

The discovery and significance of sedimentary rocks at Förstefjell, Giaeveryggen.

J.R. Krynauw

Department of Geology, University of Natal
P.O.Box 375, Pietermaritzburg 3200

The presence of sedimentary rocks at Förstefjell in the northern Giaeveryggen, western Dronning Maud Land, has not been reported previously. They are correlated provisionally with the Schumacherfjellet Formation of the Ritscherflya Supergroup which occurs in the Ahlmannryggen and Borgmassivet. Previous authors have suggested that the Schyttbreen (Schytt Glacier) flows northward along the site of a major tectonic boundary, similar to that of the Jutulstraumen. However, the presence of sedimentary rocks at Förstefjell suggests that the Schyttbreen may occupy a lithological boundary between a predominantly Archaean granitic terrane and the Ritscherflya Supergroup.

Die aanwesigheid van sedimentêre gesteentes by Förstefjell in die noordelike Giaeveryggen, westelike Dronning-Maudland, is nog nie voorheen beskryf nie. Hulle word voorlopig met die Schumacherfjelletformasie van die Ritscherflya-Supergroep, wat in die Ahlmannryggen en Borgmassivet voorkom, gekorreleer. Vorige skrywers het voorgestel dat die noordwaartsvloeiende Schyttbreen (Schyttgletsjer) saamval met die ligging van 'n belangrike tektoniese grens, soortgelyk aan die Jutulstraumen. Die voorkoms van sedimentêre gesteentes by Förstefjell skep egter die indruk dat die Schyttbreen waarskynlik 'n litologiese grens tussen 'n hoofsaaklik Argaïese granitiese terrein en die Ritscherflya-Supergroep beset.

Introduction

This paper reports the presence of sedimentary rocks at Förstefjell (71°50'S, 5°43'W; Fig. 1), which are provisionally correlated with the Schumacherfjellet Formation of the Ritscherflya Supergroup in the Ahlmannryggen and Borgmassivet. A description of the rocks, followed by a discussion on the tectonic significance of the occurrence, is given below.

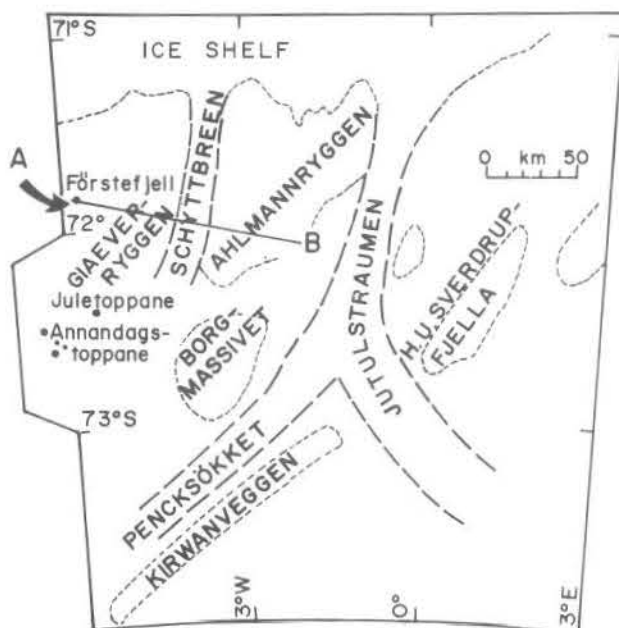


Fig. 1. Locality map of Förstefjell and the Ahlmannryggen-Giaeveryggen area. The line AB marks the section drawn in Fig. 3.

Förstefjell is an isolated nunatak in the northwestern Giaeveryggen in western Dronning Maud Land and was discovered in 1950 by members of the Norwegian-British-Swedish Antarctic Expedition (Giaeveer 1954). The nunatak consists mainly of Borgmassivet intrusions (Roots 1969), but Krynauw (1986) reported the presence of sedimentary rocks of the Ritscherflya Supergroup, discovered during a brief visit in February 1984. Time constraints during this visit permitted only a cursory examination of these rocks. Attempts to reach the nunatak in December 1988 and January 1989 were abandoned owing to inclement weather conditions.

Previous interpretations of the tectonic importance of the Schyttbreen was based largely on the presence of Archaean granite at Annandagstoppane (Fig. 1) and the supposed lack of sedimentary rocks west of the Schyttbreen (Wolmarans & Kent 1982, Znachko-Yavorskii *et al.* 1978, Krynauw 1986, Krynauw *et al.* in press). The occurrence of sedimentary rocks at Förstefjell is therefore important for an understanding of the tectonic history of western Dronning Maud Land, and is reported here despite the limited work that has been done at the nunatak.

The geology of Förstefjell

The intrusive rocks

The major part of Förstefjell nunatak consists of medium-grained gabbro-norites of the Borgmassivet intrusions. They display a vertically arranged igneous lamination, defined by modal variations of plagioclase and ortho- and clinopyroxene, with a strike of 140°. The rocks are similar in mineralogy and major and trace element geochemistry to the inverted pigeonite-bearing gabbro-norites of the main suite at Juletoppane and Annandagstoppane described by Krynauw *et al.* (1984).

