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Fifth supplementary list of British minerals (Scottish)

A. LIVINGSTONE AND H. G. MACPHERSON

Department of Geology, Royal Scottish Museum, Chambers Street, Edinburgh EH1 1JF

THE number of mineral species known to occur in the British Isles increases yearly and details of their localities and assemblages are scattered throughout the literature. For ready-reference purposes Spencer produced lists of British minerals (1898, 1931, and 1958) to complement the species detailed by Greg and Lettsom (1858) in their Manual of the Mineralogy of Great Britain and Ireland. The listing tradition was continued by Embrey (1977 and 1978) and at the latter dates the total number of known British species was approximately 600. Some entries in the earlier lists require revision in view of later work (Deer *et al.*, 1962, 1963, and 1979; Fleischer 1980; and Hey, 1962 and 1963; and Hey and Embrey 1974).

The present authors undertook the task of revising entries in Heddle's (1901) Mineralogy of Scotland endeavouring to produce an up-to-date glossary of Scottish mineral species. This work 'Glossary of Scottish Mineral Species 1981' (Macpherson and Livingstone, 1982), entailed examination of many specimens in the Scottish Mineral Collection of the Royal Scottish Museum as well as specimens in other museum collections. Contact was made with other mineralogists in order to obtain specimens or unpublished data. In works of this nature the value of museum collections is paramount for without their existence certain entries could not be made. The Scottish Glossary contains 443 entries detailing mineral name, ideal formula, crystal system, assemblage, locality (pre-Regionalization County names are retained) and reference details, following the style of the Spencer and Embrey lists. In the Scottish Glossary we consider that 399 valid species occur in Scotland. Many of these species are substantiated by X-ray diffraction identification or electron probe micro-analysis data or both.

When comparing the Greg and Lettsom, Spencer and Embrey lists with the Scottish Glossary it became apparent that some 16% of Scottish minerals (sixty-four minerals) had not been previously listed or recorded for the British Isles; a small number are omissions from earlier lists. It seems appropriate, therefore, to draw attention to these minerals by presenting a supplementary list cast in the same mould as the previous lists.

Since the publication of the 'Glossary of Scottish Mineral Species, 1981' (Macpherson and Livingstone, 1982) seven minerals have recently been discovered in Scotland and are additional to the Glossary. These minerals have not been previously recorded or listed, or both, for the British Isles and are as follows: safflorite, elyite, hydrohonessite, litharge, massicot, offretite, and tyrolite.

Within modern mineralogical reference works there are inconsistencies in accrediting species status to intermediate members of solid-solution series of common rock-forming minerals. An example of this is found in the orthopyroxene series where some intermediate members are classed as varieties unlike the minerals embraced in the oligoclase–bytownite range which are given full species status. Other examples are found in the olivine series and scapolite series. If a mineral commonly occurs within rocks, and possesses a well-established composition field, then we list that mineral as a species rather than a variety. Into this species category we would allot dipyre, mizzonite, eulite, ferroaugite, hortonolite, etc. and this does not seem unreasonable for andesine, omphacite, and pigeonite have been previously listed.

Amphibole names that appear in the Scottish Glossary, and have not been previously listed, have been omitted from this supplementary list. Many published British amphibole analyses now require recalculation according to the rules in the IMA Nomenclature of Amphiboles Report (Leake, 1978) in order to apply the correct name. Inevitably, this may lead to amphibole names that have not been previously published for the British Isles. We have not undertaken this task for the British Isles but have done so for Scotland.

By detailing the first, or earliest-found, reference for a mineral in the Scottish Glossary the authors were able to allocate reference dates to decades

between 1901 and 1980. From this it was discovered that in the period 1961–70 thirty-five species new to Scotland were recorded as compared to one hundred between 1971 and 1980. Should this trend continue there must be many more minerals within the British Isles awaiting discovery. In support of this statement twenty of the listed minerals have lain undiscovered for over a century since they were first announced as new species.

