

## A RHUDDANIAN (SILURIAN: LOWER LLANDOVERY) ECHINODERM FAUNA FROM HAVERFORDWEST, SOUTHWEST WALES

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Llandovery (Lower Silurian) echinoderm faunas are uncommon, an observation which has important implications for our understanding of the patterns of evolution and extinction over the Ordovician/Silurian boundary interval. For example, only two crinoid faunas of Rhuddanian or Rhuddanian+Aeronian age have so far been described, both from North America (Cataract Group, Ontario; Brassfield Formation, Ohio). A third echinoderm fauna of Rhuddanian age is now recognized from the Gasworks Mudstones (=upper Haverford Mudstone Formation) and, less certainly, the Gasworks Sandstone Formation of Haverfordwest, Dyfed, southwest Wales. Recent fieldwork has failed to relocate the precise horizon that produced this fauna and the taxa discussed herein are all based on specimens in the Turnbull Collection of the Sedgwick Museum, Cambridge. There is no published analysis of this fauna, but Ramsbottom, in his Ph.D. thesis, identified Pisocrinus sp., Macrostylocrinus sp. and Dimerocrinites sp. from this horizon.

A disarticulated thecal plate has been identified as the rhombiferan Homocystites? sp., confirming that the cheirocrinids survived the end Ordovician extinction. This is only the second British Llandovery cystoid. All other specimens are crinoids. Crowns of calceocrinid disparids are assigned to two species of Calceocrinus (= "Pisocrinus sp." of Ramsbottom). A dendrocrinid cladid is interpreted as a smooth-cupped Dendrocrinus? A unique internal mould is a monobathrid, possibly Macrostylocrinus. Distinctive petaloid columnals of Floricultumnus (col.) sp. cf. F. girvanensis Donovan and Clark, possibly derived from a rhodocrinitid diplobathrid, are congeneric with ossicles from the Newlands Formation of southwest Scotland (latest Rhuddanian-earliest Aeronian) and the Brassfield Formation of Ohio ('Bead Bed'). A new species of rhodocrinitid diplobathrid (= "Dimerocrinites sp." of Ramsbottom) has low infrabasals just apparent in lateral view; a moderately bowl-shaped dorsal cup; prominent ray ridges; 2, 3 or 5 plates, respectively, in the first three tiers of interprimibrachials; and uniserial arms that branch isotomously once and heterotomously thereafter. Two further crinoid species are indeterminate. At the familial level, this fauna shows strong similarities with coeval, but more diverse, crinoid assemblages from North America.