

**Crystal Data:** Tetragonal. *Point Group:* 4/m. As aggregates of prismatic crystals to 5 cm displaying {100}, {110} with striations along [001] and {331}.

**Physical Properties:** *Cleavage:* None. *Tenacity:* n.d. *Fracture:* n.d. Hardness = 6.5  
D(meas.) = 3.40(3) D(calc.) = 3.44 (Mg rich); 3.49 (Mn rich)

**Optical Properties:** Transparent. *Color:* Dark red with a lilac hue. *Streak:* n.d. *Luster:* Vitreous.  
*Optical Class:* Uniaxial (-).  $\omega = 1.744(2)$   $\varepsilon = 1.732(2)$  *Pleochroism:* Strong; *O* = dark purple, *E* = pale red to *O* = dark reddish brown, *E* = pale yellowish brown. *Absorption:* O>>E.

**Cell Data:** *Space Group:* P4/n.  $a = 15.5173(4)$   $c = 11.8230(5)$  [Mg rich];  $a = 15.5699(2)$   
 $c = 11.8042(2)$  [Mn rich]  $Z = 1$

**X-ray Powder Pattern:** Wessels mine, North Cape Province, Republic of South Africa.  
2.752 (100), 2.594 (76), 2.950 (47), 2.459 (35), 1.6224 (28), 5.89 (12), 3.007 (12)

| Chemistry:                     | (1)    | (2)    |
|--------------------------------|--------|--------|
| SiO <sub>2</sub>               | 36.98  | 36.51  |
| Al <sub>2</sub> O <sub>3</sub> | 14.98  | 13.70  |
| CaO                            | 36.70  | 36.18  |
| MgO                            | 3.24   | 1.10   |
| Mn <sub>2</sub> O <sub>3</sub> | 2.27   | 6.04   |
| CuO                            | 2.39   | 1.86   |
| Fe <sub>2</sub> O <sub>3</sub> | 0.62   | 2.50   |
| Cr <sub>2</sub> O <sub>3</sub> | 0.23   | 0.04   |
| H <sub>2</sub> O               | 3.30   | 3.30   |
| Total                          | 100.71 | 101.23 |

(1) Wessels mine, North Cape Province, Republic of South Africa; average electron microprobe analysis, H<sub>2</sub>O by TGA/DSC, supplemented by FTIR and SREF; corresponds to Ca<sub>18.00</sub>Ca<sub>1.00</sub>(Cu<sub>0.95</sub>Mg<sub>0.05</sub>)<sub>Σ=1.00</sub>Al<sub>4.00</sub>(Al<sub>5.50</sub>Mg<sub>1.00</sub>Mn<sup>3+</sup><sub>1.19</sub>Fe<sup>3+</sup><sub>0.22</sub>Cr<sub>0.09</sub>)<sub>Σ=8.00</sub>[(SiO<sub>4</sub>)<sub>9.91</sub>[H<sub>4</sub>O<sub>4</sub>]<sub>0.09</sub>]<sub>Σ=10.00</sub>[Si<sub>2</sub>O<sub>7</sub>]<sub>4</sub>[(OH)<sub>9</sub>O]<sub>Σ=10.00</sub>. Mg-rich zone. (2) Wessels mine, North Cape Province, Republic of South Africa; average electron microprobe analysis, H<sub>2</sub>O by TGA/DSC, supplemented by FTIR and SREF; corresponds to Ca<sub>18.00</sub>Ca<sub>1.00</sub>(Cu<sub>0.90</sub>Mg<sub>0.10</sub>)<sub>Σ=1.00</sub>(Al<sub>3.22</sub>Mn<sup>3+</sup><sub>0.60</sub>Fe<sup>3+</sup><sub>0.18</sub>)<sub>Σ=4.00</sub>(Al<sub>4.72</sub>Mn<sup>3+</sup><sub>1.20</sub>Fe<sup>3+</sup><sub>1.06</sub>Mn<sup>2+</sup><sub>0.60</sub>Mg<sub>0.40</sub>Cr<sub>0.02</sub>)<sub>Σ=8.00</sub>[(SiO<sub>4</sub>)<sub>9.91</sub>[H<sub>4</sub>O<sub>4</sub>]<sub>0.09</sub>]<sub>Σ=10.00</sub>[Si<sub>2</sub>O<sub>7</sub>]<sub>4</sub>[(OH)<sub>9</sub>O]<sub>Σ=10.00</sub>. Mn-rich zone.

**Mineral Group:** Vesuvianite group.

**Occurrence:** Of hydrothermal origin.

**Association:** Calcite, apatite, andradite, henritermierite, rhodochrosite.

**Distribution:** From the Wessels mine, near Hotazel, Kalahari Manganese Field, North Cape Province, Republic of South Africa.

**Name:** For a member of the vesuvianite group with predominance of Cu<sup>2+</sup> at the Y1A, B sites. The historical name *cyprine* (derived from Latin *cuprum*, copper) given by J.J. Berzelius in 1821 for Cu-bearing vesuvianite is transferred to this new mineral.

**Type Material:** Mineralogical Museum, Department of Mineralogy, St. Petersburg State University, St. Petersburg, Russia (1/19652).

**References:** (1) Panikorovskii, T.L., V.V. Shilovskikh, E.Yu. Avdontseva, A.A. Zolotarev, I.V. Pekov, S.N. Britvin, U. Hålenius, and S.V. Krivovichev (2017) Cyprine, Ca<sub>19</sub>Cu<sup>2+</sup>(Al,Mg,Mn)<sub>12</sub>Si<sub>18</sub>O<sub>69</sub>(OH)<sub>9</sub>, a new vesuvianite-group mineral from the Wessels mine, South Africa. *Eur. J. Mineral.*, 29(2), 295-306. (2) (2018) *Amer. Mineral.*, 103, 658-659 (abs. ref. 1).