

NEW MINERAL NAMES*

MICHAEL FLEISCHER, L. J. CABRI, G. Y. CHAO AND ADOLF PABST

Amicite*

A. Alberti, G. Hentschel and G. Vezzalini (1979) Amicite, a new natural zeolite. *Neues Jahrb. Mineral. Monatsh.*, 481-488.

A. Alberti and G. Vezzalini (1979) The crystal structure of amicite, a zeolite. *Acta Crystallogr.*, 35B, 2866-2869.

Electron microprobe analysis (av. of 10) gave SiO₂ 36.38, Al₂O₃ 29.46, Fe₂O₃, MgO, BaO traces, CaO 0.22, SrO 0.03, Na₂O 8.22, K₂O 12.96, H₂O (loss of wt. on dehydration) 12.80, sum 100.07%, corresponding to K_{3.75}Na_{3.61}Ca_{0.05}(Al_{7.86}Si_{8.24})O₃₂ · 9.67H₂O, or K₄Na₄Al₈Si₈O₃₂ · 10H₂O. TG and DTG curves are given; the latter shows a sharp peak at 40-120°C and a broad one at 260°C. An infrared spectrum is given.

Single-crystal study showed amicite to be monoclinic, pseudotetragonal, space group *I*₂, with *a* = 10.226, *b* = 10.422, *c* = 9.884 Å, β 88°19', *Z* = 1; *G* calc. = 2.146, meas. = 2.06. The strongest X-ray lines (48 given) are 7.295(55)(110), 4.220(90)(211,121), 3.238(45)(310), 3.141(80)(013), 2.722(100)(132,321), 2.704(50)(123).

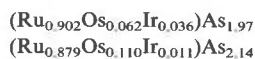
The mineral occurs as radial aggregates of small crystals (100-200 microns), some showing forms {011}, {110}, rarely {111} and {110}. It is colorless, hardness low, av. *n* = 1.498, no cleavage. It occurs in veins of melilite-nepheline volcanic rocks at Höwenegg, Hegan, Germany, associated with CaCO₃ (phase not specified) and merlinoite.

The name is for Giovan Battiste Amici (1786-1863), physicist and optician, inventor of the Amici lens. Location of type material is not stated. M.F.

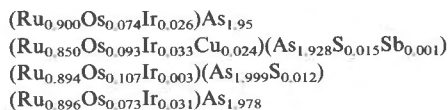
Anduoite

Chromium Group and Electron Probe Group, Institute of Utilization, Chinese Academy of Geological Science; Platinum Group and Electron Probe Group, Institute of Geology and Mineral Resources, Chinese Academy of Geological Science; X-ray Laboratory, Wuhan Geologic College; and X-ray Laboratory, Institute of Geology, Academia Sinica (1979) Anduoite, a new ruthenium arsenide. *Kexue Tongbao*, 15, 704-708 (in Chinese with English abstract).

Electron microprobe analyses of six grains, using sperrylite and pure metals as standards, gave Ru 35.1, 31.4, 35.5, 33.61, 33.44, 33.89; Os 4.5, 7.4, 5.5, 6.96, 7.57, 5.24; Ir 2.6, 0.8, 2.0, 2.44, 2.41, 2.20; Cu -, -, -, 0.61, -, -; As 57.0, 56.7, 56.9, 56.51, 55.74, 57.06; Sb -, -, -, 0.04, -, -; S -, -, -, 0.19, 0.20, 0.20; sums 99.2, 96.3, 99.9, 100.36, 99.36, 98.59 wt%. The analyses correspond to



*Minerals marked with asterisks were approved before publication by the Commission on New Minerals and Mineral Names of the International Mineralogical Association.



The ideal formula is thus RuAs₂.

Precession and Weissenberg X-ray studies show the mineral to be orthorhombic, *Pnmm* or *Pnn2*, *a* = 5.41, *b* = 6.206 and *c* = 3.01 Å, *Z* = 2; *D* calc. = 8.692 g/cm³. Strongest lines of the X-ray diffraction pattern (28 lines given) obtained with a home-made Gandolfi-type camera are: 2.000(50)(121), 1.920(100)(211), 1.501(90)(002,311), 1.210(70)(411,150), 1.187(70)(132), 1.133(80)(430), 1.095(90)(341), 1.083(40)(322). The mineral is isomorphous with omeiite (OsAs₂, *Am. Mineral.*, 64, 464, 1979) and is thought to have the marcasite structure. An intermediate member with a composition of (Ru,Os)As₂ has also been found in the same deposit.

The mineral is dull lead gray with metallic luster and grayish black streak. It is brittle, not soluble in 1:1 HNO₃ and HCl. Under reflected light in air the mineral is white with a pink tint, pinkish brown next to ruthenian osmiridium. The birefractance is noticeable, from pinkish grayish white to pinkish white. It is anisotropic from brownish yellow to grayish green, pale red to pale green. In oil, the birefractance is distinct and anisotropism pronounced, from reddish yellow, greenish yellow to purplish gray. Reflectances measured along the long side and the short side of a grain are: 55.1, 49.5 (480); 53.7, 46.7 (546); 55.4, 46.4 (589); 62.5, 47.3% (656nm). VHN₁₀ = 1120 (1131-1266), VHN₅₀ = 1077.9.

The mineral occurs as massive grains or granular aggregates (60-100 μ) in a chromium deposit related to augite peridotite and dunite in Tibet, China. The host rock is an altered dunite. The main ore mineral is chromian spinel with minor pyrite, pyrrhotite, marcasite, magnetite, chalcopyrite, molybdenite, galena, millerite, and violarite. Other platinum-group minerals present are ruthenarsenite, sperrylite, ruthenian iridarsenite, irarsite, osarsite, osmiridium, ruthenian osmiridium, laurite, and a new mineral "ruarsite" (RuAsS). Anduoite and other arsenides and sulfarsenides, often distributed around the grains of rutheniridosmine, are closely associated with irarsite and show replacement of irarsite. The mineral has also been found in placers near the host rock body with iridosmine, osmiridium, osmium, a Fe-Ru mineral, and minor sperrylite, osarsite, ruarsite, iridarsenite, and irarsite. The name is for the locality. Type specimens are deposited in the collections of the Chinese Geological Museum.