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Arrojadite Monoclinic

$(K,Ba)(Na,Ca)_5(Fe^{2+},Mn,Mg)_{14}Al(PO_4)_{12}(OH,F)$

Honey-brown glassy anhedral grains in bluish-black, wad-like areas up to 1 cm in lepidolite-tourmaline-bearing pegmatite, Glenbuchat, Aberdeenshire. [RSM X-ray diffraction identification 1980.]

Baddeleyite ZrO_2 Monoclinic

As uranium-enriched colourless, anhedral to subhedral, grains (*c.* 20 μm) associated with apatite, chlorite, amphibole, and biotite in the mesostasis areas of the Rhum layered pluton, Rhum, Inverness-shire. Zirkelite and zircon also occur. C. T. Williams (1978) *Contrib. Mineral. Petrol.* **66,** 29, 35. [M.A. 78-4895.]

Betekhtinite $Cu_{10}(Fe,Pb)S_6$ Orthorhombic

In galena-bearing veins cutting the Grudie granite, near Lairg, Sutherlandshire. M. J. Gallagher *et al.* (1974) *Trans. Inst. Mining Metall.* **83,** B83. [M.A. 75-930.]

Bismoclite BiOCl Tetragonal

In small amounts, associated with atacamite, connellite, and secondary uranium minerals, in veins cutting the aureole of the Criffel granodiorite, near Dalbeattie, Kirkcudbrightshire. J. M. Miller and K. Taylor (1966) *Bull. Geol. Surv. G. B.* **25,** 9. [M.A. **18,** 17.]

Boltwoodite Monoclinic

$(H_3O)K(UO_2)(SiO_4)\cdot H_2O$

With zeunerite as alteration products of pitchblende (in situ) in veins cutting the aureole of the Criffel granodiorite, near Dalbeattie, Kirkcudbrightshire. J. M. Miller and K. Taylor (1966) *Bull. Geol. Surv. G. B.* **25,** 9. [M.A. **18,** 17.]

Brugnatellite Hexagonal

$Mg_6Fe^{3+}(CO_3)(OH)_{13}\cdot 4H_2O$

Pearly-white to pale-brown scaly efflorescence on sheared brucite-bearing vein in serpentinite, Swinna Ness, Unst, Shetland. [Identified 1978 on RSM specimen by X-ray diffraction and distinguished from pyroaurite by the larger *d* spacing.]

Copiapite Triclinic

$Fe^{2+}Fe_4^{3+}(SO_4)_6(OH)_2\cdot 20H_2O$

As a powdery yellow efflorescence on altered pyrite 'from 160 level, Wanlockhead, Dumfriesshire'. IGS specimen collected by J. Brown in 1916. Also as sulphur yellow granular aggregates infilling cracks in an altering pyrite nodule from Slateford, Edinburgh. Associated minerals are coquimbite, rozenite, and voltaite. RSM specimen donated by Mr Sutherland in 1951. [Both specimens confirmed by X-ray diffraction in 1979.]

Coquimbite $Fe_2^{3+}(SO_4)_3\cdot 9H_2O$ Trigonal

Small clusters of minute, clear glassy crystals associated with halotrichite, roemerite, pyrite, and voltaite, from old railway cutting west of Stanely, near Paisley, Renfrewshire. [RSM specimen, identified by X-ray diffraction 1979.]

Cristobalite SiO_2 Tetragonal

In cavities in aegirine-granite, Rockall, Inverness-shire. P. A. Sabine (1960) *Bull. Geol. Surv. G. B.* **16,** 166. [M.A. **14,** 507.]

Dipyre (Ma 80–50) Tetragonal

As a minor constituent of garnet-amphibolites, Beinn a Chapuill, Glenelg, Inverness-shire. C. E. Tilley (1937) *Mineral. Mag.* **24,** 559.

Elyite $Pb_4Cu(SO_4)(OH)_8$ Monoclinic

Sprays of lilac needles (up to 0.4 mm) in cavities in small 2 cm sample of litharge, massicot, and cerussite. Sample found in stream bed, Leadhills, Lanarkshire. Presented to RSM in 1981 by Mrs F. Christison. [Identified by X-ray diffraction and electron-probe microanalysis which gave PbO 78.7%, CuO 6.9%, and SO_3 6.0%. Elyite probably formed naturally in what may be a dumped flue product.]

