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Explanatory Text of Geological Map of Bergersenfjella, Sør Rondane Mountains, Antarctica

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Plate 1

The region of Bergersenfjella, viewed from NW through the window of the helicopter (Photo by S. SANO). Vent-like granite masses intruding in gneisses are most characteristic in this region.

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1. Introduction

The Sør Rondane Mountains were discovered from the air in 1937 during the Norwegian expedition of Lars Christensen. The mountains extend from 22° to 28°E and from 71.5° to 72.5°S, about 200 km south from the nearest coast. Before the Japanese Antarctic Research Expedition (JARE) started to survey, the Belgian parties performed the geological and glaciological surveys of the Sør Rondane Mountains during 1958, 1959, 1960 and 1965 (VAN AUTENBOER *et al.*, 1964; PICCIOTTO *et al.*, 1964; VAN AUTENBOER, 1969; PASTEELS and MICHOT, 1970; VAN AUTENBOER and LOY, 1972). The Soviet geologists also briefly surveyed the mountains in their 1966–1967 expedition (RAVICH and KAMENEV, 1972).

After JARE-25 started the geodetic and geological surveys of the central part of the mountains in 1984 (MEMBERS OF THE SØR RONDANE RECONNAISSANCE PARTY, 1984), the Japanese parties then performed geological surveys of extensive areas in the Sør Rondane Mountains (KOJIMA and SHIRAISHI, 1986; ISHIZUKA and KOJIMA, 1987; SAKIYAMA *et al.*, 1988; ASAMI *et al.*, 1989). Other studies also included petrology (ASAMI and SHIRAISHI, 1987; SHIRAISHI and KOJIMA, 1987; ASAMI *et al.*, 1990, 1992;

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GREW *et al.*, 1989a,b; MAKIMOTO *et al.*, 1990; OSANAI *et al.*, 1990; OWADA *et al.*, 1992; YOSHIKURA *et al.*, 1992), geochemistry (SHIRAISHI *et al.*, 1988; TAINOSHO *et al.*, 1991, 1992a, b; OSANAI *et al.*, 1992a, b) and geochronology (TAKIGAMI *et al.*, 1987; TAKIGAMI and FUNAKI, 1991; GREW *et al.*, 1992; SHIRAISHI and KAGAMI, 1992; TAKAHASHI *et al.*, 1990). These studies have been summarized by SHIRAISHI *et al.* (1991).

This sheet (1/100,000 scale), Sheet-33 "Bergersenfjella", of the Antarctic Geological Map Series of National Institute of Polar Research covers the central to eastern part of the Sør Rondane Mountains, ranging from 25.3° to 26.7°E and from 71.5° to 72.5°S, and is edited mainly based on th results of JARE-27, -29, -31 and -32. JARE-31 carried out the geological survey throughout the present region by using helicopters.

2. General Geology

The Sør Rondane Mountains are divided by outlet glaciers from the southern ice plateau (higher than 2200 m a.s.l.) into several mountain blocks which are rising out of the ice sheet to 1000 m. The present ice sheet falls about 1100 m a.s.l. along the northern foot of the mountains.

In the mapped area there are two large mountain blocks (Bergersenfjella and Isachsenfjella) and many small mountains or nunataks. The highest peak is Winsnesfjellet (2730 m a.s.l.) in Bergersenfjella. The largest outlet glacier, Byrdbreen, flows concordantly with a tectonic boundary (OSANAI *et al.*, 1992b) running from SE to NW.

MORIWAKI *et al.* (1991, 1992) discussed the late Cenozoic glacial history of the mountains in detail. On the basis of degree of weathering of moraines and analysis of cosmic ray bombardment products (^{10}Be and ^{26}Al) of bedrock samples, at least five exposure stages are recognized in the Sør Rondane Mountains. These stages enable to interpret the late Cenozoic glacial history of the mountains (MORIWAKI *et al.*, 1991, 1992; NISHIIZUMI *et al.*, 1991). During the maximum glaciation prior to 4 Ma (Stage 5), the mountains had been covered by an ice sheet that was thicker 400 m or more than the present. Then the ice sheet retreated progressively with some pauses (Stages 4 and 3), and formed and exposed Tertiary moraines by 1.6 Ma. During early-middle Pleistocene (Stage 2), the ice sheet re-advanced, forming small lateral moraines on the outlet valley walls about 100 m above the present ice surface. Since the middle Pleistocene, the ice sheet has retreated to the nearly same level as at present with minor fluctuations forming lateral moraines and present day supraglacial moraine fields (Stage 1). The Quaternary moraine in the map shows mainly Stage 1.

The previous studies listed above revealed that the Sør Rondane Mountains are underlain by various kinds of metamorphic and plutonic rocks. The metamorphic rocks are most common lithology in the mapped area, among which the psammitic and pelitic gneisses are dominant in the northern area whereas in the southern area the intermediate to basic gneisses occur predominantly. The metamorphic foliation of the gneisses strikes generally E–W to NE–SW in the northern area, but N–S to NW–SE in the southern area. The dips are generally gentle (55°–30°) in the whole area. There are several antiforms and synforms inferred in the mapped area, of which

Table 1. Chemical analyses of metamorphic rocks from the Bergersenfjella region.

