

Cambridge Elements

Elements of Paleontology

edited by

Colin D. Sumrall

University of Tennessee

NICHE EVOLUTION AND PHYLOGENETIC COMMUNITY PALEOECOLOGY OF LATE ORDOVICIAN CRINOIDS

Selina R. Cole

*National Museum of Natural History, Smithsonian
Institution and American Museum of Natural History*

David F. Wright

*National Museum of Natural History, Smithsonian
Institution and American Museum of Natural History*



CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre,
New Delhi – 110025, India

103 Penang Road, #05–06/07, Visioncrest Commercial, Singapore 238467

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning, and research at the highest international levels of excellence.

www.cambridge.org

Information on this title: www.cambridge.org/9781108810012

DOI: 10.1017/9781108893459

© Selina R. Cole and David F. Wright 2022

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 2022

A catalogue record for this publication is available from the British Library.

ISBN 978-1-108-81001-2 Paperback

ISSN 2517-780X (online)

ISSN 2517-7796 (print)

Additional resources for this publication at www.cambridge.org/colewright

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

Niche Evolution and Phylogenetic Community Paleoecology of Late Ordovician Crinoids

Elements of Paleontology

DOI: 10.1017/9781108893459
First published online: April 2022

Selina R. Cole

*National Museum of Natural History, Smithsonian Institution and American
Museum of Natural History*

David F. Wright

*National Museum of Natural History, Smithsonian Institution and American
Museum of Natural History*

Author for correspondence: Selina R. Cole, colesr@si.edu

Abstract: Fossil crinoids are exceptionally suited to deep-time studies of community paleoecology and niche partitioning. By merging ecomorphological traits and phylogenetic data, this Element summarizes niche occupation and community paleoecology of crinoids from the Bromide fauna of Oklahoma (Sandbian, Upper Ordovician). Patterns of community structure and niche evolution are evaluated over a ~5-million-year period through comparison with the Brechin Lagerstätte (Katian, Upper Ordovician). Filtration fan density, food size selectivity, and body size are established as major axes defining niche differentiation, and niche occupation is strongly controlled by phylogeny. Ecological strategies were relatively static over the study interval at high taxonomic scales, but niche differentiation and specialization increased in most subclades. Changes in disparity and species richness indicate that the transition between the early-middle Paleozoic Crinoid Evolutionary Faunas was already underway by the Katian due to ecological drivers and was not triggered by the Late Ordovician mass extinction.

Keywords: phylogenetic comparative methods, Crinoidea, disparity, niche differentiation, functional ecology

© Selina R. Cole and David F. Wright 2022

ISBNs: 9781108810012 (PB), 9781108893459 (OC)

ISSNs: 2517-780X (online), 2517-7796 (print)

Contents

1 Introduction	1
2 Characteristics of the Bromide and Brechin Crinoid Faunas	5
3 Methods	9
4 Results	15
5 Discussion	24
6 Conclusions	31
References	33