

Darwin's Fishes: the writing of a lost book

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Charles Darwin, (1809-1882), as we all know, wrote numerous books on particular groups of organisms: barnacles, orchids, earthworms – but never on fishes. Hence the subtitle of this brief account, which describes how I have assembled a book, titled “Darwin's Fishes: An Encyclopedia of Ichthyology, Ecology and Evolution” out of scattered quotes ‘lost’ in the many works of Darwin. The book covers two areas dear to the staff and friends of the Charles Darwin Research Station, (i.e., Darwin and fishes, of course), and hence the decision to ‘launch’ it during the conference documented in this report. The conference provided an excellent forum for presenting the near-complete draft, and to receive feedback from the participants, notably from the scientist of the CDRS.

“Darwin's Fishes” documents everything ever written by Charles Darwin on fishes and closely related groups. This is done in form of entries that are arranged alphabetically and structured around taxa, e.g., ‘parrotfishes’ (see below), scientists, e.g., ‘Weber’ (he of the ossicles), or concepts, e.g., ‘sexual selection,’ in this case one coined by Darwin, and illustrated with many fish examples.

Entries were extracted from Darwin's books, his short publications, his notebooks (Barret et al. 1987), and that part of his complete correspondence now published (Vol. 1-12, 1821-1864; see Burkardt et al. 1985). An appendix by Jacqueline McGlade presents Darwin's list of “Fishes in Spirits of Wine,” so far unpublished, while two other appendices present Darwin's fishes the Natural History (London) and Zoology (Cambridge University) museums. The text extracted from Darwin's works (in italics) was matched against his sources, and then complemented by entries, which provide a modern context for the ideas discussed by Darwin. Most of the resulting alphabetic entries thus consist of three layers:

- A Darwin quote (with exact source);
- Exact identification and verification of Darwin's source(s);
- Comments on the Darwin quote, based on contemporary knowledge of the issue the quote dealt with.

Another form of layering results from Darwin writing on the same topics in different form, i.e., as:

- Private jottings, e.g., in annotations to his books (Di Gregorio and Gill 1990) and in his notebooks (Barrett et al. 1987);
- Personal correspondence (7,000 letters, mostly to scientific friends and collaborators, cited below as ‘Corresp.’; and
- Public statements (in nearly 200 short papers [Barret 1977], and 29 books [the exact numbers depends on how you count], a few cited below with their titles in italics [Barret and Freeman 1989]).

Overall, quotes comprising about 45,000 words were extracted, contributing over one third of this book. Given the extent of Darwin's writing (well over six million words), this indicates a limited interest in fishes. However, the sample of 0.7 % of Darwin's lifetime written output analyzed here allows the drawing of a number of inferences, some quantitative, that are missed in many

conventional biographies. Examples are the high accuracy of Darwin's citations of his sources (documented in great detail in my book), his mining for and systematic re-publication of information relevant to Natural selection, and the high success rate of his many hypotheses.

I defined 'Darwin's Fishes' as:

1. Species which he collected as specimens during the voyage of H.M.S. *Beagle* (1831-1836);
2. Species he wrote about informally, e.g., in his correspondence, or formally, e.g., in books such as 'Descent of Man' or 'Variations of Species', or in his Journal (of the *Beagle* voyage); and
3. Species named after Darwin, e.g., *Semicossyphus darwini* (which also happens to be a species he sampled in the Galápagos).

Here is an example of a 'fishy' quote by Darwin, pertaining to parrotfishes in Cocos (Keeling) Islands during the voyage of the *Beagle*, and how I followed up on it:

"[T]here are here two species of fish, of the genus Sparus, which exclusively feed on coral. Both are coloured of a splendid bluish-green, one living invariably in the lagoon, and the other amongst the outer breakers. Mr Liesk assured us that he had repeatedly seen whole shoals grazing with their strong bony jaws on the tops of the coral branches. I opened the intestines of several, and found them distended with a yellowish calcareous matter. These fish, together with the lithophagous shells and nereidous animals, which perforate every block of dead coral, must be very efficient agents in producing the finest kind of mud, and this, when derived from such materials, appears to be the same with chalk." (Journal, April 6, 1836).

In a paper presented before the Geological Society of London on Nov. 1, 1837, Darwin had suggested that,

"In recent coral formations, the quantity of stone converted into the most impalpable mud, by the excavations of boring shells and of nereidous animals, is very great. Numerous large fishes (of the genus Sparus) likewise subsist by browsing on the living branches of coral. [...A] large portion of the chalk of Europe was produced from coral, by the digestive action of marine animals, in the same manner as mould has been prepared by the earthworm on disintegrated rock." (see Barrett, 1977, Vol. I, p. 53, Note 4).

This was neatly rephrased by Elizabeth Wedgwood as

"your hypothesis of chalk being made by fishes — if fish made Chalk Hill I don't see why worms may not make a meadow" (Corresp., Nov. 10, 1837).

However, William Buckland, in his referee's report to the Geological Society of London, to which Darwin's paper had been submitted for publication, recommended

"that the Author be advised to withdraw the passage relating to the origin of Chalk - as introducing very disputable matter into a paper that is otherwise unexceptionable" (Corresp., March 9, 1838).

Though he saw Buckland as *"a vulgar and almost coarse man"* (Autobiography, p. 102), Darwin had no option but to drop this hypothesis from the published version of his talk (Darwin 1840). It was a good idea, as the mighty layer of chalk sediments of the Cretaceous (135 to 70 millions year ago) consists almost exclusively of foraminiferans shells. However, Darwin left this bit in the first (though not the second) edition of the Journal (April 6, 1836).

The other error to be noted here is that the fish in question should be parrotfishes (*Scarus*), not porgies (*Sparus*), an error also popping up elsewhere.

... And so it goes, for hundreds of quotes. You have to like fishes, or be interested in Darwin (preferably both) to find this exciting. But it was fun tracking all this stuff down, and writing it up.

References:

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