Discussion

The symmetry and cell parameters of anduoite are closely comparable with those reported for synthetic RuAs₂ (*Pnmm*, *a* = 5.41, *b* = 6.17, *c* = 2.96 Å; Heyding and Calvert, *Can. J. Chem.*, 39, 955-957, 1961). The material used for single-crystal X-ray work was stated as a cleavage fragment, thus at least one set of cleavage is present in the mineral. The new mineral "ruarsite" and the Fe-Ru mineral "Ti Liao Kuang" should be fully documented, as the Fe-

Ru alloy has not previously been found in nature. The mineral ruthenian osmiridium reported in this paper may correspond to ruthenosmiridium as defined by Harris and Cabri (*Can. Mineral.*, 12, 104–112, 1973). If so, a formal documentation of the mineral may prove worthwhile as so far only one grain of the alloy from the Heazlewood district, Tasmania has been shown to be ruthenosmiridium (Cabri and Harris, *Can. Mineral.*, 13, 226–274, 1975). G.Y.C.

Drugmanite*

R. Van Tassel, A. M. Fransolet and K. Abraham (1979) Drugmanite, $\text{Pb}_2(\text{Fe}^{3+}, \text{Al})(\text{PO}_4)_2(\text{OH}) \cdot \text{H}_2\text{O}$, a new mineral from Richelle, Belgium. *Mineral. Mag.*, 43, 463–467.

Drugmanite occurs as rare colorless transparent platy crystals up to 0.2 mm, aggregated in bunches in vugs of a mineralized and silicified limestone. Associated minerals are pyromorphite, anglesite, corkite, and phosphosiderite. Microprobe analysis gave: P 8.89, Al 0.85, Fe 6.19 Pb 59.76%, leading to $\text{Pb}_{4.02}(\text{Fe}_{1.55}\text{Al}_{0.45})\text{P}_{4.00}\text{O}_{17.02} \cdot 3\text{H}_2\text{O}$. The monoclinic crystals are {001} platelets bounded by {110}. The space group is $P2_1/a$, cell dimensions determined by 4-circle diffractometer and refined from powder data are: $a = 11.100(6)$, $b = 7.976(4)$, $c = 4.644(3)\text{Å}$, $\beta = 90^\circ 18'(2)'$, $Z = 2$; D calc. = 5.55 g/cm^3 ; strongest lines in the powder pattern are: 4.63(9)(001), 3.752(10)(120), 3.350(8)(310), 3.247(8)(211), 2.912(9)(121). The mean refractive index, n , calculated from reflectance measurements, is 1.87; $2V_\alpha = 33 \pm 2^\circ$; α is approximately normal to (001), the optic axial plane is (010), dispersion $r < v$ strong, measured birefringence on (001) sections is 0.020(2). The name is for Dr. Julien Drugman, Belgian mineralogist (1875–1950). A.P.

Girdite*, oboyerite*, fairbankite*, winstanleyite*

S. A. Williams (1979) Girdite, oboyerite, fairbankite, and winstanleyite, four new tellurium minerals from Tombstone, Arizona. *Mineral. Mag.*, 43, 453–457.

These species were found in small amounts on the waste dumps of the Grand Central mine, Tombstone, associated with many other tellurites and tellurates, mostly as yet undescribed.

Girdite occurs as dense, chalky, spherules up to 3 mm in diameter, usually on fracture surfaces within sheared vein quartz gangue or cutting a massive wallrock composed mostly of adularia. The spherules are brittle, but the Mohs hardness is only 2. The average of two chemical analyses after deduction for insoluble residue gave: PbO 63.2 (65.4) TeO₂ 16.5 (15.6), TeO₃ 18.2 (17.2), H₂O 2.1 (1.8), reset to 100%, the figures in brackets being the ideal values corresponding to the formula $\text{H}_2\text{Pb}_3(\text{TeO}_3)\text{TeO}_6$. *Girdite* is readily soluble in 1:1 HNO₃ and HCl. Dimensions of the monoclinic cell are: $a = 6.241$, $b = 5.686$, $c = 8.719\text{Å}$, $\beta = 91^\circ 41'$; $Z = 1$; D meas. 5.5(2), calc. 5.49 g/cm³. Principal lines in the powder pattern are: 3.11(7)(200), 3.054(10)(11 $\bar{2}$), 2.994(7)(112), 2.842(8)(020), 2.102(7)(220), 1.765(8)(204,312). Refractive indices are $\alpha = 2.44$, $\beta = 2.47$, $\gamma = 2.48$; $2V_\alpha(-)$ is 70° , dispersion strong $r > v$; $\gamma = b$, β : [100] is 34° in acute β . The name is for Richard Gird, mining engineer and assayer, who assayed the first rich silver ores found at Tombstone.

Oboyerite was found in only two hand specimens of rock consisting mainly of fine-grained adularia (altered shale) hosting fine-grained jarosite pseudomorphs after pyrite and partly filled or

lined voids derived from galena. These voids are typically lined with jarosite and in one case also with fairbankite crystals, coated with clear botryoidal opal. Tiny milk-white spherules of fibrous oboyerite are perched on the opal. H is estimated at 1.5; G meas. is 6.4(6). Chemical analyses on 954 μg after correcting for 16 μg insoluble gave: PbO 58.0 (58.6), CaO 0.3 (0.3), TeO₂ 22.1 (21.4), TeO₃ 16.2 (15.7) H₂O 4.2 (4.0), sum 100.8 (100.0), corresponding to the formula $\text{H}_6\text{Pb}_6(\text{TeO}_3)_3(\text{TeO}_6)_2 \cdot 2\text{H}_2\text{O}$ with Pb:Ca = 5:1. The minimum and maximum refractive indices, determined in S–Se melts, are: $\alpha = 2.24$, $\gamma = 2.26$; optics suggest triclinic symmetry but lattice dimensions could not be determined from X-ray data. The five strongest lines of the unindexed powder pattern are: 3.180 7, 3.040 10, 2.976 5, 2.927 5, 2.862 5. The name is from the first initial and last name of Oliver Boyer, one of two men who first staked the Grand Central lode claim, the type locality.

