

Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals are acicular to prismatic, thick tabular, equant, with $\{100\}$, $\{010\}$, $\{001\}$, $\{110\}$, $\{\bar{2}01\}$, several other forms, rounded, in sprays and crude composite aggregates, to 9 cm; typically stalactitic, mammillary, botryoidal, as such, radially fibrous internally. *Twinning:* On $\{100\}$, $\{201\}$, very common as contact or penetration twins, also polysynthetic.

Physical Properties: *Cleavage:* Perfect on $\{\bar{2}01\}$; fair on $\{010\}$. *Fracture:* Subconchoidal to uneven. Hardness = 3.5–4 D(meas.) = 4.05(2) D(calc.) = 3.983

Optical Properties: Translucent to opaque. *Color:* Bright green, dark green, blackish green, commonly banded in masses; green to yellowish green in transmitted light. *Streak:* Pale green. *Luster:* Adamantine to vitreous; silky if fibrous; dull to earthy if massive. *Optical Class:* Biaxial (-). *Pleochroism:* X = nearly colorless; Y = yellowish green; Z = deep green. *Orientation:* Y = b; X \wedge c = 23.5°. *Dispersion:* r < v, moderately strong. $\alpha = 1.655(3)$ $\beta = 1.875(3)$ $\gamma = 1.909(3)$ $2V(\text{meas.}) = 43(2)^\circ$

Cell Data: *Space Group:* $P2_1/a$. a = 9.502 b = 11.974 c = 3.240 $\beta = 98^\circ 45'$ Z = 4

X-ray Powder Pattern: Synthetic.

2.857 (100), 3.693 (85), 5.055 (75), 5.993 (55), 2.520 (55), 2.778 (45), 2.464 (35)

Chemistry:

	(1)	(2)
CO ₂	20.04	19.90
CuO	72.03	71.95
H ₂ O	8.09	8.15
Total	100.16	100.00

(1) Rio Marina, Elba, Italy. (2) $\text{Cu}_2(\text{CO}_3)(\text{OH})_2$.

Occurrence: A common secondary mineral formed in the oxidation zone of copper deposits; locally may be an ore of copper.

Association: Azurite, cuprite, cerussite, chrysocolla, calcite. "limonite".

Distribution: Many localities; some for abundant and rich material include: from Chessy, near Lyon, Rhône, France. In Russia, large pure masses formerly from mines around Nizhni Tagil and Ekatarinburg, Ural Mountains. In Congo, in Katanga Province (Shaba Province, Zaire), from Lubumbashi, at the Musonoi mine, near Kolwezi, and elsewhere, with large crystals from the Mashamba West mine. In Namibia, from Tsumeb, and as large crystals at the Onganja mine, 60 km northeast of Windhoek. In Australia, from Broken Hill and Cobar, New South Wales, and Burra, South Australia. In the USA, from the Copper Queen, Czar, and other mines in the Warren district, Bisbee, Cochise Co. and at Morenci, Greenlee Co., Arizona; in the Fierro-Hanover district and at Santa Rita, Grant Co., New Mexico.

Name: From the Greek for *mallow*, in allusion to its green color.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 252–256. (2) Süssse, P. (1967) Verfeinerung der Kristallstruktur des Malachites, $\text{Cu}_2(\text{OH})_2\text{CO}_3$. Acta Cryst., 22, 146–151 (in German with English abs.). (3) Zigan, F., W. Joswig, H.D. Schuster, and S.A. Mason (1977) Verfeinerung der Struktur von Malachit, $\text{Cu}_2(\text{OH})_2\text{CO}_3$, durch Neutronenbeugung. Zeits. Krist., 145, 412–426 (in German with English abs.). (4) (1960) NBS Circ. 539, 10, 31.