

**Crystal Data:** Monoclinic. *Point Group:*  $2/m$ . Prismatic crystals, flattened on {100}, elongated and striated along [001], showing {001}, {100}, {011}, and {110}, to 3 mm.

*Twinning:* Pseudo-merohedry by twin law  $[\bar{1} 0\bar{1} / 010 / 001]$  confirmed by structure analysis.

**Physical Properties:** *Cleavage:* On {100}, good; on {110}, probable. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness =  $\sim 2.5$  D(meas.) =  $\sim 5.1$  D(calc.) = 5.74 Radioactive.

**Optical Properties:** Transparent to translucent. *Color:* Yellow-orange to yellowish brown, brown. *Streak:* Pale yellow. *Luster:* Greasy to adamantine. *Optical Class:* Biaxial (+) to uniaxial (+).  $\alpha = 1.898(5)$   $\beta = 1.915(5)$   $\gamma = \text{n.d.}$   $2V(\text{meas.}) = \text{Small}$  [red] to large [blue];  $0^\circ$ - $25^\circ$ . *Pleochroism:* Moderately strong;  $X = \text{yellow}$ ;  $Y = \text{yellow with orange tint}$ ;  $Z = \text{colorless to pale yellow}$ . *Orientation:*  $Y = c$ . *Dispersion:*  $r \ll v$ ; extreme, showing anomalous interference colors and incomplete extinction.

**Cell Data:** *Space Group:*  $P2_1/m$ .  $a = 31.066(3)$   $b = 17.303(2)$   $c = 7.043(1)$   $\beta = 96.492(2)^\circ$   $Z = 8$

**X-ray Powder Pattern:** Michael mine, Germany.  
3.73 (10b), 3.06 (9), 3.00 (7), 2.89 (7), 1.833 (7), 4.33 (6b), 2.70 (6)

**Chemistry:** (1) Michael mine, Germany; microchemical tests show Pb, U, and As are the main components,  $\text{H}_2\text{O}$  determined as 5.3%; structure analysis confirms the composition (no analysis given) and this species to be the arsenate analog of dumontite.

**Mineral Group:** Phosphuranylite group.

**Occurrence:** A rare secondary mineral in cavities in hornstone breccia.

**Association:** Hallimondite, widenmannite, zeunerite, mimetite, cerussite.

**Distribution:** From the Michael mine, Weiler, near Lahr, Black Forest, Germany.

**Name:** Honor Baron Friedrich von *Hügel* (1852-1925), Austrian-British theologian.

**Type Material:** n.d.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 815. (2) Walenta, K. (1979) Über den Hügelite. *Tschermaks Mineral. Petrog. Mitt.*, 26, 11-19 (in German with English abs.). (3) Piret, P. and J. Piret-Meunier (1988) Nouvelle détermination de la structure cristalline de la dumontite  $\text{Pb}_2[(\text{UO}_2)_3\text{O}_2(\text{PO}_4)_2] \cdot 5\text{H}_2\text{O}$ . *Bull. Minéral.*, 111, 439-442 (in French with English abs.). (4) Locock, A.J. and P.C. Burns (2003) The structure of hügelite, an arsenate of the phosphuranylite group, and its relationship to dumontite. *Mineral. Mag.*, 67(5), 1109-1120. (5) (2004) *Amer. Mineral.*, 89, 897 (abs. ref. 4).