Sp. No.	1	2	3	4	5	6	7	8	9
(wt %)									
SiO_2	47.49	71.57	49.93	46.62	76.75	65.95	49.82	67.43	44.11
TiO_2	0.79	0.46	0.35	0.78	0.20	0.46	1.43	1.13	1.33
Al_2O_3	13.57	12.79	8.37	15.30	11.73	16.62	10.15	12.83	13.49
Fe_2O_3	1.13	1.66	3.01	1.04	1.32	2.08	3.56	3.17	16.18*
FeO	10.16	3.65	8.04	9.39	1.64	1.72	6.50	4.89	—
MnO	0.22	0.17	0.25	0.13	0.11	0.05	0.19	0.11	0.24
MgO	8.68	1.32	13.60	8.08	0.29	1.31	11.01	2.50	8.06
CaO	12.55	2.36	13.40	12.59	2.02	4.52	11.14	2.22	10.87
Na_2O	2.35	3.48	1.39	2.59	4.37	4.73	2.26	2.30	1.44
K_2O	1.03	1.90	1.07	0.85	0.74	1.33	1.18	2.19	1.67
P_2O_5	0.05	0.06	0.04	0.11	0.06	0.14	0.52	0.22	0.12
LOI	0.96	0.96	1.98	1.82	0.55	0.52	1.49	0.46	—
Total	98.98	100.38	101.43	99.30	99.78	99.43	99.25	99.45	97.51
(ppm)									
Ba	100	370	90	70	270	270	640	500	200
Co	38	3	46	29	1	8	36	18	—
Cr	329	20	992	301	5	11	602	147	143
Cu	6	5	7	1	1	2	41	17	—
Ni	54	12	237	42	2	7	209	46	79
Pb	4	14	2	12	4	8	6	8	—
Sr	123	198	67	387	180	871	680	203	196
V	303	—	152	232	4	52	136	119	322
Zn	90	124	296	116	52	56	110	98	—
F	1500	1170	2420	3560	320	340	530	360	—
Rb	13	88	24	18	4	20	35	84	15
Ga	11	15	6	10	14	17	9	14	—
Hf	2	4	2	2	6	2	2	2	—
Nb	7	13	7	7	8	8	12	15	12
Y	12	73	35	17	38	5	47	47	30
Zr	19	170	28	51	145	88	81	260	104

Sp. No.		
1	A90011001A	two-pyroxene amphibolite (Mjellbreen E)
2	A90011102A	biotite-garnet gneiss (Miellbreen E)
3	A90011102B	two-pyroxene-hornblende-biotite gneiss (Mjellbreen E)
4	A90011103E	two-pyroxene amphibolite (Mjellbreen E)
5	A90011104	garnet-biotite-hornblende gneiss (Mjellbreen E)
6	A90013007A	biotite gneiss (Isrosene E)
7	A90013007B	two-pyroxene gneiss (Isrosene E)
8	A90013007C	garnet-biotite gneiss (Isrosene E)
9	A86020102A	amphibolite (Isachsenfjella)

Fe_2O_3 with asterisk (*) represents total iron as Fe_2O_3.

the axes strike nearly E–W in the northern area and NW–SE in the southern area. Also, there are several unmappable shear zones inferred in the area, all striking WNW–ESE to NW–SE. The neighboring gneisses with these shear zones are typically modified to mylonite or cataclasite. In this connection, there is the big shear zone called the Sør Rondane Suture (SRS) inferred in the southwestern part; the

Table 2. Chemical analyses of plutonic rocks from the Bergersenfjella region.

Sp. No.	1	2	3	4	Sp. No.	1	2	3	4
(wt %)					(ppm)				
SiO_2	52.78	49.51	68.50	72.41	Co	—	—	—	15
TiO_2	1.33	2.70	0.50	0.13	Cr	0	0	0	5
Al_2O_3	18.14	16.65	16.54	14.18	Cu	—	—	—	2
Fe_2O_3	7.19*	11.97*	2.54*	1.42	Ni	0	0	0	2
FeO	—	—	—	0.53	Pb	—	—	—	32
MnO	0.06	0.12	0.03	0.01	Sr	2876	833	675	314
MgO	2.38	3.62	0.77	0.29	V	132	173	25	3
CaO	4.19	6.86	2.67	1.65	Zn	—	—	—	34
Na_2O	2.73	3.67	4.91	3.89	F	—	—	—	250
K_2O	6.69	2.17	2.53	4.12	Rb	100	71	102	132
P_2O_5	0.60	0.62	0.11	0.04	Ga	—	—	—	18
LOI	—	—	—	1.01	Hf	—	—	—	6
					Nb	10	31	9	14
Total	96.09	97.89	99.10	99.14	Y	19	25	16	26
					Zr	371	393	208	110

Sp. No. 1 A86011604B diorite (Sørhaugen)
2 A86011601B dolerite (Sørhaugen)
3 B86020301 granite (Bergersenfjella)
4 B90013001C granite (Bergersenfjella)
Fe_2O_3 with asterisk (*) represents total iron as Fe_2O_3.

geological significance of SRS is given by OSANAI *et al.* (1992b). On the other hand, plutonic rocks form large intrusive masses, but more commonly they are unmappable-scaled intrusive masses and stocks within the metamorphic rocks. The metamorphic foliation tends to be modified by the intrusions of the granites and dips more steeply near the contact with the granite.