Emplectite $CuBiS_2$ Orthorhombic

In small fractures in galena, and associated with electrum, bismuth, and schirmerite, from old mine dumps at Corrie Buie, Meal nan Oighreag, south of Loch Tay, Perthshire. [R. A. D. Pattrick (1979) pers. com.]

Eulite Orthorhombic

90–70% orthoferrosilite

The analysis quoted for a 'hypersthene' in a hypersthene–grunerite–garnet rock from Druideag Lodge, Loch Duich, Ross-shire, is that of a eulite. See N. F. M. Henry (1935) *Mineral. Mag.* **24,** 222, and A. Poldervaart (1947) *Mineral. Mag.* **28,** 168, anal. 18.

Euxenite Orthorhombic

$(Y,Ca,Ce,U,Th)(Nb,Ta,Ti)_2O_6$

In pegmatites from near Kinlochbervie, Sutherlandshire, associated minerals being thorite and allanite. M. J. Gallagher *et al.* (1971) *Trans. Inst. Mining Metall.* **80,** B150. [M.A. 75-1981.]

Fassaite Monoclinic

$Ca(Mg,Fe^{3+},Al)(Si,Al)_2O_6$

In marble, Tiree, Argyllshire. A. F. Hallimond (1947) *Mineral. Mag.* **28,** 236. In eclogite, Knockormal, south Ayrshire. T. W. Bloxam and J. B. Allen (1959) *Trans. R. Soc. Edinb.* **64,** 18. [M.A. **16,** 217.]

Fergusonite $YNbO_4$ Tetragonal

'In the Cairngorms [from Glen Lui], a minor but very interesting assemblage of niobium and rare-earth minerals comprising fergusonite, columbite, ilmenorutile, monazite, and xenotime, was found associated with cassiterite in the heavy mineral suite of stream sediments.' *Inst. Geol. Sci. Ann. Rept. for 1974,* 91–2 (1975).

Ferrimolybdite

$Fe_2^{3+}(MoO_4)_3 \cdot 8H_2O(?)$

Yellow earthy coating, associated with molybdenite, in a quartz vein cutting granite, Screel Hill, Kirkmirran, Kirkcudbrightshire. J. Williams (1973) *Trans. Dumfriesshire Galloway Nat. Hist. Antiq. Soc.* **50,** 3. [RSM X-ray diffraction identification.]

Ferroaugite Monoclinic

$(Ca,Na)(Fe^{2+},Mg,Al,Ti)(Si,Al)_2O_6$

A ferroaugite of composition $Ca_{39.1}Fe_{47.3}Mg_{13.6}$ occurs in the upper zone of the Insch layered intrusion, Aberdeenshire. P. D. Clarke and W. J. Wadsworth (1970) *Scott. J. Geol.* **6,** 20, anal. 4. [M.A. 72-568.]

Ferrobustamite Triclinic

$Ca(Fe^{2+},Ca,Mn)Si_2O_6$

'Iron rhodonite' from Skye described by C. E. Tilley (*Am. Mineral.* **33,** 736; M.A. **11,** 16; but Tilley actually used the name iron wollastonite) is shown to have the bustamite structure and is renamed. P. A. Rapoport and C. W. Burnham (1973) *Z. Kristallogr.* **138,** 419. [M.A. 74-905.]

Ferrohedenbergite Monoclinic

$(Fe,Ca,Mg)_2Si_2O_6$

As elongated prisms (< 1.5 mm) in granophyre, Meall Dearg, Skye, Inverness-shire. Y. M. Anwar (1955) *Geol. Mag.* **92,** 367. [M.A. **13,** 531.]

Ferrohypersthene $(Fe,Mg)SiO_3$ Orthorhombic

As brown crystals (< 4 mm) in biotitic norite, Craig Wood, Glenbuchat, Aberdeenshire. N. F. M. Henry (1935) *Mineral. Mag.* **24,** 222, anal. A (hypersthene). [Henry's hypersthene analysis is that of a ferrohypersthene.]

