Pattersonite $PbFe_3(PO_4)_2(OH)_4[(H_2O)_{0.5}(OH)_{0.5}]_2$

Crystal Data: Triclinic. *Point Group*: $\bar{1}$. 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 VHN = 530 (25 g load). D(meas.) = > 4.04 D(calc.) = 4.17

Optical Properties: Translucent. *Color*: Dark yellow. *Streak*: Very pale yellow. *Luster*: Adamantine.
Optical Class: Biaxial (-). α = 1.86(1) β = 1.917 (calc) γ = 1.93(1) 2Vα = 50(5)°
Dispersion: Very strong, $r > v$. *Pleochroism*: Weak; *X* = nearly colorless to very pale yellow; *Y* = pale yellow to yellow; *Z* = yellow to dark yellow. *Absorption*: $Z > Y > X$.
Orientation: (polar coordinates in terms of φ and ρ based on (010) = 0°/90°), *X* (−113°/85°); *Y* (155°/70°); *Z* (−10°/21°).

Cell Data: *Space Group*: $P\bar{1}$. a = 5.309(1) b = 7.211(1) c = 7.349(1) α = 87.74(3)° β = 86.38(3)° γ = 71.40(3)° 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:

	(1)
PbO	33.10
Fe_2O_3	35.64
P_2O_5	20.97
H_2O	9.32
Total	98.79

(1) Vereinigung mine, Taunus, Hesse, Germany; average of 46 electron microprobe analyses, H_2O from structure determination, anionic groups confirmed by IR, corresponding to $Pb_{1.00}\ Fe_{3.02}(PO_4)_{1.98}(OH)_{5.12}(H_2O)_{0.94}$

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.

References: (1) Kolitsch, U., H.-J. Bernhardt, W. Krause, and G. Blass (2008) Pattersonite, $PbFe_3(PO_4)_2(OH)_4[(H_2O)_{0.5}(OH)_{0.5}]_2$, a new supergene phosphate mineral: description and crystal structure. Eur. J. Mineral., 20, 281–288. (2) (2009) Amer. Mineral., 94, 401-402 (abs. ref. 1).