How to become an unforgettable taxonomist: Christian Gottfried Ehrenberg (1795-1876) reevaluated

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Why is C. G. Ehrenberg still remembered by so many taxonomists even today? This brief attempt at answering the question is based on a lecture held at the 14th annual meeting of the German Society of Protozoologists in Delitzsch (Germany), Ehrenberg's birthplace, in celebration of his 200th birthday. Other aspects of his life and scientific career are treated in Bolling (1976), Zölffel & Hausmann (1990), and in the contributions by Corliss and Hausmann (this volume).

Ehrenberg's life and work are a stimulating example of the rewards of diligence, conscientiousness, integrity and, to a certain extent, seclusion. While many of his contemporaries wasted their time on bickering and pretty intrigues, Ehrenberg worked, and it is his name that has lived on, the others are forgotten.

Ehrenberg published hundreds of original papers and three giant monographs during his long and busy life. The „Symbolae physicae" (1828), an unfinished édition deluxe comprising several volumes, summarize the results of his two collecting expeditions to North Africa and the Near East, two regions which were still poorly explored at the time. These books contain, inter alia, descriptions and beautiful coloured figures of new and rare invertebrates and vertebrates. In his second monograph, „Die Infusionsthierchen als vollkommene Organismen", Ehrenberg (1838) summarized his studies on the „animalcula infusoria". This voluminous, and in every sense of the word, huge (19 x 13 inches!) monograph, well known to all protistan taxonomists, contains 64 hand-coloured copperplates showing 553 infusorians and 170 rotators. Ehrenberg's (1854) third, final and equally monumental monograph was on microfossils collected worldwide and is based on 40.000 (!) slides, which are still maintained today. It includes 41 copperplates with 4000 figures, and is well known especially among paleontologists and diatom scientists.

There are, I believe, four reasons why Ehrenberg, the taxonomist, has become unforgettable:

1) Ehrenberg was one of the first professional protistologists with a firm and reputable academic position. There was, in fact, only one comparable precedessor, viz. O. F. MÜLLER (1786). Both profited from the unique opportunity to discover the still almost unknown microscopic world, including even very common genera like the diatoms *Amphora* and *Cocconeis* and the ciliates *Carchesium* and *Nassula*, simply because they were the first who studied these „animalcules" more carefully and from a scientific point of view. As far as I know, nobody has ever tried to count the number of new species and genera Ehrenberg described. They certainly number several thousand, encompassing practically all protists, like green algae, diatoms, ciliates, and flagellates. As an example, about 15 % (~ 120) of the diatom genera known were discovered by Ehrenberg (ROUND et al. 1990).

2) Ehrenberg was a master at making accurate drawings showing only the things he actually saw, which is much more difficult than most people think! Furthermore, he had an artistic hand and usually illustrated each species with a multitude of lively figures, often making species recognizable simply by comparing the microscope view with his figures, much as in the monographs by F. Stein and A. Kahl, two of Ehrenberg's famous successors. A typical example is *Aspidisca turrita* (Figs. 1-3).

3) Ehrenberg was not only an excellent observer but also a giant of a monographer. He assessed and reviewed the literature published between 1700 and 1850 so carefully that later workers often used his monographs as the actual point of original reference. Indeed, Ehrenberg introduced a quality of revisions rarely found in the earlier, later, or even modern protozoological literature! Unfortunately, protozoologists today rarely produce revisions whose quality is comparable to the standard generally found, e. g. among botanists. Some obviously do not even know the simplest nomenclatural procedures and have little understand of how new species are to be properly described. It might therefore be useful to show how Ehrenberg went about it well over a century ago. First, the literature and synonymies are not merely mentioned but also carefully discussed. Second, the literature used for each species is clearly listed at the head of the description. Third, citation of literature is extremely accurate; I have rarely found a mistake! Anybody who has ever put together a voluminous list of references knows how difficult a task this is. Fourth, each species is characterized by a short, clear diagnosis. Unfortunately, this is still far from common in modern protozoological literature, where diagnosis (if any!) and description are frequently intermingled. Fifth, most of Ehrenberg's descriptions are characterized by his sincerity and integrity

based on profound and conscientious research both in the field and in the literature. Ehrenberg was neither a „splitter" nor a „lumper", nor did he „overlook" earlier descriptions or found new species on poor, old descriptions. Unfortunately, the same cannot always be said for previous, later, and even contemporary taxonomists. There are colleagues who will take 10 poorly described species from the literature and blithely make 10 new genera from them. Such practices certainly have contributed to the great loss of reputation of taxonomy over the past hundred years.

4) Having stated three steps along Ehrenberg's road to becoming an unforgettable taxonomist, let it be said that the fourth is not only inherent in all three, but probably the *prima causa:* diligence. Ehrenberg must have been an extremely busy worker, even considering his longevity, to prepare over 5000 figures and an almost equal number of text pages!

Ehrenberg, who was dean of the Berlin University several times, knew the significance of diligence to science. In one of his inaugural addresses he called upon the students to „fight the difficulties courageously, from wherever they may come, create talent by diligence, because talent springs from diligence. Where diligence and independent thinking are combined, there is hope that genius will conjoin to impart the true blessing!"

This encouraging view, expressing my own feelings, would seem to be an appropriate point on which to close these brief deliberations on the work of C. G. Ehrenberg, a great scientist and lover of the microscopic world.

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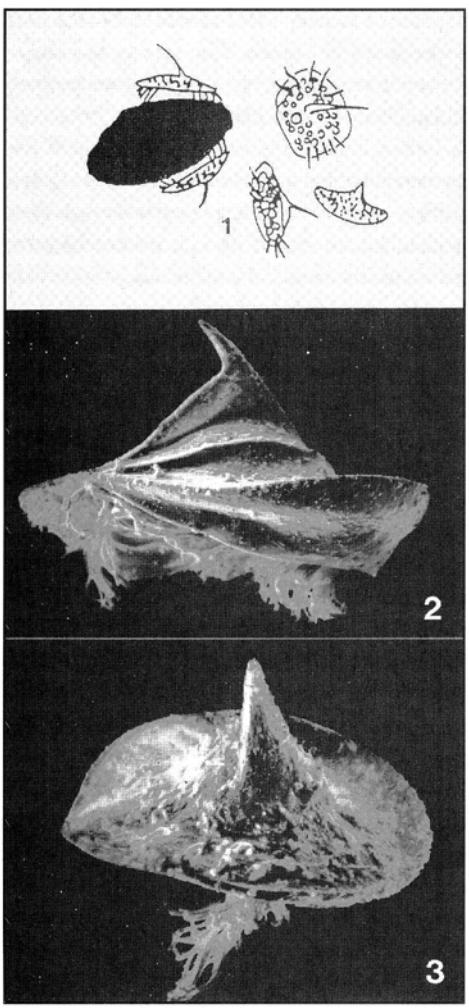

Fig. 1-3: *Aspidisca turrita* (EHRENBERG, 1831). 1: Original drawing from EHRENBERG (1838). This „Life-view" shows not only the typical dorsal thorn, but also the characteristic climbing on detritus particles. – 2, 3: New scanning electronmicroscopic pictures from *A. turrita* (from FOISSNER 1994) showing how striking Ehrenberg draw this species which is only 50 µm long.