NEW MINERAL NAMES

Michenerite, Froodite

J. E. Hawley and L. G. Berry. Michenerite and froodite, palladium bismuthide minerals. *Canadian Mineralogist*, v. **6**, 200–209 (1958).

These minerals were described by C. E. Michener (Ph.D. dissertation, Univ. of Toronto, 1940); to his work has been added comparison with recent *x*-ray work on synthetic compounds.

Michenerite is grayish-white, streak black, no visible cleavage, brittle, hardness B (2.5). Sp. gr. between those of sperrylite and galena, probably about 9.5. Optically isotropic. Etch reactions: HNO_3—effervesces slowly, blackens; $FeCl_3$—slowly stains dark, some negative; aqua regia—instantly stains black; HCl, KCN, KOH negative.

Chemical analyses (not given) by the dithizone method on 3 samples gave the ratio Pd:Bi = 2:3, but the indexed *x*-ray powder data are close to those for synthetic $PtBi_2$ and aurostibite ($AuSb_2$), so the composition is probably $PdBi_2$. a_0 6.68 Å. Strongest lines (in Å) are 2.99 (100), 2.01 (90), 2.73 (80), 1.79 (75), 0.870 (40). No compound corresponding to this was found by Burr and Peacock (Univ. Toronto Studies, Geol. Ser. 47, 19–20 (1942) in their study of alloys of Pd with Bi.

The name is for C. E. Michener, vice-president, Canadian Nickel Co., Ltd.

Froodite is gray, streak black, luster metallic, splendent on fresh cleavage, tarnishes quickly; fracture uneven; brittle, G. 12.6, 12.5. Optically anisotropic. Etch reactions: HNO_3 (1+1)—effervescence slow, turns brown and gives granular surface; KCN—slowly stains dark; $FeCl_3$—instantly stains black; HCl (1+1), KOH, and $HgCl_2$—negative. Synthetic material gives slightly different results.

Rotation and Weissenberg photographs by the late Harry Berman gave: monoclinic, a_0 5.71, b_0 4.29, c_0 6.37 Å, beta 102°27′ cleavages (001) very perfect, (100) less perfect. The mineral is identical with synthetic alpha-$PdBi_2$ prepared by Burr and Peacock which was monoclinic, *C2/m*, with a_0 12.75, b_0 4.29, c_0 5.67, β 102°52′, cleavages (100) and (102), *G* 11.5 (measured), 11.52 (calcd.). (Note that Berman's value for *c* must be doubled.)

The work on synthetic material indicates that the composition is close to $PdBi_2$. Michener's approximate analyses (not given) gave Pi:Bi near 1:3. Indexed *x*-ray powder data are given; the strongest lines are 2.77 (100), 1.556 (80), 2.97 (70), 2.48 (70), 2.21 (70), 1.637 (60), 1.419 (60).

The name is for the Frood Mine, Sudbury District, Ontario.

Michenerite and froodite were found in mill concentrates of arsenic- and lead-copper-rich ores of the Frood Mine. Michenerite is apparently the more abundant.

Michael Fleischer

Reinerite

B. H. Geier and K. Weber. Reinerit, $Zn_3(AsO_3)_2$, ein neues Mineral der Tsumeb Mine, Südwestafrika. *Neues Jahrb. Mineral., Monatsh.* **1958**, No. 7–8, 160–167.

The name was mentioned, without details, in an earlier paper. The mineral occurs rarely, associated with chalcocite and a little bornite in cavities in the "second oxidation zone" at a depth of about 900 meters (see under Stottite, *Am. Mineral.*, **43**, 1006 (1958)).

Analyses by W. Reiner gave: for a light-green variety ZnO 56.01, As_2O_3 48.83, sum 99.84%; for an ocean-blue variety ZnO 53.27, FeO 1.30, Cu 2.23, As_2O_3 42.51, S not detd., sum 99.76%, corresponding to $Zn_3(AsO_3)_2$. The Cu and probably part of the FeO are ascribed to inclusions of chalcocite and a little bornite. The mineral dissolves in cold (1+1) HCl.

Rotation, Guinier, and powder photographs show reinerite to be orthorhombic, space group D_{2h}^5 (*Pmma*) with a_0 6.091±0.007, b_0 14.397±0.005, c_0 7.804±0.007 Å, $a:b:c$

$=0.4231:1:0.5421$, $Z=4$. Indexed *x*-ray powder data are given (81 lines); the strongest lines are 3.995 (vs)(121), 2.644 (s)(042), 1.440–1.436 (s)(−), 3.203 (s)(112), 3.432 (ms)(022), and 3.397 (ms)(131). The *x*-ray pattern is identical with that of synthetic $Zn_3(AsO_3)_2$, but is very different from that of armangite, $Mn_3(AsO_3)O_2$.

Reinerite occurs in rough crystals up to 4.7×2 cm. with the faces (010), 110), and (001) dominant, and (012) present. Cleavages (110) good, also (011) and (111). The color is ocean-blue to light yellow-green, luster vitreous to adamantine on fracture surfaces. Hardness 5–5½, G. (pycnometer) 4.27_0 (calcd. from *x*-ray) 4.27_8. Optically biaxial, neg., with *ns* (Na), $\alpha 1.74_9$, β 1.79_0, γ 1.82_1.