Freibergite Cubic

$(Ag,Cu,Fe)_{12}(Sb,As)_4S_{13}$

As inclusions (< 100 μm) in fine-grained massive galena from the 'Hard Vein', Tyndrum, Perthshire. R. A. D. Pattrick (1978) *Mineral. Mag.* **42,** 287. [M.A. 78-4901. R. A. D. Pattrick (1979) pers. com.]

Galenobismutite $PbBi_2S_4$ Orthorhombic

As plates (< 0.5 cm) in galena containing altered pyrrhotine, from old mine dumps at Corrie Buie, Meal nan Oighreag, south of Loch Tay, Perthshire. Identification based on reflected-light microscopy and S.E.M. microanalysis. About 1% Ag is also present in this mineral. [R. A. D. Pattrick (1979) pers. com.]

Glushinskite $MgC_2O_4 \cdot 2H_2O$ Monoclinic(?)

Glushinskite occurs at the lichen/rock interface on serpentinite colonized by *Lecanora atra* at Mill of Johnston, near Insch in Kincardineshire. It is found in a creamy white layer intermingled with the hyphae of the lichen fungus. It consists of crystals mainly 2 to 5 μm in size showing a distorted pyramidal form, often with curved and striated faces. M. J. Wilson *et al.* (1980) *Mineral. Mag.* **43,** 837. [M.A. 80-4912.]

Godlevskite $(Ni,Fe)_7S_6$ Orthorhombic

'In the Unst ophiolite belt [Shetland], associated with finely disseminated metals, alloys, arsenides and sulphides.' *Inst. Geol. Sci. Ann. Rept. for 1974,* 92 (1975).

Gorceixite Monoclinic, pseudotrigonal
$BaAl_3(PO_4)_2(OH)_5 \cdot H_2O$

Microscopic, greenish, six-sided platy crystals with halloysite (7 Å) in a vein at Hospital quarry, Elgin, Morayshire. Identified by X-ray diffraction and electron-probe microanalysis. [M. J. Wilson (1978) pers. com.]

Goyazite $SrAl_3(PO_4)_2(OH)_5 \cdot H_2O$ Trigonal

In the clay fraction of a soil derived from Middle Old Red Sandstone rocks and collected from the side of the B9163 road near junction with road B9169, north-west side of Black Isle, Ross and Cromarty. [M. J. Wilson (1978) pers. com.]

Graftonite $(Fe^{+2},Mn,Ca)_3(PO_4)_2$ Monoclinic

Grey grains (< 4 mm) in small (15-30 cm) pods within Moine striped gneisses exposed near the entry of Glen Chosaidh, Loch Quoich, Inverness-shire. Mineral associates are jahnsite, johnsomervilleite, mitridatite, phosphosiderite, rockbridgeite, vivianite, with apatite and garnet. A. Livingstone (1980) *Mineral. Mag.* **43,** 833. [M.A. 80-4916.]

Grandidierite Orthorhombic
$(Mg,Fe^{2+})Al_3(BO_4)(SiO_4)O$

In one of the rock samples of the Comrie contact aureole, Comrie, Perthshire. [M. H. Hey (1979) pers. com. Identified by X-ray diffraction by Dr H. Helmers, Geol. Inst. Univ. Amsterdam.]

Heazlewoodite Ni_3S_2 Trigonal

Minute grains in chromitite, Hagdale quarry, Unst, Shetland. [RSM specimen collected and identified by X-ray diffraction in 1977.]

Hexahydrite $MgSO_4 \cdot 6H_2O$ Monoclinic

As a pale green, secondary growth, coating surface of an exposed drill core (serpentinite) from North Ballaird Bore No. 3, Balsalloch Farm, near Ballantrae, Ayrshire. Identified by X-ray diffraction. [R. I. Lawson (1980) pers. com.]