Thirteen bulk analyses of metamorphic and plutonic rocks are listed in Tables 1 and 2, respectively. Bulk compositions of major and minor elements were analyzed by X-ray fluorescence spectrometry (XRF) of Chemex Laboratories Ltd., Canada and Kochi University and by Inductively Coupled Plasma spectrometry (ICP) of Chemex Labs. Ltd., in combination with ordinary wet chemical analyses for FeO, Fe_2O_3 and loss of ignition (LOI). Rare earth element analyses were obtained by using instrumental neutron activation analyses (NAA) at Chemex Labs. Ltd. Detailed discussions on the geochemistry of the metamorphic and plutonic rocks were given elsewhere (OSANAI *et al.*, 1992b; TAINOSHO *et al.*, 1992b).

3. Metamorphic Rocks

For mapping units, we classify the metamorphic rocks into the following four rock-types; (1) biotite (-garnet) gneiss, (2) biotite-hornblende or hornblende-biotite (-garnet) gneiss, (3) amphibolite, and (4) calc-silicate rocks.

3.1. Biotite (-garnet) gneisses

The biotite gneisses occur typically in Fidjeiandfjellet, Nordhaugen, Mehaugen, Strandrudfjellet, and locally in the central area of Bergersenfjella and in the western and eastern areas of Isachsenfjella. Small and unmappable-scaled inclusions of the biotite gneisses are sometimes embedded in the granites throughout the mapped area. The garnet-bearing biotite gneisses are found widely in Simensentoppen and the northwestern area of Bergersenfjella, and locally in Austhjelmen and Hettene. In general, the gneisses exhibit granoblastic to lepidoblastic texture, and range from medium to coarse in grain size, and from pelitic to semi-pelitic and occasionally psammitic in composition. Also, there is a difference in modal proportion of biotite, which results in the well-banded structure due to the alternation of melanocratic (biotite-rich) and leucocratic (biotite-poor) parallel bands; each band ranging from several millimeters to several centimeters in width. The migmatitic and sometimes augen structures develop locally.

The following mineral assemblages are observed in the biotite gneisses; (1) biotite+plagioclase+K-feldspar+quartz, (2) garnet+biotite+plagioclase+K-feldspar+quartz, (3) sillimanite+biotite+plagioclase+K-feldspar+quartz, and (4) sillimanite+garnet+biotite+plagioclase+K-feldspar+quartz. The sillimanite-bearing rock of the assemblage (3) is found in the northern area of Nordhaugen, occurring as a thin layer in the biotite gneisses with the mineral assemblage of (1), while the sillimanite- and garnet-bearing gneisses of the assemblage (4) are widespread in the southern area of Mehaugen. The gneisses of the assemblage (3) from two localities in Austhjelmen contain relict kyanite enclosed in plagioclase. Relict kyanite in garnet is also found in the gneiss of the assemblage (2) from Hettene. The kyanite-, sillimanite- and garnet-bearing gneisses occur around Austhjelmen. Muscovite, epidote and chlorite are more or less included in the biotite (-garnet) gneisses, but they have textural evidence suggesting that these minerals may have been produced during the retrograde stage.

3.2. Biotite-hornblende or hornblende-biotite (-garnet) gneisses

The garnet-free types of these gneisses occur generally in a relatively large area, but they are also found as unmappable-scaled thin layers within the biotite gneisses throughout the mapped area. The garnet-bearing types of these gneisses are restricted to Austhamaren and the southern area of Isachsenfjella. The modal proportion of mafic minerals such as biotite and hornblende is highly variable and have given rise to variations of rock-names. With increasing modal proportion of biotite, the biotite-hornblende gneiss grades into the hornblende-biotite gneiss. Most commonly, the banded structure composed of the leucocratic (plagioclase-rich) and melanocratic (hornblende- and/or biotite-rich) parallel bands develops; each band ranging from 5 mm or less to more than 10 cm in thickness. The gneisses are coarse- to medium-grained rocks with granoblastic texture, and basic to intermediate in composition. The following mineral assemblages are observed in the gneisses; (1) biotite+hornblende+plagioclase+quartz, (2) clinopyroxene+biotite+hornblende+plagioclase+quartz, (3) garnet+biotite+hornblende+plagioclase+quartz, (4) clinopyroxene+garnet+biotite+hornblende+plagioclase+quartz, (5) clinopyroxene

+garnet+biotite+cummingtonite+hornblende+plagioclase+quartz, and (6) orthopyroxene+garnet+biotite+hornblende+plagioclase+quartz. K-feldspar may be added to the above-listed mineral assemblages, but very rarely. The clinopyroxene-bearing rock of the assemblage (2) occurs locally in some places of Bergersenfjella, in which the modal proportion of clinopyroxene is generally small (less than 10%), while the clinopyroxene- and garnet-bearing rocks of the assemblages (4) and (5) are widespread. The cummingtonite of the mineral assemblage (5) is commonly intergrown with green hornblende. The orthopyroxene-bearing rock is restricted in the southern area of Isachsenfjella. Chlorite and epidote are sometimes included in the gneisses, but their textural relationships with other constituents suggest that they may have been the secondary phases of the retrograde stage.

