nineteenth-century astronomy and will surely be of great value to historians and perhaps to nonspecialist readers as well.

James Lattis, *University of Wisconsin–Madison*

Robert J. Richards. *The Tragic Sense of Life: Ernst Haeckel and the Struggle over Evolutionary Thought*. Chicago: University of Chicago Press, 2008. Pp. xx+551. $39.00 (cloth), $25.00 (paper).

Certain people hardly need any introduction at all. According to Robert J. Richards, this is not the case for the German champion of evolution Ernst Haeckel. It is not because we do not know of Haeckel; quite the opposite, in fact. It is because most of our standard knowledge about him is filtered through more than a century of Haeckel bashing by his many adversaries, leaving us with a distorted image of an atheistic, fraudulent, science-popularizing loudmouth caught in a web of poor science, contradictions, and Romantic metaphysics. Richards wants to set the record straight: Haeckel does indeed need an introduction, a proper one, and here it is.

The Tragic Sense of Life: Ernst Haeckel and the Struggle over Evolutionary Thought is a comprehensive and incredibly rich account of Haeckel's personal and scientific life. But it is so much more than a biography. It is a detailed study of the people, institutions, and debates shaping evolutionary thought in the nineteenth century. And it is a powerful antidote to the Anglocentric standard narrative of the origins of evolutionary science with Charles Darwin as the grand old man. Darwin has his place in this story. He had a profound influence on the young Haeckel. But he was just one among others and was, as Darwin himself pointed out, building on the work, findings, observations, results, and ideas of many others. *The Tragic Sense of Life* serves as an important reminder of that and provides a fascinating account of how the world of evolutionary science and related disciplines looked from Germany in the nineteenth century. Through Haeckel, Richards presents the complex eighteenth- and nineteenth-century continental European context for studying and discussing the development of life, which is crucial for understanding what evolution meant; how widespread a deep knowledge of central concepts, ideas, and practices independently of Darwin's work were; and the background for the fierce debates in Haeckel's tailwind. Interestingly, it also puts Darwin and Huxley, as some of the most

prominent British proponents of evolutionary thought, in a different light. Seeing them through the nineteenth-century German context brings a refreshing perspective on many well-known discussions and episodes in the British story of the origins and discussion of evolutionary ideas.

The evolutionary world did not evolve around Darwin's Down House, nor did it evolve around Jena, the center of Haeckel's scientific career. But it was widely acknowledged that Haeckel, through his many publications, lectures, students, and active public life, was instrumental in making evolutionary theory known in wider circles and reaching more people than Darwin's own writings. His *Natürliche Schöpfungsgeschichte* (Natural history of creation), first published in 1868, went through 12 editions in his own lifetime and proved to be one of the most successful works of popular science in the nineteenth and early twentieth centuries. *Die Welträthsel* (The world puzzles), published in 1899, enjoyed a similar popularity, with sales figures around 40,000 within the first year of publication and 400,000 before the outbreak of the First World War in 1914. By 1903, Haeckel had received more than 3,000 letters about the book from readers who loved it and readers who certainly did not. Haeckel had provided an extraordinary success and a delicious scandal to the reading public. There was much to react against. The *New York Times* observed in 1901 that the chief objective seemed to be "to prove that the immortality of the human soul and the existence of a Creator, designer, and ruler of the universe are simply impossible" (cited on 399). Tracing discussions and themes through an extraordinary array of different sources spanning from archival material, printed books, articles, and pamphlets to illustrations, photographs, and newspaper articles, Richards documents and backs up his story with so much evidence that it is difficult not to be persuaded by some of his sweeping general claims. When you read at the beginning of the book that it was Haeckel's formulations that created the texture of modern evolutionary theory as a cultural product, you see what Richards means by the end of it. Haeckel was instrumental in promoting the militant rhetoric regarding questions of evolution—and, in particular, human origins—that for better and worse is still central to public debates about evolution.

