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K-Ar AND Rb-Sr AGE DETERMINATIONS ON FERROSTILPNOMELANE FROM THE DEER ISLE MINE, PENOBSCOT BAY, MAINE

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The Deer Isle Mine, located at Dunham Point (44°13.1′N; 68°44.1′W) on Deer Isle, Penobscot Bay, Maine was described by Emmons (1910). Rocks at the prospect are schistose, with both sulfide and gangue minerals fractured and crushed (illustrated in Emmons, 1910, fig. 7 and plate 1A). These rocks were originally assigned to the Castine Formation by Emmons, but are now assigned by Stewart (1956) to the Ellsworth Schist, known from the author's (D.G.B.) unpublished Rb-Sr whole-rock dating to be Cambrian in age. The prospect is located outside the contact metamorphosed aureole of Ellsworth Schist surrounding the Stonington Granite, which has been dated at 341±21 m.y. (Brookins and Spooner, 1970). Because the relative ages of the ore deposit and the granite are not determinable from observable geologic relations, the present study was undertaken at the suggestion of D. B. Stewart. (Note: Emmons suggested the possibility that the ores at the Deer Isle Mine are contact metamorphic deposits formed near the margin of the North Haven Greenstone intrusive of Cambrian (?) age.)

Large blocks common in the eroded mine dump at tide level were sampled. The gangue assemblage calcite-stilpnomelane was separated for isotopic investigation. Concentrates more than 98 percent pure of each mineral were obtained. Obradovich determined the K-Ar ages in the U. S. Geological Survey laboratory at Denver. Constants used in the age calculations were: $\lambda_\epsilon = 0.584 \times 10^{-10}$/yr; $\lambda_\beta = 4.72 \times 10^{-10}$/yr; $K^{40}/K_{total} = 1.22 \times 10^{-4}$ gm/gm. The Rb-Sr data were obtained by Brookins at Kansas State University and the University of New Mexico. The Eimer and Amend Sr standard gives $Sr^{87}/Sr^{86} = 0.7080$. The decay constant used for Rb^{87} was 1.39×10^{-11}/yr.

The K-Ar ages are too low, and stilpnomelane, as suggested by Goldich and others (1957), is apparently unsuitable for obtaining reliable K-Ar ages. The Rb-Sr age is tenuous, and the relative age of the deposit and the granite has not been determined. Ruitenberg (1972) has demonstrated a long and complex interval of Paleozoic sulfide mineralization in rocks from southwestern New Brunswick comparable to those at the Deer Isle Mine. It would be premature to conclude that the general similarity of the Rb-Sr ages for the stilpnomelane and the Stonington Granite is significant, with respect to either the age of mineralization or contact metamorphic overprint.

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SAMPLE DESCRIPTIONS

1. Me-20/DKA-2410 K-Ar (ferrostilpnomelane) 27.5±0.9 m.y.
Ferrostilpnomelane concentrate (44°13.1′N, 68°44.1′W; Deer Isle Mine, on Dunham Point, South Deer Isle, ME) baked out overnight at 300°C and fused at a temperature suitable for fusing biotite. Analytical data: K = 1.11%; $*Ar^{40} = 5.48 \times 10^{-11}$ m/gm; $*Ar^{40}/\Sigma Ar^{40} = 53.5\%$. Comment: Ferrostilpnomelane apparently is unsuitable for reliable K-Ar dating.

2. Me-20/DKA-2473 K-Ar (ferrostilpnomelane) 24.4±0.9 m.y.
Ferrostilpnomelane concentrate (44°13.1′N, 68°44.1′W; Deer Isle Mine, on Dunham Point, South Deer Isle, ME) same as no. 1 (above) but fused at temperature suitable for fusing muscovite. Analytical data: K = 1.11%; $*Ar^{40} = 4.87 \times 10^{-11}$ m/gm; $*Ar^{40}/\Sigma Ar^{40} = 54.3\%$. Comment: Ferrostilpnomelane apparently is unsuitable for reliable K-Ar dating.

3. Me-20b Rb-Sr Initial Sr^{87}/Sr^{86} = 0.7084 (calcite)
Mn-rich calcite (44°13.1′N, 68°44.1′W; Deer Isle Mine, on Dunham Point, South Deer Isle, ME). Analytical data: No Rb detected by XRF; contains 275 ppm Sr by XRF.

4. Me-20a Rb-Sr (ferrostilpnomelane) 310±20 m.y.
Ferrostilpnomelane concentrate (44°13.1′N, 68°44.1′W; Deer Isle Mine, on Dunham Point, South Deer Isle, ME). Analytical data: Absolute abundance of Rb and Sr not determined. Rb^{87}/Sr^{86} = 7.02 (calculated from replicate XRF measurements of Rb/Sr). Sr^{87}/Sr^{86} = 0.7385. Age calculated using 0.7084 as initial ratio (from Me-20b). Error estimated by considering ± 2% error in replicate XRF analyses for Rb/Sr. Comment: See discussion in text.

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