Honessite Trigonal
$Ni_6^{2+}Fe_2^{3+}(OH)_{16}(SO_4) \cdot 4H_2O$

Occurs intimately associated with hydrohonessite and reevesite in a citron-yellow crust, together with theophrastite, on chromitite from Hagdale quarry, Unst, Shetland. D. L. Bish and A. Livingstone (1981) *Mineral. Mag.* **44,** 339. [M.A. 82M/0675.]

Hortonolite (Fo 50-30) Orthorhombic

In olivine-gabbro from Camas Mor, Muck, Inverness-shire. C. E. Tilley (1952) *Am. J. Sci.,* Bowen volume, 533, anal. 3 (olivine). See also J. D. Birle *et al.* (1968) *Am. Mineral.* **53,** 809. [M.A. **12,** 151; M.A. 69-136.]

Hyalophane $(K,Ba)Al(Si,Al)_3O_8$ Monoclinic

As a minor constituent in strata-bound Ba-Zn mineralization in Dalradian schist, near Aberfeldy, Perthshire. Associated minerals include baryte, barian muscovite, celsian, and cymrite. J. S. Coats *et al.* (1980) *Trans. Inst. Mining Metall.* **89,** B116. [Identified by X-ray diffraction and electron-probe microanalysis. N. J. Fortey (1980) pers. com.]

Hydrohonessite Hexagonal
$Ni_6^{2+}Fe_2^{3+}(OH)_{16}(SO_4) \cdot 7H_2O$

Citron-yellow crusts associated with honessite, reevesite, and theothrastite on chromitite from Hagdale quarry, Unst, Shetland. Distinguished from honessite by its larger basal spacing (*c.* 11 Å). New species approved by IMA in 1981. D. L. Bish and A. Livingstone *Mineral. Mag.* **44,** 333 and 339. [M.A. 82M/0675 and 82 M/0691.]

Ilmenorutile $(Ti,Nb,Fe^{3+})_3O_6$ Tetragonal

'In the Cairngorms [from Glen Lui], a minor but very interesting assemblage of niobium and rare-earth minerals, comprising fergusonite,

columbite, ilmenorutile, monazite, and xenotime, was found associated with cassiterite in the heavy mineral suite of stream sediments'. *Inst. Geol. Sci. Ann. Rep. for 1974*, 91 (1975).

Jahnsite Monoclinic
$CaMn(Mg,Fe^{2+})_2Fe^{3+}_2(PO_4)_4(OH)_2 \cdot 8H_2O$

Rare small (< 1 mm) brown anhedral grains in small (15–30 cm) pods within Moine striped gneisses. Loch Quoich, Inverness-shire. For associates, see graftonite.

Johnsomervilleite Trigonal
$Na_{10}Ca_6Mg_{18}(Fe^{2+},Mn)_{25}(PO_4)_{36}$

Dark brown grains (< 1.5 mm) with vitreous lustre occur in small metamorphic pods in kyanite-bearing metasediments, Loch Quoich, Inverness-shire. For associates, see graftonite. A. Livingstone (1980) *Mineral. Mag.* **43,** 833. [M.A. 80-4916. Specimens collected by J. M. Somerville 1962, and by H. G. Macpherson and A. Livingstone 1977.]

Litharge PbO Tetragonal

Red plates (up to 1.0 mm) in sample from stream bed, Leadhills, Lanarkshire. For associates see elyite. [Identified by X-ray diffraction. Surprisingly, this mineral has not been listed previously possibly due to doubts over its origin when found in well-established lead mining and smelting areas.]

Margarite Monoclinic
$CaAl_2(Al_2Si_2)O_{10}(OH)_2$

In quartz-bearing Dalradian graphitic schists both as a primary phase and as an alteration product of kyanite. These schists occur in Perthshire, Aberdeenshire and Banffshire. G. A. Chinner (1974) *Geol. Mag.* **111,** 75. [M.A. 74-2398.]

Massicot PbO Orthorhombic

Soft, cream-yellow earthy mineral in sample from stream bed, Leadhills, Lanarkshire. For associates and comment see elyite and litharge respectively. [Identified by X-ray diffraction.]

