



# Geological *Magazine*

---

VOLUME 128

---

NUMBER 2

---

MARCH 1991

---

CAMBRIDGE UNIVERSITY PRESS

---

**EDITORS**

C. P. Hughes, N. H. Woodcock, I. N. McCave,  
M. J. Bickle

**ASSISTANT EDITOR**

Mrs J. M. Holland

---

**EDITORIAL ADVISORY BOARD**

Professor M. P. Coward  
*Department of Geology, Imperial College, Prince Consort  
Road, London SW7 2BP, UK.*

Sir Kingsley Dunham FRS, *Charleycroft, Quarryheads  
Lane, Durham DH1 3DY, UK.*

Professor R. Kerrich, *Department of Geological  
Sciences, University of Saskatchewan, Saskatoon, Canada  
S7N 0W0.*

Dr J. A. Pearce, *Department of Geological Sciences,  
University of Durham, Science Laboratories, South  
Road, Durham DH1 3LE, UK.*

Dr A. J. Reedman, *British Geological Survey, Keyworth,  
Nottingham NG12 5GG, UK.*

Dr M. Tucker, *Department of Geological Sciences,  
University of Durham, Science Laboratories, South Road,  
Durham, DH1 3LE, UK.*

Dr J. R. Wilson, *Laboratoriet for Endogen Geologi,  
Geologisk Institut, Aarhus Universitet, DK-8000 Aarhus  
C, Denmark.*

Professor J. A. Wolff, *Department of Geology, The  
University of Texas at Arlington, UTA Box 19049,  
Arlington, Texas 76019, USA.*

Dr B. W. D. Yardley, *Department of Earth Sciences,  
University of Leeds, Leeds LS2 9JT, UK.*

---

The *Geological Magazine* was originally established in 1864 and has been published continuously ever since. It covers the whole field of earth sciences, has a worldwide readership, and has a particular strength in providing a niche for interdisciplinary papers and papers that would be of interest to geologists from many different specialities. Papers of any length are considered, provided that the length is justifiable.

The *Magazine* publishes both original and review articles, rapid communications, discussions of papers which have already appeared in the *Magazine*, book reviews, a list of publications received, and occasional notices from the International Commission on Zoological Nomenclature.

There are no page charges for papers published in the *Magazine*.

© Cambridge University Press 1991

*Geological Magazine* (ISSN 0016-7568) is published every two months in January, March, May, July, September and November. Six parts form a volume.

**Orders**, which must be accompanied by payment, should be sent to any bookseller or subscription agent, or direct to the publisher: Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU. Subscriptions in the USA or Canada should be sent to Cambridge University Press, Journals Department, 40 West 20th Street, New York, NY 10011-4211. The subscription price of volume 128, 1991, is £103 UK, £109 elsewhere (US \$205 in the USA and Canada) including postage. Students (who must get a statement signed by a tutor) may subscribe

at the reduced rate of £26 (\$49); separate parts cost £19 net (US \$38 in the USA and Canada) plus postage. Second class postage paid at New York, NY, and at additional mailing offices. **POSTMASTER**: send address changes in USA and Canada to *Geological Magazine*, Cambridge University Press, 110 Midland Avenue, Port Chester, New York, NY 10573-9864.

**Back Volumes**: Vols. 1-60 and 112 out of print. Vols. 61-111: Enquiries to Wm Dawson & Sons Ltd, Cannon House, Folkestone, Kent. Volumes 113 onwards are available from Cambridge University Press.

**Copying**: This journal is registered with the Copyright Clearance Center, 27 Congress St., Salem, Mass. 01970. Organizations in the USA who are also registered with C.C.C. may therefore copy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to C.C.C. of the per-copy fee of \$5.00. This consent does not extend to multiple copy for promotional or commercial purposes. Code 0016-7568/91 \$5.00 + .00.

**For all other use**, permission should be sought from Cambridge or the American Branch of Cambridge University Press.

**Claims** for missing issues can only be considered if made immediately after receipt of the subsequent issue.

**Advertising**: Details of advertising in *Geological Magazine* may be obtained from the publisher.