

# JOURNAL of PALEONTOLOGY



The  
Paleontological  
Society

VOL 89 | NO 2 | 2015



**CAMBRIDGE**  
UNIVERSITY PRESS



## OFFICERS AND EDITORS OF THE PALEONTOLOGICAL SOCIETY



### *President*

STEVE HOLLAND,  
Department of Geology  
University of Georgia  
210 Field Street  
Athens, GA 30602-2501  
stratum@uga.edu

### *President-Elect*

ARNOLD I. MILLER,  
Department of Geology  
University of Cincinnati  
Cincinnati, OH 45221-0013  
Arnold.miller@uc.edu

### *Past President*

SANDRA J. CARLSON,  
Geology Department  
University of California–Davis  
One Shields Avenue  
Davis, CA 95616-8605  
sjcarlson@ucdavis.edu

### *Secretary*

MARK A. WILSON  
Department of Geology  
The College of Wooster  
Wooster, OH 44691  
mwilson@wooster.edu

### *Treasurer*

PETER J. HARRIES  
Department of Geology  
University of South Florida  
4202 East Fowler Avenue  
Tampa, FL 33620  
harries@chuma.cas.usf.edu

### *JP Editors*

BRIAN R. PRATT, Univ. Saskatchewan  
brian.pratt@usask.ca

STEVEN J. HAGEMAN,  
Appalachian State Univ.  
hagemansj@appstate.edu

### *JP Managing Editor*

SARA A. MARCUS, Klamath Falls, OR 97601  
journalofpaleontology@cambridge.org

### *JP Associate Editors*

JUAN LUIS BENEDETTO,  
Univ. Nacional de Cordoba  
jbenedetto@efn.uncor.edu

STYLIANOS CHATZIMANOLIS,  
Univ. Tennessee–Chattanooga  
stylianos-chatzimanolis@utc.edu

