alteration product gave SiO_2 49.78, TiO_2 0.32, ZrO_2 0.44, Al_2O_3 2.45, Fe_2O_3 1.86, FeO 0.54, MnO 0.58, MgO 0.41, CaO 22.68, BaO 0.09, SrO none, Na_2O 16.14, K_2O 1.18, P_2O_5 0.02, CO_2 none, F 1.87, Cl 0.30, SO_3 0.19, H_2O^- 0.42 H_2O^+ 1.39, sum 100.66$-$($O=F_2$, Cl_2) 0.86$=$99.80%. Spectrographic tests showed rare earths to be absent. This is interpreted as corresponding to the simplified formula $Na_4(Ca, Al, Fe)_3Si_6O_{16}(OH, F)_2$; the unit cell contains 3 formula weights. Combeite is easily soluble in hot dilute HCl.

The mineral occurs in poorly developed colorless stout hexagonal prisms a few tenths of a mm. in length. No terminal faces were observed. Cleavage none. D_4^{20} 2.844 (pycnometer). It is optically uniaxial, negative, birefringence very low, $\epsilon \approx \omega = 1.598 \pm 0.002$. Weissenberg photographs show the mineral to be hexagonal rhombohedral, $\bar{3}mR$, possible space groups $R3m$, $R32$, $R\bar{3}m$. The unit cell has $a=10.43$, $c=13.14$, both ± 0.03 Å, $c/a=1.260$. Indexed *x*-ray powder data are given; the strongest lines are 2.657 (100), 2.607 (80), 3.304 (70), 2.722 (50), 3.354 (40), 1.861 (40).

The mineral has altered to a product of higher birefringence with wavy extinction, uniaxial, negative, with optic axis parallel to that of unaltered combeite, and with *n*s 1.56–1.57. Its *x*-ray pattern is very similar to that of combeite.

Combeite occurs in the same rock as götzenite, see above. The name is for the late A. D. Combe of the Geological Survey of Uganda; pronounced k$\overline{oo}$mbite. Perhaps an analogue of eudialyte.

M. F.

Vibertite

N. R. Goodman. Gypsum in Nova Scotia and its associated minerals. The geology of Canadian industrial mineral deposits, pp. 110–114, Canadian Inst. Mining and Metallurgy, 1957.

$CaSO_4 \cdot 0.5H_2O$ was identified optically and by *x*-ray powder study in many samples of well borings from the upper 1,000 feet drilled at Nappan, Cumberland County, Nova Scotia. It replaces gypsum or anhydrite and is believed to have been present in the rocks, and not formed during drilling or in making sections.

The name is for G. Vibert Douglas, Professor of Geology, Dalhousie University.

Discussion.—The name bassanite has priority, see Dana's System, 7th Ed., Vol. II, p. 476, and remarks on the name miltonite (*Am. Mineral.*, **36,** 640 (1951)).

M. F.

Niobolopariite

I. P. Tikhonenkov and M. E. Kazakova. Niobolopariite—a new mineral of the perovskite group. *Zapiski Vses. Mineralog. Obshch.*, **86,** 641–644 (1957) (in Russian).

The mineral occurs as crystals up to 1.5 mm. in diameter, with the octahedron dominant, and the cube minor but usually present. It is black, reddish-brown in fine splinters. Streak grayish-brown. Luster strong, metallic. No cleavage, fracture conchoidal. Hardness $5\frac{1}{2}$–6, G. 4.657 Isotropic, with n about 2.35.

Analysis (by M. E. K.) gave TiO_2 32.01, $(Nb, Ta)_2O_5$ 26.26, ΣCe_2O_3 25.55, ThO_2 1.16, FeO (total iron) 0.94, CaO 1.32, MgO 0.18, Na_2O 10.53, K_2O 0.80, H_2O 0.85, sum 99.60%. This corresponds to $(Na_{0.59}\ Ce_{0.27}\ Ca_{0.07})\ (Ti_{0.67}\ Nb_{0.33})\ O_{2.87}\ (OH)_{0.13}$, with a slight deficiency in the A position of the formula $A_2B_2(O, OH)_6$. A dehydration curve shows that most of the water was lost at 150°, the remainder at 700–800°. The mineral is insoluble in acids.

