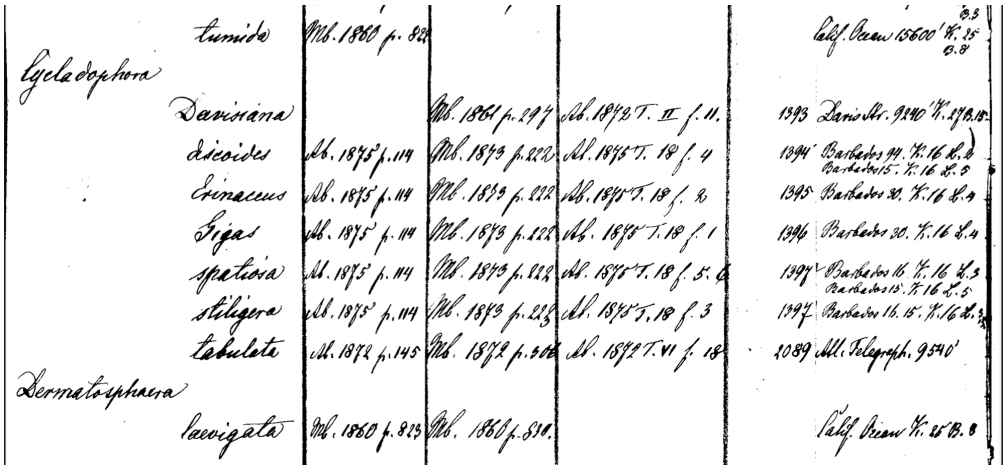
Classifying Cycladophora

Taxonomy beyond animals



Clara Ehrenberg's index, 1860s. Source: Museum für Naturkunde Berlin, http://download.naturkundemuseum-berlin.de/Ehrenberg/

- Article type: story
- Author: Filippo Bertoni
- Text license: CC BY-SA
- DOI: 10.7479/64y2-m311/1

In the 1850s, Christian Gottfried Ehrenberg[1] was a respected naturalist and one of the leading experts on what was then called (Infusoria) – what we now call microorganisms. Thanks to his fame and connections, he had established a global network and corresponded with the most celebrated naturalists of the time, who sent him specimens from around the world for his microscopical analyses and studies. And so, he was not unprepared when he received eight bottles with (deep sea sediment samples) from Taliaferro Schaffner's survey at the Zoological Collections of the Friedrich-Wilhelms-Universität zu Berlin where he worked. Ehrenberg proceeded to wash, filter, and observe the samples under his trusted microscope. In this way he identified and classified several different microfossils that he found in the samples. *Cycladophora davisiana* was among them: a microscopic siliceous shell, which was all that remained of a long dead microorganism. As he did with all his samples, he mounted the microfossils on microscope slides made of mica (analogous to contemporary glass slides), and covered them with Canada balsam, a viscous resin which remains transparent but solidifies with time – still used today as (microscopic media) to preserve and prepare slides and specimens, and access them later on.[2]

After sharing his results with Schaffner, Ehrenberg proceeded to present them in front of the Royal Prussian Academy of Sciences in 1861. The following year, the results were published in the *Monatsberichte der Königlichen Preussischen Akademie der Wissenschaften zu Berlin* – to this day, this remains the reference description of *C. davisiana*. While Ehrenberg's description still has priority according to current [taxonomic orders], his classification rapidly encountered

significant criticism, in step with the changing understanding of microorganisms emerging in those times. The same year the description of *Cycladophora* was published, another young German naturalist, Ernst Haeckel, turned his dissertation into a successful and elegant monograph on (Radiolaria). Due to Haeckel's stunning illustrations and detailed descriptions, this volume, and its reclassification of these microorganisms along with the principles of Charles Darwin's evolutionary theory, quickly turned its author into one of the leading authorities on the subject of radiolaria. As it propelled Haeckel's success as a fervent supporter and populariser of Darwin, the volume also continued and consolidated an aesthetic tradition in the visualisation of natural history, extending it to the wonders of [microbial worlds].[3]

Unlike Ehrenberg, who believed infusoria to be complete animals, with complex internal organs just like larger animals, Haeckel considered them unicellular ancestors of more complex life forms. This understanding was built on the cell theory that was emerging at the time in Germany, which Ehrenberg openly opposed. But, while Haeckel tried to arrange radiolarians (including *C. davisiana*) into a natural system that represented their own evolutionary history, he became convinced that their evolutionary changes were *slow*. Haeckel came to think that radiolarian species had long ranges and had remained mostly the same over the planet's geological history. This belief was confirmed in Haeckel's detailed report on the radiolaria of the HMS Challenger. Doing so, Haeckel inadvertently almost consigned radiolaria to what seemed to be (micropaleontological evolutionary dead ends), as naturalists focused on other species which were considered more interesting and useful. *Cycladophora davisiana* became invisible again, as the specimens of the Ehrenberg Collection faded out, and were almost forgotten. At least until other ways of (using Cycladophora) brought them back to light almost a century later.[4]

Footnotes

1. There are several biographies of Ehrenberg. For a good overview, see David M. Williams and Robert Huxley. *Christian Gottfried Ehrenberg (1795-1876): The Man and His Legacy*. London: Acad. Press, 1998. The introduction is available here: https://ca1-tls.edcdn.com/Special-Issue-1-Christian-Gottfried-Ehrenberg-1795-1876-The-Man-and-His-Legacy-Small.pdf?mtime=20160715141137 (03.01.2022). For a biography in German, see Johannes v. Hanstein. "Ehrenberg, Christian Gottfried". In *Allgemeine Deutsche Biographie 5* [Online-Version], 1877: 701-711. https://www.deutsche-biographie.de/pnd118529250.html#adbcontent (03.01.2022).↩
2. And the preparation was successful, since that original specimen of *C. davisiana*, alongside many others, is still preserved in mica slides covered in Canada balsam in the Ehrenberg Collection of the Museum für Naturkunde Berlin.↩
3. The aesthetic value of Haeckel's illustrations, which is attested in his 1904 book *Kunstformen der Natur*, continued the tradition begun by Goethe in bringing the understanding of nature and its aesthetics together. See also Robert J. Richards. *The Tragic Sense of Life: Ernst Haeckel and the Struggle over Evolutionary Thought*. Chicago and London: University of Chicago Press, 2009.↩
4. On the history of this collection and its curation, see David Lazarus. "The Ehrenberg Collection and its Curation". In *Christian Gottfried Ehrenberg (1795-1876): The Man and His Legacy*, D.M. Williams and R. Huxley (eds.). London: Acad. Press, 1998: 31-48. On the impact of this early phase of micropaleontological taxonomy, see David Lazarus. "The Legacy of Early Radiolarian Taxonomists, with a Focus on the Species Published by Early German Workers". *Journal of Micropalaeontology* 33 (2014): 3-19.↩