

Origins and Evolution of the Antarctic Biota

Geological Society Special Publications
Series Editor K. COE

GEOLOGICAL SOCIETY SPECIAL PUBLICATION NO 47
ORIGINS AND EVOLUTION OF THE ANTARCTIC BIOTA

EDITED BY
J. A. CRAME
British Antarctic Survey
Natural Environment Research Council
Cambridge

1989
Published by
The Geological Society
LONDON

THE GEOLOGICAL SOCIETY

The Geological Society of London was founded in 1807 for the purposes of 'investigating the mineral structures of the earth'. It received its Royal Charter in 1825. The Society promotes all aspects of geological science by means of meetings, special lectures and courses, discussions, specialist groups, publications and library services.

It is expected that candidates for Fellowship will be graduates in geology or another earth science, or have equivalent qualifications or experience. All Fellows are entitled to receive for their subscription one of the Society's three journals: *The Quarterly Journal of Engineering Geology*, the *Journal of the Geological Society* or *Marine and Petroleum Geology*. On payment of an additional sum on the annual subscription, members may obtain copies of another journal.

Membership of the specialist groups is open to all Fellows without additional charge. Enquiries concerning Fellowship of the Society and membership of the specialist groups should be directed to the Executive Secretary, The Geological Society, Burlington House, Piccadilly, London W1V 0JU.

Published by the Geological Society from:

The Geological Society Publishing House

Unit 7

Brassmill Enterprise Centre

Brassmill Lane

Bath

Avon BA1 3JN

UK

(Orders: Tel. 0225 445046)

First published 1989

© The Geological Society 1989. All rights reserved. No reproduction, copy or transmission of this publication may be made without written permission. No paragraph of this publication may be reproduced, copied or transmitted save with the written permission or in accordance with the provisions of the Copyright Act 1956 (as Amended) or under the terms of any licence permitting limited copying issued by the Copyright Licensing Agency, 33-34 Alfred Place, London WC1E 7DP. Users registered with Copyright Clearance Center: this publication is registered with CCC, 27 Congress St., Salem, MA 01970, USA. 0305-8719/89 \$03.00.

British Library Cataloguing in Publication Data

Origins and the evolution of the Antarctic

1. Antarctic. Fossils

I. Crame, J. A. (James Alistair) 1949-

560.998'9

ISBN 0-903317-44-3

Printed in Great Britain at the Alden Press, Oxford

Contents

J. ALISTAIR CRAME, Origins and evolution of the Antarctic biota: an introduction	1
L. R. M. COCKS, Antarctica's place within Cambrian to Devonian Gondwana	9
FRANCOISE DEBRENNE & PETER D. KRUSE, Cambrian Antarctic archaeocyaths	15
GERALD F. WEBERS & ELLIS L. YOCHELSON, Late Cambrian molluscan faunas and the origin of the Cephalopoda	29
G. C. YOUNG, The Aztec fish fauna (Devonian) of southern Victoria Land: evolutionary and biogeographic significance	43
SHERRI L. DEFAUW, Patterns of evolution in the Dicynodontia with special reference to austral taxa	63
W. G. CHALONER & G. T. CREBER, The phenomenon of forest growth in Antarctica: a review	85
MARY E. DETTMANN, Antarctica: Cretaceous cradle of austral temperate rainforests?	89
ROSEMARY A. ASKIN, Endemism and heterochroneity in the Late Cretaceous (Campanian) to Paleocene palynofloras of Seymour Island, Antarctica: implications for origins, dispersal and palaeoclimates of southern floras	107
T. H. RICH, P. V. RICH, B. WAGSTAFF, J. McEWEN-MASON, C. B. DOUTHITT & R. T. GREGORY, Early Cretaceous biota from the northern side of the Australo–Antarctic rift valley	121
R. E. MOLNAR, Terrestrial tetrapods in Cretaceous Antarctica	131
G. R. STEVENS, The nature and timing of biotic links between New Zealand and Antarctica in Mesozoic and early Cenozoic times	141
PETER DOYLE & PHILIP HOWLETT, Antarctic belemnite biogeography and the break-up of Gondwana	167
RODNEY M. FELDMANN & DALE M. TSHUDY, Evolutionary patterns in macrurous decapod crustaceans from Cretaceous to early Cenozoic rocks of the James Ross Island region, Antarctica	183
SANKAR CHATTERJEE & BRYAN J. SMALL, New plesiosaurs from the Upper Cretaceous of Antarctica	197
JUDD A. CASE, Antarctica: the effect of high latitude heterochroneity on the origin of the Australian marsupials	217
K. BIRKENMAJER & E. ZASTAWNIAK, Late Cretaceous–early Tertiary floras of King George Island, West Antarctica: their stratigraphic distribution and palaeoclimatic significance	227
J. T. EASTMAN & L. GRANDE, Evolution of the Antarctic fish fauna with emphasis on the recent notothenioids	241
ANDREW CLARKE & J. ALISTAIR CRAME, The origin of the Southern Ocean marine fauna	253
R. EWAN FORDYCE, Origins and evolution of Antarctic marine mammals	269
ELLEN THOMAS, Development of Cenozoic deep-sea benthic foraminiferal faunas in Antarctic waters	283
LES WATLING & MICHAEL H. THURSTON, Antarctica as an evolutionary incubator: evidence from the cladistic biogeography of the amphipod Family Iphimediidae	297