Fairbankite crystals are colorless and clear with an adamantine luster. They are brittle with hardness 2 and show no good cleavage. The specific gravity could not be determined due to paucity of material. The mineral is slowly soluble in cold dilute HNO₃ and HCl. Chemical analysis on a 272 μg sample, after correction for 11 μg opal and 13% anglesite, gave: PbO 58.3, TeO₂ 41.7%, corresponding closely to PbTeO₃. Dimensions of the triclinic cell determined from rotation and Weissenberg patterns and refined from powder data are: $a = 7.81$, $b = 7.11$, $c = 6.96\text{Å}$, $\alpha = 117^\circ 12'$, $\beta = 93^\circ 47'$, $\gamma = 93^\circ 24'$; if $Z = 4$, D calc. is 7.45 g/cm^3 . The four strongest lines of the powder pattern are: 3.265(10)(21 $\bar{1}$), 3.148(6)(111,020), 3.098(6)(1 $\bar{1}$ 2), 2.828(6)(120,2 $\bar{1}$ 1). The refractive indices are $\alpha = 2.29$, $\beta = 2.31$, $\gamma = 2.33$, $2V$ (meas.) = 86° ; dispersion is negligible. The name is for Nathaniel Kellogg Fairbank, an important figure in the early development of Tombstone.

Winstanleyite occurs in fragments of a granodiorite dike that is severely altered and carries 20–50% pyrite by volume. The pyrite is leached and replaced by crystalline jarosite, chlorargyrite, and rodalquilarite. *Winstanleyite* occurs with jarosite in some voids, but only where the pyrite nucleated in biotite, hornblende, or sphene. Most *winstanleyite* crystals are simple cubes, frequently with concave faces. The Mohs hardness is 4 and the crystals are tough and brittle with no observable cleavage. Chemical analysis of two small samples contaminated by opal yielded: TiO₂ 11.0, 10.3, Fe₂O₃ 3.15, 3.15, TeO₂ 82.6, 83.9, sum 96.75, 97.35%; remainder is opal. The sum of Ti+Fe is close to 1/3 that of Te. Ideal for TiTe_3O_8 is TiO₂ 14.3, TeO₂ 85.7%. The space group is $Ia\bar{3}$ with $a = 10.963\text{Å}$. The four strongest lines of the powder pattern, which resembles that of cliffordite, are: 4.474(6)(211), 3.165(10)(222), 2.741(7)(400), 1.938(8)(440). *Winstanleyite* is yellow, inclined to tan or cream. The refractive index is 2.34(2); anomalous birefringence up to 0.11 was observed. The name is for B. J. Winstanley, amateur mineralogist of Douglas, Arizona, who called attention to the mineral. A.P.

Holtedahlite*

Gunnar Raade and M. H. Mladek (1979) Holtedahlite, a new magnesium phosphate from Modum, Norway. *Lithos*, 12, 283–287.

Analysis by electron microprobe, using althausite as standard (H₂O and CO₂ determined with Perkin-Elmer 240 elemental analyzer) gave P₂O₅ 41.19, CO₂ 2.06, MgO 50.01, MnO 0.06, Na₂O 0.22, F 0.34, H₂O+ 6.22 = 100.10, – (O = F₂0.14) = 99.96%. This corresponds to $\text{Mg}_{1.97}(\text{P}_{0.923}\text{C}_{0.074})[\text{O}_{3.874}(\text{OH})_{0.126}]\text{OH}_{0.97}\text{F}_{0.03}$ or nearly $\text{Mg}_2\text{PO}_4(\text{OH})$. The infrared spectrum

shows the presence of OH^- , CO_3^{2-} , and PO_4^{3-} . Holtedahlite is the Mg analogue of satterlyite (*Am. Mineral.*, 64, 657, 1979) and is dimorphous with althausite.

Weissenberg and precession study show that holtedahlite is hexagonal, space group $P321$, $P3m1$, or $P\bar{3}m1$, $a = 11.188$, $c = 4.9751$, $Z = 6$; G calc. 2.936, meas. 2.94.

The strongest X-ray lines (35 given) are 3.722(90)(11 $\bar{2}$ 1), 3.475(50)(20 $\bar{2}$ 1), 3.234(30)(30 $\bar{3}$ 0), 2.796(30)(22 $\bar{4}$ 0), 2.438(100)(22 $\bar{4}$ 1), 2.177(30)(4041), 1.859(30)(22 $\bar{4}$ 2).

The mineral is colorless with vitreous luster. No cleavage, fracture uneven. H 4½–5. Optically uniaxial, neg., $\omega = 1.599$, $\epsilon = 1.597$.

The mineral occurs in serpentine–magnesite deposits, Modum, Norway, in irregular patches up to 0.5 × 1 cm, associated with apatite, althausite, serpentine, and talc, and cut by veins of szaibelyite.

The name is for Olaf Holtedah (1885–1975), professor of geology at the University of Oslo. Type material is at the Mineralogical–Geological Museum, Oslo. M.F.

Imandrite*

A. P. Khomyakov, N. M. Chernitsova, S. M. Sandomirskaya and G. L. Vasil'eva (1979) Imandrite, a new mineral of the lovozerite family *Mineralog. Zhurnal*, 1, 89–93 (in Russian).

Analysis by electron microprobe gave SiO_2 50.95, TiO_2 0.95, ZrO_2 1.43, Fe_2O_3 5.47, MgO 0.26, MnO 2.30, CaO 12.00, Na_2O 26.66, sum 100.01%, corresponding to $\text{Na}_{12}\text{Ca}_3\text{Fe}_2^{3+}(\text{Si}_6\text{O}_{18})_2$. Heating to 1000° caused a weight loss of 0.3%, with no change in optics or X-ray pattern.

X-ray study showed imandrite to be orthorhombic, space group $Pn\bar{m}$ or $Pnn2$, $a = 7.426 \pm 0.004$, $b = 10.546 \pm 0.001$, $c = 10.331 \pm 0.001 \text{ \AA}$, $Z = 1$; G calc. 2.92, meas. 2.93. The strongest X-ray lines (60 given) are 3.73(50)(200), 3.33(60)(031), 2.63(100)(040), 1.853(70)(400), and 1.520(50)(325).

Color honey-yellow, luster vitreous. Optically biaxial, positive, $\alpha = 1.605$, $\beta = 1.608$, $\gamma = 1.612$, $2V(+)$ = 75°.