X-ray powder data are given. The strongest lines (kX) are 2.756 (10), 1.951 (6), 1.592 (6), 1.378 (4). This corresponds to a cubic cell with $a_0\,3.905 \pm 0.005$ A., but the mineral may be pseudo-cubic.

The mineral occurs in a pegmatite vein cutting pyroxene-bearing rischorrites of Kukisvumchorr Mt., Khibina Tundra, Kola Peninsula. It occurs only in parts of the vein in which the principal minerals (K feldspar, nepheline, arfvedsonite, and aegirine) have been largely replaced by natrolite and hackmanite, and appears to have been formed at the expense of rinkolite.

Discussion.—This member of the perovskite group contains 26% Nb_2O_5, whereas loparite contains about 10%. Nevertheless, since Ti is still >Nb, the name seems to be an unnecessary one for niobian loparite.

M. F.

Orthochamosite

Frantisek Novak, Jiri Vtelensky, Jiri Losert, Frantisek Kupa, and Zdenek Valcha. The orthochamosite from the ore veins of Kank near Kutna Hora—a new specific mineral. Frantisek Slavik Memorial Vol., *Czech Acad. Sci.*, **1957,** 315–344. (Czeck with English summary).

The name orthochamosite is given to the orthohexagonal modification first described by Brindley (*Mineralog. Mag.*, **29,** 502–522 (1951), and since by Brindley and Youell (*Ibid.*, **30,** 57–70 (1953), and Deudon (*Bull soc franc. mineral. crist.* **78,** 475–480 (1955)).

Analysis gives the formula:

$$(Fe^{2+}{}_{3.60}Mg_{1.06}Ca_{0.06})\ (Fe^{3+}{}_{0.46}Al_{0.71})\ (Si_{3.02}Al_{0.98})O_{10}(OH)_8.$$

G. 3.078, H. about 2, mean n 1.649. X-ray powder data give a_0 5.355, b_0 9.293, c_0 7.043 kX Dehydration and D.T.A. data are given.

M. F.

Parapitchblende

Jacques Geffroy and Jacqueline A. Sarcia. Contribution a l'etude des pechblendes francaises. *Sciences de la Terre* (*Ann. école natl. superieure géol. appliquée et prospection minière Univ. Nancy*) **2,** No. 1–2, 1–157 (1954).

The name parapitchblende is provisionally given to a black, isotropic alteration product of the pitchblende variety of uraninite from veins at Bauzot and Ruaux, Saone-et-Loire, France. It is apparently an oxide of uranium containing chiefly U^{+6} and minor U^{+4}. It differs from ordinary pitchblende in polished section in lower hardness and inferior reflectivity.

Discussion.—*X*-ray and chemical study would probably establish the identity of the substance as one of the known gummite-type alteration products of uraninite or perhaps a relatively highly oxidized type of uraninite itself. In the absence of diagnostic *x*-ray and other criteria, it would have been preferable to have simply called the substance an unidentified mineral and not to have advanced a new name, even provisionally.

Clifford Frondel

Unnamed Manganese Silicate

Smirnov, S. S., Mineralogy of some polymetallic ores of the Transbaikal region, p. 18–128 in *Selected works, Moscow, Acad. Sci. USSR*, 248 p. (1955).

An unnamed manganese silicate is described (p. 115–116) in this posthumous paper, never before published. The silicate occurs in highly oxidized material not visibly connected with lead-zinc ores of the Donin area, Nerchinsk district. The mineral, rosy-red where fresh, is veined by bustamite. Other paragenetic details could not be determined, owing to the strong oxidation. Optical properties: colorless in thin section, $nX \sim 1.780$, $nZ \sim 1.810$, $nZ - nX = 0.031$, $2V_X = 60°$; cleavage ⊥Y distinct, cleavage ⊥X less distinct. One grain showed a very good cleavage whose coördinates relative to X, Y, and Z are 45°, 0, and 45°. Analysis by M. M. Stukalova in 1930, on material highly contaminated with bustamite and some calcite, gave: SiO_2 37.72, TiO_2 nil, Al_2O_3 nil, Fe_2O_3 2.01, FeO 6.33, MnO 45.65, MgO 1.35, CaO 5.94, CO_2 1.13; sum 100.15% [100.13%]. Deducting CO_2 as calcite and the remaining CaO as bustamite ($6MnSiO_3 \cdot 5CaSiO_3$—the formula of analyzed bustamite from the Donin area), the author gets the molecular proportions 668 (Mn, Fe, Mg)O:452SiO_2, or very nearly 3(Mn, Fe, Mg)O.2SiO_2 [equivalent to $(Mn_{2.43}Fe_{0.42}Mg_{0.15})O.2SiO_2$; total iron as FeO]. Though no mineral of like physical and chemical character was known to him, the author thought his data inadequate for establishing a new mineral species.

