Cambridge Elements

Elements of Paleontology
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A REVIEW AND EVALUATION OF HOMOLOGY HYPOTHESES IN ECHINODERM PALEOBIOLOGY

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Paleontological Society
CAMBRIDGE UNIVERSITY PRESS

Shaftesbury Road, Cambridge CB2 8EA, 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 Cambridge University Press & Assessment, a department of the University of Cambridge.

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www.cambridge.org
Information on this title: www.cambridge.org/9781009397179

DOI: 10.1017/9781009397155

First published 2023

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

ISBN 978-1-009-39717-9 Paperback
ISSN 2517-780X (online)
ISSN 2517-7796 (print)

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Abstract: The extraxial–axial theory (EAT) and universal elemental homology (UEH) are often portrayed as mutually exclusive hypotheses of homology within pentaradiate Echinodermata. Extraxial–axial theory describes homology upon the echinoderm bauplan, interpreted through early postmetamorphic growth and growth zones, dividing it into axial regions generally associated with elements of the ambulacral system and extraxial regions that are not. Universal elemental homology describes the detailed construction of the axial skeleton, dividing it into homologous plates and plate series based on symmetry, early growth, and function. These hypotheses are not in conflict; the latter is rooted in refinement of the former. Some interpretive differences arise because many of the morphologies described from eleutherozoan development are difficult to reconcile with Paleozoic forms. Conversely, many elements described for Paleozoic taxa by UEH, such as the peristomial border plates, are absent in eleutherozoans. This Element recommends that these two hypotheses be used together to generate a better understanding of homology across Echinodermata.

Keywords: echinoderm, homology, evolution, anatomy, inheritance

ISBNs: 9781009397179 (PB), 9781009397155 (OC)
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