Decrespignyite-(Y)  \( \text{Y}_4\text{Cu(CO}_3\text{)}_4\text{Cl(OH)}_5\cdot2\text{H}_2\text{O} \)

Crystal Data:  Monoclinic. Point Group: 2/m, 2, or m. Rarely as thin pseudohexagonal crystals, to 50 \( \mu \)m, commonly curved; in stellate rosettes and as massive crusts and coatings.

Physical Properties:  Hardness = \( \sim 4 \)  \( D(\text{meas.}) = 3.64(2) \)  \( D(\text{calc.}) = [3.92] \)

Optical Properties:  Transparent. Color: Deep Royal blue to turquoise-blue; very pale blue in transmitted light. Streak: Pale blue. Luster: Vitreous to pearly. Optical Class: Biaxial (−). Pleochroism: Medium strong; \( X = \) very pale blue; \( Y = Z = \) greenish blue. Absorption: \( Z \simeq Y \gg X \). \( \alpha = 1.604(4) \)  \( \beta = \simeq 1.638 \)  \( \gamma = 1.638(3) \)  2V(\text{meas.}) = Very small.

Cell Data:  Space Group: \( P2/m, P2_1, \) or \( Pm \). \( a = 8.899(6) \)  \( b = 22.77(2) \)  \( c = 8.589(6) \)  \( \beta = 120.06(5)^\circ \)  \( Z = 4 \)

X-ray Powder Pattern:  Paratoo mine, Australia. 6.241 (100), 7.086 (50), 3.530 (40), 22.8 (30), 7.463 (30), 4.216 (30), 3.336 (30)

Chemistry:  \begin{align*}
\text{CO}_2 & \quad 19.8 & \text{Ho}_2\text{O}_3 & \quad 2.6 \\
\text{Y}_2\text{O}_3 & \quad 42.2 & \text{Er}_2\text{O}_3 & \quad 2.5 \\
\text{La}_2\text{O}_3 & \quad 0.3 & \text{CuO} & \quad 10.9 \\
\text{Pr}_2\text{O}_3 & \quad 0.1 & \text{CaO} & \quad 0.5 \\
\text{Nd}_2\text{O}_3 & \quad 1.3 & \text{Cl} & \quad 3.0 \\
\text{Sm}_2\text{O}_3 & \quad 1.0 & \text{H}_2\text{O} & \quad 10.8 \\
\text{Gd}_2\text{O}_3 & \quad 4.8 & \text{O} = \text{Cl}_2 & \quad 0.7 \\
\text{Tb}_2\text{O}_3 & \quad 0.4 & \text{Total} & \quad 103.2 \\
\text{Dy}_2\text{O}_3 & \quad 3.7 & & 
\end{align*}

(1) Paratoo mine, Australia; by electron microprobe, average of seven analyses, \( \text{CO}_2 \) and \( \text{H}_2\text{O} \) by CHN analyzer, presence of \( \text{CO}_3^{2−} \) and \( \text{H}_2\text{O} \) confirmed by IR; corresponds to \( (\text{Y}_{3.32}\text{Gd}_{0.24}\text{Dy}_{0.18}\text{Ho}_{0.11}\text{Er}_{0.12}\text{Ca}_{0.05}\text{Nd}_{0.07}\text{Sm}_{0.05}\text{Th}_{0.02}\text{La}_{0.02})_2\text{Cu}_{1.22}(\text{CO}_3)_{4.09}\text{Cl}_{0.75}(\text{OH})_{6.27} \cdot 2.20\text{H}_2\text{O} \).

Occurrence:  A rare secondary mineral in the oxidized zone of a copper deposit, the source of rare-earths enigmatic, perhaps from surrounding sediments.

Association:  Caysichite-(Y), donnayite-(Y), kamphaugite-(Y), malachite, nontronite, calcite, gypsum, “limonite”.

Distribution:  From the Paratoo copper mine, 30 km southwest of Yunta, Olary district, South Australia.

Name:  Honors Robert James Champion de Crespigny (1950− ), Chairman of Normandy Mining Limited and Chairman of the South Australian Museum, for his contributions to Australian education.

Type Material:  South Australian Museum, Adelaide, Australia, G25453–G25455.