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Age Measurements of Antarctic Rocks (Queen Maud Land)

THIS communication is a report of the age measurement project carried out on rocks from the Sør-Rondane Mountains (Queen Maud Land, 23° E. to 28° E.). The rocks were sampled by Picciotto^{1,2} during the 1958 Belgian Antarctic Expedition led by Gaston de Gerlache¹. A first set of results has already been published³. The biotite strontium/rubidium ages of various eruptive and metamorphic rocks ranged from 460 to 500 million years.

Radiogenic strontium-87 is known to migrate out of biotite minerals^{4,5}. In the available samples, minerals other than biotite have been selected together with whole rocks of sufficient high rubidium/strontium ratio. Isotopic measurements on zircons were also carried out.

The analytical methods used are close to those described by Aldrich *et al.*⁶ and Tilton *et al.*⁷. The geological and

Table 1. MINERAL AND TOTAL ROCK AGES ON ANTARCTIC ROCKS (QUEEN MAUD LAND)

Location*	Sample No.	Source rock	Mineral†	Method	Age (m.y.)‡
Romnesfjellet	R1 R1a	Porphyroblastic granite of intrusive type	B	Sr/Rb§	480 ± 15
			Z	²⁰⁷ Pb/ ²⁰⁶ Pb¶	540 ± 10
				²⁰⁷ Pb/ ²³⁸ U	518 ± 20
				²⁰⁶ Pb/ ²³⁸ U	514 ± 20
Nordtoppen 950		Granitic vein in diorite	B	Sr/Rb	463 ± 15
			Z	²⁰⁷ Pb/ ²⁰⁶ Pb	500 ± 30
				²⁰⁷ Pb/ ²³⁸ U	508 ± 20
				²⁰⁶ Pb/ ²³⁸ U	510 ± 20
Nordtoppen 1100	S9	Gneiss xenolith in diorite	B	Sr/Rb	475 ± 15
			Z	²⁰⁷ Pb/ ²⁰⁶ Pb	550 ± 150
				²⁰⁷ Pb/ ²³⁸ U	555 ± 55
				²⁰⁶ Pb/ ²³⁸ U	555 ± 20
Gunnestadbrean		Granite of intrusive type	B	Sr/Rb	474 ± 15
			F	Sr/Rb	482 ± 160
			Z	²⁰⁷ Pb/ ²⁰⁶ Pb	575 ± 10
				²⁰⁷ Pb/ ²³⁸ U	524 ± 20
Austkampane	K16	Muscovite biotite corundum gneiss	B	Sr/Rb	492 ± 15
			M	Sr/Rb	510 ± 15
Strandrudfjellet	T4	Fine-grained microcline granite (anatectic ?)	B	Sr/Rb	483 ± 15
			F	Sr/Rb	460 ± 90
			WR	Sr/Rb	500 ± 50
Bautaen	A3	Fine-grained microcline granite (anatectic ?)	B	Sr/Rb	503 ± 15
			F	Sr/Rb	476 ± 60
			WR	Sr/Rb	590 ± 60

* The geographical names refer to the map of the Sør-Rondane Mountains published by the Norsk Polar-institutt during 1957.

† B, Biotite; M, muscovite; F, feldspar; WR, whole rock; Z, zircon.

‡ $\lambda_{\text{Sr}^{87}} = 1.39 \times 10^{-11} \text{ yr}^{-1}$, rubidium-87 = 0.283 g/g rubidium.

§ Common strontium $^{87}\text{Sr}/^{86}\text{Sr} = 0.709$ (measured on calcic feldspar from Bautaen granite).

¶ $\lambda_{\text{U}^{238}} = 1.54 \times 10^{-10} \text{ yr}^{-1}$, $\lambda_{\text{U}^{235}} = 0.72 \times 10^{-10} \text{ yr}^{-1}$.

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petrographic descriptions of the Sør-Rondane Mountains have been published by Picciotto *et al.*⁸ and Michot^{9,10}.

The new results, given in Table 1, confirm the existence of a magmatic and metamorphic activity, roughly 500 million years old (between 460 and 600 m.y.). No greater ages have been found in this region.

The small, but systematic, discordance between the younger biotite ages and the older whole rock and zircon ages seems to be significant. It follows a pattern already described in the literature¹¹.

In the present case, our tentative interpretation is as follows: the emplacement of the intrusive-type granites (Nordtoppen, Romnesfjellet and Gunnestadreen) and the differentiation of the fine-grained 'anatectic' granites occurred between 500 and 600 million years ago. A distinct phase of the geological evolution of this region might have happened around 480 m.y. ago; it could correspond to an uplift of the rocks into a superficial zone where radiogenic strontium-87 diffusion has stopped, according to the views of Hurley *et al.*⁵. An alternate interpretation would be to assume, at this time, a retro-morphose mesozonal episode. Evidence of such a retro-morphose has been observed in thin sections^{9,10}.

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