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978-1-009-39717-9 — A Review and Evaluation of Homology Hypotheses

in Echinoderm Paleobiology

Colin D. Sumrall, Sarah L. Sheffield, Jennifer E. Bauer, Jeffrey R. Thompson, Johnny A. Waters

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Cambridge Elements

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edited by

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A REVIEW AND EVALUATION OF HOMOLOGY HYPOTHESES IN ECHINODERM PALEOBIOLOGY

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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

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