Discussion.—Chemically, Smirnov's manganese silicate is analogous to artificial $Mn_3Si_2O_7$, named *Manganiustit* [manganjustite] by O. Glaser (1926, *Centralbl. Mineralogie*, Abt. A, p. 81–96). Optical data for the artificial compound have never been reported, and *x*-ray data are lacking for both substances. Because physical correspondence between these substances has not been demonstrated, one can state only that a mineral chemically resembling the manganjustite of Glaser has been reported by Smirnov.

B. F. Leonard

Strunzite

Clifford Frondel. Strunzite, a new mineral. *Die Naturwissenschaften* **45,** 37–38 (1958).

The new mineral forms divergent tufts and felted coatings of tiny hair-like or lath-like crystals. Color straw-yellow to brownish-yellow. G. variable, 2.47–2.56, mostly near 2.52.

Weissenberg and precession photographs show it to be monoclinic, $a_0 = 9.80$, $b_0 = 18.06$, $c_0 = 7.34$ (A. or kX?), β 100°10′, $a_0:b_0:c_0 = 0.543:1:0.406$. Space group probably $C2/c$. The laths are flattened on (010) and twins on (100) have been observed. *X*-ray powder patterns (not given) are nearly identical, but show slight variations in spacings.

"An approximate chemical analysis on 150 mg" gave P_2O_5 33.0, MnO 9.1, Fe_2O_3 36.0, $H_2O(\pm)$ 22.5, sum 100.6%. Spectrographic analysis showed also 0.X% Mg and Zn. This is close to $MnFe_2(PO_4)_2(OH)_2 \cdot 8H_2O$. The unit cell contains 4 molecules.

The optical properties vary, both from the same locality and from different localities. For Hagendorf material, α 1.619, β 1.670, γ 1.720, $Z:c = 10°$, pleochroism faint in yellow, absorption Z>X, Y. There is no obvious correlation between optical properties, *x*-ray spacings, and Fe/Mn ratio.

The mineral occurs as a near-surface weathering product in 10 pegmatites that contain triphylite (Palermo and Fletcher, N. H.; Norway, Rumford, Newry, and Unity, Maine; Hagendorf and three others in Bavaria), also as films in weathered outcrops of phosphate rock of the Phosphoria Formation at Rasmussen Valley, Idaho.

The name is for Professor Hugo Strunz of Berlin and Regensburg.

M. F.

Revoredite

G. C. AMSTUTZ, P. RAMDOHR, and F. DE LAS CASAS. A new low temperature mineral of hydrothermal origin from Cerro de Pasco. *Bol. soc. geol. Peru,* **32,** 25–33 (1957).

The mineral, first thought to be botryoidal supergene limonite, was found on the 1400 level of the Cerro de Pasco mine in cavities in the lead-zinc sections. It occurs as stalactitic tubes, as massive reniform crusts, and as powdery incrustations; the vugs range from very small ones to one probably containing several tons of the mineral. The mineral is associated with quartz, galena, sphalerite, pyrite, and gratonite.

The color ranges from silvery-gray to orange to carmine-red; streak brownish-red. Fracture conchoidal. Optically isotropic, semi-opaque, pleochroism not detected. Fairly soft. *X*-ray studies at Harvard, Heidelberg, and the U. S. Geological Survey show the material to be amorphous.

Chemical analyses (by Research Dept., Cerro de Pasco Corp.) gave As 52.1, 51.9; Pb 8.7, 2.7; S 34.9, 34.7, Tl 0.5–1%. Semiquant. spectrographic analyses of 6 samples of different color show As major in all, Pb major in 3, minor (1–10%) in 3, Fe 1–10% in 3, 0.1–1% in 3, Tl 1–10% in 2, 0.1–1% in 3, 0.01–0.1% in 1. Also detected Cd, Al, In, Sn, Zn, Sb and others. When heated, the material turns black and melts.

The name revoredite, for Juan Francisco Aguilar Revoredo, a Peruvian mineralogist, is proposed "in case that a crystalline sample should be found or that, by some method, it might be possible to attribute a crystalline structure to this so far amorphous mineral."

