

THE NORTH AMERICAN *Holocystites* FAUNA (ECHINODERMATA, BLASTOZOA: DIPLOPORITA): PALEOBIOLOGY AND SYSTEMATICS

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ABSTRACT

The *Holocystites* fauna of central North America includes most known Silurian Diploporita (Echinodermata: Blastozoa). This distinctive diploporite association, widespread in the Wenlockian of Wisconsin, Illinois, Indiana, Kentucky, Ohio, and Tennessee, consists of eight genera in the Aristocystitidae, Sphaeronitidae, and Holocystitidae. Species of *Holocystites* Hall, 1864, and *Triamara* Tillman, 1967, are particularly characteristic. The fauna is best known from the Osgood Member, Salamonie Dolomite (late Llandoveryan-early Wenlockian) of southeastern Indiana. Expanded quarrying operations near Napoleon, Ripley County, Indiana, add materially to knowledge of the *Holocystites* fauna. Thousands of specimens were recovered, including some in life position. Information from this and other localities allows formulation of a paleoecological model for the *Holocystites* fauna, which is tested against previously known distributional information. Most Silurian diploporites were low-level feeders with relatively inefficient subvective systems as compared with co-occurring camerate crinoids. In the Osgood, they required firm attachment sites in comparatively quiet, offshore, dominantly soft-bottomed environments with a moderate rate of continuous terrigenous sedimentation, conditions limited in southeastern Indiana to the Ripley Island positive area. Two major adaptive strategies are recognized: one relatively eurytopic group comprising species with free adults with elongate thecae, narrow bases, and aboral, stem-like processes, and a more stenotopic group of globular, large-based, completely sessile (attached) species. New taxa include a species of *Holocystites* Hall, 1864 (*H. clavus* n. sp.), a new genus (*Paulicystis* n. gen.) related to *Trematocystis* Jaekel, 1899, but with uniquely large ambulacral facets, and a new *Pentacystis*-like genus (*Osgoodicystis* n. gen.). The fauna also has an advanced sphaeronitid (*Finitiporus* n. gen.), the only Silurian sphaeronitid yet known. Both the Sphaeronitidae and Holocystitidae are revised. Subfamilies are established in both (Sphaeronitidae: Sphaeronitinae and Herpetocystinae; Holocystitidae: Holocystitinae, Pentacystinae, and Trematocystinae), based largely on peristome morphology. *Holocystites* is divided into three new subgenera (*Holocystites*, *Megacystites* n. sgen., and *Sepulticystis* n. sgen.) on the basis of pore morphology. Evolutionary trends are noted in the Holocystitidae toward reduction in number of thecal and peristomial plates, enlargement of the subvective system, elevation of the theca. Humatipore morphology becomes more specialized and efficient, but average size decreased. Detailed specific and generic phylogenies are constructed, using both traditional and quantitative phenetic methods. All produced similar results. Osgood diploporite biostratigraphy is revised and a zonal scheme presented. Osgood diploporites are strongly endemic.

¹Deceased 10 April 2008. Because Harrell Strimple was unable to contribute to the present manuscript beyond the first draft (Frest, 1983), any remaining errors of fact or judgement are solely the responsibility of the senior author.

²Deceased 21 August 1983.

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INTRODUCTION

The late Llandoveryan-early Wenlockian Osgood (Osgood Member, Salamonie Dolomite of Pinsak & Shaver, 1964) of Indiana, Kentucky, and Tennessee has long been a focus of paleontological interest because of its extraordinary diploporite fauna. It served as the *exemplar nonpareil* of the *Holocystites* fauna (Paul, 1971), reported from six horizons in the Wenlockian of eastern North America. The *Holocystites* fauna includes all known Silurian Diploporita (Echinodermata, Blastozoa), with the exception of the more cosmopolitan Gomphocystitidae, common to Europe and North America (Bockelie, 1979).