A fine- to medium-grained gabbro sill intrudes the gabbro-norites and sedimentary rocks in the eastern, northern and northwestern section of the Förstefjell windscoop (Fig. 2). Krynauw (1986) correlated this sill with the younger suite of the Borgmassivet



Fig. 2. Borgmassivet gabbro sill of the younger suite intruding Schumacherfjellet Formation (?) at Förstefjell. The person for scale is 1.83 m tall.

References

- BARTON, J.M., Jr & COPPERTHWAIT, L. 1983. Sr-isotopic studies of some intrusive rocks in the Ahlmann Ridge and Annandagstoppane, western Queen Maud Land, Antarctica. In: Antarctic Earth Science. Eds R.L. Oliver, P.R. James, & J.B. Jago. Australian Academy of Sciences, Canberra. pp 59-62.
- BREDELL, J.H. 1976. The Ahlmannryggen Group, the Viddalen Formation, and associated igneous rocks in the Viddalen area, western Dronning Maud Land, Antarctica. M.Sc thesis (unpubl.), University of Pretoria, Pretoria.
- ELWORTHY, T.P. 1982. Geochronology. In: Geological investigations in western Dronning Maud Land, Antarctica - a synthesis. Eds L.G. Wolmarans & L.E. Kent. *S. Afr. J. Antarct. Res.*, Supplement 2.
- FERREIRA, E.P. 1986. 'n Sedimentologies-stratigrafiese ondersoek van die sedimentêre gesteentes in die Ahlmannryggen, Antarktika. M.Sc thesis (unpubl.), University of Stellenbosch, Stellenbosch.
- GIAEVER, J. 1954. The white desert. The official account of the Norwegian-British-Swedish Antarctic Expedition. Chatto and Windus, London, 304 pp.
- HINZ, K. & KRAUSE, W. 1982. The continental margin of Queen Maud Land/Antarctica: seismic sequences, structural elements and geological development. *Geologische Jahrbuch* E23: 17-41.
- KAMENEV, G.I. 1987. A geological model of the Ritscher plateau (western part of Dronning Maud Land, (in Russian). Geological-geophysical investigations in Antarctica. Published by the Ministry of Geology of the USSR, Leningrad, 63-74.
- KRYNAUW, J.R. 1986. The petrology and geochemistry of intrusions at selected nunataks in the Ahlmannryggen and Giaeverryggen, western Dronning Maud Land, Antarctica. Ph.D thesis (unpubl.), University of Natal, Pietermaritzburg.
- KRYNAUW, J.R., HUNTER, D.R. & WILSON, A.H. 1984. A note on the layered intrusions at Annandagstoppane and Juletoppane, western Dronning Maud Land. *S. Afr. J. Antarct. Res.* 14: 2-10.
- KRYNAUW, J.R., HUNTER, D.R. & WILSON, A.H. 1988. Emplacement of sills into wet sediments at Grunehogna, western Dronning Maud Land, Antarctica. *J. Geol. Soc. Lond.* 145: 1019-1032.
- KRYNAUW, J.R., WATTERS, B.R., HUNTER, D.R. & WILSON, A.H. in press. A review of the field relations, petrology and geochemistry of the Borgmassivet intrusions in the Grunehogna Province, western Dronning Maud Land, Antarctica. In: Geological Evolution of Antarctica. Eds M.R.A. Thomson, J.A. Crame, & J.W. Thomson, Cambridge University Press, Cambridge.
- NEETHLING, D.C. 1964. The geology of the Zukkertoppen nunataks, Ahlmannryggen, western Dronning Maud Land. In: Antarctic geology. Ed. R.J. Adie. North-Holland Publishing Co., Amsterdam. pp 378-389.
- ROOTS, E.F. 1969. Geology of western Queen Maud Land. In: Geologic maps of Antarctica. Eds V.C. Bushnell & C. Craddock. Antarctic map folio series, 12, Pl VI.
- WOLMARANS, L.G. 1982. Subglacial morphology of the Ahlmannryggen and Borgmassivet, western Dronning Maud Land. In: Antarctic geoscience. Ed. C. Craddock. University of Wisconsin Press, Madison. pp 963-968.
- WOLMARANS, L.G. & KENT, L.E. 1982. Geological investigations in western Dronning Maud Land, Antarctica - a synthesis. *S. Afr. J. Antarct. Res.*, Supplement 2. 93 pp.
- ZNACHKO-YAVORSKII, G.A., KURININ, R.G. & GRIKUROV, G.E. 1978. Tectonic map of Antarctica 1:10 000 000 sheet. Research Institute of the Geology of the Arctic, Complex "Sevmorgeo", Ministry of Geology of the USSR, Moscow.