3.3. Amphibolites and iron-rich mafic granulite

The amphibolites are found throughout the surveyed area, and occur as dark-colored thin layers or beds, measuring 0.1 to 1.0 m wide, within the various kind of gneisses, or as various-sized xenoliths included in the granites. In the northeastern area of Isachsenfjella, they form relatively large masses. A distinctive variety is the garnet amphibolite lens of 4 by 10 m at Vesthjelmen. The garnet amphibolite also occurs as the older metadike at Austhamaren. Although in some cases they are massive, most commonly the amphibolites exhibit the banded structure composed of leucocratic (plagioclase-rich) and melanocratic (hornblende-rich) parallel bands; each band measuring from 5 mm to 1 cm in thickness. This banded structure shows the dip-strike direction comparable with the metamorphic foliation of the neighboring gneisses. The amphibolites are medium- to coarse-grained commonly with granoblastic texture, and in some cases display nematoblastic texture defined by prismatic hornblende. Compositionally, the amphibolites are typically basic. In contrast, the "leucocratic" amphibolites are composed mainly of plagioclase with a trace amount of hornblende, probably derived from pelitic or tuffaceous rocks with minor basic composition. The iron-rich mafic granulite, a black and compact rock, is found at the north end of Austhamaren, and occurs as a conformable layer in the biotite-hornblende gneiss.

The following mineral assemblages are observed in the amphibolites; (1) hornblende+plagioclase+quartz, (2) garnet+hornblende+plagioclase+quartz, (3) clinopyroxene+hornblende+plagioclase+quartz, (4) epidote+hornblende+plagioclase+quartz, (5) garnet+clinopyroxene+hornblende+plagioclase+quartz, and (6) clinopyroxene+orthopyroxene+garnet+hornblende+biotite+plagioclase±quartz. Chlorite and epidote are more or less included in the above-listed mineral assemblages except for the mineral assemblage of (4). However, the textural relationships of chlorite and epidote with other constituents suggest that these two phases are mostly secondary in origin except for the epidote in the mineral assemblage of (4) which appears to be in equilibrium with hornblende and plagioclase in texture. The garnet- and/or clinopyroxene-bearing rocks are restricted to Vesthjelmen, Austhamaren and the southern area of Isachsenfjella. The iron-rich mafic granulite has the mineral assemblage (7) fayalite+garnet+orthopyroxene+clinopyroxene+hornblende+biotite+plagioclase+K-feldspar.

3.4. Calc-silicate rocks

The calc-silicate rocks are widespread in the mapped area, occurring as intercalations (less than 5 m wide) or small lenses within the gneisses, and occasionally within the amphibolites. At the north end of Austhamaren, a calcite marble layer is intercalated with the iron-rich mafic granulite. The constituent minerals of the calc-silicate rocks include olivine, clinopyroxene, garnet, phlogopite, scapolite, calcite and rarely quartz. Wollastonite is found in a calc-silicate lense developed in the marble at Austhamaren.

4. Plutonic Rocks

The plutonic rocks include granite and diorite. They occur as forming small intrusive masses such as found in Sørhaugen, Krakken and the central part of Bergersenfjella. Small and unmappable-scaled intrusive masses of granites are also present in many places, and sometimes granites occur as neosomes in migmatites.

4.1. Granite

There are several granite masses throughout the mapped area, typically in Krakken and Bergersenfjella. Sometimes, the granites occur as vent-like masses, typically found in the eastern area of Bergersenfjella. In general, the contact of granite masses with the host gneisses is sharp, but occasionally the granites that include many xenoliths derived from the neighboring gneisses are found along the contact. Small and unmappable-scaled masses or dikes of granites or granitic pegmatites are also widespread.

The granites are generally coarse- to medium-grained and massive rocks, but there are some variations in color from pink to gray. Occasionally, the gneissose structure develops weakly in the pink-colored granite. The constituent minerals include biotite, hornblende, plagioclase, K-feldspar and quartz with trace amounts of apatite, fluorite, zircon, sphene and iron oxide. Garnet is rarely included, but it has not yet been certain whether this is a primary phase crystallized from the granitic magma or a xenocryst derived from the gneisses.

4.2. Diorite

The dioritic to quartz dioritic rocks occur in several places, of which the large and mappable-scaled masses are found in Sørhaugen and the central area of Bergersenfjella. The xenoliths of dioritic rocks are embedded in the granites in the eastern area of Bergersenfjella, showing an angular shape. The rocks are generally dark-grayish in color, and range from medium to coarse in grain size. The main constituent minerals are orthopyroxene, clinopyroxene, hornblende, biotite, plagioclase and quartz.

5. Metamorphic and Plutonic Evolutions

In general, two stages of re-equilibration are recognized in the metamorphic rocks from the Sør Rondane Mountains. Details of the petrography and chemistry for the Sør Rondane Mountains have been described by Shiraishi *et al.* (1991, 1992), YOSHIKURA *et al.* (1992) and ASAMI *et al.* (1991, 1992).