Meta-autunite Tetragonal
$Ca(UO_2)_2(PO_4)_2 \cdot 2\text{–}6H_2O$

With metatorbernite, quartz and baryte, in boulders believed to be derived from an adjacent silicified fracture zone 2.4 km north of Helmsdale, Sutherlandshire. M. J. Gallagher *et al.* (1971) *Trans. Inst. Mining Metall.* **80,** B159. [M.A. 75-1981.]

Metakahlerite Tetragonal
$Fe^{2+}(UO_2)_2(AsO_4)_2 \cdot 8H_2O$

Yellow scales closely associated with kahlerite and other secondary uranium minerals in veins cutting the aureole of the Criffel granodiorite, near Dalbeattie, Kirkcudbrightshire. [T. M. Seward (1975) pers. com.]

Mitridatite Monoclinic
$Ca_3Fe^{3+}_4(PO_4)_4(OH)_6 \cdot 3H_2O$

Earthy dark yellow-green coatings on iron-manganese-phosphate minerals, Loch Quoich, Inverness-shire. For associates see graftonite.

Mizzonite (Ma 50–20) Tetragonal

Anhedral crystals enclosing other minerals, sometimes apatite, in symplectite-bearing nodules in the Ardgour marble, Coire Dubh, Argyllshire. H. I. Drever (1936) *Geol. Mag.* **73,** 452, 457. [M.A. 7, 47.]

Nontronite Monoclinic
$Na_{0.33}Fe^{3+}_2(Si,Al)_4O_{10}(OH)_2 \cdot nH_2O$

Fibrous pale olive-green alteration product from green actinolite in syenite, Noss Hill, South Mainland, Shetland. I. Stephen (1954) *Mineral. Mag.* **30,** 472. [M.A. **12,** 505.]

Norbergite Orthorhombic
$Mg_3(SiO_4)(F,OH)_2$

Waxy yellow-brown crystals (< 12 mm) with arsenopyrite in crystalline limestone, Loch Ness, Inverness-shire. [BM(NH) specimen, BM 93088, purchased 1860.]

Offretite Hexagonal
$(K_2Ca)_5Al_{10}Si_{26}O_{72} \cdot 30H_2O$

Fibrous outgrowths on box-work of levyne crystals occurring in vesicles (up to 1.5 cm) in basalts at Quirang and other areas, Isle of Skye, Inverness-shire. Samples collected by B. Jackson 1981. [Identified by X-ray diffraction, optical properties, and electron-probe microanalysis which gave SiO_2 50.0–51.8%, Al_2O_3 18.7–20.6%, CaO 7.2–7.9%, MgO 0.2%, K_2O 4.0–4.3%, and Na_2O 0.9–1.4%.]

Paragonite Monoclinic
$NaAl_2(Si_3Al)O_{10}(OH)_2$

In red phyllites with quartz, muscovite, chlorite, hematite, rutile, and apatite, near Dunoon, Argyllshire. M. J. McNamara (1963) *Nature* **197,** 1193. [M.A. **16,** 396.]

Phoenicochroite $Pb_2(CrO_4)O$ Monoclinic

Associated with pyromorphite, leadhillite, and cerussite, Hopeful vein, near Leadhills, Lanarkshire. A. K. Temple (1955) *Trans. R. Soc. Edinb.*

63, 104. [M.A. **14,** 283, 395. Temple's 'phoenicochroite' probably = impure phoenicochroite, while his 'new mineral' almost certainly = pure phoenicochroite. See S. A. Williams (1974) *Bull. Brit. Mus. (Nat. Hist.), Mineral.* **2,** 394.]

Phosphosiderite $Fe^{3+}PO_4 \cdot 2H_2O$ Monoclinic

Minute patch in iron-phosphate assemblage in small (15–30 cm) pods within Moine striped gneisses, Loch Quoich, Inverness-shire. For associates, see graftonite.

