

International Geoscience Programme Project 653

The onset of the Great Ordovician Biodiversification Event

Third Annual Meeting

Trekking Across the GOBE

From the Cambrian through the Katian



Athens, Ohio 2018



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Program & Abstracts



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Cover photo: Edenian through Maysvillian Strata (Kope through Bellevue Formations) at the US-68 "Big Maysville Roadcut" visited on the mid-conference field excursion.

Morphological variation of chitinozoans: a case study from the Upper Ordovician Viola Springs Formation, Arbuckle Mountains, Oklahoma, USA

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Chitinozoans are an extinct group of widely occurring, Lower to Middle Paleozoic organic-walled microfossils, commonly interpreted as eggs of unknown marine metazoans. The aim of this study is to analyze morphological variation exhibited by chitinozoans in order to detect any patterns supporting or contradicting the "egg hypothesis". Our study focuses on an exceptionally variable species Gen. et sp. nov. 1, specimens of which are abundant and three-dimensionally preserved in the Upper Ordovician Viola Springs Formation from SE Oklahoma. This species is characterized by a sub-conical to sub-cylindrical chamber with flaring short collar. It is also distinguished by very distinctive ornamentation: simple or multi-rooted spines distributed near the collar, low and multi-rooted longitudinal spines developed in the lower part of the chamber, and much stronger and more complex ones on the basal margin. The vesicle size of this species varies greatly, but the constriction and highly distinctive ornamentation provide solid evidence for presence of single species. Multivariate statistical analysis (PCA) shows also clearly single grouping of all specimens.

Morphological analyses are based on 331 specimens extracted from two samples from the Viola Springs Formation at the Fittstown auxiliary GSSP section. The vesicle length ranges from 93 to 318 μm , with median and mean values around 183 μm . The maximum/constriction diameter ($D_{\text{cons}}/D_{\text{p}}$) ranges from 55 to 120 μm and 40 to 99 μm , respectively. The frequency distribution plots of all parameters show nearly normal distribution, especially the $D_{\text{cons}}/D_{\text{p}}$ ratio. Besides, the constrictions become stronger and the outlines become slenderer with the vesicles becoming larger in general.

Over three-fold variation in length detected in Gen. et sp. nov. 1 is far too large for the intraspecific variation usually observed in case of eggs, for instance, the insect and avian eggs. Moreover, the shape variation of the new species suggests longitudinal growth of vesicles during ontogeny of individuals rather than the variation of eggs. Growth-lines or other supporting evidence for that hypothesis are yet to be found. Considering that some egg-shaped desmochitinids usually show smaller intraspecific variation, our study suggests the egg hypothesis may not be suitable for explaining the nature of all chitinozoans.