The name is for Willy Reiner, senior chemist of the Tsumeb Corp., Ltd. Not to be confused with the sulfosalt renierite, which also occurs at Tsumeb. To be grouped with the arsenites, Dana Class 45, but apparently not isostructural with any known arsenite.

M. F.

Arsenuranylite

L. N. BELOVA. Arsenuranylite, the arsenic analogue of phosphuranylite, *Zapiski Vses. Mineralog. Obshch.*, **87,** 589–602 (1958) (in Russian).

Analysis by L. E. Novorosova and V. L. Litenkova gave UO_3 68.64, CaO 3.48, As_2O_5 16.68, H_2O 9.12, sum 97.95%, corresponding to $CaO \cdot 3.89UO_3 \cdot 1.17As_2O_5 \cdot 8.1H_2O$ or $Ca(UO_2)_4(AsO_4)_2(OH)_4 \cdot 6H_2O$, analogous to the formula of phosphuranylite, but with more water.

The mineral occurs in lichen-like deposits, color more orange than that of phosphuranylite. Under the microscope appears as extremely fine yellow scales. Pleochroism not evident, *ns* α' 1.737, γ' 1.766. G not given.

An *x*-ray powder pattern by N. I. Organov is given, with partial indexing by analogy to phosphuranylite. The strongest lines are 7.72 (10)(200), 3.85 (10)(400), 8.41 (8)(−), 3.13 (8)(204), 3.42 (7)(004, 402), 1.778 (7)(−), 1.729 (7)(−), 1.612 (7)(−), 1.512 (7)(−), 2.57 (6)(−), 1.883 (6)(−). From these, the unit cell is calculated to be a_0 15.40, b_0 17.40, c_0 13.768 Å.

The mineral occurs in the oxidation zone of a deposit containing arsenic-bearing sulfides (no locality is given, as usual), associated with metazeunerite, uranospinite, and novacekite, which it replaces; it is replaced by schoepite and paraschoepite.

The name is for the composition and the relation to phosphuranylite.

M. F.

Zinalsite

F. V. CHUKHROV. Zinc clays from the Akdzhal deposits in Kazakhstan. *Kora Vyvetrivaniya* (*The crust of weathering*), **2,** 107–123 (1956), from an abstract by E. M. Bonshtedt-Kupletskaya in *Zapiski Vses. Mineral. Obshch.*, **87,** 487–488 (1958).

Analysis by V. A. Moleva gave SiO_2 26.60, TiO_2 0.36, Al_2O_3 14.60, Fe_2O_3 1.34, ZnO 36.00, CuO 2.00, NiO 0.04, CoO 0.03, MgO 1.57, MnO 0.02, CaO 1.32, BaO 1.06, K_2O 0.20, P_2O_5 0.50, SO_3 1.02, H_2O^- 2.70, H_2O^+ 10.60, sum 99.96%, corresponding to $Zn_7Al_4(SiO_4)_6 \cdot (OH)_2 \cdot 9N_2O$. Dissolves in 10% HCl or 30% NaOH. The absorption curve with methylene blue is not affected by the addition of KCl (difference from montmorillonite).

The mineral occurs in cryptocrystalline dense aggregates, resembling halloysite, in the zone of oxidation of the Akdzhal and Achisai deposits, Kazakhstan, associated with hydromicas and with other Zn clays; also noted from Sterling Hill, N. J. Color white, rose, to reddish-brown. Does not give a plastic mass with water. G 3.007, hardness 2½–3. Under the microscope appears as very fine anisotropic grains, biaxial, negative, mean *n* 1.56–1.58. Electron microscope photographs show irregular forms.

The x-ray pattern has strong lines at 10.46 and 7.30, other lines at 4.55, 3.58, 2.71 2.425, and 1.559.

The name is for the composition: Zn, Al, Si.

M. F.

Polynite

E. A. Yarilova and E. I. Parfenova. New formation of clay minerals in soils. *Pochvoved.* **1957,** No. 9, 37–48; from an abstract by E. M. Bonshtedt-Kupletskaya in *Zapiski Vses. Mineral. Obshch.*, **87,** 488–489 (1958).

The name is given to a clay mineral of variable composition; 11 samples, separated from the illuvial horizons of different soils, contained: SiO_2 54.83–50.90, P_2O_5 0.17–0.01, Al_2O_3 31.51–24.14, Fe_2O_3 15.74–9.24, CaO 2.52–0.98, MgO 3.74–2.29, K_2O 3.99–1.40, Na_2O 0.33–0.15; the ratio SiO_2:Al_2O_3 2.51–3.81. The DTA curve shows endothermal breaks at 95–120°, at 250–350°, a very weak one at 835°, and an exothermal break at 915–930°. The adsorptive capacity ranges from 45 to 65 meq./100 g.

