

Geology of the Sør Rondane Mountains

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Introduction

The Sør Rondane Mountains are a 250-km long, wedge-shaped range in Queen Maud Land about 200 km south of Roi Baudouin base. The mountains include peaks which rise more than 3000 m above sea level. All outcrops studied are crystalline rocks of the East Antarctic shield; no unmetamorphosed sedimentary rocks have been discovered.

The mountains were first studied in 1957-1958 by field work were carried out in the eastern part by E. Picciotto and J. Giot. T. Van Autenboer and K. V. Blaiklock surveyed the western part in 1958-1959, and in 1959-1960 T. Van Autenboer and S. Berckmans worked in the central part of the range. Published papers on the geology, geomorphology, and geochronology of the range include those of Picciotto et al. (1960), Michot (1961, 1962), Van Autenboer (1964a, 1964b), Picciotto et al. (1964), and Van Autenboer and Loy (1966).

Two major assemblages of rocks have been distinguished in the Sør Rondane Mountains. The older is composed of gneisses and migmatites containing quartzites, graphite schists, lenses of carbonate rock, and ophiolites; these rocks have been divided into a northern group and a southern group. The younger assemblage consists of numerous homogeneous, igneous plutons ranging in composition from gabbro to granite.

The Gneiss Terrane

The Teltet-Vengen Group. The northern and eastern parts of the range consist mainly of diverse gneisses and migmatites, including homogeneous, streaky (mylonitic), banded, embrechitic, anatexitic, and

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agmatitic types. In the field distinction can be made between epibolites (lit-par-lit migmatites), diadysites (complex networks of dikes), and agmatites (breccialike migmatites) according to the definitions of Roques (1961). Foliation in the gneisses strikes eastward and

dips steeply to the south. These gneisses vary in composition from tonalite and granodiorite to syenite and granite; locally they include micaceous quartzite, graphite schist, marble and dolomite beds, and amphibolites. The carbonate Teltet-Vengen Group is cut by a number of mafic dikes the Belgian Antarctic Expedition, when 51 days of rocks commonly occur as lenses of pure to impure which average 50 cm in width and trend mainly northmarble containing such minerals as forsterite, graphite, westward. These lamprophyres and dolerites are garnet, chrysotile, scapolite, phlogopite, and diopside. clearly post-orogenic. These marbles are often associated with calcium silicate-bearing gneisses. The amphibolites occur as giant eyes in augen gneiss, as lenses, or as bands of nodules parallel to the foliation in the gneiss.

Migmatization of varying intensity has affected this entire group, forming several complex but distinctive those of the gneiss terrane. These rocks form a quartzofield facies. Homogeneous migmatites, in which metazome and paleozome cannot be readily distinguished, bonaceous, argillaceous, arkosic, dolomitic, and are represented by embrechitic and anatexitic gneisses calcareous units. The mafic gneisses probably result locally grading into anatexitic granitic masses. Out- from early geosynclinal magmatism and later deepcrops of heterogeneous migmatites, or migmatites seated synorogenic magmatism. The mineral facies in sensu stricto in which metazome and paleozome can the gneisses indicate upper catazonal metamorphism be easily distinguished, are numerous, especially in the followed by slight retrograde metamorphism. The Sør eastern part of the range where important masses of Rondane Mountains appear to occupy an intermediate fine-grained microcline granite occur.

southern part of the mountains differ markedly from Land [Roots, 1953] and Ongul Island [Tatsumi and the Teltet-Vengen Group. The Nils Larsenfjellet Kikuchi, 1959; Ravich, 1959]). Petrographic evidence Group is composed of more homogeneous gabbroic, and radiometric ages (Table 1) suggest that the gneiss gabbro-dioritic, and dioritic gneisses, commonly as- terrane formed during the same orogenic cycle as the sociated with mafic igneous rocks of the ophiolitic slightly younger plutonic intrusives. The gneisses are type. The latter occur mainly as fragments contained considered the result of metamorphism in early or in agmatitic fashion within the gneisses. In several middle Cambrian time. localities the contact between these gneisses and the Teltet-Vengen Group is obscured by the presence of mafic to felsic igneous plutons. Radiometric ages igneous intrusives. The foliation in this southern group of gneisses also strikes eastward and dips steeply about 475 m.y. and suggest a late Cambrian age.

these two groups in the gneiss terrane are presently

Intrusive Igneous Rocks

This younger rock assemblage consists of massive, structureless igneous plutons, locally containing xenoliths derived from the gneiss terrane. The contacts of these intrusives with the gneisses are usually sharp. The plutons are homogeneous and include such diverse types as norite, diorite, syenite, and granites ranging from red, pink, or gray porphyritic, biotitehornblende granite to pink or gray medium-to-finegrained granite. The main outcrops of these rocks are in the northern and western parts of the range and along the contact between the two groups of gneisses.

