

# Zooming in on the GOBE

## 2020 Virtual Annual Meeting of IGCP 653

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Svend Stouge & Niels H. Schovsbo (Eds)

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International Geoscience Programme Project 653:  
The onset of the Great Ordovician Biodiversification Event

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## **Re-explore the biological affinity of chitinozoans: Evidence from morphological variation and exceptional specimens**

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As an extinct group of cryptic organic-walled microfossils, chitinozoans widely distributed in Ordovician to Devonian marine sedimentary rocks, however, with a hitherto debated biological affinity. Since the first description in the 1930s, they have been classified as multiple groups of protists, metazoans or egg capsules of metazoans. A fungi hypothesis, possible polyphyletic origin, vegetative reproduction, and ontogenetic development have also been hypothesized, however, with less general acceptance. Over the last three decades, chitinozoans have almost exclusively been interpreted as eggs of unknown marine metazoans, possibly some wormlike animals. Nevertheless, no further discussions related to their affinity have been advanced.

In our recent study, three-dimensionally preserved specimens of *Hercochitina violana* show a highly variable morphological variation. A compiled size variation dataset of chitinozoan species and a dataset of coefficients of variation (CV) in eggs of extant aquatic metazoan have been carried out. The result shows that the magnitude of the size variation within chitinozoan species is larger than observed in fossil and modern eggs, which indicates, more plausibly, chitinozoans are not eggs. Furthermore, the previously reported abnormal specimens which preserved as “vesicle-in-vesicle” turn out to be the key specimens during the life history of chitinozoans. All of those specimens are distinguished by occupying regularity and repeatability, i.e., a complete vesicle carrying one or several “less-complete” but highly similar one(s) at the base. With more details decoded by the Field Emission Scanning Electron Microscope and X-ray micro-computed tomography, the “less-complete” specimens are verified to be or to have the potential to develop into a complete specimen, which points to a reproduction stage. Herein, chitinozoans should not be eggs, instead, they are an independent group of microorganisms.