

**Crystal Data:** Orthorhombic. *Point Group:* *mm*2. Crystals are typically wedge-shaped, tabular to short prismatic on [100], to 3 cm, showing (100), ( $\bar{1}00$ ), (011), (0 $\bar{1}1$ ), (00 $\bar{1}$ ), with {011} striated by {00 $\bar{1}$ } || [100].

**Physical Properties:** *Cleavage:* Distinct on {010}. *Fracture:* Conchoidal. Hardness = 3–4.5 D(meas.) = 2.629 D(calc.) = 2.620 Slowly decomposes in H<sub>2</sub>O, with CaCO<sub>3</sub> residue; strongly pyroelectric; pale amber fluorescence under SW UV.

**Optical Properties:** Transparent. *Color:* Colorless, pale yellow, dark yellow; colorless in transmitted light. *Luster:* Vitreous.

*Optical Class:* Biaxial (-). *Orientation:* X = c; Y = a; Z = b. *Dispersion:* r < v, moderate.  $\alpha = 1.531\text{--}1.532$   $\beta = 1.555\text{--}1.556$   $\gamma = 1.570$  2V(meas.) = 69.0(5)° 2V(calc.) = 73.9°–75°

**Cell Data:** *Space Group:* *Amm*2. a = 4.947(1) b = 11.032(2) c = 7.108(1) Z = 2

**X-ray Powder Pattern:** John Hay, Jr. Well No. 1, Wyoming, USA.

2.562 (100), 5.515 (71), 4.957 (71), 2.179 (71), 1.996 (60), 5.985 (50), 3.818 (50)

**Chemistry:**

|                   | (1)   | (2)      | (3)    |
|-------------------|-------|----------|--------|
| CO <sub>2</sub>   | 42.90 | [43.37]  | 43.12  |
| MgO               | 0.04  |          |        |
| CaO               | 36.34 | 36.57    | 36.63  |
| Na <sub>2</sub> O | 19.91 | 20.06    | 20.25  |
| insol.            | 0.66  |          |        |
| Total             | 99.85 | [100.00] | 100.00 |

(1) John Hay, Jr. Well No. 1, Wyoming, USA. (2) Upper Canada mine, Canada; by electron microprobe, CO<sub>2</sub> by difference. (3) Na<sub>2</sub>Ca<sub>2</sub>(CO<sub>3</sub>)<sub>3</sub>.

**Occurrence:** In saline dolomitic marl (Green River Formation, Wyoming and Utah, USA); in kimberlite dikes (Upper Canada mine, Canada); in carbonatite (Vuoriyarvi massif, Kola Peninsula, Russia); in differentiated alkalic massifs (Kovdor and Khibiny massifs, Kola Peninsula, Russia); associated with an intrusive alkalic gabbro-syenite complex (Mont Saint-Hilaire, Canada).

**Association:** Trona, nahcolite, pyrite (Green River Formation, Wyoming and Utah, USA); phlogopite, magnetite, apatite, perovskite, calcite, olivine (Upper Canada mine, Canada); barentsite, villiaumite, natrite, natrolite, albite (Khibiny massif, Kola Peninsula, Russia).

**Distribution:** In the USA, from the Green River Formation, Wyoming and Utah, with indicated reserves of billions of tons; found in the John Hay, Jr. Well No. 1, about 30 km west Green River, Sweetwater Co., Wyoming; and in the Uintah Basin, northeastern Utah. In Canada, in the Upper Canada gold mine, Kirkland Lake district, Ontario, and at Mont Saint-Hilaire, Quebec. In Russia, on the Kola Peninsula, in the Vuoriyarvi carbonatite complex, from the Kovdor massif, and on Mt. Restin'yun, Khibiny massif; from the Udachnaya pipe, Daldyn kimberlite field, Sakha.

**Name:** To honor Dr. Maxwell Naylor Short (1889–1952), Professor of Mineralogy, University of Arizona, Tucson, Arizona, USA.

**Type Material:** Harvard University, Cambridge, Massachusetts, USA, 98093.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 222–223. (2) Fahey, J.J. (1962) Saline minerals of the Green River Formation. U.S. Geol. Surv. Prof. Paper 405, 22–28, 46. (3) Dickens, B., A. Hyman, and W.E. Brown (1971) Crystal structure of Ca<sub>2</sub>Na<sub>2</sub>(CO<sub>3</sub>)<sub>3</sub> (shortite). J. Res. Natl. Bur. Stnd., A. Physics and chemistry, 75(2), 129–135. (4) Watkinson, D.H. and G.Y. Chao (1973) Shortite in kimberlite from the Upper Canada Gold mine, Ontario. J. Geology, 81, 229–233.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior written permission of Mineral Data Publishing.