The first metamorphism is the granulite facies condition characterized by the common occurrence of mineral assemblages such as orthopyroxene+clinopyroxene+garnet+hornblende+plagioclase, orthopyroxene+biotite+K-feldspar+plagioclase± garnet, and sillimanite+garnet+biotite+K-feldspar+plagioclase in quartz-bearing rocks, and corundum+garnet+sillimanite+spinel+biotite+plagioclase in quartz-free rocks. On the basis of pyroxene, garnet and plagioclase compositions, the peak temperature and pressure of this granulite facies metamorphism are estimated to be 750–800°C and 7–8.5 kbar. Some of pelitic granulites also contain prograde relict minerals such as kyanite, staurolite, sapphirine and gedrite, all of which are partially replaced by the above listed minerals. On the other hand, retrograde kyanite-bearing biotite aggregates occur as embaying in garnet, and its peak metamorphic P-T conditions are estimated to be 530–580°C and 5.5 kbar. It is most likely that this mineral association reflects a retrograde episode under static conditions during a regional metamorphic overprint.

The second stage of metamorphism produced the andalusite+sillimanite (S2)+ biotite (B2)+muscovite assemblage that replaced some minerals formed in the first stage. Of these, the sillimanite (S2) and biotite (B2) are texturally and chemically different from those (S1 and B1) of the first stage (for details, see YOSHIKURA *et al.*, 1992). Furthermore, cordierite occurs as partially or totally replacing garnet, and is also interpreted as a secondary mineral. The second stage must have developed at *P-T* conditions near the intersection between the andalusite-sillimanite phase transition and muscovite-quartz reaction boundaries (about 550°C and 3 kbar), and its origin is attributed to the plutonic intrusion.

On the basis of geochronologic data, two episodes have been inferred in the Sør Rondane Mountains. The older episode is indicated by a 956 Ma Rb-Sr whole rock age on metamorphosed tonalites (TAKAHASHI *et al.*, 1990); a 1110 Ma U-Pb zircon age on biotite gneisses (GREW *et al.*, 1992); and a 978 Ma Rb-Sr and a 961 Ma Sm-Nd whole rock ages on granulites (SHIRAISHI and KAGAMI, 1992). The younger episode is indicated by a 536 Ma K-Ar whole rock age on a metamorphosed dolerite dike (KOJIMA and SHIRAISHI, 1986); a 440–450 Ma ^{40}Ar-^{39}Ar and K-Ar whole rock ages on metamorphosed dolerites and gneisses (TAKIGAMI *et al.*, 1987; TAKIGAMI and FUNAKI, 1991); a 525 Ma Rb-Sr and 406–415 Ma K-Ar whole rock ages on granites (TAKAHASHI *et al.*, 1990); and a 489 Ma Rb-Sr internal isochron age on a granulite (SHIRAISHI and KAGAMI, 1992). The older ages around 1000 Ma (late Proterozoic ages) have been interpreted to date the first stage of the granulite facies metamorphism, while the younger ages around 500 Ma (early Paleozoic ages) to reflect the second stage of the plutono-metamorphic episode.