The mineral has collomorphic texture. Color yellowish. Variable ns; alpha 1.555–1.562 (and up to 1.5 with higher Fe), gamma 1.570–1.585. Pleochroism distinct, X straw-yellow, Z greenish-brown. Under the electron microscope consists of flake-like aggregates; the particles have irregular outlines. Distinguished from kaolinite and montmorillonite by the x-ray lines at 7 and 14 kX. The innermost lines are characteristically broad and very intense, varying in the range 13.47–12.51 kX in inner diameter, and 10.67–9.85 kX in outer; the variation is not the result of the treatment of the mineral.

The name is for B. B. Polynov, "investigator of the process of clay formation in soils."

Discussion.—As the abstractor points out, this may be a mixture and the name is not warranted.

M. F.

Kremenchugite

M. M. Dobrokhotov. A new variety of chlorite from iron-bearing quartzites of the Galeshchin deposits of the Kremenchug region. *Mineralog. Sbornik, Lvov Geol. Obshch.* No. **11,** 295–302 (1957), from an abstract by E. M. Bonshtedt-Kupletskaya in *Zapiski Vses. Mineral. Obshch.*, **87,** 488 (1958).

Analysis, after deducting quartz and siderite, gave SiO_2 27.47, TiO_2 0.34, Al_2O_3 6.19, Fe_2O_3 16.44, FeO 30.43, MnO 0.28, MgO 6.32, CaO 1.76, K_2O+Na_2O 1.15, H_2O^+ 9.62, total 100.00%. Easily decomposed by dilute HCl with separation of gelatinous silica. Color dark green, G. 3.27, b_0 9.41, $c_0 \sin\beta$ 14.2 kX. The x-ray diagram and DTA curve are stated to correspond to those of the iron-rich chlorites (thuringite, chamosite, cronstedtite, etc.), the mineral is distinguished from these by its high refraction. ns, alpha 1.697, gamma 1.703, strongly pleochroic, X clear reddish-brown, Z dense dark green, absorption $Z=Y>X$. Occurs in fine scales, associated with quartz, magnetite, and siderite in quartzites of the Kremenchug region, Ukraine.

The name is for the locality.

Discussion.—An unnecessary name.

M. F.

Dzhulukulite

N. N. Shishkin. Dzhulukulite—a new cobalt mineral. *Doklady Akad Nauk S.S.S.R.*, **121,** 724–726 (1958) (in Russian).

The mineral occurs in cobalt ore in quartz-ankerite veins associated with tennantite, chalcopyrite, glaucodot, pyrite, and bornite, 10 km. N.E. of Lake Dzhulu-Kul, Tuva Autonomous Region. Analysis by H. M. Mikhailova gave Co 26.00, Ni 7.72, Fe 0.55, Cu

1.05, As 45.52, S 18.81, SiO_2 0.40, sum 100.05%. Spectrographic analysis also showed Sb, Ag, Bi, Al, Mg, and Ca, and traces of Pb, Zn, and Mn. A partial analysis of another sample by K. S. Yurina gave Co 18.20, Ni 13.80, Fe 1.20%. The formula is (Co,Ni)AsS.

Color gray, luster metallic, streak gray, hardness 6, sp. gr. 6.36, a_0 5.575±0.01 Å. Unindexed *x*-ray powder data on two samples are given. In polished section grayish-white, relief less than for pyrite, strongly etched by (1+1 HNO_3.

DISCUSSION.—An unnecessary name for nickeloan cobaltite, in the series cobaltite-gersdorffite.

M. F.

Arshinovite

E. G. RAZUMNAYA, G. A. SMELYANSKAYA, K. G. KOROLEV, and G. V. POKUL'NIS. On arshinovite, a new metacolloidal variety of zircon. Methods of study of raw materials, *Gosgeoltekhizdat*, **1957**, 45–50; from an abstract by E. M. Bonshtedt-Kupletskaya in *Zapiski Vses. Mineral. Obshch.*, **87**, 486 (1958).

The name is given to a metacolloidal variety of zircon, occurring in phosphorites, in phosphate-containing tuffs, and in the cement of phosphate-containing sandstones and conglomerates. Rarely forms visible fine veinlets of dense, jasper-like texture with a network of fissures. Color greenish light-gray, hardness low, G. about 3.3, also 3.0–2.8. Isotropic or weakly anisotropic, *n* (nearly colorless) 1.650–1.660, (yellowish, brownish) *n* 1.664–1.70. Recalculation of analyses of mixtures indicates the composition to be close to that of zircon with SiO_2:ZrO_2 about 1:1, Hf:Zr 0.5:0.8, contains tenths of a per cent U. Soluble in HNO_3 and HCl. The *x*-ray pattern is that of zircon but with diffuse lines.

The name is in memory of Professor V. V. Arshinov.

DISCUSSION.—An unnecessary name.

M. F.

DISCREDITED MINERALS

Condurrite (=Tenorite+Cuprite)

P. G. EMBREY. Condurrite: a mixture and not domeykite. *Mineralog. Mag.*, **31**, 979–980 (1958).

Condurrite (Phillips, 1827) has been listed as a synonym of domeykite. It does occur with domeykite and β-domeykite, but the original description specifically restricted the name to the black mineral present, now found by *x*-ray study of type material to be a mixture with cuprite and tenorite predominant, and chalcocite and domeykite present.

M. F.