

RADIUM IN ROCKS: V. THE RADIUM CONTENT OF THE FOUR GROUPS OF PRE-CAMBRIAN GRANITES OF FINLAND.

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ABSTRACT.

The radium content of the pre-Cambrian granites of Finland is reported, grouped according to the four classifications of Sederholm.

The pre-Cambrian granites of Finland are some of the oldest rocks available, and the fact that they have been so thoroughly mapped and classified makes them particularly useful for study. The Geological Survey of Finland, under the direction of Dr. J. J. Sederholm,¹ has conducted a very exhaustive survey of these rocks, mapped them geologically, and classified them according to several pre-Cambrian "cycles of sedimentation" into four great subdivisions.

In the summer of 1932, Dr. Tom. F. W. Barth, then a member of the staff of the Geophysical Laboratory, visited Finland and, with Doctor Sederholm's assistance, selected several representative samples of each of these four subdivisions. The radium content of the samples, arranged according to the Sederholm grouping, is given below:

GROUP I.

The oldest granites in Finland, called "gneissose or post-Svionian granites."

Serial No.

P-71 Granite from Bockholm, Enklinge, in the Åland Archipelago.²

P-72 Gneissose granite from Pävskär, about 40 km. west of Helsingfors.³

P-73 Gneiss-granite (Vätskär type) from Bergholm, east of Pellinge, 80 km. east of Helsingfors.⁴

P-74 Granite from the western shore of Orijärvi.⁵

¹ Cf. Sederholm, J. J.: Pre-Quaternary rocks of Finland, Bull. comm. géol. Finlande, No. 91, 1930; The geology of Fennoscandia, *ibid.*, No. 98, 1932.

² Sederholm, J. J.: On migmatites, etc., Part III, Bull. comm. géol. Finlande, No. 107, 1934.

³ Sederholm, J. J.: On migmatites, etc., Part II, Bull. comm. géol. Finlande, No. 77, 1926.

⁴ Sederholm, J. J.: On migmatites, etc., Part I, Bull. comm. géol. Finlande, No. 58, 1923.

⁵ Eskola, P.: On the petrology of the Orijärvi region in southwestern Finland, Bull. comm. géol. Finlande, No. 40, 1914.

Radium content of Group I.

Serial No.	Grams $\times 10^{-12}$ Ra per gram rock
P-71	1.04
P-72	0.63
P-73	0.85
P-74	1.23

GROUP II.

Younger Archean coastal granites. Post-Bothnian granites.

Coastal

Serial No.

- P-75 From Kumlinge, Åland Archipelago. Post-Bothnian penetrating the gneissose granite of P-71.⁶
 P-76 From Ingå, about 40 km. west of Helsingfors.³
 P-79 Helsinkite granite from Kajholmen, about 20 km. east of Helsingfors.

Interior

- P-80 From Lavia.⁷
 P-81 From Siuro (highway between Tampere, "Tammerfors," and Suodenniemi).
 P-78 From Kuru, 40 km. north of Tampere, "Tammerfors." Analyzed by N. Sahlbom, reported by Hackman.⁸
 P-77 From west of Kalvolanjärvi, northwest of Hämeenlinna, "Tavastehus."
 P-82 (Unakite, Helsinkite) from Tarvala in Laukaa. Described by Wilkman.⁹

Radium content of Group II.

Coastal

Serial No.	Grams $\times 10^{-12}$ Ra per gram rock
P-75	5.51*
P-76	0.91
P-79	1.55

Interior

P-80	2.30
P-81	1.55
P-78	3.17
P-77	1.87
P-82	3.28

GROUP III.

The sedimentary rocks of eastern and northern Finland belonging to the Karelidic Cycle are penetrated by the post-Kalevian granites, called "post-Jatulian," which comprise Group III. Only one sample of these granites has been investigated. But Seder-

⁶ Sederholm, J. J.: Granit-gneis problemen i Åbo—Ålands Skärgård, Geol. För. Förh., 46, 1924; The Åland Islands, Bull. comm. géol. Finlande, No. 107, 1934.

⁷ Mäkinen, E.: Ein archaisches Konglomerat von Lavia, Geol. För. Förh., 37, 418, 1915.

⁸ Hackman, V.: Bull. comm. géol. Finlande, No. 15, 1905.

⁹ Wilkman, W. W.: Über Unakite in Mittel Finnland, Fennia, 50, No. 15, 1928.

* The mica of this sample was separated by a magnet and was found to have a radium content of 13.47×10^{-12} grams of radium per gram of mica.

holm has paralleled certain granites in Sweden and Norway (Nos. 93 and 94) with the post-Jatulian granites in Finland.

Serial No.

- P-86 From Ounasjoki in Rovaniemi, end of the railway in northern Finland.⁸
 P-93 From Tranås, Småland, Sweden.
 P-94 From Kristiansand, Norway.

Radium content of Group III.

Serial No.	Grams x 10 ⁻¹² Ra per gram rock
P-86	0.43
P-93	3.144
P-94	0.566

GROUP IV.

Rapakivi granites and other late pre-Cambrian granites.*

Serial No.

- P-83 From Åva, north of Brändö, Åland Archipelago.²
 P-84 From Onas, 30 km. east of Helsingfors.¹⁰
 P-85 From Obbnäs, 40 km. west of Helsingfors.⁴
 P-87 From Rödglaskär, north of Enklinge, Åland Archipelago.^{11, 2, 8}
 P-88 From Storskär, Gustaf Sökn, Åbo Archipelago.¹²
 P-89 From Pula, center of the Viborg area, a "true rapakivi."
 P-90 From Viborg, eastern end of Viborg area, a "true rapakivi."
 P-91 From south of Bockholm and east of Pellinge, western end of the Viborg area.
 P-92 From Salmi, the Ladoga area.

Radium content of Group IV.

Serial No.	Grams x 10 ⁻¹² Ra per gram rock
P-83	1.21
P-84	1.03
P-85	1.48
P-87	2.21
P-88	1.13
P-89	1.60
P-90	2.74
P-91	1.47
P-92	0.92

In the following paper Dr. Barth discusses these samples and the relations existing among the rocks which they represent.

¹⁰ Borgström, L.: Das Granitgebiet von Onas. Helsingfors, 1931.

¹¹ Sederholm, J. J.: Granit-gneis problemen i Åbo-Ålands Skärgård, Geol. För. Förh., 46, 1924.

¹² Kanerva, I.: Über das Rapakivigebiet von Vehmaa in südwestlichen Finnland, Fennia, 50, No. 40, 1928.

* The granites Nos. 83, 84, and 85 are not of the rapakivi type, but like the rapakivis they are younger than the youngest mountain folding in southern Finland. Sederholm tentatively regarded them as contemporaneous with the granites of group III in northern Finland.