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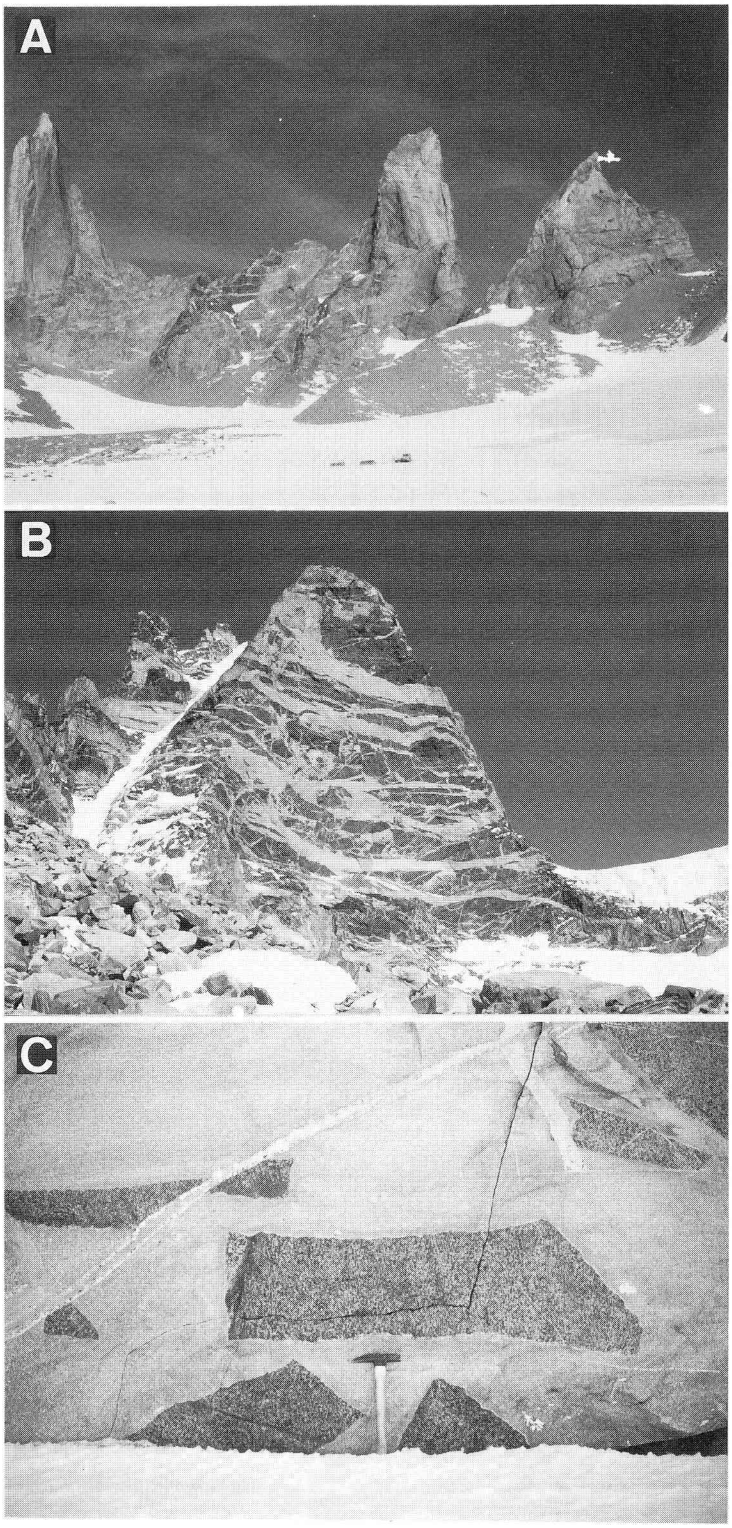
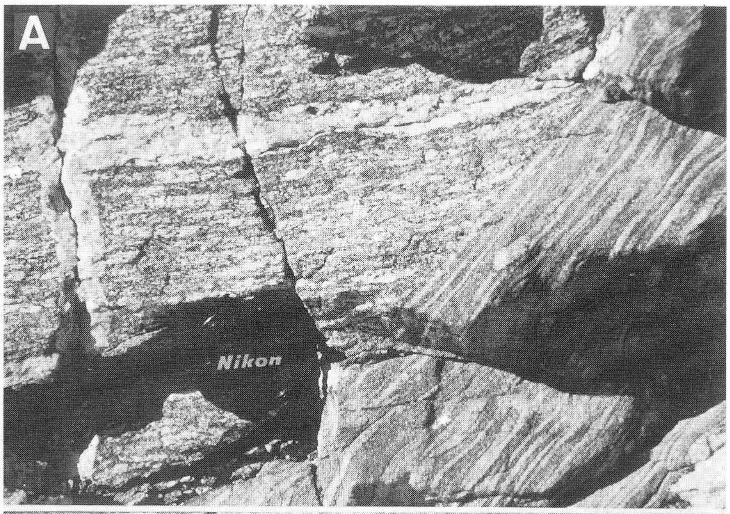


A : Vent-like granite masses at Bergersenfjella.

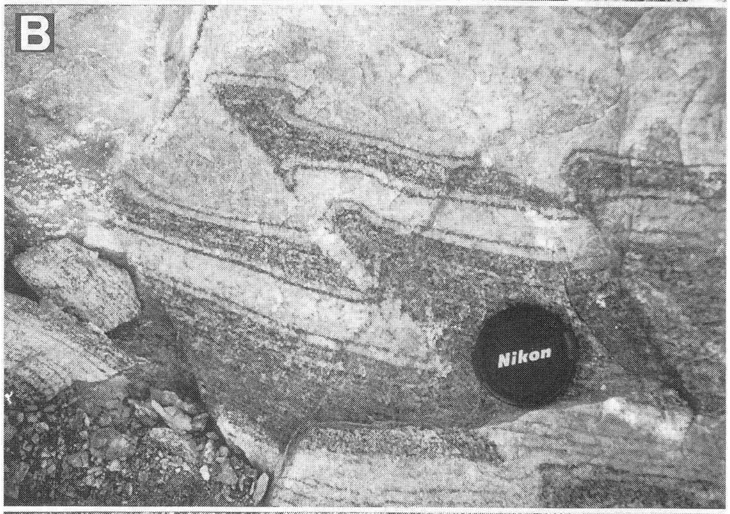
B : Granitic pegmatite layers within biotite-hornblende gneiss at Bergersenfjella.

C : Xenoliths of diorite within granite at Bergersenfjella.

