

**Crystal Data:** Monoclinic. *Point Group:*  $2/m$ . Crystals acicular, to 2 mm; in radiating clusters.

**Physical Properties:** *Cleavage:* Perfect on {100}, {010}, and {001}. *Tenacity:* Brittle. Hardness = 3  
D(meas.) = 2.32-2.39 D(calc.) = [2.51]

**Optical Properties:** Semitransparent. *Color:* Gold, brown, reddish brown, yellow, tan, rose, lavender, bronze. *Streak:* Yellow. *Luster:* Vitreous, may be silky.  
*Optical Class:* Biaxial (+). *Pleochroism:* Distinct;  $X$  = nearly colorless;  $Y$  = yellowish;  $Z$  = golden brown. *Orientation:*  $Z \wedge c = 0^\circ$ - $30^\circ$ .  $\alpha = 1.540(2)$   $\beta = 1.542(2)$   $\gamma = 1.550(2)$   $2V(\text{meas.}) = \text{n.d.}$   
 $2V(\text{calc.}) = 53^\circ$

**Cell Data:** *Space Group:*  $C2/m$ .  $a = 15.1(1)$   $b = 17.6(1)$   $c = 5.290(4)$   $\beta = 100.5(2)^\circ$   $Z = 2$

**X-ray Powder Pattern:** Lovozero massif, Russia.  
11.4 (100), 2.939 (100), 2.650 (100), 4.5 (80), 3.8 (60b), 2.482 (60), 1.640 (60)

| Chemistry:                          | (1)   |                               | (1)         |
|-------------------------------------|-------|-------------------------------|-------------|
| SiO <sub>2</sub>                    | 46.20 | MnO                           | 15.00       |
| TiO <sub>2</sub>                    | 3.11  | MgO                           | 0.20        |
| ZrO <sub>2</sub>                    | 0.16  | CaO                           | 1.24        |
| Al <sub>2</sub> O <sub>3</sub>      | 0.12  | Na <sub>2</sub> O             | 11.24       |
| RE <sub>2</sub> O <sub>3</sub>      | 0.16  | K <sub>2</sub> O              | 0.17        |
| Fe <sub>2</sub> O <sub>3</sub>      | 1.86  | H <sub>2</sub> O <sup>+</sup> | 8.01        |
| (Nb,Ta) <sub>2</sub> O <sub>5</sub> | 0.44  | H <sub>2</sub> O <sup>-</sup> | 11.36       |
| FeO                                 | 0.37  | <u>CO<sub>2</sub></u>         | <u>0.40</u> |
|                                     |       | Total                         | 100.04      |

(1) Lovozero massif, Russia.

**Mineral Group:** Palygorskite group.

**Occurrence:** On the walls of fractures filled with nepheline in alkalic pegmatite in a differentiated alkalic massif (Lovozero massif, Russia).

**Association:** Nepheline, aegirine, mountainite, natrolite, zorite (Lovozero massif, Russia); aegirine, albite, nepheline, sodalite, sérandite, analcime, ancylite, epididymite, eudialyte, nenadkevichite (Mont Saint-Hilaire, Canada).

**Distribution:** In the Jubilee pegmatite, Mt. Karnasurt, near the Ilmajok River valley, Lovozero massif, and in the Khibiny massif, Kola Peninsula, Russia. At Mont Saint-Hilaire, Quebec, Canada.

**Name:** Honors the scientists, led by Thor Heyerdahl, crewing the papyrus ship *Ra* (1969-1970).

**Type Material:** Geology Museum, Kola Branch, Academy of Sciences, Apatity, 3206, 3271; Mineralogical Museum, St. Petersburg University, 19047; Mining Institute, St. Petersburg, 1060/1-4; and the A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 74489.

**References:** (1) Mer'kov, A.N., I.V. Bussen, E.A. Goiko, E.A. Kul'chitskaya, Y.P. Men'shikov, and A.P. Nedorezova (1973) Raite and zorite, new minerals from the Lovozero Tundra. *Zap. Vses. Mineral. Obshch.*, 102, 54-62 (in Russian). (2) (1973) *Amer. Mineral.*, 58, 1113-1114 (abs. ref. 1). (3) Khomyakov, A.P., E.M. Es'kova, G.E. Cherepivskaya, V.V. Kaptsov, and A.D. Timchenko (1982) New data on raite. *Nov. Dannye Miner.*, 30, 205-207 (in Russian). (4) (1983) *Chem. Abs.*, 219080 (abs. ref. 3). (5) Mandarino, J.A. and V. Anderson (1989) Montegian treasures. Cambridge Univ. Press, 174. (6) Pushcharovskii, D.Y., I.V. Pekov, J. Pluth, J. Smith, G. Ferraris, S.A. Vinogradova, A.V. Arakcheeva, S.V. Soboleva, and E.I. Semenov (1999) Raite, manganonorderite-(Ce), and ferronordite-(Ce) from the Lovozero Massif: Crystal structures and mineralogical geochemistry. *Crystallographic Reports* 44(4), 565-574.