TOM CRONIN, USGS  
tcronin@usgs.gov

WILLIAM A. DIMICHELE,  
Smithsonian Institution  
dimichel@si.edu

ROBERT J. ELIAS, Univ. of Manitoba  
eliasrj@ms.umanitoba.ca

NADIA FRÖBISCH, Museum für Naturkunde  
nadiafroebisch@mfn-berlin.de

FOREST J. GAHN, Brigham Young Univ., Idaho  
gahnf@byui.edu

JOSEPH HANNIBAL, Cleveland Museum of  
Natural History  
jhannibal@cmnh.org

PETER J. HARRIES, Univ. of South Florida  
harries@chuma.cas.usf.edu

JOACHIM HAUG, Univ. of Greifswald  
joachim.haug@palaeo-evo-devo.info

MICHAEL HAUTMANN, Univ. of Zurich  
michael.hautmann@pim.uzh.ch

MARTIN J. HEAD, Brock Univ.  
mjhead@brocku.ca

BRIAN T. HUBER, Smithsonian Institution  
huberb@si.edu

NIGEL HUGHES, UC Riverside  
nigel.hughes@ucr.edu

ZERINA JOHANSON,  
Natural History Museum, London  
z.johanson@nhm.ac.uk

DANIEL KSEPKA, Bruce Museum  
dksepka@brucemuseum.org

STEPHEN A. LESLIE, James Madison Univ.  
lesliesa@jmu.edu

BRUCE LIEBERMAN, Univ. of Kansas  
blieber@ku.edu

RICK LUPIA, OK Museum  
rlupia@ou.edu

GABRIELA MÁNGANO, Univ. Saskatchewan  
gabriela.mangano@usask.ca

MALGORZATA MOCZYDŁOWSKA-VIDAL,  
Uppsala Univ.  
malgo.vidal@pal.uu.se

ERIC SCOTT, San Bernardino Co. Museum  
escott@sbc.sbcounty.gov

MARY SILCOX, Univ. of Toronto Scarborough  
msilcox@utsc.utoronto.ca

HANS-DIETER SUES, Smithsonian Institution  
suesh@si.edu

COLIN SUMRALL, Univ. of Tennessee  
csumrall@utk.edu

LEIF TAPANILA, Idaho State Univ.  
tapaleif@isu.edu

DAVID VARRICCHIO, Montana State Univ.  
djv@montana.edu

PETER WAGNER, Smithsonian Institution  
wagnerpj@si.edu

STEVE WESTROP, OK Museum  
swestrop@ou.edu

DAVID M. WORK, Maine State Museum  
david.work@maine.gov

MARGARET M. YACOBUCCI,  
Bowling Green State Univ.  
mmyacob@bgsu.edu

### *Paleobiology Co-Editors*

BRUCE MACFADDEN,  
DOUGLAS JONES, JOHNATHAN BLOCH,  
AND MICHAEL KOWALEWSKI,  
Univ. of Florida

### *Editor of Special Publications*

SARA A. MARCUS, Oregon Inst. Of Technology  
sara.marcus@oit.edu

### *Communications Officer*

LEIF TAPANILA, Idaho State Univ.  
tapleif@isu.edu

### *Program Coordinator*

THOMAS OLSZEWSKI, Texas A&M Univ.  
tomo@geo.tamu.edu

### *Education Coordinator*

MARGARET M. YACOBUCCI,  
Bowling Green State Univ.  
mmyacob@bgsu.edu

### *Councilors*

LAURIE COLLINS,  
Florida International Univ.  
collinsl@fiu.edu

MARGRET FRAISER,  
Univ. of Wisconsin, Milwaukee  
mfraiser@uwm.edu

### *Student Representative*

LUCY CHANG,  
Univ. California, Berkeley  
luchang@berkeley.edu

### *Section Chairs*

Cordilleran: NICOLE BONUSCO  
CA State Univ.–Fullerton  
nbonuso@fullerton.edu

North Central: REBECCA FREEMAN  
Univ. of Kentucky  
rebecca.freeman@uky.edu

Northeastern: ALEXANDER J.  
BARTHOLOMEW  
SUNY–New Paltz  
barthola@newpaltz.edu

Rocky Mountain: LEIF TAPANILA  
Idaho State Univ.  
tapaleif@isu.edu

South-Central: BEN WAGGONER  
Univ. Central Arkansas  
benw@mail.uca.edu

Southeastern: CHRISTY VISAGGI,  
Georgia State Univ.  
cvisaggi@gsu.edu

Cover illustration: Eriksson and von Bitter 89(2):222-235 Fig. 4.3

SEM micrograph of jaw apparatus of *Hindentes parkheadensis* n. sp., from the Eramosa Lagerstätte, Eramosa Formation (Silurian), near Park Head, Ontario.

ISSN 0022-3360

Copyright © 2015 The Paleontological Society. All rights reserved.

## SUBSCRIPTION INFORMATION

*The Journal of Paleontology* [ISSN 0022-3360] is published bimonthly (January, March, May, July, September, and November) by Cambridge University Press for the Paleontological Society. Members of the Paleontological Society automatically receive electronic subscriptions to the *Journal of Paleontology* and *Paleobiology* as a benefit of membership. Institutional subscriptions can be purchased direct from Cambridge University Press or through any major subscription agent. Print-only, online-only and bundled print and online prices are all available, and subscription prices are tiered according to institution type and size.

Please contact Cambridge University Press for further details:

### **For customers in North America**

Email: [subscriptions\\_newyork@cambridge.org](mailto:subscriptions_newyork@cambridge.org);

Phone: (845) 353-7500; Fax: (845) 353-4141

### **For customers outside of North America**

Email: [journals@cambridge.org](mailto:journals@cambridge.org);

Phone: +44 (0)1223-32-6070; Fax: +44 (0)1223-32-5150

**Downloads** of individual articles are available on <http://journals.cambridge.org/JPA>.

**Reprints** of individual articles may be ordered. For information on reprints, please contact Cambridge University Press.

**Archives** of previous issues are available on <http://journals.cambridge.org/JPA>.

**Permissions** All rights reserved. Permissions policies, request forms, and contacts are available at: <http://www.paleosoc.org/content/copyright.html>.

**Reproduction Policy** For complete information, please see: <http://www.paleosoc.org/copyright.htm>.

## ADVERTISING

To advertise in the journal please email [USAdSales@cambridge.org](mailto:USAdSales@cambridge.org) or telephone +1(212) 337-5053 in the USA, Canada, or Mexico; email [ad\\_sales@cambridge.org](mailto:ad_sales@cambridge.org) or telephone +44 (1223) 325083 in the rest of the world.

## ABSTRACTING AND INDEXING

Articles published in the *Journal of Paleontology* are indexed by De Gruyter Saur, EBSCOhost, Elsevier BV, Gale, GeoScienceWorld, MetaPress, National Library of Medicine, Ovid, ProQuest, and Thomson Reuters.

## POSTAL INFORMATION

Periodicals postage rate paid at New York, NY, and at additional mailing offices. POSTMASTER: Send address changes in the USA, Canada, and Mexico to: *Journal of Paleontology*, Cambridge University Press, Journals Fulfillment Department, 100 Brook Hill Drive, West Nyack, NY 10994-2133. Send address changes elsewhere to the *Journal of Paleontology*, Cambridge University Press, Journals Fulfillment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, England.

Copyright© 2015 The Paleontological Society. All rights reserved.

*Printed in the United States of America*

*Lane*

**PALEONTOLOGY**

**SPECIMEN CABINETS**



- \* All steel construction
- \* Powder paint finish
- \* Durable door seal
- \* No adhesives
- \* Reinforced for easy stacking
- \* Sturdy steel trays

**LANE SCIENCE EQUIPMENT CORP.**

225 West 34th Street  
Suite 1412  
New York, NY 10122-1496

Tel: 212-563-0663  
Fax: 212-465-9440  
[www.lanescience.com](http://www.lanescience.com)