

**Crystal Data:** Monoclinic. *Point Group:* 2/*m*. As crystals, stubby to acute dipyrarnidal with forms {111}, { $\bar{1}11$ }, {101}, to 15 cm, or tabular on { $\bar{1}11$ } or {101}, with several other forms noted; granular, massive. *Twinning:* Common on {100} with composition plane {001} and marked re-entrant, occasionally producing lamellar or polysynthetic groups; rare on {223}; by reflection on { $\bar{2}21$ } with composition plane {331}; several other twin laws reported.

**Physical Properties:** *Cleavage:* Poor to good on {110}; indistinct on {101}. *Fracture:* Uneven to splintery. *Tenacity:* Brittle. Hardness = 5.5–6 D(meas.) = 3.122–3.240 D(calc.) = 3.144

**Optical Properties:** Transparent to translucent, may be nearly opaque. *Color:* Azure-blue, sky-blue, bluish white, yellow-green, blue-green, rarely green. *Streak:* White. *Luster:* Vitreous. *Optical Class:* Biaxial (-). *Pleochroism:* Strong; X = colorless; Y = blue; Z = darker blue. *Orientation:* Y = b; X  $\wedge$  c = 10°. *Dispersion:* r < v, weak. *Absorption:* Z > Y  $\gg$  X.  $\alpha$  = 1.604–1.626  $\beta$  = 1.626–1.654  $\gamma$  = 1.637–1.663 2V(meas.) =  $\sim$ 70°

**Cell Data:** *Space Group:* P2<sub>1</sub>/c. a = 7.144(1) b = 7.278(1) c = 7.228(1)  $\beta$  = 120.50(1)° Z = 2

**X-ray Powder Pattern:** Werfen, Austria; nearly identical to scorzalite. 3.23 (100), 3.20 (59), 3.14 (55), 3.077 (42), 4.73 (18), 2.548 (18), 1.571 (18)

Chemistry:	(1)	(2)	(1)	(2)
P <sub>2</sub> O <sub>5</sub>	45.79	44.64	FeO	3.95
TiO <sub>2</sub>	0.20		MgO	10.38
Al <sub>2</sub> O <sub>3</sub>	32.49	32.06	CaO	0.06
Fe <sub>2</sub> O <sub>3</sub>	0.60		H <sub>2</sub> O	6.48
			Total	99.95
				100.00

(1) Graves Mountain, Georgia, USA. (2) (Fe, Mg)Al<sub>2</sub>(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>2</sub> with Fe:Mg = 1:1.

**Polymorphism & Series:** Forms a series with scorzalite.

**Mineral Group:** Lazulite group.

**Occurrence:** Disseminated in metamorphic quartzites, schists and quartz veins; in the border zones of complex granite pegmatites; in alluvium and colluvium.

**Association:** Quartz, andalusite, rutile, kyanite, corundum, muscovite, pyrophyllite, dumortierite, wagnerite, svanbergite, berlinite (metamorphic); albite, quartz, muscovite, tourmaline, beryl (pegmatites).

**Distribution:** Many minor localities. Well-crystallized or rich material from: Färbergraben and Höllgraben, near Werfen, Salzburg, Austria. In Sweden, very large crystals from Hålsjöberg, Värmland, and in the Västanaå iron mine, Nasum, Skåne. In the USA, large crystals from Graves Mountain, Lincoln Co., Georgia; from about 30 km southeast of Beatty, Nye Co., Nevada; at the Champion mine and the nearby Vulcanus claim, White Mountains, Mono Co., California. Fine crystals along Cross-cut Creek, Big Fish River–Rapid Creek area, Yukon Territory, Canada. From 15 km west of Dattas, Minas Gerais, Brazil. On Mt. Bity, Ranomainty, and near Jamalezo, Madagascar. Fine gemmy crystals from the Chilas area, near Nanga Parbat Peak, Pakistan.

**Name:** From the German *lazurstein*, for *blue stone*.

**Type Material:** The Natural History Museum, London, England, 83304.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 908–911. (2) Pecora, W.T. and J.J. Fahey (1950) The lazulite-scorzalite isomorphous series. *Amer. Mineral.*, 35, 1–18. (3) Giuseppetti, G. and C. Tadini (1983) Lazulite, (Mg, Fe)Al<sub>2</sub>(OH)<sub>2</sub>(PO<sub>4</sub>)<sub>2</sub>: structure refinement and hydrogen bonding. *Neues Jahrb. Mineral., Monatsh.*, 410–416. (4) Blanchard, F.N. and S.A. Abernathy (1980) X-ray powder diffraction data for the phosphate minerals: vauxite, scorzalite, and lazulite. *Florida Scientist*, 43, 257–265.

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