

## The Ophiolite of Northern Oman



# The Ophiolite of Northern Oman

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This memoir is dedicated to the memory of the late  
DR ISMAEL EL BOUSHI  
former geological adviser to the Sultan of Oman,  
without whose help and whole-hearted co-operation  
this research project  
would not have been possible.

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## Preface

This memoir is based on studies by Open University (OU) and associated personnel between 1975–85 and represents a full-some precis, correlation and evaluation of work presented in eleven Ph.D. theses and numerous scientific publications. In total, it represents some 48 man-years of effort. The names of persons associated with the research project at various times, together with their status and affiliation, are listed in the table below.

Early in the reign of Sultan Quaboos the Oman Government began to welcome overseas scientists. Until then, only geologists of the PDO (Petroleum Development Oman) a part-Oman Government part-Shell International Company, had been allowed to work in the north of the Sultanate. Work by PDO scientists, particularly the classic study of the Oman mountains by K. W. Glennie and his colleagues (Glennie *et al.* 1974), although primarily concerned with sedimentary formations, provided a firm foundation for this ophiolite-orientated project.

Our own association with the Oman began in 1975 when one of us (IGG), on a visit to King Abdulaziz University (KAU) in Jeddah, Saudi Arabia, discussed with Dr A.O. Nasseef, Presi-

dent of that University and now Secretary General of the Muslim World League, the scientific desirability of investigating the Oman Ophiolite and its potential as a post-graduate training ground. Dr Nasseef contacted Dr El Boushi, then Geological Advisor to the Sultan of Oman, and as a result Gass & Dr Abdurrazzak Bakor (KAU), together with Drs J.D. Smewing and A.D. Lewis (OU Research Fellows) visited the Sultanate later that year.

It took only a few days to realize that the Oman mountains are a magnificent ophiolite, similar in many respects to the then better known Troodos massif of Cyprus. All present were convinced that it was a research area of the highest potential. It was envisaged that the area would be used as a training ground for Saudi, Omani and British graduate students who would work under the supervision of Dr I.M. El Boushi, and academic staff from the Open and King Abdulaziz Universities. Geological maps on the scale of 1:100,000 would be produced under an informal agreement with no contractual obligations on any of the parties.

A grant of £9,546 from the Royal Society of London paved the way for a detailed feasibility study of the ophiolite in 1976

	75	76	77	78	79	80	81	82	83	84	85	86
<b>Open University</b>												
<b>ACADEMIC STAFF</b>												
I.G. Gass	—											
J.A. Pearce	—											
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R.M. Shackleton	—											
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K.O. Simonian (OU)	—											
A.D. Lewis (OU)	—											
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C.R. Neary (BGS; ODA; chromites)	—											
D.I.J. Mallick (BGS; ODA; remote sensing)	—											
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D.T. Aldiss (NERC)	— (Granitic rocks of ophiolites: 1978)											
M.A. Brown (ODA)	— (Chromite studies: 1983)											
G.M. Graham (Shell)	— (Allochthonous sediments, Hawasina Window: 1980)											
M.P. Searle (OU)	— (Allochthonous Haybi complex and metamorphic sole: 1980)											
T. Alabaster (OD^)	— (Volcanic and hydrothermal processes: 1982)											
A.W. Shelton (ODA)	— (Gravity and palaeomagnetic studies: 1984)											
D.A. Rothery (ODA)	— (Remote sensing: 1982)											
P. Browning (NERC)	— (Plutonic rocks in Rustaq area: 1982)											
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A.H.F. Robertson (Edinburgh)	— (Sedimentology)											
A.G. Smith (Cambridge)	— (Structure)											
N.H. Woodcock (Cambridge)	— (Structure)											
D. Elliot (John's Hopkins)	— (Sedimentology and structure)											
P. Tippitt (Texas)	— (Structure)											
	— (Radiolarian dating)											

by J.D. Smewing, A.D. Lewis, K.O. Simonian and D.T. Aldiss. This fully confirmed that high quality geological studies could be made in this well exposed and relatively undeformed terrain. When it became likely that no KAU personnel would be further involved, Dr El Boushi agreed that the OU group should proceed alone.

Subsequent to the initial Royal Society grant, the Natural Environmental Research Council (NERC) provided, over the period 1976–81, a research grant of £36,233 as well as three research studentships. However, by far the largest support (£118,492: 1977–82) came from the British Government's Ministry of Overseas Development (now Overseas Development Administration: ODA). Through the good offices of Dr David Bleakley, then the Director of the Overseas Division of the British Institute of Geological Sciences (now BGS: British Geological Survey) and Professor E. Machens, the project was put to the OEDC (Organization for Economic Cooperation and Development) whose enthusiastic support resulted in the ODA grant. These monies funded four research students and three BGS specialists and allowed the production of four 1:100,000 coloured geological maps as well as the 1:250,000 geological and gravity maps that accompany this memoir. Another major contributor was the Open University which funded 15 man-years of Research Fellowship and one research student. Shell and the European Economic Community (EEC) each funded a research studentship whilst the American Oil Company (AMOCO) funded a Research Fellow for two years. We are most grateful to all these funding agencies for their support.

Throughout the project we have received invaluable assistance from numerous groups and individuals. In Oman, we are particularly indebted to the Department of Petroleum & Minerals (DPM) whose Director, Mr Mohammed Kassim, sponsored the project and provided the necessary documentation for project personnel to work in the Sultanate. We also acknowledge with many thanks the provision, by the DPM, of a house in Sohar that acted as the project's base for many

years. We were particularly fortunate that between 1977–79, our peak period of field work, we had the company in Oman of a University of California – United States Geological Survey research team who were making a detailed study of the ophiolite along a 25 km wide N-S strip extending south from Muscat. We benefited greatly from discussions with our American colleagues as we did from the PDO geologists who gave freely of their time and expertise. But, perhaps most of all, we will remember the unfailing and uniquely generous hospitality of the Omanis whose mountains we invaded.

On the more practical side, the RAF and SOAF (Sultans Own Air Force) provided invaluable assistance in air lifting two landrovers to the Oman, and bringing back to the UK several tons of rock specimens. At the OU we received the fullest support and cooperation from the Department of Earth Sciences' technical and secretarial staff. We are most grateful to John Holbrook, Ian Chaplin, Andy Tindle & John Watson who provided prompt and efficient curating, specimen preparation and analytical services, to Helen Boxall who prepared all the text figures in this memoir and to John Taylor for the 1:250,000 geological and gravity maps that accompany it and to Pam Owen and Carol Whale who provided a first class secretarial service that saw the manuscript through numerous stages.

The principle objective of this memoir is to present the major findings of the project under one cover as a coherent whole. We are greatly indebted to our former colleagues for allowing us to use their data in this way and also for commenting on and correcting those parts of the manuscript based on their findings. We are particularly grateful to the following who checked and improved earlier versions of the manuscript. Julian Pearce, Robert Shackleton, John Smewing, Chris Neary, Tony Alabaster, Dave Rothery, Paul Browning, Gordon Stanger, Steve Roberts, Iain Bartholomew, Micky Brown, John Malpas, Alastair Robertson, Alan Smith & Martin Menzies.