The mineral occurs as a rarity in anhedral grains up to 1–3 mm in a drill core in pegmatitic alkalic rocks of the hanging wall of apatite-bearing strata of the Khibina deposits, near Lake Imandra, Kola Peninsula. It forms rims around eudialyte and along fractures in it. Associated minerals include adularia, alkali amphibole, aegirine, eudialyte, and others.

The name is for Lake Imandra. Type material is at the Mineralogical Museum, Acad. Sci. USSR, Moscow. M.F.

Liujinyinite (= Uytengobaardtite)

Chen Zhen-jie, Guo Yong-fen, Zen Ji-liang, Xu Wen-yuan and Wang Feng-ge (1979) On discovery and investigation of liujinyinite. *Kexue Tongbao*, 24, 843–848 (in Chinese with English abstract).

Electron microprobe analyses of the mineral from Guangdong, Anhui, and Gansu provinces gave respectively: S 10.7, 11.4, 11.7; Cu 1.2, –, 4.8; Ag 52.7, 67.7, 52.0; Sb –, 2.3, –; Au 35.9, 18.6, 30.5; sums 100.5, 100.0, 99.0 wt%. The analyses correspond to $(\text{Ag}_{2.92}\text{Au}_{1.09}\text{Cu}_{0.11})\text{S}_2$, $(\text{Ag}_{3.35}\text{Au}_{0.50})(\text{S}_{1.90}\text{Sb}_{0.10})$ and $(\text{Ag}_{2.63}\text{Au}_{0.85}\text{Cu}_{0.41})\text{S}_2$, approaching the ideal formula $(\text{Ag}_3\text{Au})\text{S}_2$.

The X-ray powder diffraction pattern of the mineral is basically similar to that of the synthetic Ag_3AuS_2 . The latter is indexable on the basis of a tetragonal cell with $a = 9.75$, $c = 9.85 \text{ \AA}$, and $Z = 8$

(Graf, *Am. Mineral.*, 53, 496–500, 1968). The strongest lines (20 given) are: 3.09(5), 2.86(5), 2.71(9), 2.60(10), 2.12(5), 1.89(5), 1.84(5).

Under reflected light the mineral is gray with a green tint. The green tint is more pronounced in the Cu-bearing varieties. The mineral is easily oxidized in air, producing a thin film of dark brown coating on the surfaces. Some grains show weak anisotropy. The reflectance is low, 19.3% (589 nm). $\text{VHN}_{20} = 76.19$, corresponding to 2.84 on the Mohs scale. The mineral is usually fine-grained from several to more than 10 microns; the largest grain is about 1–2 mm long.

In Guangdong the mineral occurs in a migmatite as fissure-filling veinlets in pyrite–quartz veins and as milk-drop-like grains in association with electrum, galena, and argentite in pyrite. In Anhui the mineral occurs in close association with electrum and pyrrhotite in a disseminated copper deposit of the skarn type. In Gansu the mineral mainly occurs in close association with electrum in massive quartz–barite veinlets in a massive chalcopyrite–pyrite–tetrahedrite–galena deposit. The name is for the composition (Liu = S, Jin = Au, Yin = Ag).

The mineral was synthesized hydrothermally at 200–450°C. Electron microprobe analyses of three synthetic grains correspond to $(\text{Ag}_{2.20}\text{Cu}_{0.93}\text{Au}_{0.67})\text{S}_2$, $(\text{Ag}_{2.53}\text{Au}_{1.16})\text{S}_2$ and $(\text{Ag}_{2.33}\text{Au}_{1.10}\text{Cu}_{0.88})\text{S}_2$. The X-ray powder diffraction pattern is comparable to that of the synthetic Ag_3AuS_2 of Graf (1968). For the Cu-free and Cu-bearing compounds the reflectances are 24.15 and 22.54% (589 nm), $\text{VHN}_{20} = 78.99$ and 83.81. The synthetic compound is steel gray with metallic luster. D meas. 7.95 g/cm³. Some synthetic crystals are acicular to prismatic with square cross-sections. The DTA curve shows endothermic peaks at 100° and 170°C and an exothermic peak at 400°C.

Discussion

Single crystal data and more detailed locality information are desirable. G.Y.C.

The mineral is uytengobaardtite (Barton *et al.*, *Can. Mineral.*, 16, 651–657, 1978). M.F.

Maghagendorfite*, ferrowyllieite*, rosemaryite*, wyllyite redefined*

Paul B. Moore and Jun Ito (1979) Alluaudites, wyllyites, arrojadites: crystal chemistry and nomenclature. *Mineral. Mag.*, 43, 227–235 (one-page synopsis plus 8 pages of miniprint).

A nomenclature is proposed for the alluaudite and wyllyite complex series which is based on sequentially distributing the cations in the cell according to increasing polyhedral size, matching that size with increasing radii of the cations. For oxidized members, the largest site may be partly occupied or empty after all cations have been distributed.

For alluaudites, the cell formula is $\text{X}(2)_4\text{X}(1)_4\text{M}(1)_4\text{M}(2)_8(\text{PO}_4)_{12}$ and is written according to decreasing size of discrete sites. The X(1) and X(2) sites are appended as suffixes in the trivial nomenclature, that is *specific name-X(1)X(2)*, for example, hagendorfite-NaNa.

For wyllyites, the cell formula is $\text{X}(2)_4\text{X}(1a)_2\text{X}(1b)_2\text{M}(1)_4\text{M}(2a)_4\text{Al}_4(\text{PO}_4)_{12}$. Again the occupancies of the X sites are appended to the specific name in the trivial nomenclature.

Three new names and one redefinition are explicitly reported to have been approved by the Commission on New Minerals and New Mineral Names (IMA).

Maghagendorfite. This new name is applied to a member of the alluaudite series. An analysis of material from the Dyke Lode, Custer, South Dakota, gave: Al_2O_3 0.01, Fe_2O_3 9.89, FeO 8.75, MnO 20.42, MgO 5.06, ZnO 0.23, CaO 0.86, Li_2O 0.06, Na_2O 6.12, K_2O 0.00, P_2O_5 44.32, $\text{H}_2\text{O}+$ 3.06, insol. 1.03, sum 99.83%. No further information is given.

