

研究论文

寒武系底部宽川铺生物群中的卵裂胚胎过程：来自化石薄片的证据

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摘要:

陕南寒武纪早期宽川铺生物群中保存的大量磷酸盐化动物胚胎化石为古生物研究开辟了一个新领域。目前已报道了囊胚期之后不同发育阶段的胚胎化石标本, 并且初步建立了从光滑球形胚胎化石 *Olivoooides* 到带有瘤刺的锥体化石 *Punctatus* 的发育序列, 而对卵裂期的胚胎化石却鲜有报道。基于通过醋酸浸泡获得的多枚卵裂期、囊胚期及原肠胚期的三维化石标本, 加上应用岩石切片技术获得的卵裂期胚胎化石的切片标本, 共同见证了从单个卵细胞 (*Olivoooides*) 经卵裂到囊胚、原肠胚的完整胚胎发育序列。新化石材料的发现, 不仅填补了宽川铺生物群中卵裂期胚胎化石的空白, 完善了从单个卵细胞 (*Olivoooides*) 经卵裂到囊胚、原肠胚, 再到孵化的锥形幼体 (*Punctatus*) 的完整胚胎发育序列, 而且通过与贵州瓮安生物群中卵裂期细胞胚胎化石及一些现生的低等动物卵裂期胚胎的对比, 对揭示 *Olivoooides* 胚胎的卵裂过程和特点, 探讨其亲缘关系, 以及后生动物的早期演化提供了新的化石证据。

关键词: 早寒武世 卵裂期 胚胎化石 宽川铺生物群

The Characteristics of Cleavage Embryos in the Early Cambrian Kuanchuanpu Biota based on the Proof of Fossil Slices

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Abstract:

The small shelly fossils appeared along with a large number of phosphatized embryo fossils. These embryos provide a unique window for paleontology, and its information including developmental biology has brought new hope for revealing the secret of Cambrian explosion. As more and more new specimens were recovered, the embryonic developmental sequence of *Olivoooides* as well as the relationship between *Olivoooides* and *Punctatus*, is widely built. However, the developmental stages of these embryos are between embryos of late blastula stage and hatch animals. The intermediate stages (cleavage and blastula stages) are seldom reported. Based on several exceptionally-preserved three-dimensional embryo fossils and the slice of embryo fossils, we suggest a nearly complete developmental sequence being from a fertilized egg to cleavage, blastula and gastrula stage, then toward larvae. In comparison with Weng'an Biota in Guizhou province and their modern equivalents, it is found that the embryos from the Neoproterozoic Doushantuo Formation are similar to our specimens. In this paper, the developmental data facilitate a thorough integration of palaeontology into evolutionary developmental biology on understanding the biological evolution.

Keywords: Early Cambrian Cleavage stage Embryos fossil Kuanchuanpu Biota

收稿日期 2011-09-30 修回日期 2012-01-13 网络版发布日期 2012-03-10

DOI:

基金项目:

中央高校基本科研业务费专项项目“陕南地区早寒武世微骨骼化石研究”(编号: CHD2010JC074); 教育部博士点基金项目“早寒武世宽川铺生物群中 *punctatus* 的胚胎及个体发育模式研究”(编号: 20100205110003); 国家自然科学基金项目“湖北宜昌下寒武统岩家河组宏体化石研究”(编号: 40902007) 资助。

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