

---

# THE PALEONTOLOGICAL SOCIETY PAPERS

---

Volume 9

November 2003

---



## **BRIDGING THE GAP** **Trends in the Ostracode Biological and Geological Sciences**

Lisa E. Park and Alison J. Smith, Editors

---

SERIES EDITOR: Russell D. White

A publication of The Paleontological Society  
ISSN 1089-3326

---

# THE PALEONTOLOGICAL SOCIETY PAPERS

---

Volume 9

November 2003

---



## **BRIDGING THE GAP** **Trends in the Ostracode Biological and Geological Sciences**

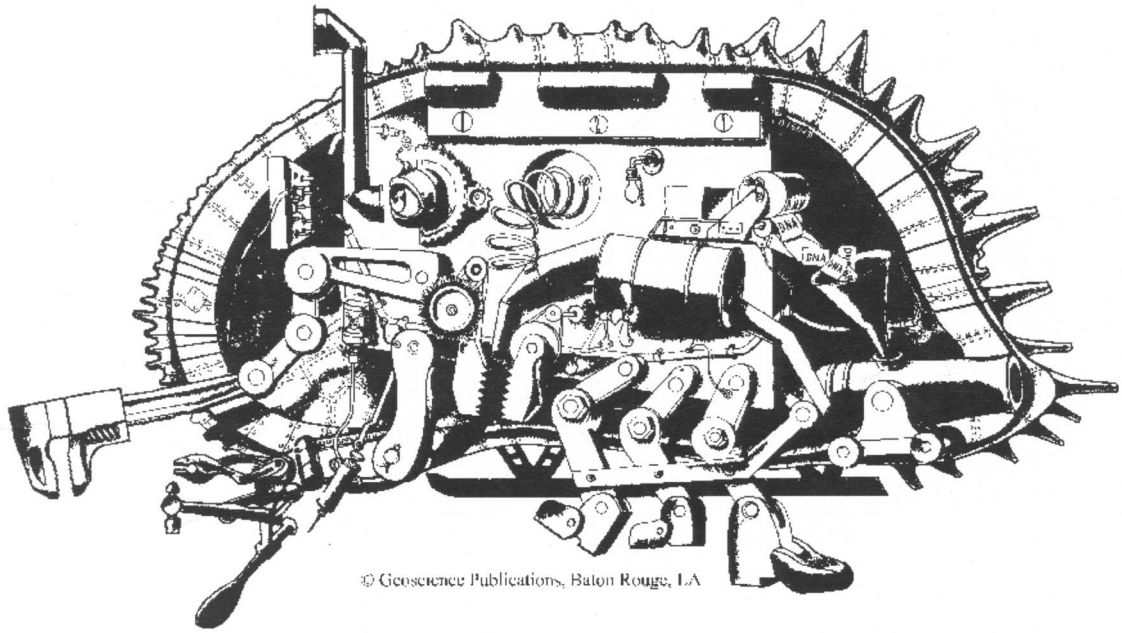
Lisa E. Park and Alison J. Smith, Editors

---

Series Editor: Russell D. White  
A Publication of the Paleontological Society  
ISSN 1089-3326

*This volume is dedicated to*

*Richard Hall Benson*  
*1929-2003*



© Geoscience Publications, Baton Rouge, LA

**BRIDGING THE GAP**  
**Trends in the Ostracode Biological and Geological Sciences**

Lisa E. Park and Alison J. Smith, Editors

Presented as a Paleontological Society Short Course  
at the Geological Society of America, Seattle, WA  
November 1, 2003

*Convened by*

Lisa E. Park  
University of Akron

Alison J. Smith  
Kent State University

*Special Publication Editor*

Russell D. White  
Peabody Museum of Natural History  
Yale University

# The Paleontological Society Special Publications

A Publication of The Paleontological Society

Series Editor

Russell D. (“Tim”) White  
Division of Invertebrate Paleontology  
Peabody Museum of Natural History  
Yale University  
170 Whitney Ave., P.O. Box 208118  
New Haven, CT 06520 USA  
<tim.white@yale.edu>

Copyright © 2003 by The Paleontological Society

All rights reserved. This entire publication may not be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without permission in written form from the Secretary of the Society. Diagrams, figures, tables, illustrations, and graphs may be reproduced by photocopying and distributing free of charge for educational purposes, if proper credit is given to the author(s) and the Society.

Printed by Yale University Reprographics & Imaging Services, New Haven, CT.