Powellite $CaMoO_4$ Tetragonal

A single greenish-black crystal (*c.* 1 cm), associated with apophyllite and analcime, in a geode in phonolite, Traprain Law, near Haddington, East Lothian. M. H. Battey and A. A. Moss (1962) *Mineral. Mag.* **33,** 158. [M.A. **16,** 64.]

Pseudobrookite $Fe_2^{3+}TiO_5$ Orthorhombic

Crystals granular or in laths which may be of honey-brown colour, associated with corundum, magnetite, spinel, and mullite, in emery-like rocks adjacent to a dolerite plug, Sithean Sluaigh, Strachur, Loch Fyne, Argyllshire. D. G. W. Smith (1965) *Am. Mineral.* **50,** 1982, 2006. [M.A. **17,** 717.]

Reevesite Trigonal

$Ni_6Fe_2^{3+}(CO_3)(OH)_{16} \cdot 4H_2O$

Found intimately associated with hydrohonessite and honessite in a citron-yellow crust, together with theophrastite, on chromitite from Hagdale quarry, Unst, Shetland. D. L. Bish and A. Livingstone (1981) *Mineral. Mag.* **44,** 339. [M.A. 82M/0675.]

Retgersite $NiSO_4 \cdot 6H_2O$ Tetragonal

Pale blue to blue-green crusts and minute curved or twisted crystals associated with annabergite and niccolite, 'Menimuir Burn', near Cassencarie, Kirkcudbrightshire. [RSM X-ray diffraction identification 1977 from specimens in Heddle collection.]

Rozenite $Fe^{2+}SO_4 \cdot 4H_2O$ Monoclinic

Porcelain white patches replacing a greenish melanterite stalactite, West Mains coal mine, West Calder, Midlothian. [RSM specimen identified by X-ray diffraction 1978.] Also, blue-green crystals (< 6 mm) partly covered with white encrustations, in laminated shale, Howcommon limestone mine, Kilmarnock, Dunbartonshire. [R. I. Lawson (1978) pers. com.]

Safflorite $(Co,Fe,Ni)As_2$ Monoclinic

Tin-white patches associated with native silver crystals (2 mm) and erythrite in baryte gangue from old mine dump, Silver Glen, Alva, Clackmannanshire. Sample submitted for examination in 1982 by S. Moreton. [Identified by X-ray diffraction and electron-probe microanalysis.]

Schirmerite Orthorhombic

$Ag_3Pb_3Bi_9S_{18}$ to $Ag_3Pb_6Bi_7S_{18}$

In small fractures in galena, and associated with electrum, bismuth, and emplectite, from old mine dumps at Corrie Buie, Meal nan Oighreag, south of Loch Tay, Perthshire. [R. A. D. Pattrick (1979) pers. com.]

Schoepite $UO_3 \cdot 2H_2O$ Orthorhombic

Lemon yellow minute crystals (about 0.1 mm) in aggregates or as fine-grained massive fissure-fillings and encrustations, associated with pitchblende, in altered radioactive rock, Southwick cliffs area, near Dalbeattie, Kirkcudbrightshire. [J. Knight (1978) pers. com. Identification confirmed by electron-probe microanalysis, RSM.]

Siegenite $(Co,Ni)_3S_4$ Cubic

Fine-grained bronze-like patches in mine dump material from Blackcraig, Kirkcudbrightshire. A. Livingstone *et al.* (1976) *Mineral. Mag.* **40,** 894. [M.A. 77-1264. Two electron-probe microanalyses of an X-rayed grain gave: Co = 30.0–31.0%, Ni = 24.3–25.0%, Fe = 1.6%, Cu = 0.3–0.5%.]

Sodalite Cubic

$Na_8Al_6Si_6O_{24}Cl_2$

Associated with analcite in small (< 0.2 mm) irregular patches in the groundmass or as larger (< 0.5 mm) roundish patches with ophitic relations to the feldspars, in the phonolite at Traprain Law, near Haddington, East Lothian. A. G. MacGregor (1922) *Geol. Mag.* **59,** 516. [This mineral has now been confirmed by electron-probe microanalysis. U. Söffler pers. com.]

