Varulite  
\((\text{Na, Ca})\text{Mn}^{2+}(\text{Mn}^{2+}, \text{Fe}^{2+}, \text{Fe}^{3+})_2(\text{PO}_4)_3\)

Crystal Data: Monoclinic.  
Point Group: \([2/m]\) (by analogy to hagendorfite).  
Nodular, granular, massive.

Physical Properties:  
Cleavage: Good on \(\{100\}\); distinct on \(\{010\}\).  
Hardness = 5  
D(meas.) = 3.5–3.6  
D(calc.) = n.d.

Optical Properties:  
Semitransparent.  
Color: Dull olive-green, brownish on oxidation.  
Luster: Vitreous.  
Optical Class: Biaxial (+).  
Pleochroism: X = yellowish green; Z = grass-green.  
Orientation:  
\(Y = b\).  
Dispersion: \(r > v\).  
\(\alpha = 1.708–1.720\)  
\(\beta = \text{n.d.}\)  
\(\gamma = 1.722–1.732\)  
\(2V(\text{meas.}) = 70^\circ\)

Cell Data:  
Space Group: n.d.  
\(Z = \text{n.d.}\)


Chemistry:  
\begin{align*}  
P_2\text{O}_5 & \quad 42.80 \quad 44.93 \quad \text{Li}_2\text{O} \quad 0.88 \quad 1.65 \\  
\text{Al}_2\text{O}_3 & \quad 0.36 \quad \text{Na}_2\text{O} \quad 7.12 \quad 8.08 \\  
\text{Fe}_2\text{O}_3 & \quad 8.35 \quad 5.32 \quad \text{K}_2\text{O} \quad 0.12 \quad 0.12 \\  
\text{FeO} & \quad 7.52 \quad 11.03 \quad \text{F} \quad 0.06 \\  
\text{MnO} & \quad 25.30 \quad 25.31 \quad \text{H}_2\text{O}^+ \quad 0.75 \quad 0.64 \\  
\text{MgO} & \quad 0.13 \quad \text{H}_2\text{O}^- \quad 0.14 \quad 0.18 \\  
\text{CaO} & \quad 4.86 \quad 2.30 \quad \text{insol.} \quad 1.80 \quad 0.28 \\  
\text{Total} & \quad 100.06 \quad 99.97 \\
\end{align*}

(1–2) Varuträsk pegmatite, Sweden.

Polymorphism & Series: Forms a series with hagendorfite.

Mineral Group: Alluaudite group.

Occurrence: In complex granite pegmatites, either as a primary mineral or an alteration product of triphylite–lithiophilite; as nodules in shale.

Association: Alluaudite.

Distribution: In Sweden, in the Varuträsk pegmatite, 15 km northwest of Skellefteå, Västerbotten, and from Skrumpetorp, Östergötland. In Finland, at Hunnakkko and Kaatiala, near Kuertane. From the Manggalde pegmatite, near Mesquitela, Portugal. Found in the Big Fish River and Boundary Creek areas, Yukon Territory, Canada.

Name: For its initially noted occurrence in the Varuträsk pegmatite, Sweden.

Type Material: n.d.

References:  