Pyrophyllite $Al_2Si_4O_{10}(OH)_2$

Crystal Data: Monoclinic or triclinic. *Point Group:* $2/m$ ($2M_1$); $\bar{1}$ or 1 (1A). As lamellar crystals, to 8 cm; in compact spherulitic aggregates of needlelike radiating crystals; as fine grained foliated laminae, granular, massive.

Physical Properties: *Cleavage:* Perfect on {001}. *Tenacity:* Flexible but inelastic. Hardness = 1–2 D(meas.) = 2.65–2.90 D(calc.) = [2.81]

Optical Properties: Translucent to opaque. *Color:* White, pale blue, yellow, apple-green, grayish green, brownish green; in thin section, colorless. *Luster:* Pearly to dull. *Optical Class:* Biaxial (–). *Orientation:* $Z = b$; $Y \simeq a$. *Dispersion:* $r > v$, weak. $\alpha = 1.534–1.556$ $\beta = 1.586–1.589$ $\gamma = 1.596–1.601$ 2V(meas.) = 53°–62°

Cell Data: *Space Group:* $C\bar{1}$ or $C1$. $a = 5.160(2)$ $b = 8.966(3)$ $c = 9.347(6)$ $\alpha = 91.18(4)°$ $\beta = 100.46(4)°$ $\gamma = 89.64(3)°$ Z = 2

X-ray Powder Pattern: Tres Cerritos, California, USA.
3.037 (8), 4.53 (4), 8.97 (3), 2.400 (3b), 1.828 (3), 1.377 (3), 1.362 (3)

Chemistry:

	(1)
SiO_2	65.96
TiO_2	trace
Al_2O_3	28.25
Fe_2O_3	0.18
H_2O^+	5.27
H_2O^-	0.14
Total	99.80

(1) Tres Cerritos, California, USA; corresponds to $(Al_{1.97}Fe^{3+}_{0.01})_{\Sigma=1.98}(Si_{3.65}Al_{0.35})_{\Sigma=4.00}O_{10}(OH)_2$.

Polymorphism & Series: $2M_1$, 1A polytypes.

Occurrence: Somewhat uncommon, found both in hydrothermal veins and in bedded deposits in schistose metamorphic rocks.

Association: Kyanite, andalusite, topaz, mica, quartz.

Distribution: Some localities for rich or well-crystallized material follow. In Russia, at Krassik, between Pyschminsk and Beresov, Ural Mountains. From St. Niklas, Zermatt, Valais, Switzerland. In Sweden, at Västanå, Kristianstad. From near Ottré, Ardennes Mountains, Belgium. In the USA, found near Ogilby, Imperial Co., at Tres Cerritos, Mariposa Co., and the Champion mine, White Mountains, Mono Co., California; from near Quartzsite, La Paz Co., Arizona; at Staley, Randolph Co., Glendon and Robbins, Moore Co., and Hillsborough, Orange Co., North Carolina; in the Brewer mine, Chesterfield Co., South Carolina; on Graves Mountain, Lincoln Co., Georgia. From Ibitiara, Bahia, Brazil, in large crystals. In a number of mines in Nagano Prefecture, and elsewhere in Japan.

Name: From the Greek for *fire* and *leaf*, in allusion to its tendency to exfoliate into fan shapes when heated.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 691–692. (2) Deer, W.A., R.A. Howie, and J. Zussman (1963) Rock-forming minerals, v. 3, sheet silicates, 115–120. (3) Gruner, J.W. (1934) The crystal structures of talc and pyrophyllite. Zeits. Krist., 88, 412–419. (4) Lee, J.H. and S. Guggenheim (1981) Single crystal X-ray refinement of pyrophyllite-1*Tc*. Amer. Mineral., 66, 350–357.