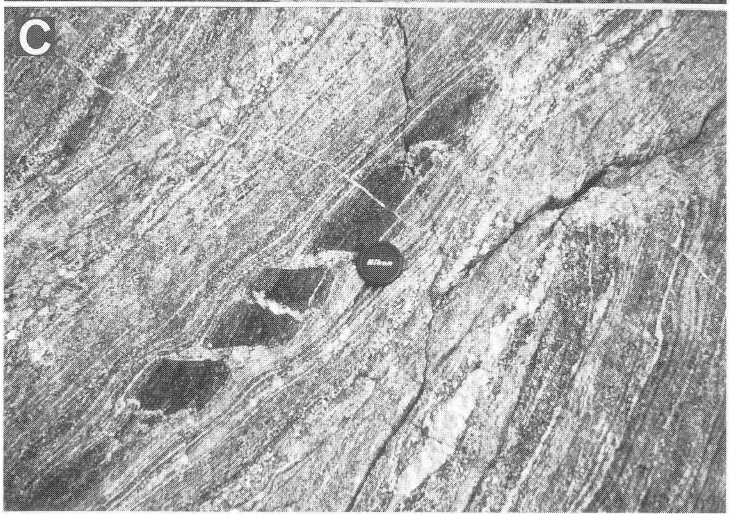
Plate 3



A : Intrusive relation of gneissose granite (lower right) in hornblende-biotite gneiss (upper left) at Bergersenfjella. Note that the gneissosity of granite cuts the foliation of the host gneiss obliquely.

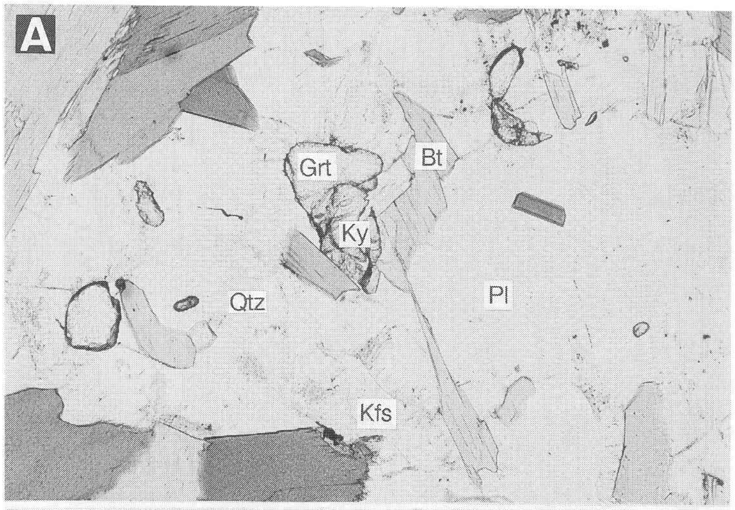


B : Reverse fault ovserved in hornblende-biotite gneiss at Bergersenfjella. Note that each band of the gneiss bends at fault contact.

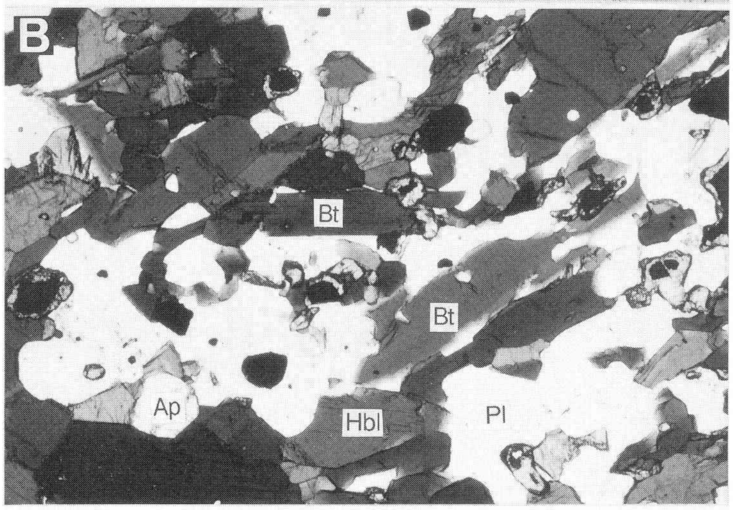


C : Pull-apart structure observed in hornblende-biotite gneiss at Bergersenfjella. Note that the shape of the structure shows the top-to-left sense of shear.

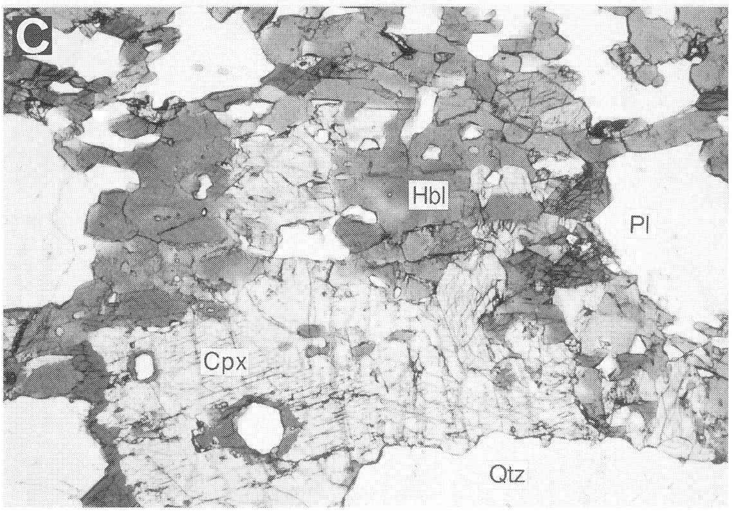
Plate 4



A : Photomicrograph of relict kyanite enclosed in garnet of garnet-biotite gneiss (MN88012805D). Loc.: Hettene. Bt: biotite. Grt: garnet, Kfs: K-feldspar, Ky: kyanite, Pl: plagioclase, Qtz: quartz. Open nicol. Width of photograph is 1.3 mm.