Ferrowyllieite. The mineral from the Victory mine, Custer County, South Dakota, originally named wyllieite and assigned the simplified formula $\text{Na}_2\text{Fe}_2^+\text{Al}(\text{PO}_4)_3$ (Moore and Ito, *Mineral. Rec.*, 4, 131–136, 1973), has been renamed ferrowyllieite. The name wyllieite is now applied to a mineral from the Old Mike mine, Custer, S. D., having a lower proportion of ferrous iron and higher proportions of ferric iron and manganese. In the following listing of the analytical results for ferrowyllieite and for wyllieite as redefined, the figures for the latter are given in brackets: Al_2O_3 7.9 (6.43), Fe_2O_3 0.33 (10.62), FeO 29.2 (14.73), MnO 4.3 (11.22), MgO 1.97 (1.71), ZnO 0.04 (0.41), CaO 2.5 (3.12), Li_2O 0.01 (0.004), Na_2O 8.0 (3.93), K_2O 0.5 (0.5), P_2O_5 43.8 (45.41), SiO_2 0.8 (----), $\text{H}_2\text{O}+$ 0.70 (0.92), insol. nil (1.22), sum 99.56% (99.82%).

Rosemaryite. This new name is applied to minerals of the wyllieite series in which Fe^{3+} is the end-member composition over the M(2a) position. The name is for Mrs. F. Rosemary Wyllie, the wife of Professor Peter J. Wyllie. The name is applied to a mineral from the Rock Ridge pegmatite, Custer, S. D. for which the analytical results are: Al_2O_3 6.90, Fe_2O_3 14.58, FeO 11.64, MnO 13.62, MgO 0.47, ZnO 0.02, CaO 1.81, Li_2O 0.04, Na_2O 3.40, K_2O 0.00, P_2O_5 43.84, SiO_2 ----, $\text{H}_2\text{O}+$ 1.73, insol. 1.78, sum 99.83%. No further data are given.

The recommended nomenclature for these minerals is summarized as follows:

Generic Name	M(2a)	M(1)	Specific Name
wyllieites	$\left\{ \begin{array}{l} \text{Fe}^{2+} \\ \text{Fe}^{2+} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Fe}^{2+} \\ \text{Mn}^{2+} \end{array} \right.$	$\left\{ \begin{array}{l} \text{ferrowyllieite} \\ \text{wyllieite} \end{array} \right.$
unnamed	$\left\{ \begin{array}{l} \text{Mn}^{2+} \\ \text{Fe}^{3+} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Mn}^{2+} \\ \text{Fe}^{2+} \end{array} \right.$	$\left\{ \begin{array}{l} \text{unnamed} \\ \text{unnamed} \end{array} \right.$
rosemaryites	$\left\{ \begin{array}{l} \text{Fe}^{3+} \\ \text{Fe}^{3+} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Mn}^{2+} \\ \text{Mn}^{2+} \end{array} \right.$	$\left\{ \begin{array}{l} \text{unnamed} \\ \text{rosemaryite} \end{array} \right.$

In addition the names ferrohagendorfite and ferrosemaryite appear in the text but it is not specifically stated that they were approved by the IMA Commission. The name ferroalluaudite, which also appears, had been used by D. J. Fisher (*Am. Mineral.*, 42, 661, 1957) in the form "ferro-alluaudite", but not formally proposed as a specific name. Referring to the actions of the IMA Commission, the authors state "Although the objections raised were not scant, the nomenclature and species were nevertheless approved." A.P.

Nichromite, cochromite*

S.A. DeWaal (1978) Nickel minerals from Barberton, South Africa. VIII. The spinels cochromite and nichromite, and their significance to the origin of the Bon Accord nickel deposit. *Bull. Bur. Rech. Geol. Minières, Sec. II, Géol. Gîtes Minéraux*, 1978, no. 3, 225–230.

These new spinels occur in the assemblage trevorite–liebenbergit–bunsenite [*Am. Mineral.*, 58, 733–735 (1973); 57, 1524–1527 (1972); 61, 502 (1976)] as grains (av. diameter 21 microns). Electron microprobe analyses by E. A. Viljoen and E. van der Walt, gave for nichromite and 3 cochromites NiO 15.86, 7.11, 5.49, 7.67; CoO 12.49, 16.9, 16.70, 17.45; ZnO n.d., 0.59, 0.45, 0.59; MgO 0.40, 0.76, 0.82, 0.95; FeO (calc) 6.45, 9.78, 10.98, 7.45; MnO 0.21, 0.82, 0.78, 0.84; Fe_2O_3 (calc) 12.06, 1.35, 1.03, 4.14; Al_2O_3 7.46,

12.56, 9.77, 9.11; Cr_2O_3 45.56, 49.49, 53.39, 50.38; TiO_2 1.13, 1.34, 1.08, 1.26; SiO_2 0.20, 0.13, 0.14, sum 101.83, 100.83, 100.63, 99.95%. Standards used were synthetic (Ni,Fe)S, CoS, and ZnS, natural chromite, ilmenite, pyrope. The formulas for the nichromite and the third cochromite are, resp., $(\text{Ni}_{3.65}\text{Co}_{2.87}\text{Mg}_{0.17}\text{Mn}_{0.05}\text{Fe}_{1.55}^{2+})(\text{Cr}_{10.31}\text{Fe}_{2.60}^{3+}\text{Al}_{2.51}\text{Ti}_{0.24})\text{O}_{32}$ and $(\text{Ni}_{4.01}\text{Co}_{1.77}\text{Zn}_{0.12}\text{Mg}_{0.41}\text{Mn}_{0.21}\text{Fe}_{1.79}^{2+})(\text{Cr}_{11.41}\text{Al}_{3.08}\text{Fe}_{0.90}\text{Ti}_{0.27})\text{O}_{32}$, FeO and Fe_2O_3 being calculated to the spinel formula.

The minerals are dark, probably black, luster metallic, streak greenish-gray, fracture conchoidal. Isotropic in reflected light, reflectance of cochromite: 480 nm, 14.3; 546, 13.7; 589, 14.0; 656, 13.9%. Microhardness of cochromite 1.218 kg/mm² at 50 g load. Cubic, presumably *Fd3m*, $a = 8.292\text{Å}$ for a cobaltoan chromite with CoO 12.65, NiO 6.57%. X-ray power data are not given.

The names are for the compositions.

The minerals were formed by replacement of chromite and are rimmed by trevorite. M.F.

