

Beauty Beyond Belief

The art of Ernst Haeckel transcends his controversial scientific ideas.

By James Hanken

Nineteenth-century German morphologist, embryologist, natural philosopher, and artist Ernst Haeckel must surely be counted as one of the most influential and controversial figures in the history of evolutionary biology. To some a genius, to others a bigoted zealot and fraudulent scientist, Haeckel was arguably, next to Darwin, the dominant intellectual figure of his time. His writings and lectures ranged widely, touching on everything from microscopic unicellular forms of organisms to larger and more complex animals and plants, the evolution of humans and human culture, and the philosophical relationship between mind and matter. Many of his scientific ideas engendered vigorous debate at the time and were often more widely accepted by his lay audience than by his more critical colleagues, but his overall influence on biological research was enormously stimulating. Haeckel's forays into social theory had less benign consequences, however. He treated evolutionary biology almost as a religion and believed that just as one could apply the concept of natural selection to animals and plants, one could also determine which groups of humans were superior. Offering intellectual justification and "scientific" support for racism, anti-Semitism, and eugenics, his ideas were later a major ideological influence on the National Socialist German Workers' Party, better known as the Nazis.

Haeckel coined several scientific terms in use today, including *ecology* and *phylogeny*, but among students of biology, he is principally known as the author of the biogenetic law. Commonly summarized as "ontogeny recapitulates phylogeny," it posits that the embryonic stages in the development of an individual (its ontogeny) repeat the evolutionary history of its ancestors (its phylogeny). Haeckel thought that if you could watch a vertebrate embryo develop, you would see it pass through the adult forms of its ancestors in the order in which they evolved. A corollary of the biogenetic law is the idea that new evolutionary features are typically added at the end of development, with formerly adult, or "terminal," stages gradually being compressed into progressively earlier stages (or sometimes being eliminated outright).

Biologists today regard the similarity between some living embryos and their putative adult ancestors as more apparent than real. And where it does exist, they see it as due most likely to the retention of basic embryonic features among a group of related organisms. Furthermore, in this century, science has accumulated