M. F.

Koutekite

ZDENEK JOHAN. Koutekite: a new mineral. *Nature,* **181,** no. 4622, 1553–1554 (1958).

The mineral occurs with arsenic, silver, smaltite, loellingite and chalcocite "in the bicarbonate gangue" of specimens from Černy Dul in the Krkonoše (Giant Mts.), Bohemia. It occurs as fine grains intergrown with an unknown copper arsenide. Synthetic alloys corresponding closely to Cu_2As were identical with the new mineral by optical and *x*-ray study.

Under the microscope the mineral is bluish-gray (markedly blue compared to chalcocite). Strongly anisotropic, no internal reflections. Etched by HNO_3 (1+1), HCl (1+1), 20% $FeCl_3$ solution, giving first a crimson color, then a light gray; partly positive, partly negative results were obtained with 5% $HgCl_2$ solution, negative with 40% KOH. Apparently hexagonal; the strongest lines of the *x*-ray pattern have spacings (intensities not given) 3.32, 2.446, 2.078, 2.024, 1.994, 1.374, 1.324, 1.197, 1.178, 1.147A. G. (synthetic) 8.48.

The name is for J. Koutek, professor of economic geology, Charles University, Prague.

DISCUSSION.—Nearly all these lines are fairly close to strong lines of "β-domeykite" (see Padera, *Rozpravy Česke Akad.* **61,** No. 4 (1951)), but many lines of the latter are missing here. More data are needed.

M. F.

Kobokobite

J. Thoreau. Sur un mineral de la famille des "Dufrenites" dans la pegmatite de Kobokobo (Congo Belge). *Acad. royale Belg., Bull. classe sci.*, **43,** 705–710 (1957).

The mineral occurs as crusts of radiating fibers and as masses in the Kobokobo pegmatite, South Kivu. Fresh material is dull green, altered material is brown. Analyses by P. Ronchesne of the green and brown material gave FeO 9.36, —; MnO 8.40, 4.14; CaO, MgO, Al_2O_3 n.d., n.d.; Fe_2O_3 41.33, 49.21; Mn_2O_3 —, 4.96; P_2O_5 32.20, 31.67; H_2O 8.38, 10.90; sum 99.67, 100.88%. The first analysis gives approximately $RO:Fe_2O_3:P_2O_5=10:10:9$, or if slight oxidation is assumed, $(Fe'', Mn'')_2Fe_3'''(PO_4)_3(OH)_4\cdot nH_2O$, whereas Frondel had proposed $Fe''Fe_6'''(PO_4)_4(OH)_8$ and Lindberg $(Fe'', Mn'')Fe_4'''(PO_4)_3(OH)_5\cdot 2H_2O$ for the rockbridgeite-frondelite series.

X-ray powder data are given; they agree closely with those of rockbridgeite and frondelite. The green mineral is optically biaxial, positive, with α 1.798±0.003, β 1.820 ±0.002, 2V very large, Z perpendicular to the cleavage, γ parallel to elongation, pleochroism marked, X green to bluish, γ pale brown. The brown variety has *n*s approximately α 1.86, β above 1.88, X parallel elongation, X pale brown, γ dark brown.

The new name is justified on the basis of the composition (higher content of FeO+MnO) and the lower indices of refraction than those reported for the rockbridgeite-frondelite series (see Frondel, *Am. Mineral.*, **34**, 513–540 (1949, Lindberg, Ibid., 541–549).

Discussion.—Should not have been named. The formulas of these minerals are uncertain because of doubt as to the degree of oxidation of FeO.

M. F.

Unnamed (β-MnS)

Guy Baron and Jacques Debyser. Sur la presence dans les vases organiques de la mer Baltique du sulfure manganeux β hexagonal. *Compt. rendu acad. sci. France,* **245,** 1148–1150 (1957).

