Fredrikssonite  \( \text{Mg}_2(\text{Mn}^{3+}, \text{Fe}^{3+})\text{BO}_5 \)  

**Crystal Data:** Orthorhombic. *Point Group:* \( 2/m \ 2/m \ 2/m \). As crystals, prismatic and striated along \([001]\), sharp to rounded, to 2.0 mm, with diamond-shaped cross-sections; in parallel to randomly oriented aggregates.

**Physical Properties:**  
*Cleavage:* One, poor, and a second, very poor. *Fracture:* Irregular to uneven. *Tenacity:* Brittle. *Hardness:* \( \sim 6 \) \( \text{D(meas.) = 3.84(5) \ D(calc.) = 3.80} \)

**Optical Properties:** Nearly opaque to translucent. *Color:* Medium reddish brown.  
*Streak:* Pale brown to yellow. *Luster:* Vitreous to dull.  
*Optical Class:* Biaxial (+). *Pleochroism:* Pronounced; \( X = \) golden brown; \( Z = \) dark reddish brown to black. *Orientation:* \( Z = \) elongation of cleavage fragments \( = c \) (by analogy to ludwigite). *Dispersion:* \( r > v \), strong. *Absorption:* \( Z > X \). \( \alpha = 1.82(2) \) \( \beta < 1.86 \) \( \gamma = \sim 1.99 \) \( 2V(\text{meas.}) = > 60^\circ \)

**Cell Data:**  
*Space Group:* \( \text{Pbam} \).  
\( a = 9.198(2) \) \( b = 12.528(3) \) \( c = 2.965(1) \) \( Z = 4 \)

**X-ray Powder Pattern:** Långban, Sweden.
\( 2.590 \ (100), \ 2.486 \ (90), \ 5.16 \ (80), \ 2.013 \ (50), \ 1.513 \ (40), \ 2.201 \ (30), \ 1.570 \ (30) \)

**Chemistry:**
\[
\begin{align*}
\text{B}_2\text{O}_3 & \quad [17.9] \\
\text{Al}_2\text{O}_3 & \quad 1.9 \\
\text{Fe}_2\text{O}_3 & \quad 5.4 \\
\text{Mn}_2\text{O}_3 & \quad 35.5 \\
\text{MnO} & \quad 0.0 \\
\text{MgO} & \quad 40.3 \\
\text{Total} & \quad [101.0]
\end{align*}
\]

(1) Långban, Sweden; by electron microprobe, \( \text{B}_2\text{O}_3 \) calculated from stoichiometry and by analogy to orthopinakiolite; corresponds to \( \text{Mg}_{1.93}(\text{Mn}_{0.87}\text{Fe}_{1.3}\text{Al}_{0.07})\text{O}_5 \) \( \approx = 1.07\text{B}_2\text{O}_5\text{O}_{5.05} \).

**Polymorphism & Series:** Polymorphous with orthopinakiolite, pinakiolite, takéuchiite.

**Mineral Group:** Ludwigite group.

**Occurrence:** From a metamorphosed Fe–Mn orebody.

**Association:** Hausmannite, manganese calcite, brucite, adelite, dolomite–kutnohorite, clinohumite, jacobsite.

**Distribution:** From Långban, Värmland, Sweden.

**Name:** Honors Dr. Kurt A. Fredriksson (1926– ), Swedish–American geochemist and meteoriticist, Smithsonian Institution, Washington, D.C., USA.

**Type Material:** National Museum of Natural History, Washington, D.C., USA, 149811, 150341.