BOOK REVIEWS

Embryology in Darwinism

The Meaning of Evolution. The Morphological Construction and Ideological Reconstruction of Darwin's Theory. ROBERT J. RICHARDS. University of Chicago Press, Chicago, IL, 1992. xvi, 205 pp., illus. $19.95. Science and Its Conceptual Foundations.

Starting out to write a brief essay on the etymology of the term "evolution," Richards has expanded his study into this more comprehensive exploration of the connection between the usage of this term in the now well-known Darwinian sense and its meaning in embryology in the pre-Darwinian period. The work is a straightforward effort to get clear about Darwin's utilization of the embryological thinking of his time for the formulation of his novel transformist theory. Rather than the anti-progressionist, anti-teleological, anti-recapitulationist of the neo-selectionist tradition, Richards's Darwin is a theoretical morphologist of the 1830s and '40s—familiar with all the models, analogies, and assumptions that were in some important respects the common property of Owen, Serres, Meckel, Chambers, Carpenter, and Agassiz. The Darwin who emerges from the Notebooks, the drafts of the *Origin*, and the newly published volumes of the *Correspondence* was schooled in the writings of Robert Grant, Erasmus Darwin, Lamarck, Louis Agassiz, Martin Barry, the French transformists, and Richard Owen. Despite Darwin's differences with them, one is not left with any one uncertainty about their presence in the background of many of his most important discussions.

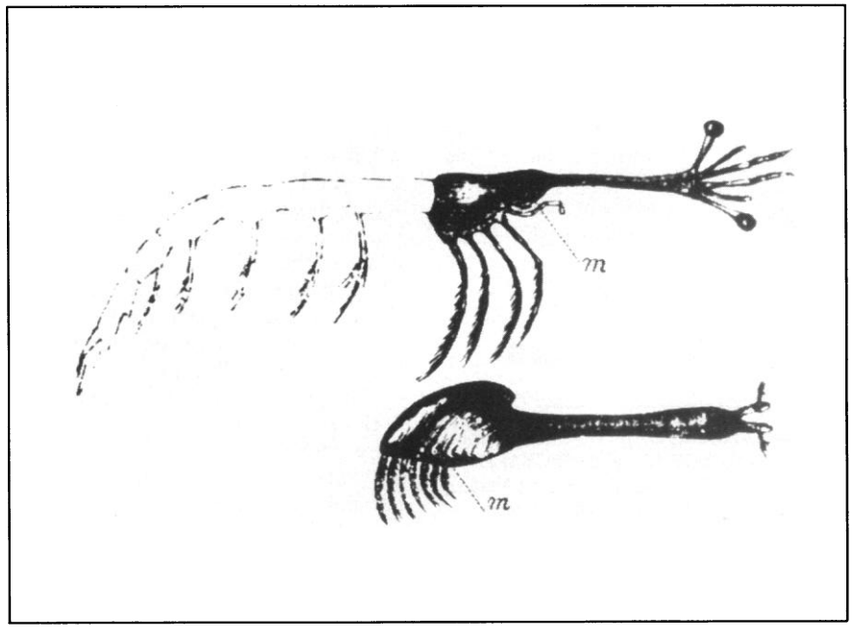
The argument is developed in six brief chapters. After an opening apologia for writing the history of ideas, there are useful chapters on the relation of recapitulation theory to so-called transcendental morphology and on the development of analogies between individual change and species change in the early transformist theories; an analysis of Darwin's embryological theory of progressive change; and a final, somewhat polemical chapter on the "ideology" of standard neo-Darwinian historiography. Generally these are brief and summary chapters. One wishes for more in each of them. But I found them deft, well documented, and very useful as overviews. They are exactly the kind of discussions needed for introducing students to these issues. The book is also nicely illustrated with clear plates of the main actors, many of them (such as Lorenz Oken) difficult to find elsewhere.

For more detailed comment I will concentrate on the chapters on theories of species change and Darwin's theory of progressive evolution. In the first of these Richards has treated a set of theoretical morphologists who are all drawing analogies between "individual" and "species" development—Etienne Serres, Robert Grant,
J. F. Meckel, Joseph Henry Green, and Charles Lyell. Darwin is nicely situated within this context, with analysis of his early notebook discussions. Here Richards's brevity perhaps gets a bit in the way of his ability to convince. For example, the ever-enigmatic significance of Darwin's discovery of Malthus in 1838 seems still to be missed. Drawing on Malthus enabled Darwin to turn attention away from the internal, vital causes of change and to concentrate on the external factors limiting populations. In my view, this shifted the grounds of the "embryological" analogies of the early notebooks more significantly than Richards seems to allow.

The most useful aspect of the treatment of Darwin's views on progression is its discussion of the impact of several issues emerging in the 1840s, especially Agassiz's work on hetero- and homocercal fish tail formation, Owen's archetype theory, and the embryological inquiries into the barnacles. These discussions, drawing upon the new evidence from the *Correspondence*, display Darwin's continued attention to the embryological issues.

In spite of the wide agreement I find with all of this, the more polemical point of the book requires comment. It is surely not accidental that Richards has chosen to reuse for this book the title of a neo-selectionist classic that many of us cut our evolutionary teeth on in the 1950s—George Gaylord Simpson's *The Meaning of Evolution: A Study of the History of Life and of Its Significance for Man*. Richards's book is more broadly an attack upon the historiography adopted by champions of neo-selectionist evolutionary theory—especially Stephen J. Gould and Peter Bowler—and behind them Simpson and Ernst Mayr, whose histories have inevitably trotted out a cast of characters—Haeckel, Owen, Lamarck, Chambers, Oken, Schindewolf—infected in some way with the diseases of essentialism, teleology, Platonism, recapitulationism, "non-populational" thinking, and a host of other *peccata*.