Rose-colored beds 0.5–2 mm. thick were found in cores taken at 2.15–4.45 m. below the water-sediment interface at Landortsdjupet on the Baltic Sea. These very fine-grained layers contained 2.35–3.40% organic carbon and consisted chiefly of quartz, alkali feldspar, plagioclase, illite, and kaolinite. Minute bipyramidal black prisms in the clay were found spectrographically to contain much Mn, less Si and Al, no Fe. A microchemical analysis gave S 27.3±0.3%. The *x*-ray powder diagram is identical with that of synthetic hexagonal red β-MnS (Schnaase, *Zeitschr phys. Chem.* **B20,** 89–117 (1933)). Indexed *x*-ray powder data (no intensities given) show lines at 3.43, 3.21, 3.03, 2.352, 1.992, 1.82, 1.725, 1.693, 1.666, 1.52, 1.45, 1.344, 1.204, 1.149, 1.113. The mineral is believed to be authigenic.

Discussion.—Apparently a member of the wurtzite group.

M. F.

NEW DATA

Rinkite, Johnstrupite, Rinkolite, Lovchorrite, and Calcium Rinkite (all = Mosandrite)

Yu. S. Slepnev. The minerals of the rinkite group. *Izvest. Akad. Nauk S.S.S.R., Ser. geol.*, 1957, No. **3,** 63–75 (in Russian).

Th. G. Sahama and Kai Hytönen. Unit cell of mosandrite, johnstrupite, and rinkite. *Geol. Foren. Forh.*, **79,** 791–796 (1957) (in English).

Slepnev gives the results of new *x*-ray and D.T.A. studies of these minerals. Only calcium-rinkite gave an *x*-ray pattern; the others were metamict, but gave essentially the same pattern after being heated to 800°. All are essentially identical in composition; special tests showed that mosandrite, rinkite, and johnstrupite, previously reported to contain up to about 7% ZrO_2, actually contain about 1%. Calcium-rinkite contains only 2.3% rare earths, compared to 13–21% for the others; however, the content of CaO and Na_2O is not correspondingly increased. Mosandrite is somewhat lower in Na_2O and F and higher in H_2O than the others and may represent an early stage of alteration. The general formula of the group is $Na_2Ca_4CeTiSi_4O_{15}(F, OH)_3$.

Vud'yavrite is highly altered, all the Na_2O and F having been leached out, and is highly hydrated. It is considered to be a distinct mineral.

Slepnev believes the minerals to be monoclinic; he gives for rinkolite $a=18.52$, $b=5.71$, $c=7.52$, β 91°30′–92°; for rinkite $a=18.47$, $b=5.67$, $c=7.46$, β 91°13′; for mosandrite $a=18.37$, $b=5.63$, $c=7.42$, β 93°4′ (?). S. and H. find the minerals to be triclinic. Mosandrite and johnstrupite have $a_0=18.45\pm0.06$, $b_0=7.44\pm0.03$, $c_0=5.63\pm0.02$, alpha 90.2°, beta 91.0°, gamma 100.9°; rinkite has $a_0=18.51\pm0.1$, $b_0=7.45\pm0.03$, $c_0=5.64\pm0.03$, alpha 90°, beta 91°, gamma 101°. (These are clearly identical within experimental error, S. and H. having reversed the *b* and *c* of Slepnev. M. F.) The *x*-ray powder data of S. and H. agree fairly well with those of Slepnev. The unit cell of götzenite (see above) is, however, distinctly different.

The only recommendation made by Slepnev as to nomenclature is that all these minerals be placed in a single group, to be called the rinkite group because mosandrite is partially altered. S. and H. consider that despite the near identity of unit cells, rinkite clearly differs from mosandrite and johnstrupite and is to be regarded as a separate species (The differences seem to me to consist only in that the pattern of rinkite showed many additional lines. M.F.).

DISCUSSION.—The minerals appear to be identical and some names can be dropped, including rinkite (1884), johnstrupite (1890), rinkolite (1926, *Am. Mineral.*, **14**, 440 (1929)), and lovchorrite (1926, *Am. Mineral*, **15**, 203 (1930)), all in favor of mosandrite (1841). The slight degree of alteration of the latter seems insufficient reason for dropping the name. Calcium-rinkite (1935) differs somewhat in composition, but not enough to justify retaining the name (see Götzenite, above).

M. F.

Schuilingite

C. GUILLEMIN AND R. PIERROT. Nouvelles donnees sur la schuilingite. *Bull. soc franc. mineral. crist.*, **80,** p. 549–551 (1957).

The original fragmentary description (see *Am. Mineral.*, **33,** 385–386 (1948) is greatly amplified. The mineral occurs in crusts of crystals rarely up to 0.3 mm in length. Apparently monoclinic, with one good cleavage parallel to the elongation. Color turquoise—to azure-blue, powder pale blue. H. 3–4. G. (hydrostatic) 5.2±0.1.

