Aurichalcite $(Zn, Cu)_5(CO_3)_2(OH)_6$

Crystal Data: Monoclinic, pseudo-orthorhombic by twinning. *Point Group:* $2/m$. As acicular to lathlike crystals with prominent {010}, commonly striated ‖ [001], with wedgelike terminations, to 3 cm. Typically in tufted divergent sprays or spherical aggregates, may be in thick crusts; rarely columnar, laminated or granular. *Twinning:* Observed in X-ray patterns.

Physical Properties: *Cleavage:* On {010} and {100}, perfect. *Tenacity:* "Fragile". Hardness = 1–2 D(meas.) = 3.96 D(calc.) = 3.93–3.94

Optical Properties: Transparent to translucent. *Color:* Pale green, greenish blue, sky-blue; colorless to pale blue, pale green in transmitted light. *Luster:* Silky to pearly. *Optical Class:* Biaxial (–). *Pleochroism:* Weak; X = colorless; $Y = Z$ = blue-green. *Orientation:* $X = b$; $Y \simeq a$; $Z \simeq c$. *Dispersion:* $r < v$; strong. α = 1.654–1.661 β = 1.740–1.749 γ = 1.743–1.756 2V(meas.) = Very small.

Cell Data: *Space Group:* $P2_1/m$. a = 13.82(2) b = 6.419(3) c = 5.29(3) $\beta = 101.04(2)^\circ$ Z = 2

X-ray Powder Pattern: Mapimí, Mexico.
6.78 (10), 2.61 (8), 3.68 (7), 2.89 (4), 2.72 (4), 1.827 (4), 1.656 (4)

Chemistry:

	(1)
CO_2	16.22
CuO	19.87
ZnO	54.01
CaO	0.36
H_2O	9.93
Total	100.39

(1) Utah; corresponds to $(Zn_{3.63}Cu_{1.37})_{\Sigma=5.00}(CO_3)_2(OH)_6$.

Occurrence: In the oxidized zones of copper and zinc deposits.

Association: Rosasite, smithsonite, hemimorphite, hydrozincite, malachite, azurite.

Distribution: Widespread in small amounts. Localities noteworthy for good specimens include: from the Loktevskii mine, upper Loktevka River, west Altai Mountains, Russia. At Monteponi, and in the Rosas mine, Sulcis, Sardinia, Italy. From Laurium, Greece. At Chessy, near Lyon, Rhône, France. In the USA, in Arizona, fine examples from Bisbee, Cochise Co., in the Silver Hill mine, Pima Co., and at the 79 mine, Gila Co.; from Cerro Gordo, Inyo Co., California; at the Kelly and Graphic mines, Magdalena, Socorro Co., New Mexico. In Utah, from the Tintic district, Juab Co., at the Hidden Treasure mine, Tooele Co., in the Apex mine, near St. George, Washington Co., and from Big Cottonwood Canyon, Salt Lake Co.; at Leadville, Lake Co., Colorado. In Mexico, rich specimens from the Ojuela mine, Mapimí, Durango, Mexico. At the Tchah Khuni mine, Anarak district, Iran. From Tsumeb, Namibia. At Kipushi, 28 km southwest of Lubumbashi, Katanga Province, Congo (Shaba Province, Zaire).

Name: From the Latin for *golden copper*, brass, for the copper and zinc content of the mineral.

Type Material: The Natural History Museum, London, England, 31118.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 249–250. (2) Jambor, J.L. and G. Pouliot (1965) X-ray crystallography of aurichalcite and hydrozincite. Can. Mineral., 8, 385–389. (3) Harding, M.M., B.M. Kariuki, R. Cernik, and G. Cressey (1994) The structure of aurichalcite, $(Cu, Zn)_5(OH)_6(CO_3)_2$, determined from a microcrystal. Acta Cryst., 50, 673–676. (4) Charnock, J.M., P.F. Schofield, C.M.B. Henderson, G. Cressey, and B.A. Cressey (1996) Cu and Zn ordering in aurichalcite. Mineral. Mag., 60, 887–896.