Tamarugite Monoclinic

$NaAl(SO_4)_2 \cdot 6H_2O$

White fluffy encrustations associated with alunogen and potassium alum, Hurlet, Paisley, Renfrewshire. [RSM identification in 1979 by X-ray diffraction of BM(NH) specimen, BM 95187, from the Allan–Greg collection, purchased 1860. Qualitative electron-probe microanalysis confirms major aluminium, sulphur, and minor sodium.]

Theophrastite $Ni(OH)_2$ Trigonal

Green encrustation on chromitite specimens, together with citron-yellow crust (see hydrohones-

site) from Hagdale quarry, Unst, Shetland. A. Livingstone and D. L. Bish (1982) *Mineral. Mag.* **46,** 1. [M.A. 82M/1752.]

Thorianite ThO_2 Cubic

With thorite associated with apatite in syenite, Cnoc nan Cullean, Ben Loyal, Sutherlandshire. M. J. Gallagher *et al.* (1971) *Trans. Inst. Mining Metall.* **80,** B160. [M.A. 75-1981.]

Thorogummite Tetragonal

$Th(SiO_4)_{1-x}(OH)_{4x}$

As inclusions of glassy red or earthy red-brown grains (3-6 mm) with thorite in biotite crystals in the Sletteval pegmatite, South Harris, Inverness-shire. O. von Knorring and R. Dearnley (1959) *Mineral. Mag.* **32,** 371. [M.A. **14,** 498.]

Tyrolite Orthorhombic

$CaCu_5(AsO_4)_2(CO_3)(OH)_4 \cdot 6H_2O$

Blue-green radiating pearly blades forming encrustation on country rock found loose in stream, Silver Glen, Alva, Clackmannanshire. Specimens collected by H. G. Macpherson and B. Jackson 1982. [Identified by X-ray diffraction.] [Previously reported from Matlock, Derbyshire; see Dana, 7th edn., II, p. 926, but not listed.]

Valleriite Hexagonal

$4(Fe,Cu)S \cdot 3(Mg,Al)(OH)_2$

Lamellae associated with small patches (< 0.5 mm) of sulphide composed of pentlandite, pyrrhotine, chalcopyrite, and carbonate in an allivalite, Huntly, Aberdeenshire. J. Babkine and F. Conquéré (1968) *C. R. Hebd. Seances Acad. Sci.* **267,** Ser. D, 268. [M.A. 70-677.]

Vandendriesscheite Orthorhombic

$PbU_7O_{22} \cdot 12H_2O$

Minute pure orange patches on rock matrix, Southwick cliffs area, south of Dalbeattie, Kirkcudbrightshire. [Identified by BM(NH) prior to 1969 on samples submitted by R. S. W. Braithwaite. J. Knight (1978) pers. com.]

Voltaite Cubic

$K_2Fe_5^{2+}Fe_4^{3+}(SO_4)_{12} \cdot 18H_2O$

Small clusters of minute black crystals, pale green in thin section, associated with halotrichite, pyrite, coquimbite, and roemerite. From old railway cutting west of Stanely, near Paisley, Renfrewshire. [RSM specimen identified by X-ray diffraction 1979.]

Walpurgite Triclinic

$(BiO)_4(UO_2)(AsO_4)_2 \cdot 3H_2O$

Minute (< 1 mm) yellow crystals with high lustre in uranium-bearing veins cutting the aureole of the Criffel granodiorite, near Dalbeattie, Kirkcudbrightshire. [BM(NH) identification prior to 1970 from sample submitted by R. S. W. Braithwaite. J. R. Knight 1978, pers. com.]

Zirkelite Monoclinic, ps. Cubic

$(Ca,Th,Ce)Zr(Ti,Nb)_2O_7$

Anhedral grains (< 60 μm), dark reddish-brown in thin-section, associated with baddeleyite, apatite, chlorite, amphibole, and biotite in mesostasis areas of the Rhum layered pluton, Rhum, Inverness-shire. Zircon also occurs. C. T. Williams (1978) *Contrib. Mineral. Petrol.* **66,** 29, 33. [M.A. 78-4895.]

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