Tomichite*

E. H. Nickel and I. E. Grey (1979) Tomichite, a new oxide mineral from Western Australia. *Mineral. Mag.*, 43, 469–471.

Tomichite, $(\text{V,Fe})_4\text{Ti}_3\text{AsO}_{13}(\text{OH})$, was found in a single hand specimen "reported to have originated at one of the gold mines at Kalgoorlie in Western Australia." The specimen is mostly milky quartz with some vanadian muscovite and irregular concentrations of pyrite. Accessory minerals include rutile, calcite, and calaverite. Tomichite occurs as small euhedral tabular crystals up to 1.5 mm in longest dimension, in quartz. The average of 4 microprobe analyses gave: V_2O_5 34.92, Fe_2O_3 11.39, TiO_2 37.42, As_2O_3 11.31, Sb_2O_3 1.22, SiO_2 0.21, H_2O (calc.) 1.36, sum 97.83%, leading to the idealized formula above. Tomichite is monoclinic, diffraction symbol $P2_1/*$; $a = 7.119(3)$, $b = 14.176(5)$, $c = 4.992(2)\text{Å}$, $\beta = 105.05(1)^\circ$, $Z = 2$; G meas. 4.16, calc. 4.422. Principal lines of the powder pattern are: 3.092(4)(22), 2.836(9)(131), 2.662(10)(231), 1.572(5)(351). Cell dimensions, formulas, and powder patterns show that tomichite is closely related to derbylite (*M.A.* 76-3291). Tomichite is opaque, has a black streak, and is gray in reflected light with measured reflectivity at 589 nm 16.6%. The Vickers microhardness, using a 50 g load, is 800 ± 136 kg/mm². No cleavage was observed. The name is for Mr. S. A. Tomich, consulting geologist in Perth, Western Australia, who presented the specimen to E. H. Nickel. A.P.

Vigezzite*

S. Graeser, H. Schwander, H. Hänni and V. Mattioli (1979) Vigezzite, $(\text{Ca,Ce})(\text{Nb,Ta,Ti})_2\text{O}_6$, a new aeschynite-type mineral from the Alps. *Mineral. Mag.*, 43, 459–462.

Vigezzite occurs with other Nb-minerals such as pyrochlore, columbite and fersmite in an albitic rock of presumably pegmatitic origin near Orcesco, Valle Vigezzo, Prov. Novara, northern Italy. Electron microprobe analysis gave: CaO 12.0, Ce_2O_3 10.5, TiO_2 10.5, Nb_2O_5 31.0, Ta_2O_5 36.0, sum 100.0% (this sum was reached accidentally) leading to the formula $(\text{Ca}_{0.82}\text{Ce}_{0.24})(\text{Nb}_{0.9}\text{Ta}_{0.62}\text{Ti}_{0.5})\text{O}_6$. The mineral is not completely homogeneous; $\text{Nb}/(\text{Nb}+\text{Ta})$ varies from 0.55–0.62. Vigezzite forms flat prismatic crystals up to 2–3 mm long of an orange-yellow color. It is orthorhombic, space group *Pmnb*, with $a = 7.559 \pm 0.01$, $b = 11.028 \pm 0.01$, $c = 5.360 \pm 0.004\text{Å}$, $Z = 4$; density not reported. The

six strongest lines of the X-ray powder pattern are: 4.821(9)(011), 3.784(8)(200), 3.036(10)(031), 2.974(10)(211), 1.7129(6)(242), 1.6018(7)(431). Vickers hardness VHN = 396 kg/mm², corresponding to Mohs hardness 4½–5; fracture is conchoidal; cleavage {100} distinct. Refractive indices are: $\alpha = 2.14$, $\gamma = 2.315$, $2V(+)$ large, $\alpha = c$, $\beta = b$, $\gamma = a$; though intensely yellow-colored, nonpleochroic. A.P.

Vitusite*

J. G. Rønso, A. P. Khomyakov, E. I. Semenov, A. A. Voronkov and V. K. Garanin (1979) Vitusite, a new phosphate of sodium and rare earths from the Lovozero alkaline massif, Kola, and the Ilimaussaq alkaline intrusion, south Greenland. *Neues Jahrb. Mineral. Abh.*, 137, 42–53.

Microprobe analyses from Ilimaussaq, Mt. Karnasurt, Kola, and Mt. Sengistchorr, Kola, gave P₂O₅ 36.27, 35.92, 36.50; SiO₂ 0.25, 0.23, 0.15; Na₂O 23.15, 23.00, 22.50; CaO 0.92, 1.22, 4.75; La₂O₃ 15.56, 9.25, 12.20; Ce₂O₃ 19.95, 21.72, 16.50; Nd₂O₃ 4.39, 7.69, 4.33; Pr₂O₃ 1.24, 1.92, 1.13, sum 101.73, 100.95, 98.06%, corresponding to Na₃(Ce,La)(PO₄)₂. A microchemical analysis from Ilimaussaq agrees well with those given above. Vitusite is readily dissolved by cold dilute HCl or H₂SO₄.

X-ray study shows the mineral to be orthorhombic, pseudo-hexagonal, space group *Pcmb* or *Pc21b*, $a = 5.36$, $b = 18.68$, $c = 13.96 \text{ \AA}$ (Lovozero), $a = 5.342$, $b = 18.680$, $c = 14.062 \text{ \AA}$ (Ilimaussaq). The strongest lines (Ilimaussaq, 46 given) are 6.580(9)(012), 4.665(9)(040,032), 4.634(9)(120), 3.512(9)(140,132), 2.811(10)(044), 2.801(10)(124), 2.690(9)(160), 2.671(9)(200), 1.935(9)(244). There are indications of a superlattice with $a = 58.75 \text{ \AA}$. When heated, the mineral inverts to a hexagonal phase at 1050°. The structure is probably similar to those of apthitalite, merwinite, and bredigite.

Vitusite is pale pink (Lovozero)(L), white to pale green (Ilimaussaq) (I), luster vitreous; G 3.60 (L), 3.70(L); H 4.5(L). Cleavages {100}, {010}, {001}. Optically, biaxial neg., refractive indices (L), $\alpha = 1.602$, $\beta = 1.650$, $\gamma = 1.654$, $-2V = 30^\circ$; $\alpha = 1.604$, $\beta = 1.6465$, $\gamma = 1.649$, $2V = 28.5^\circ$ (I); $X = a$, $Y = b$. Twinned after (160) and (120).