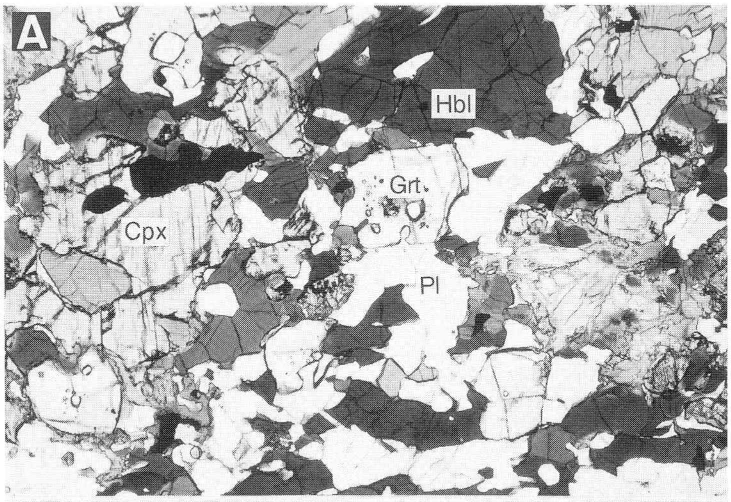


B : Photomicrograph of biotite-hornblende gneiss (B86013001B). Loc.: Bergersenfjella. Hbl: hornblende. Open nicol. Width of photograph is 2.0 mm.

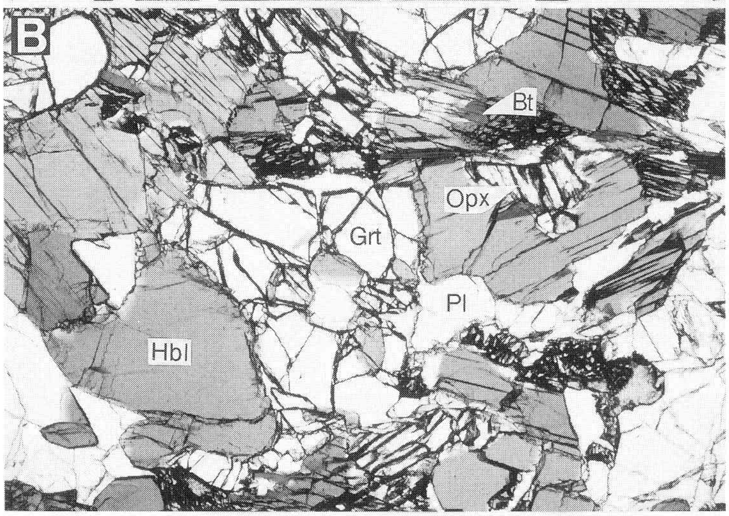


C : Photomicrograph of clinopyroxene-bearing amphibolite (B86012804B). Loc.: Bergersenfjella. Cpx: clinopyroxene. Open nicol. Width of photograph is 2.0 mm.

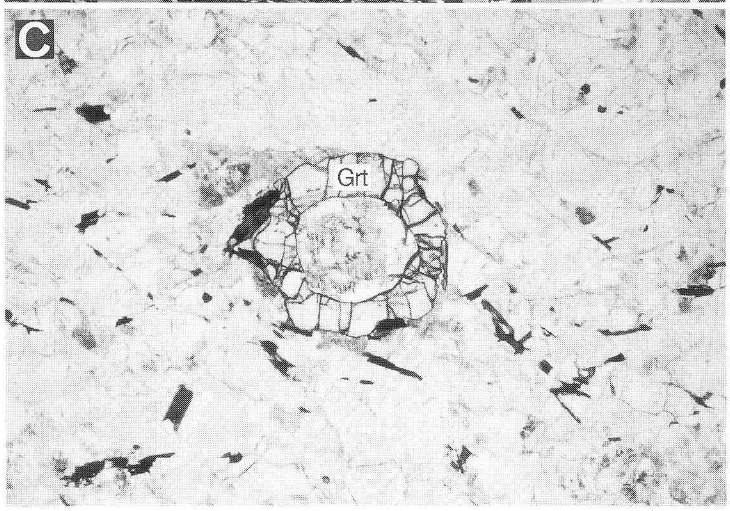
Plate 5



A : Photomicrograph of garnet- and clinopyroxene-bearing amphibolite (B86020202B). Loc.: Isachsenfjella. Grt: garnet. Open nicol. Width of photograph is 3.3 mm.



B : Photomicrograph of garnet- and orthopyroxene-bearing amphibolite (B86020202B). Loc.: Isachsenfjella. Opx: orthopyroxene. Open nicol. Width of photograph is 3.3 mm.



C : Photomicrograph of garnet-bearing granite (B86013105B). Loc.: Bergersenfjella. Open nicol. Width of photograph is 2.0 mm.

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