



Dennis Field

1943–1986

In Memoriam

PETER W. L. CLOUGH

Dr. Dennis Field, lecturer in Geology at the University of Nottingham, England, died of cancer on February 16th 1986 at the age of 42. He had made outstanding contributions to the interpretation of the Precambrian of south Norway.

Dennis Field graduated in Geology at Nottingham in 1965 with first class honours. He married and spent a year in Canada before returning to Nottingham for his doctorate. He had already been introduced to the Precambrian terrain of south Norway by Professor Roger Morton, now of the University of Alberta. Dennis quickly grew to love Norway: its people and its culture attracted him and he devoted his professional life to unravelling the complexities of its Precambrian history. His thesis was completed in 1969 on the Geology of the area around Tvedestrand. It was a sound production, meticulous in detail,

embracing detailed mapping with hard rock petrology and geochemistry. He delineated the isograd between the amphibolite and granulite facies in the Bamble sector and established that this was a prograde transition. He was particularly interested in the metabasic minor intrusions within the high-grade gneisses. On the award of his doctorate he was immediately appointed to a lectureship by Nottingham – a clear measure of the Geology Department's confidence in his potential.

Dennis approached his academic career conscientiously and thoroughly, giving a high priority to his teaching of mineralogy and geochemistry. His systematic and lucid treatment of basic concepts was highly appreciated by his students, who also found he could be inspirational when addressing his favourite subject of Precambrian geology. He was a dedicated teacher with

high standards, always willing to help those who wished to learn.

Six months after his appointment, Dennis's research suffered a major setback when fire destroyed many samples, personal records and analytical equipment. It was not until about 1973 that he picked up the threads of his work. The next ten years, however, produced research of the highest quality. In 1974, an elegant paper (with R. B. Elliott) described chemical changes associated with the metamorphism of gabbro to amphibolite. Pairs of samples were collected from localities where the amphibolite had been formed from material cogenetic with adjacent gabbro. Systematic chemical differences therefore represented metamorphic changes and showed which elements had been removed and which introduced by the metamorphism. The bulk geochemistry of the entire Bamble transition dominated his work for the next few years and he studied two groups: the intrusive metabasites and the charnockitic gneisses. Both rock types displayed marked chemical differences with grade of metamorphism and yet were cogenetic. The metabasites were shown to preserve a tholeiitic iron-enrichment trend. At first Dennis and his co-workers (D. C. Cooper and P. W. L. Clough) preferred the hypothesis that hydrous transport of large-ion-lithophile (LIL) elements to higher crustal levels best explained the geochemical variations, though a primary fractionation was not ruled out. Subsequently, rare-earth element (REE) determinations and trace element modelling using new reliable partition data brought firmer conclusions. In an excellent innovative paper (with S. A. Drury and D. C. Cooper) Dennis showed that the charnockites represented two provinces separated from a primary dacitic-andesite magma emplaced under high grade metamorphism. The LIL-deficient charnockites represented cumulus material whilst normal LIL rocks had crystallised from the original melt. The charnockites were found to have close affinities with rapakivi granites.

As this research reached fruition, Dennis moved into another controversial area: the geochronology of the Proterozoic of southern Scandinavia. His work here was undertaken in collaboration with Dr. Arne Råheim of the Geologisk Museum in Oslo. By combining very careful geochronological work with his first-rate knowledge of the petrology and chemistry of south Norway, Dennis showed that the major gneiss-forming event in Bamble occurred at c. 1540 Ma. Previ-

ous, widely reported, dates at c. 1100 Ma were ascribed to isochron resetting during low grade (Sveconorwegian) metamorphism. There was no evidence for a gneiss-forming event during the Sveconorwegian (1200 Ma – 900 Ma), and long established correlations with the Grenvillian of North America were brought into question. A wider implication of this work was the illustration that partial resetting of isochrons could lead to statistically valid yet geologically meaningless dates.

Dennis was always content to be a partner in research and he preferred to publish jointly rather than alone. Yet his many co-workers and research students would acknowledge his central and inspirational role in coordinating activity, generating ideas and ultimately interpreting complex data. His literary style was precise, and he always took immense care with published work.

If Norwegian geology has suffered loss then it is nothing to that of Dennis's colleagues and above all his family. He was a devoted and loving family man and heartfelt sympathy goes to Barbara, Kenneth and Colin, who cared for him during his long illness, borne typically with great courage and determination. During the last months of his life, Dennis's doctors were amazed by his repeated ability to pull himself back from adversity; as one said, 'he's fighting this disease by his own rules'. That was the man; he will be deeply missed.

Dennis Field's major publications on Norwegian Geology

(A complete list of publications is available on request)

- 1968 Field, D. & Rodwell, J. R.: The occurrence of prehnite in a high-grade metamorphic sequence from south Norway. *Nor. Geol. Tidsskr.* 48, 55–59.
- 1974 Field, D. & Elliott, R. B.: The chemistry of gabbro – amphibolite transitions in south Norway. *Contrib. Mineral. Petrol.*, 47, 63–76.
- 1976 Field, D. & Clough, P. W. L.: K/Rb ratios and metasomatism in metabasites from a Precambrian amphibolite-granite transition zone. *J. Geol. Soc. Lond.* 132, 277–288.
- 1977 Cooper, D. C. & Field, D.: The chemistry and origins of Proterozoic low-potash, high-iron charnockitic gneisses from Tromøy, South Norway. *Earth Planet. Sci. Lett.* 35, 105–115.
- 1979 Field, D. & Råheim, A.: Rb-Sr total rock isotope studies on Precambrian charnockitic gneisses from south Norway: evidence for isochron resetting during a low-grade metamorphic-deformational event. *Earth Planet. Sci. Lett.* 45, 32–44.

- 1979 Field, D. & Råheim, A.: A geologically meaningless Rb-Sr total rock isochron. *Nature* 282, 497–499.
- 1980 Field, D., Drury, S. A. & Cooper, D. C.: Rare earth and LIL element fractionation in high-grade charnockitic gneisses, south Norway. *Lithos* 13, 281–289.
- 1980 Clough, P. W. L. & Field, D.: Chemical variation in metabasites from a Precambrian amphibolite-granulite transition zone. *Contrib. Mineral. Petrol.* 73, 277–285.
- 1980 Field, D. & Råheim, A.: Secondary geologically meaningless Rb-Sr isochrons, low $^{87}\text{Sr}/^{86}\text{Sr}$ initial ratios and crustal residence times of high-grade gneisses. *Lithos* 13, 295–304.
- 1981 Field, D. & Råheim, A.: Age relationships in the Proterozoic highgrade gneiss regions of southern Norway. *Precamb. Res.* 14, 261–275.
- 1982 Field, D. & Starmer, I. C.: Graphite genesis in high-grade metamorphic rocks. *Nature* 298, 303.
- 1983 Smalley, P. C., Field, D., Lamb, R. C. & Clough, P. W. L.: Rare earth and Th-Hf-Ta variations in metabasites from the amphibolite-granulite transition zone at Arendal, south Norway. *Earth Planet. Sci. Lett.* 63, 446–458.
- 1983 Smalley, P. C., Field, D. & Råheim, A.: Resetting of Rb-Sr whole rock isochrons during Sveconorwegian low-grade events in the Gjerstad augen gneiss, Telemark, southern Norway. *Isotope Geoscience* 1, 269–282.