**Pattersonite**  \( \text{PbFe}_3(\text{PO}_4)_2(\text{OH})_4[(\text{H}_2\text{O})_{0.5}\text{(OH)}_{0.5}]_2 \)

**Crystal Data:** Triclinic.  \( \text{Point Group:} \ T \).  As slightly elongated to rosette-like aggregates of subparallel plates, to 0.5 mm, exhibiting rough forms \{110\}, \{001\}, and \{011\}.

**Physical Properties:** Cleavage: One poor direction. Fracture: Conchoidal. Tenacity: Brittle. Hardness = 4.5  \( \text{VHN} = 530 \) (25 g load).  \( D(\text{meas.}) > 4.04 \)  \( D(\text{calc.}) = 4.17 \)

**Optical Properties:** Translucent.  \( \text{Color:} \) Dark yellow.  \( \text{Streak:} \) Very pale yellow.  \( \text{Luster:} \) Adamantine.  \( \text{Optical Class:} \) Biaxial (-).  For: 1.86(1)  \( \beta = 1.917 \) (calc)  \( \alpha = 1.93(1) \)  \( 2\alpha = 50(5)^\circ \)

**Dispersion:** Very strong, \( r > v \).  \( \text{Pleochroism:} \) Weak; \( X = \) nearly colorless to very pale yellow; \( Y = \) pale yellow to yellow; \( Z = \) yellow to dark yellow.  \( \text{Absorption:} \)  \( Z > Y > X \).

**Orientation:** (polar coordinates in terms of \( \phi \) and \( \rho \) based on \( \{010\} = 0^\circ/90^\circ \)), \( X(-113^\circ/85^\circ) \); \( Y(155^\circ/70^\circ) \); \( Z(-10^\circ/21^\circ) \).

**Cell Data:** Space Group: \( \text{P} \).  \( a = 5.309(1) \)  \( b = 7.211(1) \)  \( c = 7.349(1) \)  \( \alpha = 87.74(3)^\circ \)  \( \beta = 86.38(3)^\circ \)  \( \gamma = 71.40(3)^\circ \)  \( Z = 1 \)

**X-ray Powder Pattern:** Vereinigung mine, Taunus, Hesse, Germany.  
4.848 (100), 6.839 (64), 3.547 (57), 3.417 (52), 3.022 (51), 3.667 (47), 2.8339 (45)

**Chemistry:**

| & \( \text{PbO} \) & 33.10 & \( \text{Fe}_2\text{O}_3 \) & 35.64 & \( \text{P}_2\text{O}_5 \) & 20.97 & \( \text{H}_2\text{O} \) & 9.32 & Total & 98.79 |

(1) Vereinigung mine, Taunus, Hesse, Germany; average of 46 electron microprobe analyses, \( \text{H}_2\text{O} \) from structure determination, anionic groups confirmed by IR, corresponding to \( \text{Pb}_{1.00} \text{Fe}_{3.02}(\text{PO}_4)_{1.96}(\text{OH})_{5.12}(\text{H}_2\text{O})_{0.94} \)

**Mineral Group:** Alunite group.

**Occurrence:** A secondary mineral on goethite in a weathered metallic sulfide mineral vein.

**Association:** Kintoreite, goethite, pyromorphite.

**Distribution:** On the dumps of the Vereinigung mine, near Eisenbach, ~5 km north of Bad Camberg, Taunus, Hesse, Germany.

**Name:** Honors Arthur Lindo Patterson (1902–1966), who developed a method employing a Fourier series to generate a three-dimensional function, the now well-known “Patterson function” in crystal-structure determination.

**Type Material:** Natural History Museum, Vienna, Austria.