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ABSTRACT

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Chitinozoan nomenclature and databases

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In 1930, Alfred Eisenack suggested the term 'chitinozoan' for a microfossil group that he discovered from erratic boulders on the Baltic Sea coast. They are known from the Early Ordovician until the end of the Devonian and have a broad paleogeographic distribution in marine deposits. Even though they are useful biostratigraphy markers, their biological affinity is unknown. Several theories have been proposed through the years, with the most widely accepted to date being that they are the eggs of soft-bodied metazoans. Nevertheless, some studies suggest that chitinozoans are fossils of individual microorganisms (protists) rather than of metazoan origin.

The aim of this contribution is to summarize the advantages of the current chitinozoan classification and analyze the status quo of the current chitinozoan databases in order to make the classification less subjective and data more accessible.

Since the beginning of their study, chitinozoan workers have used a binominal taxonomy describing genera and species based on morphological features. In 1999, Florentin Paris and co-authors introduced a revised suprageneric classification regulated by the International Code of Zoological Nomenclature (ICZN), which proved very efficient and has since been followed by all workers on this group.

According to the ICZN, the concept of 'species' is the only one that refers to an actual population or entity and all higher categories are abstract entities. This means that any feature can be selected to separate the genera and families. In chitinozoans, scanning electron microscope (SEM) images are used to distinguish morphologic features such as the vesicle, aperture, neck, and ornamentation. These main characteristics were used as the basis of classification. The category of 'Order' is not regulated by the ICZN; however, in 1972, Eisenack proposed the useful subdivisions of 'Operculatifera' and 'Prosomatifera' that have been maintained until today. This classification gives stability to the nomenclature, prevents overlap of generic descriptions, and provides a framework for phylogenetic analysis. It was highlighted by the authors of this classification that a computer-assisted system of identification could be developed if a digital taxonomic database were available.

There are several databases with the potential to be useful for chitinozoan taxonomic classification. *ZooBank* is the official registry of the ICZN. It records nomenclatural acts and includes the original descriptions of new scientific names and their publications. For occurrence-based paleontological records, the *Paleobiology Database* and the *Geobiodiversity Database* are extremely useful. Both have an intuitive and simple interface for the user to see the taxa distribution and taxonomic information. These three databases complement each other, but they either have few chitinozoan records or lack complete taxonomic information. There is a desktop taxonomic database *CHITINOVOSP* for chitinozoans, designed by Florentin Paris, which has proven to be useful but needs to be purchased. Achab et al. developed in Canada another chitinozoan database *CHITINOS* that is not currently used. The most complete and useful chitinozoan database at present seems to be *CHITDB*, where browsing and searching for chitinozoan taxa, samples, sections, references, and SEM images is simple. However, it is focused only on material from the Baltic region. Databases such as the *Encyclopedia of Life*, the *Catalogue of Life* and the *World Register of Marine Species* lack chitinozoan records but they are collaborative and provide free global access to knowledge. This collaborative formula seems to be efficient enough to have a trusted digital source of information.

Since at present the taxonomic classification of chitinozoans is no longer under discussion and it has proven to be workable, the following step for chitinozoan researchers would be to have a complete database. We believe that a collaborative effort should be made as there are only a few specialists in the area nowadays. It is not crucial which database should be completed, but it should be useful, as complete as possible, and freely accessible. In particular, we believe that the Baltic *CHITDB* database is an excellent starting platform to achieve that goal in the near future.