

Eocrinoids and paracrinoids of the Baltic Ordovician basin: a biogeographical aspect

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Eocrinoids are represented by at least 12 genera in the Baltic Ordovician Basin. Representatives of the rhipidocystid-cryptocrinitid lineage of eocrinoids (six genera) were often dominant in Middle Ordovician echinoderm communities. This lineage originated from outside the Baltic Region. Although eocrinoid genera similar to these Baltic taxa are found only in Laurentia, morphological differences between the Baltic and American taxa suggest the presence of a third biogeographical region inhabited by their ancestors that gave rise to parallel lineages of the main rhipidocystid-cryptocrinitid stem in Laurentia and Baltica. It is possible that this province was situated in the South China Region. The phylogenetic and biogeographical roots of the unusual eocrinoid *Bolbaporites* are unknown, but its center of diversification was certainly in the Baltic Region. From here, at the end of the Darriwilian, this genus migrated to North America. Plates of Rhopalocystidae are abundant in the Volkhovian (Dapingian). The Baltic genus originated from Gondwanan rhopalocystids. Three other genera have unusual morphology, uncertain systematic position among eocrinoids and are endemic for the Baltic Region. Their phylogenetic and biogeographic roots are unknown. Eleven genera mostly occurred in the Middle Ordovician and had completely disappeared by the end of the Kukruze. Only one eocrinoid genus (new) is known from the Sandbian. Both paracrinoid genera *Achradocystites* (Keila-Oandu) and *Heckerites* (Keila) are endemic for Baltica. The genus *Heckerites* is somewhat similar to the typical Laurentian amygdalocystitid paracrinoids. The genus *Achradocystites* is significantly different from all other paracrinoids, primarily in the arm morphology. Therefore its phylogenetic roots and biogeographical origin remain uncertain.

The Hirnantian stratigraphy of Portugal, with notes on the Trás-os-Montes and Valongo-Arouca areas

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The Hirnantian succession in Portugal is characterized by the occurrence of widespread glaciomarine diamictites and shallow-water sandstone deposits, which crop out in the Amêndoa-Mação and Buçaco synclines, as well as in the Valongo anticline of the Central-Iberian Zone. Additional outcrops occur to the north in the region of Trás-os-Montes. A generalized stratigraphic succession, from base to top, consists of: a) a basal hiatus of variable extent (from a part of the late Katian to earliest Hirnantian, to a late Darriwilian to early Hirnantian long ?erosional gap); b) basal sandstones and quartzites (Maceiras Fm., Ribeira Cimeira Fm., lower part of the Sobrido Fm., upper part of Ribeira da Laje Fm.); c) massive diamictites (e.g. Guadramil and Casal Carvalhal formations, upper part of the Sobrido Fm.); and d) terminal siltstones (upper part of the Guadramil Fm.) or local quartzite (e.g. Vale da Ursa Fm. and equivalents, transitional with the Silurian). A probable Hirnantia Fauna was reported from basal beds in southern Buçaco. Correlations between the main Central-Iberian sequences of Portugal and Spain reveal a very incomplete record of Hirnantian rocks in comparison to the main glacial cycles in the glaciated areas of African Gondwana. Of significance, true dropstone textures were discovered for the first time in glaciomarine diamictites from northern Portugal (Guadramil Fm.), as well as associated pebbles in varve-like laminated mudstones in the middle part of the Sobrido Formation (Valongo-Arouca inlier).