I would suggest, however, that the his-



"Illustration of the homologies between a Stomapod [*sic*] crustacean (with posterior only sketched) and a Lepas barnacle larva (*m* indicates a mouth), from Charles Darwin, *A Monograph of the Sub-Class Cirripedia: The Lepadidae* (1851)." [From *The Meaning of Evolution*]

toriographic issue is not quite so clear-cut as Richards makes it. Those who see Darwin as an advocate of non-progressivist and anti-teleological thought can indeed cite passages, and even the general drift of his later treatises, in support of such a reading. But I believe Darwin must be read in a more historically layered way than either Richards or the neo-selectionists present. The traces of the early notebook reflections are present alongside additional developments in the drafts of 1842 and 1844. The long manuscript of 1854–56, unfortunately missing the drafts of the embryological and morphological sections of the published *Origin*, is representative of another layer of development. The changes between editions of the *Origin* represent more than textual revisions. They display the complex interplay of different stages of Darwin's thought over a 40-year period of reflection on several questions, particularly those having to do with embryology and generation. There is no difficulty citing direct textual support, at least from the later editions of the *Origin* and his subsequent writings, for the claim that Darwin held non-directional and non-recapitulationist positions. Richards's claim that "recapitulationism [was] a central part of the more general doctrine [of species change] he would defend" (p. 91) is accurate with respect to the genesis of the theory. But it does not represent, to my reading, its most mature public presentations. Without attention to this historical complexity in Darwin's work, the Gould-Bowler historiography becomes a little too easily a straw man.

But these are quibbles. This is, within its scope, a splendid and long-overdue book. I will put my words into action by immediately ordering copies for my next graduate seminar, and I recommend that others do likewise.

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Vignettes: Images of Science

Science. *Science.* SCIENCE. What a wonderful, powerful-sounding word! It instantly induces an atmosphere of pure rationality. It rings loudly a symphony of universal knowledge and understanding. It forcefully projects an aura of all-encompassing order and of control.

—*Joe Rosen*, in *The Capricious Cosmos* (Macmillan)

One of the most pervasive myths of science is the idea that "nothing is known for sure." This adage projects a disarming modesty. Even scientists have been known to fall into the arms of this myth in order to avoid the appearance of dogmatism and arrogance.

—*Milton A. Rothman*, in *The Science Gap: Dispelling the Myths and Understanding the Reality of Science* (Prometheus Books)

In terms of quantity and in terms of analytic inference, it seems to me that science and sports are very much parallel at the level of public concern. A lot of complexity, a lot of tactics, a lot of numbers, and a lot of perhaps poorly understood probabilistic judgments are present.

—*Philip Morrison*, in *When Science Meets the Public* (Bruce V. Lewenstein, Ed.; AAAS)

Ecological Linkages

Nature Conservation 2. The Role of Corridors. DENIS A. SAUNDERS and RICHARD J. HOBBS, Eds. Surrey Beatty, Chipping Norton, NSW, Australia, 1991. xiv, 442 pp., illus., + plates. $A80. From a conference, Western Australia, 1989.

Wildlife corridors have been widely touted as the cure for the ills resulting from habitat fragmentation: extinction of small, isolated populations, deterioration of genetic variability, and inbreeding depression. This book, the proceedings of a conference held in Western Australia, is to my knowledge the first attempt to present in a single volume theory, modeling, empirical results, and management recommendations for wildlife corridors.

The landscape of Western Australia is particularly suited for corridor studies. A far-sighted proclamation in the 1960s resulted in the preservation of wide roadway rights-of-way in a rapidly developing agricultural landscape. Although the initial purpose of the legislation was to preserve wildflowers, today these verges link up remnant patches of habitat and reserves in this highly modified landscape. Approximately one-fourth of the chapters in the book address the Western Australia system. There has been some excellent work done there, represented particularly by the chapters on birds by Lynch and Saunders and by Saunders and de Rebeira.

The publication of this book is extremely timely, as an increasing share of management resources are being directed toward designing, acquiring, and assessing wildlife corridors. By virtue of the book's priority it will certainly be useful. However, this priority also results in the book's main limitation. As yet very few empirical studies on the subject have been completed. Only five of the 38 chapters report on new field research on use of corridors by animals.

The real importance of the book for the wider audience lies in defining the corridor problem and the synthesis of the existing literature. Two modeling studies point out that corridor assessment is really a metapopulation problem. The criterion of a successful corridor is not whether animals occur in the corridor but whether the corridor maintains or enhances overall metapopulation viability of the target species. Chapters by Soulé and Gilpin and by Merriam demonstrate that poorly functioning corridors, those with high mortality rates, can actually decrease metapopulation viability as compared to unlinked fragments. However, as is demonstrated by Nicholls and Margules, in practice the viability of linked populations as compared to isolates is very difficult to determine. Other interesting points that arise out of the chapters on corridor value are the distinction between movement corridors and corridors that serve as habitat.

One shortcoming of the book and probably of corridor research in general at this time is the lack of studies at the level of individual behavior. Corridors need to be designed and assessed in the context of the behavior of the target species. Studies are needed to determine what type of landscape features attract and conduct individual animals through the landscape most efficiently. With the exception of radio-tracking studies on rodents and koalas described in the chapters by Merriam and Prevett, this approach has not been used. The book also fails adequately to identify and address the