It is also here that we should find the key to Haeckel's bad reputation, according to Richards. Haeckel was successful and productive, which made him generate many enthusiastic followers and equally many enthusiastic adversaries. Curiously, the group of anti-Haeckelites was and still is rather heterogeneous. Not surprisingly, various religious groups reacted against Haeckel's open attack against organized religion, in particular the Catholic Church. But several of his contemporary colleagues chimed in, which, in combination with some highly

influential early twentieth-century historical accounts of nineteenth-century biology, produced a negative image of Haeckel as a person who was never quite able to shed the accusations of fraud and shabby science. This image seeped into what eventually became the standard account of Haeckel as a scientific charlatan, popular and productive but damaging to the cause of science in general and to evolutionary theory in particular. As one would expect, the contemporary scientific criticism was eagerly embraced by members of anti-evolution movements. Less obvious, however, is it to explain why so many in the scholarly community, including scientists and historians, have accepted the charges of fraud uncritically and taken at face value the charges of Haeckel being a proto-Nazi, making him responsible for events occurring long after his death. Both in the main part of the book and in one of two appendixes, Richards makes a critical reading of the Haeckel reception, effectively taking Daniel Gasman's and Richard Weikart's Nazi arguments to pieces. Richards has the evidence, and to him this matters, as it should. It clearly matters less in the monocausal fabrication of a direct line from Darwin and Haeckel to Hitler. One of the great merits of *The Tragic Sense of Life* is to demonstrate beyond any doubt that the arguments of Gasman and Weikart should not be taken seriously.

The charges of fraud have followed Haeckel like a shadow. Richards deals with this question extensively and, as always on the basis of careful reading of an impressive number of sources, discusses at length the famous case of replicated woodcuts to illustrate embryological similarity in the first edition of *Natürliche Schöpfungsgeschichte*. Haeckel regretted his use of identical pictures and quickly altered the second edition, maintaining the argument that the earliest stages of embryonic development were quite similar, but he eliminated the replication. Richards's verdict is that as it was a lapse and a moral failure, it does not qualify as a clear-cut case of fraud. The question has not only been interesting to historians of science and antievolutionists but has generated a remarkable recent interest in the scientific community with discussions in high-ranking journals such as *Science* and *Nature*. Stephen Jay Gould famously charged against Haeckel in the 1970s, calling the actions of the German evolutionist atrocious and his embryological illustrations distortions. A similar line was taken up in the 1990s by the embryologist Michael Richardson and his colleagues in a comparison of their photographs of embryos and Haeckel's drawings from *Anthropogenie; oder, Entwicklungsgeschichte des Menschen* (Anthropogeny; or, the developmental history of man), first published in 1874. The conclusion was a negative one and received a surprising amount of publicity. *Science* titled its report "Haeckel's Embryos: Fraud Rediscovered," and the readers of the

Times were presented with "An Embryonic Liar." Addressing this still recent headline material, Richards, bit by bit, dismantles the accusations and the work and documentation of Gould, Richardson, and others. The carefully balanced conclusion is that there is no compelling evidence that Haeckel intentionally distorted his illustrations in a dishonest way.

Haeckel was a man of many agendas. So is Richards. *The Tragic Sense of Life* is a much better book for it, as Richards takes historians and scientists to task, never shies away from correcting errors where he finds them, and unfolds not just the story of Haeckel's personal and scientific life but the stories we have been telling about him, and he explains to us where they go wrong. Here, we find an original and bold book about one of the most influential advocates of evolutionary theory in the latter half of the nineteenth century in an account that takes both the man and the science seriously. The many stories, scientific details, personal events, debates, and arguments are woven together in an elegant narrative, rich and informative, never dull, and always a pleasure to read. There is little to regret. A more systematic presentation of the influential English translations of Haeckel's books would have been nice. As it stands, one should look for the information in the footnotes. Also, Richards's critical eye is less so when it comes to the discussions of palaeoanthropology and the fossil evidence of human ancestors. And it would have been interesting to see an explicit discussion of the use of history and the relationship in that regard between contemporary scientists and historians of science. But these are minor complaints and are not central to the main arguments of the book.

Haeckel's story is in many ways remarkable. Tormented by the premature deaths of two loves and the fierce personal attacks on him on several accounts making him contemplate suicide; astoundingly productive, meticulous, and hard working; original and influential; celebrated by his peers with honorary degrees and awards from a host of prestigious universities and institutions; and scientist, artist, traveler, and popularizer; Haeckel was more than most. To Robert J. Richards, there is no doubt, as he concludes: "if the term refers to an individual of high intelligence, extreme creativity, powerful expression, and extensive influence on the thought of his and succeeding generations, then Ernst Haeckel was, undeniably, a scientific and even artistic genius" (439). *The Tragic Sense of Life* gives credit to this claim. Richards has made a valuable and highly readable contribution to the history of evolutionary thought and nineteenth-century science and culture.

Peter C. Kjærgaard, *Harvard University*