Vitusite occurs in the natrolite zone of an alkalic pegmatite at Mt. Karnasurt, associated with steenstrupine, belovite, neptunite, leucosphenite, and sazhinite. At Ilimaussaq it occurs in a melanocratic nepheline syenite, with arfvedsonite, albite, microcline, nepheline, sodalite, steenstrupine, and two probably new minerals.

The name is for Vitus Bering (1681–1741), the explorer of northern seas. Type material is at the Fersman Mineralogical Museum and the Museum of I.M.G.R.E., Moscow (L) and at the Geological Museum, University of Copenhagen (I). M.F.

Unnamed Ca-analogue of birnessite

F. V. Chukhrov, A. I. Gorshkov, A. V. Sivtsov and V. V. Berzovskaya (1979) A new 14Å mineral of the birnessite group in deep-sea micronodules. *Nature*, 280, 137.

Study of Mn oxides collected from a depth of 5520 m from the Atlantis fracture zone, Atlantic Ocean, showed the presence of two minerals. One is hexagonal birnessite, $a = 2.84$, $c = 7.07 \text{ \AA}$. The other is orthorhombic with $a = 8.52$, $b = 15.1$, $c = 14.1 \text{ \AA}$, occurring as elongated platelets. Analysis showed only Mn and Ca. The mineral is therefore the Ca-analogue of birnessite. M. F.

Unnamed iridium disulfide

Ying-Chen Jen and Yu-Jen Teng (1973) Isomorphous system RuS₂–OsS₂–IrS₂, and the mineral system PdS–PtS. *Geochimica*, No. 4, 254–263 (Chinese with English abstract).

A new mineral was reported as the IrS₂ end member of the laurite–erlichmanite isomorphous series, from Pt-bearing chromite ore occurring mainly in dunite at locality C, China. The members of this series usually occur as crystals with octahedral, cubic, or dodecahedral forms. The grains are brittle, steel gray to silver white, with a metallic luster. Under reflected light in air, the mineral is greyish white with a bluish tint. Isotropic and reflectances for anal. No. 11 are: 46.2 (480 nm), 44.8 (500 nm), 43.8 (520 nm), 43.0 (540 nm), 42.5 (560 nm), 42.2 (580 nm), 42.0 (600 nm), 41.8 (620 nm), 41.6 (640 nm), 41.5 (660, 680 and 700 nm). VHN₇ = 1200 (av. of 5 meas.) and varies with composition. Microprobe analyses for two grains, analyses 11 and 10: Ir 53.6, 49.3; Os 17.1, 20.8; Pt 0.2, 0.2; Fe 1.0, 1.4; Ni 1.4, 1.5; Cu 1.6, 1.7; Co 0.5, 0.6; S 21.8, 23.9; sums 97.0, 99.3%, corresponding to (Ir,Os)S₂. Cell edge for both grains is 5.640Å, probably *Pa3* space group.

Discussion

The authors' suggestion of complete isomorphism in the RuS₂–OsS₂–IrS₂ system, on the basis of mineral analyses, appears reasonable and the mineral may thus be considered a new species with ideal end-member IrS₂ (see *Am. Mineral.*, 61, 186, 1976). The analyses, however, calculate to (Ir_{0.74}Os_{0.24}metals_{0.18})S_{1.81} and (Ir_{0.64}Os_{0.27}metals_{0.21})S_{1.87}, based on 3 atoms. Also, synthetic IrS₂ is reported to be orthorhombic (Hulliger, *Nature*, 204, 644–646, 1964), therefore due account must be taken in fully characterizing the species. L.J.C.

Unnamed manganese silicate

C. M. Gramaccioli, W. L. Griffin, and Annibale Mottana (1979) Preliminary data on a probably new mineral from the Molinello mine, Genova. *Rend. Soc. Ital. Mineral. Petrol.*, 35, 145–149 (in Italian).

The mineral occurs as small grains of a bright orange color in quartz veins cutting braunite. Microprobe analysis gave SiO₂ 30.0, MnO 47.6, CaO 0.7, FeO 0.1%, Mg, Al, Ti, Na absent. The X-ray pattern could not be identified; the strongest lines (22 given) are 3.253(100), 3.149(65), 3.028(65), 2.734(53), 2.607(58), 2.490(60). These were provisionally indexed on a monoclinic cell, space group *P2₁/n*, $a = 6.671$, $b = 19.915$, $c = 7.581 \text{ \AA}$, $\beta = 95.6^\circ$. M.F.

Unnamed titanate

S. E. Haggerty (1978) The Allende meteorite: solid solution characteristics and the significance of a new titanate mineral series in association with armalcolite. *Proc. 9th Lunar Planetary Sci. Conf.*, 1, 1331–1344.

Inclusions in the Allende meteorite consist of anorthite, fassaite, spinel, olivine, and interstitial elongate crystals of armalcolite and a new titanate. The crystals range from less than 10 microns to 100 microns, av. 20 microns. Opaque, white in reflected light, reflectivity about 19%, strongly anisotropic in shades of gray or white, "judged to have orthorhombic or trigonal symmetry."

Microprobe analyses of 16 samples are given, as calculated to a basis of 7O, which requires that part of the Ti be calculated to Ti_2O_3 . The analyses gave TiO_2 78.8–85.0, CaO 2.3–10.7, MgO 1.3–9.0, Al_2O_3 1.0–3.2, FeO 0.4–9.8, Cr_2O_3 0.22–3.50, MnO 0.02–0.32%. As calculated, the average content (to 7O): $Ti_{2.78}^{4+}Ti_{0.30}^{3+}Al_{0.12}Cr_{0.01}Fe_{0.08}Mg_{0.33}Ca_{0.35}O_7$. These may represent a series from $(Ca,Mg,Fe,Mn)Ti_3^{4+}O_7$ to $(Ti^{3+},Cr,Al)_2Ti_2^{4+}O_7$. It is also possible that the mineral is related to the crichtonite series, $AM_{21}O_{38}$. No X-ray data were obtained. M.F.

Unnamed platinum arsenosulfide

P. K. Chang, C. M. Yu and C. Y. Chiang (1973) Mineralogy and occurrence of the platinum-group elements in a chromium deposit in northwestern China. *Geochimica, No. 2*, 76–85.

