Cycladophora davisiana

Microscopic radiolarian species

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A screenshot from the digital radiolaria database radiolaria.org, describing and illustrating C. davisiana *and its characteristic features.*1

Unlike "Bobby", "Knut", and the other charismatic animals and zoological specimens kept in the Museum für Naturkinde Berlin and the Berlin Zoo and featured on this site, *Cycladophora davisiana* doesn't have a proper name, but only a scientific name common to its entire species. This is common for microscopic organisms, whose diminutive size and fast generation times make it effectively impossible for us to perceive them as individuals. Microbes are usually an invisible, indistinct, creeping multitude for us; only with the help of specific arrangements of microscopic media can we tell them apart, and even then we struggle to resolve them beyond the species or the strain. When observed through the microscope, though, *C. davisiana* presents consistent features that allow experts to distinguish this species from similar microorganisms, according to current taxonomic orders. *C. davisiana*, then, isn't an individual, but a generic definition of a species, of a collective. More precisely, it is a species of Radiolaria, a group of unicellular microorganisms that have lived in the world's oceans for more than 500 million years – although this particular species has *only* been around for 13 million years. Radiolarian bodies are supported by siliceous structures resembling shells, called tests: as these withstand the challenges of time as microfossils embedded in sediments, radiolarian and other similar microorganisms like Foraminifera have become important tools for the scientific study of micropaleontological formations. Studying their changes over long geological times, scientists can extrapolate information about the history of our planet and its biogeochemical and climatic transformations.[2]

As a microscopic unicellular organism, *Cycladophora davisiana* is not really an animal: the complex relationships forming microbial worlds remind us that what we usually think of as 'animals' represents in fact only a small fraction of all living organisms animating the planet – and a relatively recent one at that. Besides representing the majority of Earth's biodiversity, microbes also had a formative role in life's evolutionary history, and they continue to be an essential part of our ecosystems. For these reasons, despite not counting as an animal, *Cycladophora* has an important place in the zoological collections of the Museum für Naturkunde Berlin. Despite its negligible size, *C. davisiana* can teach us a lot about nature and how we know it; but also about what it means to collect, preserve, and understand 'animals as objects'. Besides challenging our assumptions on what we mean by animals, the history of this species illustrates the particular *formatting* this microorganism has undergone and continues to undergo in order to become an object of scientific research. *C. davisiana* went from being an invisible part of the ocean floor to a specimen in the Ehrenberg Collection, and from there to a universally applied taxonomic description of a species, which continues to find its way in scientific publications and databases to this day. The databases also link them back to its original specimen in the museum and its history.

Following the scientific (after)lives of this microorganism, this website invites investigation of these transformations, and *Cycladophora*'s current role in shaping how we know the natural world. Beginning with finding Cycladophora in 1859 and the early efforts of classifying Cycladophora in Berlin and beyond, the initial contribution of 19th century natural history was crucial for inscribing this microorganism in the nascent taxonomic orders. They determine how we understand nature to this day. By observing, describing, and organizing *Cycladophora*, and thousands of other organisms, renowned naturalists[3] like Christian Gottfried Ehrenberg and Ernst Haeckel helped consolidate the foundational systematics of modern biology. Once this groundwork was laid, the microorganism could travel far beyond its natural range, as the species' name and classification allowed scientists all over the world to retrace and recognise *C. Davisiana*, and use the species in their own work. Nevertheless, already by the end of the 1880s, scientists seemed to have lost interest in *Cycladophora* and other radiolarians: microorganisms were understood to be primitive forms, relatively stable over long geological times. And aside from their beautiful forms, they didn't seem to hold any particularly interesting information. This led our microorganism to an apparent micropaleontological dead end, at least until the 1950s.

While industrial micropaleontology had already successfully begun using foraminifera microfossils for interpreting geological formation in the search for fossil fuels in the 1920s, radiolarians were still believed to be slowly evolving, and therefore useless for biostratigraphy – the use of animal remains to date geological formations. That is, until 1951, when William Rex Riedel, an Australian micropaleontologist, reinterpreted Haeckel's evidence from the famous oceanographic expedition of the HMS Challenger. His reinterpretation finally showed that the fossil record of radiolarian species like *Cycladophora* could hold a lot of useful and surprising information. But, by then, the Ehrenberg Collection had been forgotten and it was believed that it had been (lost) during the (Second World War). Even if it hadn't been lost, as turned out to be the case, it would have been difficult to access for Riedel behind the Iron Curtain and the (Berlin Wall). Despite the less strong connection with its original specimen, though, *C. davisiana* continued its (scientific (after)life). Scientists found more ways of (using Cycladophora) even as its taxonomic history remained muddy. It was during this period that this radiolarian species rose to scientific fame. The success of (micropaleontology at sea) – especially evident in the international efforts in (deep sea drilling) since the 1960s – resulted in a growing global record of micropaleontological data. This record included *Cycladophora*'s abundances over a long geological period, which were famously used to demonstrate the impact of the Earth's orbital dynamics on ice-age cycles. By telling this and other stories (of microbes and planets), scientists built a complex network of data, sensors, and computer models that continues to ground and inform our understanding of climate and planetary systems.

In the 1990s, thanks to the German reunification, the Ehrenberg Collection was available again to the West, and the Natural History Museum in former East Berlin became once again an important international hub for micropaleontology, bringing this field's early history and its contemporary networks back under the same roof. This is evident, for instance, in the (NSB Database) of the Museum für Naturkunde Berlin, a database that organises the large collections of micropaleontological data gathered by the various (deep sea drilling) programmes since the 1960s. Thanks to this database, *Cycladophora davisiana* and many other microfossil species continue to help scientists triangulate and understand the global and local transformations still shaping our planet today. Formatted as data in complex and distributed sets, *Cycladophora* is once again not just an individual. Furthermore, it often isn't even just *one* object, since the relational character of datasets is what makes them particularly useful to scientists. As *Cycladophora davisiana* moves between scientific collections, classifications, and databases, it emerges together with other objects, entities, organisms, and questions; under changing orders, its scientific name brings together a multiplicity of objects – pushing the question of 'Animals as objects?' away from a clear answer.

Footnotes

1. "*Cycladophora davisiana* Ehrenberg, 1862". *Radiolaria.org*, no date, https://www.radiolaria.org/species.htm?division=13&sp_id=1 (03.01.2022).↩
2. Alexander Matul. "The Recent and Quaternary Distribution of the Radiolarian Species *Cycladophora davisiana*: A Biostratigraphic and Paleoceanographic Tool". *Oceanology* 51 (2011): 335-346. https://doi.org/10.1134/S0001437011020111.↩
3. The German translation uses the masculine term here, because it refers to two men. However, there were some renowned women naturalists in the 19th century as well. For more about women naturalists in Europe, see Barbara Mohr. "Women Popularizers and their Audience from the 18th to the 21st Century in Central Europe". *History of Science Conference*. Prague, 2015. https://doi.org/10.13140/RG.2.1.1843.6087. For an overview of women naturalists and their roles at German museums 1830-1950, see Barbara Mohr. "Clara Ehrenberg: Werk und Bedeutung". *Ehrenberg-Tag Conference*. Berlin, 2015. https://doi.org/10.13140/RG.2.1.1319.3208.↩