# OFFICERS OF THE PALEONTOLOGICAL SOCIETY

For the year ending December, 2003

---

*President*

William I. Ausich, Columbus, OH

*Special Publications Editor*

Russell D. ("Tim") White, New Haven, CT

*President-Elect*

David Bottjer, Pasadena, CA

*Priscum Editor*

Peter Harries, Tampa, FL

*Past-President*

Patricia ("Trish") H. Kelley, Wilmington, NC

*Education Coordinator*

Dale A. Springer, Bloomsburg, PA

*Secretary*

Carl W. Stock, Tuscaloosa, AL

*Student Representative*

Alycia Rode, Lawrence, KS

*Treasurer*

Mark E. Patzkowsky, State College, PA

SECTION CHAIRS

*Cordilleran Section*

Rex Alan Hanger, Whitewater, WI

*North-Central Section*

Christopher John Crow, Fort Wayne, IN

*Northeast Section*

Neil E. Tibert, Fredericksburg, VA

*Rocky Mountain Section*

Michael C. Wilson, New Westminster, BC

*South-Central Section*

Thomas Olszewski, College Station, TX

*Southeast Section*

Reese Barrick, Raleigh, NC

*Councilors*

Robert A. Gastaldo, Colby, ME  
Steven M. Holland, Athens, GA

*Journal of Paleontology Co-Editors*

Ann F. ("Nancy") Budd, Iowa City, IA  
Brian J. Witzke, Iowa City, IA  
Julia Golden, Iowa City, IA  
Jonathan Adrain, Iowa City, IA

*Paleobiology Co-Editors*

William A. DiMichele, Washington, DC  
John M. Pandolfi, Washington, DC

*Program Coordinator*

Mark A. Wilson, Wooster, OH

## AUTHORS

ANGEL BALTANÁS  
Department of Ecology  
Universidad Autónoma de Madrid, E-  
28049  
Madrid, SPAIN  
angel.baltanas@UAM.ES

RICHARD H. BENSON, deceased  
Department of Paleobiology  
National Museum of Natural History  
Smithsonian Institution, Washington  
D.C. 20013-7012 USA

IAN BOOMER  
Department of Geography  
University of Newcastle  
Newcastle NE1 7RU UK  
ian.boomer@ncl.ac.uk

WOLFGANG BRAUNEIS  
Institut für Mathematik  
Universität Salzburg, A 5020  
Salzburg, AUSTRIA  
wolfgang.brauneis@sbg.ac.at

ANNE C. COHEN  
Department of Invertebrate Zoology &  
Geology  
California Academy of Sciences  
Golden Gate Park  
San Francisco, CA 94118 USA  
Mailing Address:  
Bodega Marine Lab  
P.O. Box 247  
Bodega Bay, CA 94923 USA  
acohen@monitor.net

MICHAEL S. CORMACK  
Paleontological Institute  
University of Kansas

121 Lindley Hall  
Lawrence, KS 66045-7613 USA  
msc@ku.edu

THOMAS M. CRONIN  
926A National Center  
U. S. Geological Survey  
Reston, VA 20192 USA  
tcronin@usgs.gov

B. BRANDON CURRY  
2706 Sprnghill Lane  
Champaign, IL 61822 USA  
brandoncurry1204@hotmail.com

DAN L. DANIELOPOL  
Institut für Limnologie  
Österreichische Akademie der  
Wissenschaften, A 5310  
Mondsee, AUSTRIA  
dan.danielopol@oeaw.ac.at

JESSE W. DAVIS  
Department of Geology  
Kent State University  
Kent, OH 44242 USA  
jwdavis@kent.edu

PATRICK DE DECKKER  
Department of Geology and CRC  
LEME  
The Australian National University  
Canberra ACT 0200 AUSTRALIA  
Patrick.Dedeckker@anu.edu.au

GARY S. DWYER  
Division of Earth and Ocean Sciences  
Duke University  
Durham, North Carolina 27708 USA  
gsd3@duke.edu



STEPHEN M. EGGINS  
Research School of Earth Sciences  
The Australian National University  
Canberra ACT 0200, AUSTRALIA  
Stephen.Eggins@anu.edu.au

RICHARD M. FORESTER  
United States Geological Survey  
Box 25046, MS 980 Federal Center  
Denver, CO 80225 USA  
forester@usgs.gov

JONATHAN A. HOLMES  
Environmental Change Research Centre  
University College London  
26 Bedford Way  
London, WC1H 0AP UK  
j.holmes@geog.ucl.ac.uk

DAVID J. HORNE<sup>1</sup>  
Department of Zoology  
Natural History Museum  
London, SW7 5BD UK  
dave.horne@runbox.com

EMI ITO  
Department of Geology and Geophysics  
& Limnological Research Center  
University of Minnesota  
Minneapolis, MN 55455 USA  
eito@umn.edu