A new mineral was reported in concentrates from chromite ore in northwestern China. The mineral is usually intergrown with irarsite, olivine, and chromite; isolated crystals are rare. Under reflected light in air the color is pink, bireflection is distinct, and reflection pleochroism is from light pink to light brown. The anisotropy is from grayish-brown to brown. Reflectance is 36% (red), 37.6% (green), 35.2% (orange). $VHN_7 = 800$ –1450. Microprobe analysis gave Pt 43.5, Ir 2.8, As 43.8, S 11.0; sum 101.1%.

Discussion

The authors present the mineral as $(Pt,Ir)AsS$ but the analysis does not correspond to this stoichiometry. A better possibility is $Pt_{1.91}Ir_{0.13}As_{5.02}S_{2.94}$ or $(Pt,Ir)_2As_5S_3$, based on 10 atoms. This may be a new species requiring X-ray data for characterization. L.J.C.

Unnamed platinum-iridium-iron alloy

Same reference.

Two euhedral crystals were found in concentrates from chromite ore in northwestern China. The crystals are approximately 0.035 mm in size, light yellow in color, with extremely shiny crystal faces and a distinct metallic luster. Under reflected light in air the mineral is white with a pinkish tint, exhibits weak bireflection, and reflection pleochroism is from light pink to brownish orange. Anisotropy is weak, bluish-gray to grayish-orange. Reflectivity is 46% (red), 47.8% (green) and 51.9% (orange). $VHN_7 = 305$ –350. Microprobe analysis gave Pt 66, Ir 26, Fe 8; sum 100%.

Discussion

The analysis calculates to $Pt_{2.19}Ir_{0.88}Fe_{0.93}$, based on 4 atoms, close to the authors' suggested Pt_2IrFe stoichiometry. If a new species, this may be the iridium analogue of tulameenite (*Am. Mineral.*, 59, 383–384, 1976). L.J.C.

NEW DATA

Delvauxite, bořickýite, and foucherite

F. Cech and P. Povondra (1979) A re-examination of bořickýite. *Tschermaks Mineral. Petrog. Mitt.*, 26, 79–86.

New chemical and physical data are given for 4 samples labeled

delvauxite and bořickýite. The set includes delvauxite from the type locality at Berneau, near Visé, Belgium and bořickýite from the type localities at Leoben, Austria, and Nenačovice, Czechoslovakia. All of these minerals are X-ray amorphous and optically isotropic. DTA and TGA curves and IR absorption spectra of the samples examined are nearly identical. Chemical analyses for the 4 samples correspond to the formula $(Ca,Mg)(Fe^{3+},Al)_3(PO_4,SO_4,CO_3)_2(OH)_8 \cdot nH_2O$, with n varying from 4 to 5.5 according to the new analyses, from 3 to 7.5 according to old analyses (1854 and 1867). The indices of refraction are variable for the samples from each locality, but all are within the range 1.610–1.650, most in the range 1.620–1.645. Delvauxite, bořickýite, and foucherite are probably identical, but no nomenclatural suggestions can be made until the type material of delvauxite (not just material from the type locality at Berneau) is re-examined.

Discussion

If the identity of these "species" is established or accepted, the name delvauxite, given by Dumont in 1838, would have priority. A.P.

Violan = Mn-bearing omphacite and diopside

A. Mottana, G. Rossi, A. Kracher and G. Kraut (1979) Violan revisited: Mn-bearing omphacite and diopside. *Tschermaks Mineral. Petrog. Mitt.*, 26, 187–201.

Violet clinopyroxenes ("violan") from the manganese deposit of Praborna, near St. Marcel (Aosta Valley, Italy) occur in two different varieties: euhedral crystals grown in vugs and massive lamellar to fibrous aggregates. The euhedral crystals are predominantly $P2/n$ omphacite with $(Di+Hd+Jo)/(Jd+Ac+Mnjd)$ ratio close to unity. The lamellar aggregates consist mainly of disordered $C2/c$ impure diopside with alternating patches of pure diopside and moderately omphacitic compositions. The deep violet color, occasionally shading to blue, is presumably due to the presence of both Mn^{3+} and Mn^{2+} ions. Detailed crystal structure determinations and EPR spectra investigations, however, did not clearly solve the question of the oxidation state of manganese because of the low amounts of manganese present in "violan." Crystal structure determination and microprobe analyses nevertheless clearly showed that "violan" is not a mineral species. The name should therefore be reserved for the "ex-colore" violet varieties of both diopside and omphacite. (Authors abstract)

Discussion

"Violan" is not listed in Fleischer's 1975 Glossary of Mineral Species. In Strunz' *Mineralogische Tabellen*, 5th ed., 1970, it is listed only in the index in light type, i.e. not as a species name, thus "Violan, blauer Diopsid." Two recent publications give further information on "violan": M. Bondi, A. Mottana, G. Kraut and G. Rossi (1978) *Cristallochimica del violano e della schefferrite di St. Marcel (Valle d'Aosta)*, *Rend. Soc. It. Mineral. Petrogr.*, 34, 15–25; and P. Brown, E. J. Essene, and D. R. Peacor (1978) The mineralogy and petrology of manganese-rich rocks from St. Marcel, Piedmont, Italy, *Contrib. Mineral. Petrol.*, 67, 227–232. A.P.

DISCREDITED MINERALS**Lavrovite = chromian diopside**

Schmetzer, K. and J. Ottemann (1979) The identity of lavrovite. *Neues Jahrb. Mineral. Monatsh.*, 189-192 (in German).

Probe analysis of lavrovite from the type locality, Sludyanka, USSR, gave SiO₂ 54.82, Al₂O₃ 0.83, V₂O₃ 0.01, Cr₂O₃ 2.26, FeO 5.92, MgO 14.17, FeO 5.92, total 98.86% Lavrovite is therefore a chromian diopside. M.F.

Mossite

P. J. Dunn, R. V. Gaines, and R. Kristiansen (1979) Mossite discredited. *Mineral. Mag.*, 43, 553-554.

The status of mossite as a trirutile has been questioned by several mineralogists. Part of the holotype specimen from near Moss, Norway, has been reexamined. X-ray diffraction shows that it belongs to the orthorhombic tantalite group. Microprobe analysis of two homogeneous grains shows that they are essentially tantalian ferrocolumbite with Fe:Mn 22:6 and Nb:Ta 24:21. A.P.