In the northwestern part of the mountains the

Geologic History

The oldest rocks in the Sør Rondane Mountains are pelitic metasedimentary sequence which includes carposition in a metamorphic terrane that increases in The Nils Larsenfjellet Group. The rocks in the rank westward (compare with western Queen Maud

The gneiss terrane has been intruded by numerous obtained on some of these rocks (Table 1) average

The gneiss terrane is also cut by younger mafic dikes. The structural and chronological relations between Radiometric ages have not been determined on rocks

from these dikes, but they are definitely post-orogenic. By analogy to neighboring areas these dikes are considered possibly Jurassic in age.

Widespread glacial moraines attest to formerly more extensive ice coverage, and evidence has been found for at least two fluctuations of the ice surface. The exact ages of these glacial deposits are unknown, but they are probably Pleistocene or younger.

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Location	Lithology	Method and Material	Age (m.y.)	Ref.	Location	Lithology	Method and Mineral	Age (m.y.)	Re
Bautaen Peak 71°58'S, 25°57'E	Fine-grained	Rb-Sr	611,550,520	2	Strandrud Mountain	Fine-grained	Rb-Sr		2
	microcline	Whole rock	475	1	71°52′S, 25°36′E	microcline granite	Whole rock	459.436	1
	granite	Rb-Sr	476,467	2			Rb-Sr	482 459	1
		Biotite Rb-Sr	472 450,446	2			Biotite	433	1
		Feldspar	430,440	2			Rb-Sr	433	2
						Migmatitic-biotite	Feldspar Rb-Sr	432	1
						gneiss	Biotite	432	1
Gunnestad Glacier 72°06'S, 23°39'E	Granite	Pb ²⁰⁶ -Pb ²⁰⁷	575	1,2	Nordtoppen Nunatak	Granite vein in	U ²³⁸ -Pb ²⁰⁶	510	2
	(erratic	Zircon			(950)	diorite	Zircon		
	boulder)	U ²³⁵ -Pb ²⁰⁷	524	2	71°29'S, 25°17'E		U ²³⁵ -Pb ²⁰⁷	508	2
		Zircon					Zircon		
		U ²³⁸ .Pb ²⁰⁶	512	2			Pb ²⁰⁶ -Pb ²⁰⁷	500	2
		Zircon					Zircon		
		Rb-Sr	451	2			K-Ar	380	2
		Feldspar	***				Whole rock	105	
		Rb-Sr	445	2		Granite vein	Pb ²⁰⁶ -Pb ²⁰⁷	495	1
		Biotite	435	1			Zircon	120	1
		Rb-Sr Biotite and	443	2			Rb-Sr Biotite	439	1
		hornblende					Diotite		
		K-Ar	350	2	Isachson Mountain	Pegmatite	Rb-Sr	493.468	1
		Whole rock	330	-	72°11′S, 26°18′E		Biotite		
						Migmatitic gneiss	Rb Sr	491	1
							Biotite K-Ar	440	2
Nordtoppen Nunatak	Gneiss xenolith	U ²³⁵ -Pb ²⁰⁷	555	2			Whole rock	440	_
(1100) 71°29'S, 25°14'E	in diorite	Zircon							
		U ²³⁸ -Pb ²⁰⁶	555	2	Austkampane Hills	Muscovite-biotite-	Rb-Sr	488.469	2
		Zircon			71°48′S, 25°24′E	corundum gneiss	Muscovite	452	1
		Pb206-Pb207	550	2			Rb-Sr	463	2
		Zircon					Biotite	462	1
		Rb-Sr	468,457,452	1	Småhausane	Fine-grained	Rb-Sr	476	1
		Biotite			Nunataks 71°35'S, 25°21'E	granite vein in diorite	Biotite	476,459	2
						Quartz diorite	K-Ar	475	2
Mt. Romnaes 71°31'S, 24°00'E	Porphyroblastic	Pb ²⁰⁶ -Pb ²⁰⁷	540	1,2			Whole rock		
	granite	Zircon					Rb-Sr	435	1
		U ²³⁵ -Pb ²⁰⁷	518	2			Biotite		
		Zircon	E1A	2		Diorite	Rb-Sr	434	1
		U ²³⁸ -Pb ²⁰⁶	514	2			Biotite		
		Zircon Rb-Sr	454.449	1	Luncke Range	Syenite	Rb-Sr	460	2
		Biotite	454,449	2	72°00'S, 24°39'E		Biotite		
		K-Ar	350	2	Trillingane	Leucocratic	Rb-Sr	450	1
		Whole rock	000		Nunataks	pegmatite	Biotite	430	1
	Pegmatite vein	Rb-Sr	442	1	71°40'S, 27°26'E	Amphibole-biotite	Rb-Sr	447	1
	in granite	Biotite				gneiss	Biotite		

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