

Crystal Data: Monoclinic. *Point Group:* 2/m. Equant to short prismatic [001] crystals, typically distorted, with {001}, {011}, {010}, {110}, {120}, {132}, {101}, several others, to 23 cm; massive cleavable. *Twinning:* Common, {101} as twin and contact plane, with or without re-entrants.

Physical Properties: *Cleavage:* Good on {101}, imperfect on {010}, indistinct on {001}, {110}. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 2.5-3 D(meas.) = 2.21-2.23 D(calc.) = 2.258

Optical Properties: Transparent. *Color:* Colorless, white, may be pale yellow or pale brown; colorless in transmitted light. *Luster:* Vitreous, pearly on {010} and some cleavages. *Optical Class:* Biaxial (+). *Orientation:* X = b; Z ∩ c = 30°. *Dispersion:* r < v. α = 1.489-1.491 β = 1.553-1.554 γ = 1.649-1.650 2V(meas.) = 80°-84°

Cell Data: *Space Group:* P2₁/c. a = 6.250(1) b = 14.471(2) c = 10.114(2) β = 109.978(5)° Z = 8

X-ray Powder Pattern: Near Havre, Montana, USA.

5.95 (100), 3.652 (90), 2.357 (80), 2.971 (50), 2.497 (20), 2.262 (20), 2.906 (10)

Chemistry:	(1)	(2)	(1)	(2)
P ₂ O ₅	0.01		H ₂ O ⁺	13.01
C ₂ O ₃	48.68	49.29	H ₂ O ⁻	0.13
CaO	38.27	38.38	<u>H₂O</u>	<u>12.33</u>
			Total	100.10 100.00

(1) Huron River, Erie Co., Ohio; here converted to oxides. (2) CaC₂O₄·H₂O.

Occurrence: Of uncommon occurrence as a low-temperature primary hydrothermal mineral in carbonate-sulfide veins, geodes, or septarian nodules; may be associated with coal measures or formed by oxidation of organic material in surrounding rocks; in some uranium deposits.

Association: Calcite, barite, sphalerite, pyrite, weddellite, waxy hydrocarbons.

Distribution: Originally described from an unknown locality. Well characterized material from: in Germany, in Saxony, at Freital-Burgk, near Dresden, as large crystals; in the Himmelsfürst mine, Erbsdorf, near Freiberg; Zwickau, and Schlema-Hartenstein; at Paitzdorf, near Ronneburg, Thuringia. From Kladno, Pchery, near Slaný (Schlan), Czech Republic. At Cigelka, Slovakia. From the Boldut mine, Cavnic (Kapnikbánya), Romania, large crystals. In France, in the Saint-Sylvestre mine, Bas-Rhin, and at Condorcet, Drôme. In the Mealbank quarry, Ingleton, North Yorkshire, England. In Russia, from the Maikop district, Caucasus Mountains, and as large crystals from Dal'negorsk, Primorskiy Krai. In the USA, from about 11 km southeast of Havre, Hill Co., Montana; near Elm Springs, Meade Co., South Dakota, very large crystals; near Biggs, Sherman Co., Oregon; in the Radon mine, near Moab, San Juan Co., Utah; along the Huron River, about 2 km west of Milan, Erie Co., Ohio. There are numerous other minor localities.

Name: Honors William H. *Whewell* (1794-1866), English naturalist and philosopher.

Type Material: [Harvard University, Cambridge, Massachusetts, USA, 78102.]

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 1099-1101. (2) Leavens, P.B. (1968) New data on whewellite. *Amer. Mineral.*, 53, 455-463. (3) Deganello, S. and O.E. Piro (1981) The crystal structure of calcium oxalate monohydrate (whewellite). *Neues Jahrb. Mineral., Monatsh.*, 81-88. (4) Pecora, W.T. and J.H. Kerr (1954) Whewellite from a septarian limestone concretion in marine shale near Havre, Montana. *Amer. Mineral.*, 39, 208-214. (5) Echigo, T., M. Kimata, A. Kyono, M. Shimizu, and T. Hatta (2005) Re-investigation of the crystal structure of whewellite [Ca(C₂O₄)] and the dehydration mechanism of caoxite [Ca(C₂O₄)·3H₂O]. *Mineral. Mag.*, 69, 77-88. (6) (2005) *Amer. Mineral.*, 90(8), 1469 (abs. ref. 5).