



New Data on Ordovician Eocrinoids and Paracrinoids of the Baltic Region

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Eocrinoids are widespread in the Ordovician beds of the Baltic Region, often dominating in benthic communities of the Middle Ordovician. They are represented by 12 genera. New records allow the improvement of their morphology, stratigraphic and geographical distribution. *Rhipidocystis* was one of the first to appear in the Baltic basin (Upper Billingen of the eastern Baltic Basin); it reached its acme in the Volkhov and became scarce rare in subsequent strata, although survived up to the Uhaku. In the Azeri or Lasnamyagi, it gave rise to the close related genus *Neorhipidocystis*, which rarely occurs in the Lasnamyagi, Uhaku and Kukruze Regional Stages. New data on the arrangement of pores, morphology variability in the brachiols strongly suggest that *Rhipidocystis* is close to Volkhovian *Paracryptocrinites* and *Cryptocrinites*, which evolved from the last genus in the Azeri. *Bockia*, which occurs in the Azeri, Lasnamyagi, Uhaku and Kukruze, is closely related to *Cryptocrinites* and differs from it in the considerably larger size, greater number of plates, extended apertural part, and branching brachiolas. These five genera belong to the same lineage of closely related Ordovician eocrinoids, which is named the cryptocrinid-rhipidocystid lineage. In North America, a similar eocrinoid lineage developed in parallel. The two lineages probably evolved from a common ancestor, which inhabited eastern Gondwana in the Early Ordovician.

Plates of Rhopalocystidae are abundant in the Volkhovian Regional stage; they show distinctive sutural pores, which are characteristic of the other branch of Ordovician eocrinoids, widespread in the northern marginal area of Gondwana. The thecal fragments, which are scarce in the Baltic Region, allow the reconstruction of only the distal part; however, it is evident that the Baltic genus differs sharply in shape from Gondwanian rhopalocystids.

A unique eocrinoid specimen, with a spherical theca composed of many plates and a column similar in morphology to glyptocystitid rhombiferans, which has been found in the Baltic Basin, represents the third branch of Ordovician eocrinoids.

The reconstruction of *Bolboporites*, which is based on unique specimens with articulated proximal segments of brachiols, shows with confidence that it belongs to eocrinoids.

The Volkhov Regional Stage has yielded two endemic eocrinoid genera, which show certain similarity to crinoids. One of them, *Gadovocrinus*, has a small massive calyx without a column and facet for attachment of arms of different sizes. This is probably an unknown aberrant form of pelmatozoan echinoderm. The second genus, *Simankovocrinus*, is reconstructed based on isolated plates. The structure of its facets for the arms and the position of the gonopore below the lateral anus suggest that it probably belongs to eocrinoids, despite the extraordinary morphology and similarity to crinoids.

In Uhaku of northern Estonia, plates of *Acolocrinus* were recorded. This genus is usually assigned to crinoids. However it may belong to eocrinoids that became similar to crinoids as a result of convergent development.

These eleven genera mostly occurred in the Middle Ordovician and completely disappeared by the end of the Kukruze, when the climate approached tropical conditions.

Later deposits have yielded only one eocrinoid genus, which occur in the bioherm beds of the Keila Regional Stage near Vasalemma (northern Estonia). It has a flat theca of many plates, with an apertural part resembling that of *Mandalocystis*.

New material of Baltic paracrinoids enables a detailed reconstruction of the morphology of two previously known endemic genera, *Achradocystites* (Keila -Oandu) and *Heckerites* (Keila).

Thus, new data on Baltic eocrinoids show that they were widespread in the Middle Ordovician. The most di-

verse cryptocrinid–rhipidocystid branch developed in parallel with the North American branch of similar genera. Rhopalocystidae indicate biogeographical link with the seas of northern Gondwana. The genus *Acolocrinus* indicates that, in the Ural, a link with Laurentia appeared. This is supported by the presence in the Upper Ordovician of Laurentia of the genus *Bolboporites*, which disappeared at that time in the Baltic Region. Other genera are endemic to the Baltic Region. Both paracrinoid genera that rarely occur in the Baltic Region are endemic and differ considerably from abundant and diverse North American paracrinoids.

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