Optically biaxial, negative, *ns*, α (calcd.) 1.710, β 1.755±0.005, γ 1.775±0.005, 2V 66°. Most crystals show parallel extinction, but some show extinction at 8–10° from parallel.

Microchemical analysis (on 20 mg. for CO_2 and H_2O, 20 mg. for others) gave PbO 37.4, CuO 9.4, CaO 19.8, CO_2 20.9, H_2O 9.9, insol. 3.1, sum 100.5% This corresponds to $Pb_3Cu_2Ca_6(CO_3)_8(OH)_6 \cdot 6H_2O$. The mineral is readily decomposed by dilute acids, with strong effervescence. When heated, it blackens and melts with difficulty to a black bead.

Unindexed *x*-ray powder data are given. The strongest lines in Å. are 4.78 (S), 3.85 (mS), 9.56 (m), 6.08 (m), 4.51 (m), 3.18 (m), 2.95 (m).

DISCUSSION.—Schuilingite is apparently a valid species, to be classed in Dana's System Seventh Ed., Class 16, Type 2.

M. F.

Obruchevite

A. P. Kalita. On the composition of obruchevite—a hydrated uranium-yttrium variety of pyrochlore. *Doklady Akad. Nauk S.S.S.R.*, **117,** 120 (1957) (in Russian).

Previous data are given in *Am. Mineral.* **43,** 380–381 (1958). Two new analyses by M. E. Kazakova and M. V. Kukharchik gave Na_2O 2.43, 2.03; K_2O 0.31, 0.70; CaO 2.82, 2.66; MgO 0.26, 0.18; MnO 0.35,——; Y_2O_3 11.34, 11.73; Ce_2O_3 0.66, 1.13; ThO_2 0.26, 0.11; UO_3 9.72, 10.50; Fe_2O_3 4.30, 3.52; Al_2O_3——, 1.40; SiO_2 3.78, 3.20; TiO_2 6.29, 2.74; Nb_2O_5 37.54, 37.30; Ta_2O_5 5.47, 7.23; H_2O^+ 7.77, 14.50 (total H_2O), H_2O^- 6.48,——; ignition loss ——, 1., sum 99.78, 99.93% (given as 100.33 M.F.). The first analysis corresponds to $(Y, Na, Ca, U)_{1.27}(Nb, Ta, Ti, Fe)_2O_{5.40}(OH)_{0.60}\cdot 1.13\ H_2O$. A D.T.A. curve shows a large endothermal effect at 200° and a small exothermic effect at 710°. A curve for loss of weight shows 7.2% to 200°, 10.8% to 500°, 13.4% to 1100°.

The mineral is metamict; when heated to 1100° it gives a powder pattern similar to that of the pyrochlore group with $a = 10.0–10.34$ Å. The strongest lines are 2.975 (10), 1.695 (9), 1.488 (7), 3.152 (5), 1.550 (5).

The color is brown of various shades, mainly chocolate-brown, luster vitreous to adamantine. G. 3.60–3.80, hardness $4\frac{1}{2}$–5. Isotropic, *n* 1.830–1.835. Fracture conchoidal.

Obruchevite occurs in a pegmatite in the Alakurtt region, north-west Karelia, in albite-muscovite replacement zones, associated with garnet, fergusonite, and columbite.

Discussion.—Y predominates in the A group of the formula, so that obruchevite may be ranked as a species corresponding to the Ce-predominant member, loparite.

M. F.

Classification of the Alkali Amphiboles

A. Miyashiro. The chemistry, optics, and genesis of the alkali-amphiboles *Journ. Fac. Sci. Univ. Tokyo,* Sec. 2, **11,** 57–83 (1957).

Akiho Miyashiro and Masao Iwasaki. Magnesio-riebeckite in crystalline schists of Bizan in Sikoku, Japan. *Journ. Geol. Soc. Japan,* **63,** 698–703 (1957).

Yu. K. Andreev. A new variety of alkali amphibole-magnesio-arfvedsonite *Trudy Inst. Geol. Rudnykh Mestorozhdenii, Petrog., Mineralog., Geokhim,* **10,** 12–20 (1957) (In Russian).

The first of these papers is an important study of these minerals, with consideration of 63 analyzed and optically studied samples. Eckermannite and holmquistite, in which there is appreciable Li, are omitted.

