## Uranospathite $(Al, \square)(UO_2)_2F(PO_4)_2 \cdot 20H_2O$

**Crystal Data**: Orthorhombic. *Point Group*: *mm*2. Rectangular platy crystals, to 1 mm, flattened on {001}, showing {100}, {010}, in fanlike groups. *Twinning*: May be twinned on {110}, forming cruciform groupings.

**Physical Properties**: *Cleavage*: On {001}, perfect; on {100} and {010}, good. Hardness = 2-2.5 D(meas.) = 2.50 D(calc.) = 2.54 Radioactive. Yellowish green fluorescence under UV. Readily dehydrates to sabugalite.

**Optical Properties**: Translucent. *Color*: Yellow to pale green.
*Optical Class*: Biaxial (–), anomalous. $\alpha$ = [~1.49] $\beta$ = 1.510 $\gamma$ = 1.521 2V(meas.) = 69°
*Pleochroism*: *X* = pale yellow; *Y* = *Z* = deep yellow. *Orientation*: *X* = *c*; *Y* = *a*; *Z* = *b*.

**Cell Data**: *Space Group*: *Pnn*2. *a* = 30.020(4) *b* = 7.0084(9) *c* = 7.0492(9) Z = 2

**X-ray Powder Pattern**: Basset mines, Cornwall, England.
15.22 (10), 7.60 (10), 4.93 (10), 3.50 (8), 4.48 (6b), 2.21 (6), 4.08 (4)

**Chemistry**: (1) Basset mines, Cornwall, England; Al confirmed by electron microprobe, P and U confirmed by microchemical and spectrochemical techniques, formula established by analogy to the torbernite group and crystal structure analysis. Presence of F confirmed by wavelength-dispersion spectrometry.

**Mineral Group**: Autunite group.

**Occurrence**: A rare secondary mineral in the oxidized zone of uranium-bearing hydrothermal mineral deposits.

**Association**: Bassetite.

**Distribution**: From the Basset group of mines, Illogan, Cornwall, England. In France, at the La Crouzille and Sagnes mines, Haute-Vienne. From the Pedro Alvaro vanadium mine, Salamanca Province, and at El Padregal, Badajoz Province, Spain. In the Weisser Hirsch mine, Neustädtel-Schneeberg, Saxony, and at Menzenschwand, Black Forest, Germany. On Radium Hill, Olary, South Australia.

**Name**: For its content of uranium and the Greek for a "broad blade", an allusion to the bladed character of its crystals.

**Type Material**: [Museum of Practical Geology, Ludlam collection, L1941] now in The Natural History Museum, London, England.

**References**: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 990. (2) Walenta, K. (1978) Uranospathite and arsenuranospathite. Mineral. Mag., 42, 117-128. (3) Locock, A.J., W.S. Kinman, and P.C. Burns (2005) The structure and composition of uranospathite, $Al_{1-x}$ x$[(UO_2)(PO_4)]_2(H_2O)_{20+3x}F_{1-3x}$, x = 0-0.33, a non-centrosymmetric fluorine-bearing mineral of the autunite group, and of a related synthetic lower hydrate, $Al_{0.67}$0.33$[(UO_2)(PO_4)]_2(H_2O)_{15.5}$. Can. Mineral., 43, 989-1003. (4) (2006) Amer. Mineral., 91(1), 224 (abs. ref. 3).