ROGER L. KAESLER  
Paleontological Institute  
University of Kansas  
Lawrence, KS 66045-7613 USA  
kaesler@ku.edu

JOHAN LINHART  
Institut für Mathematik  
Universität Salzburg, A 5020

Salzburg, AUSTRIA  
johann.linhart@sbg.ac.at

KOEN MARTENS<sup>2</sup>  
Royal Belgian Institute of Natural  
Sciences  
Vautierstraat 29, B-1000  
Brussels BELGIUM  
martens@science.uva.nl

JAMES G. MORIN  
Shoals Marine Laboratory  
Cornell University  
Ithaca, N. Y. 14853 USA  
jgm18@cornell.edu

DONALD F. PALMER  
Department of Geology  
Kent State University  
Kent, OH 44242 USA  
dpalmer@kent.edu

LISA E. PARK  
Department of Geology  
University of Akron  
Akron, OH 44325-4101 USA  
lepark@uakron.edu

RICHARD D. RICKETTS  
Large Lakes Observatory  
University of Minnesota  
Duluth, MN 55812-2496 USA  
rickets@d.umn.edu

ISA SCHÖN<sup>2</sup>  
Royal Belgian Institute of Natural  
Sciences  
Vautierstraat 29  
B-1000 Brussels BELGIUM  
isa.schoen@naturalsciences.be

IAN J. SLIPPER  
Department of Earth and Environmental  
Sciences  
University of Greenwich  
Kent, ME4 4TB UK  
I.J.Slipper@gre.ac.uk

ALISON J. SMITH  
Department of Geology  
Kent State University  
Kent, OH 44242 USA  
asmith@kent.edu

*Current Addresses*

<sup>1</sup>Department of Geography  
Queen Mary, University of London  
Mile End Road  
London E1 4NS UK

<sup>2</sup>University of Amsterdam,  
Institute of Biodiversity and Ecosystem  
Dynamics (IBED)  
Mauritskade 61  
Amsterdam NETHERLANDS

# BRIDGING THE GAP

## Trends in the Ostracode Biological and Geological Sciences

Lisa E. Park and Alison J. Smith, Editors

Volume Dedication to Richard Hall Benson . . . . .	xvii
<i>Scott L. Wing</i>	
The Ontogeny of an Ostracodologist . . . . .	1
<i>Richard H. Benson</i>	
An Introduction to Ostracoda . . . . .	9
<i>Alison J. Smith and Lisa E. Park</i>	
Evolutionary History of the Ostracoda and the Origin of Nonmarine Faunas . . . . .	11
<i>Lisa E. Park and R. Douglas Ricketts</i>	
Sexual Morphology, Reproduction and the Evolution of Bioluminescence in Ostracoda . . . . .	37
<i>Anne C. Cohen and James G. Morin</i>	
Phylogenetic Reconstructions of Ostracodes—A Molecular Approach. . . . .	71
<i>Isa Schön and Koen Martens</i>	
A Biomechanical Theory of Ostracode Carapace Morphology . . . . .	89
<i>Richard H. Benson</i>	
Morphometric Methods for Applied Ostracodology: Tools for Outline Analysis of . . . . .	101
Nonmarine Ostracodes	
<i>Angel Baltanás, Wolfgang Brauneis, Daniel L. Danielopol, Johann Linhart</i>	
Ostracodes and Their Shell Chemistry: Implications for Paleohydrologic . . . . .	119
and Paleoclimatologic Applications	
<i>Emi Ito, Patrick De Deckker, and Stephen M. Eggins</i>	
The Use of Ostracodes in Paleoenvironmental Studies, or What can you do . . . . .	153
with an Ostracode shell?	
<i>Ian Boomer, David J. Horne and Ian J. Slipper</i>	
Key Events in the Ecological Radiation of the Ostracoda . . . . .	181
<i>David J. Horne</i>	
Ostracodes as Hydrologic Indicators in Springs, Streams and Wetlands: . . . . .	203
A Tool for Environmental and Paleoenvironmental Assessment	
<i>Alison J. Smith, Jesse W. Davis, Donald F. Palmer and Richard M. Forester</i>	

Linking Ostracodes to Climate and Landscape .....	223
<i>B. Brandon Curry</i>	
Deep-Sea Ostracodes and Climate Change.....	247
<i>Thomas M. Cronin and Gary S. Dwyer</i>	
Ostracoda on the Internet .....	265
<i>Roger L. Kaesler and Michael S. Cormack</i>	
Future Trends and Goals in Ostracode Research .....	275
<i>Jonathan A. Holmes</i>	

