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AGE MEASUREMENTS OF ANTARCTIC ROCKS
(QUEEN MAUD LAND)

by

S. DEUTSCH and P. PASTEELS

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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 Sör-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 Gerlache[1]. A first set of results has already been published[3]. 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.)‡
Romnoesfjellet	*R*1	Porphyroblastic granite of intrusive type	B	Sr/Rb§	480 ± 15
	*R*1*a*		Z	$^{207}Pb/^{206}Pb$¶	540 ± 10
				$^{207}Pb/^{235}U$	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
				$^{207}Pb/^{235}U$	508 ± 20
				$^{206}Pb/^{238}U$	510 ± 20
Nordtoppen 1100	*S*9	Gneiss xenolith in diorite	B	Sr/Rb	475 ± 15
			Z	$^{207}Pb/^{206}Pb$	550 ± 15
				$^{207}Pb/^{235}U$	555 ± 5
				$^{206}Pb/^{238}U$	555 ± 2
Gunnestadbreen		Granite of intrusive type	B	Sr/Rb	474 ± 15
			F	Sr/Rb	482 ± 160
			Z	$^{207}Pb/^{206}Pb$	575 ± 10
				$^{207}Pb/^{235}U$	524 ± 20
				$^{206}Pb/^{238}U$	512 ± 20
Austkampane	*K*16	Muscovite biotite corundum gneiss	B	Sr/Rb	492 ± 15
			M	Sr/Rb	510 ± 15
Strandrudfjellet	*T*4	Fine-grained microcline granite (anatectic ?)	B	Sr/Rb	483 ± 15
			F	Sr/Rb	460 ± 90
			WR	Sr/Rb	500 ± 50
Bautaen	*A*3	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 Sör-Rondane Mountains published by the Norsk Polar-institutt during 1957.

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

‡ $\lambda_{^{87}Rb} = 1{\cdot}39 \times 10^{-11}$ yr.$^{-1}$, rubidium-87 = 0·283 g/g rubidium.

§ Common strontium $^{87}Sr/^{86}Sr = 0{\cdot}709$ (measured on calcic feldspar from Bautaen granite).

¶ $\lambda_{^{238}U} = 1{\cdot}54 \times 10^{-10}$ yr.$^{-1}$, $\lambda_{^{235}U} = 9{\cdot}72 \times 10^{-10}$ yr.$^{-1}$.

petrographic descriptions of the Sör-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 literature[11].

In the present case, our tentative interpretation is as follows: the emplacement of the intrusive-type granites (Nordtoppen, Romnoesfjellet and Gunnestadbreen) 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 retromorphose mesozonal episode. Evidence of such a retromorphose has been observed in thin sections[9,10].

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