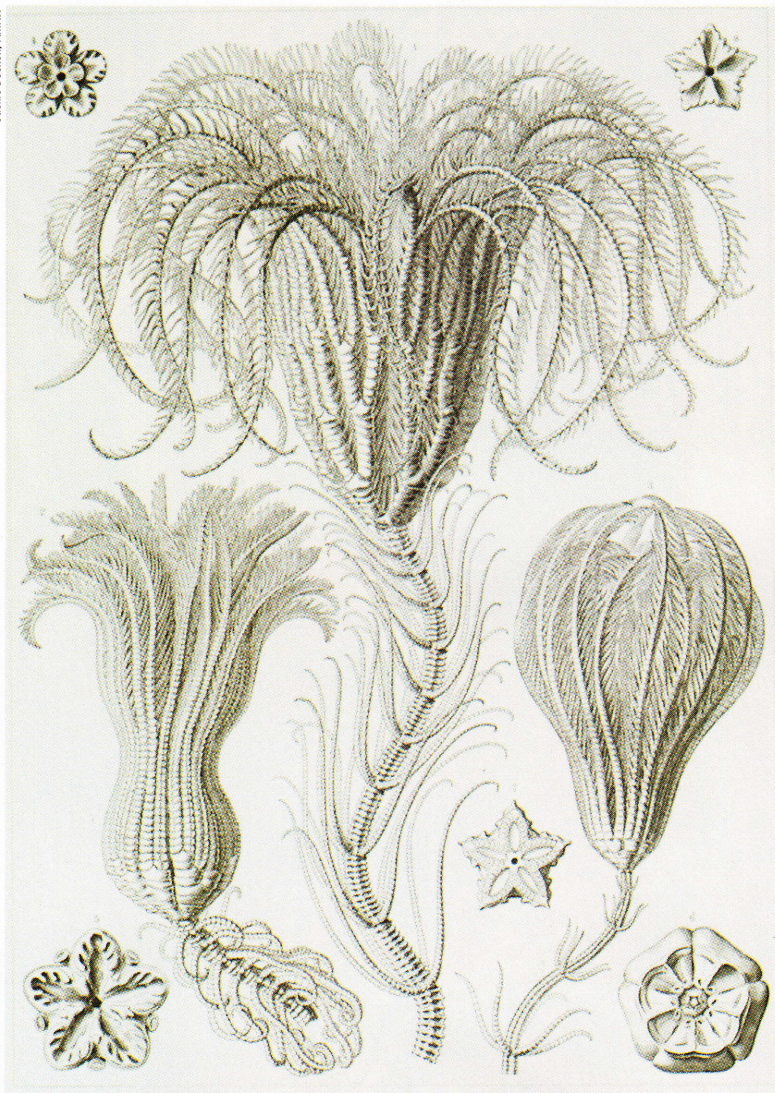


Joakim Beckett/AMNH

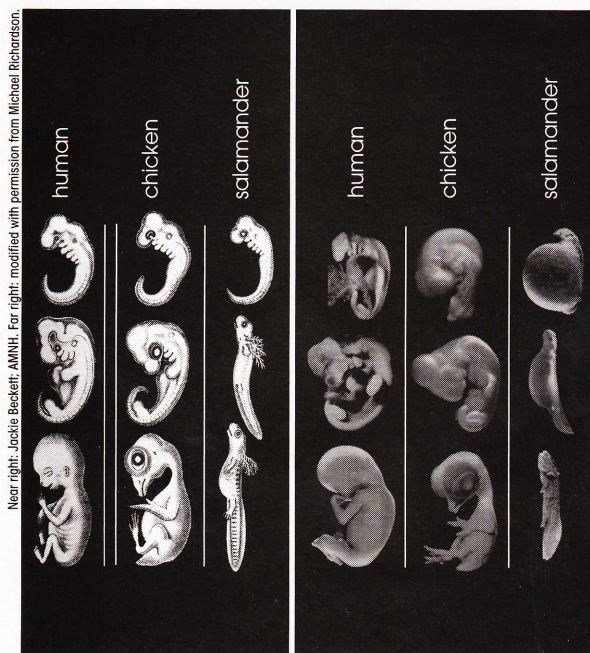
Above: Bird's-Nest Fern in the Primeval Forest of Tjibodas, plate 35, *Wanderbilder (Travel Pictures)*. Opposite: Batrachia (Frogs), plate 68, *Kunstformen der Natur (Art Forms in Nature)*.



Jackie Beckett; AMNH



Haeckel maintained that early development in vertebrates is virtually identical in all species, as can be seen in this detail from his famous 1874 illustration of embryos, near right. Photographs, far right, however, reveal differences among species even in early stages of development.



Near right: Jackie Beckett; AMNH. Far right: modified with permission from Michael Richardson.

many examples of natural selection's acting principally on early stages of development, proving that "terminal addition" cannot be the sole, or even the principal, mode of evolutionary change. Nevertheless, Haeckel's vital role in drawing professional and popular attention to the fundamental importance of development in evolution remains undisputed.

For better or, as it sometimes turned out, for worse, Haeckel the thinker was inextricably entwined with Haeckel the artist. A talented draftsman and painter, he contributed many of the figures and plates that illustrate his numerous writings on biology. Indeed, his 1874 depiction of comparable embryonic stages in humans and other vertebrates may be the single most familiar illustration in the history of biology. A prolific landscape artist as well, Haeckel produced hundreds of watercolors and oil paintings during his extensive travels; many of his tropical landscapes were published in 1905 in *Wanderbilder* (Travel Pictures). The culmination of his career as a scientific illustrator, however, came a year earlier, with the publication of *Kunstformen der Natur* (Art Forms in Nature), a collection of one hundred lithographic plates, including elaborate and ornate depictions of a wide variety of single-celled organisms, plants, and animals.