Taking the general formula of the alkali amphiboles as $(Na, K, Ca)_{2-3}(R'', R''')_5(Si, Al)_8O_{22}(OH)_2$, Miyashiro divides them into four main groups, with ideal formulas as follows:

A. Riebeckite-glaucophane	$Na_2R_3''R_2'''Si_8O_{22}(OH)_2$
B. Arfvedsonite	$Na_2Ca_{0.5}R_{3.5}''R_{1.5}'''(Si_{7.5}Al_{0.5})O_{22}(OH)_2$
C. Katophorite	$NaCaR_4''R'''(Si_7Al)O_{22}(OH)_2$
D. Soda-tremolite	$Na_2CaR_5''Si_8O_{22}(OH)_2$

The first three are in serial relation, with increasing amounts of the substitution CaR''Al for R'''Si. Soda-tremolite is derived from tremolite by substitution of Na_2 for Ca.

Within group A, the names used and ideal formulas are:

	R''	*R'''*	
Riebeckite	Fe_3	Fe_2	
Magnesioriebeckite	Mg_3	Fe_2	
Subglaucophane	$Mg_{1.5}Fe_{1.5}$	AlFe	$Fe'''/R''' = 0.3–0.7$
Glaucophane	Mg_3	Al_2	$Fe''/R'' = <0.5$, $Fe'''/R''' = <0.3$
Ferroglaucophane	Fe_3	Al_2	

Osannite (Hlawatsch, 1906) is a variety of riebeckite.

Ternovskite (Polovinkina, 1924) is magnesioriebeckite.

Crocidolite has riebeckite or magnesioriebeckite composition.

Gastaldite (Struever, 1875) is near glaucophane; the original analysis appears to have been erroneous.

Crossite (Palache, 1894) has been defined both on chemical and optical bases. Miyashiro accepts the optical definition, i.e., optic axial plane normal to (010), $b=Z$, and $c:\gamma$ small. Such material is usually subglaucophane, rarely riebeckite or magnesioriebeckite.

Within group B, the names used and ideal formulas are:

	R''	R'''	
Arfvedsonite	Fe	Fe	$Fe''>Mg$
Magnesioarfvedsonite	Mg	Fe	$Mg>Fe''$

Heikolite (Kinosaki, 1935) is a variety of arfvedsonite with composition near the boundary with riebeckite.

Fluotaramite (Morozewicz, 1925) is mostly magnesioarfvedsonite, partly magnesioriebeckite.

Torendrikite (1920) belongs to magnesioarfvedsonite; some samples later placed here on the basis of optics are magnesioriebeckite.

Andreev describes occurrences of magnesio-arfvedsonite, for which he uses the slightly different formula $Na_3Mg_4Fe'''Si_8O_{22}(OH)_2$.

Within group C, the names used and ideal formulas are:

	R''	R'''	
Katophorite	Fe''	Fe'''	$Fe''>Mg$
Magnesiokatophorite	Mg	Fe'''	$Mg>Fe''$

Anophorite (Freudenberg, 1910) is a magnesio katophorite.

In group D, R'' is largely Mg. R''' is low and predominantly Fe'''.

Imerinite (Lacroix, 1921) and Szechenyiite (Krenner, 1900) belong here. Richterite is manganoan soda-tremolite.

M. F.

Bellite

H. Strunz. Bellit, ein Chromat-Apatit, *Naturwissenschaften*, **45,** 127–128 (1958).

Bellite was originally described by Petterd (1904) as a lead chromate-arsenate, with $CrO_3$22.61, $As_2O_3$6.55($=As_2O_5$7.61), $SiO_2$7.59, PbO 61.68%. Tests by Palache (Dana, 7th Ed., Vol. II, p. 895) indicated it to be a mixture, mainly of mimetite. Strunz reports that red needles from the type locality are optically uniaxial, negative, with ϵ 2.16, ω 2.22 (much higher than those of Palache), a_0 10.13_5, c_0 7.39. The powder photograph is of the mimetite type. Spectrographic analysis showed the presence of Pb, Ag, Cr, and As. On this basis, the formula is written as $(Pb, Ag)_5Cl[(As, Cr, Si)O_4]_3$.

Discussion.—Quantitative analyses are required to establish this as being other than a chromatian variety of mimetite.

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