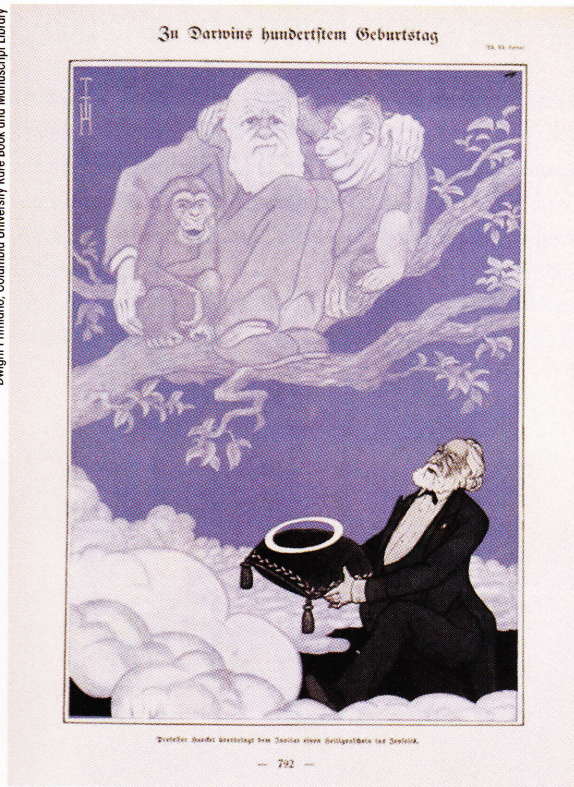
Combining science and art in the study of natural history was not unusual in Haeckel's day. Art historian Beryl Hartley has noted, for example, that beginning in the early nineteenth century, Western landscape painters worked hard to accurately portray individual species of trees and other natural features. The British painter John Constable epitomized the thinking behind this approach when, in 1836, he asked why "landscape painting should not be considered as a branch of natural philosophy of which paintings are but experiments." Equally (if not more) important to Haeckel's art was his fervent belief in evolutionary monism, an extreme worldview that purported to have found in Darwinism the unifying principle for all of life. With its romantic and, at times, mystical notions, monism encouraged artistic expression as a means of venerating the natural world.

But the enormous intensity and energy with which Haeckel promoted many of his theories frequently overreached their limited empirical foundations, as many of his contemporaries pointed out. Some of the leading embryologists and anatomists of the time, for example, criticized his depictions of vertebrate embryos, considering them fraudulent. In 1868, Ludwig Rüttimeyer, a paleontologist at the University of Basel, demonstrated that Haeckel had used the same illustration for embryos of at least three different species.

Many zoologists came to regard Haeckel as a prolific, successful popularizer and propagandist for his views, but a poor scientist. In *The Golden Age of Zoology*, the twentieth-century embryologist Richard Goldschmidt, who knew Haeckel late in life, offered a particularly damning assessment, describing Haeckel's early monographs on jellyfish and radiolarians (a kind of single-celled organism) as "actually almost the only factual contributions Haeckel made to zoology."

Goldschmidt, who regarded Haeckel's artistic talent as "a gift and a tendency which were to get him into trouble," provides insights into what might have led Haeckel to produce such apparently misleading representations of the natural world. "Haeckel's easy hand at drawing," Goldschmidt writes, "made him improve upon nature and put more into the illustrations than he saw. . . . One had the impression that he first made a sketch from nature and then drew an ideal picture as he saw it in his mind." But as the paintings on these pages show, although Haeckel's representations of—and ideas about—nature were sometimes sensational, even suspect, the artistic inspiration he derived from the natural world was the real thing. □

Dwight Primiano; Columbia University Rare Book and Manuscript Library



Opposite page, top: Crinoidea (Crinoids), plate 20, Kunstformen der Natur. Left: In 1909, artist T. T. Heine captured Haeckel's reverence for Charles Darwin in the issue of the art periodical Simplicissimus published on the centennial of Darwin's birth. Below: Tamarind tree near Madula, Ceylon, plate 32, Wanderbilder.

