

## Book Reviews

nervous functions and of the reduction of human performance to instincts, drives, reflexes or other part processes. Forced out of his work, while he waited in Amsterdam in 1934 for a visa for the United States, he took the opportunity—by his own account, five weeks that exhausted both his typist and himself—to clarify the theoretical basis of his medical work. This book is the result, the “classic” text of holistic biology. Anyone tired of vapid references to holism will be revived by a study of extraordinary range and depth.

Goldstein’s project was nothing less than a systematic biology grounded on the single principle of the unity of its subject, the organism. He believed that this principle made possible a simpler and more coherent science than that currently dominant, in which knowledge of the simplest parts is assembled into knowledge of the whole. He worked out the argument in greatest detail as a critique, simultaneously conceptual and empirical and hence powerful and unusual, of the reflex as a basis for the understanding of action. A high level of specialist knowledge is needed to assess the value of these arguments. Goldstein viewed the reflex as an artifice of isolated observation. He was particularly opposed to models of the organism as a balance of forces, of excitation and inhibition. In a scientific world in which such ways of thought had come to seem “natural”, his work was a profound act of intellectual imagination to show that alternative forms of knowledge may be possible.

The book is a rigorous work of science, though it comments in the last chapters on a formidable range of mainly German-language work in biology, physiology, psychology and medicine. It gives few clues to the social context in which it was conceived and written. Only with comments on heredity, racial biology and some versions of life philosophy then current in Germany, does the play of values start to be more apparent. Even so, his critique is expressed at the level of a critique in science. There is a startling one-paragraph marginalization of evolutionary biology. Here, most clearly, Goldstein reveals his

philosophical presuppositions, for which Goethe is cited as authority, about the “essential characteristics” of the organism at the level of the individual, at the level of the species and, it sometimes seems, at the level of life. Behind this was a Kantian programme to describe the categories in terms of which it is possible for us to have knowledge of the organism. He conceived of formal biology as nothing less than the discovery of the constants of the organism’s essential nature, of medicine as a response to the conditions in which the self-actualization of that nature is threatened by catastrophe. In his discussion of the human organism, whose essential nature he concludes on biological grounds expresses freedom, his medicine merged with a philosophical anthropology concerned with “Man”. In this connection, it is interesting to note that Goldstein was a colleague of Abraham Maslow at Brandeis University in the 1950s. It is possible to see in Goldstein’s book the attempted theoretical foundation of what Maslow was to shape institutionally into humanistic psychology. In the medical sphere, Goldstein’s way of thought about damage, and recovery or compensation for damage, provokes a response to illness as an alteration to an organism’s *telos*. Symptoms, for Goldstein, are not signs of local damage but signs of the organism’s search for new order, a sustainable actualization of its nature.

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**Lynn K Nyhart**, *Biology takes form: animal morphology and the German universities, 1800–1900*, University of Chicago Press, 1995, pp. xiii, 414, illus., £59.95, \$75.00 (hardback 0-226-61086-1), £21.95, \$27.50 (paperback 0-226-61088-8).

This is the first big-canvas history of animal morphology since E S Russell’s classic *Form and function* of 1916. Lynn Nyhart tells us about many of the same characters as Russell did, but hers is a very different project. Russell used history to argue that organisms were

## Book Reviews

“active, living, passionate beings like ourselves”, “working out” their “own salvation upon original and individual lines”. Nyhart’s morphologists may have sought salvation, but they were obliged to find jobs in the German universities. In this much amplified version of her 1986 PhD thesis, she focuses on the dialectic between research agenda (“orientations”) and appointments to professorships, to chairs of anatomy in the medical faculties and to chairs of zoology in the philosophical faculties. She thus shows how the science was made and remade through the nineteenth century in the negotiations of professors and ministerial officials. And, although she accepts Russell’s basic periodization into transcendental, evolutionary and then causal morphology, her findings significantly revise our map of the morphological terrain, and powerfully explain why the landscape did, or did not, change.

Here are some highlights. In the first part Nyhart reinterprets the reorganization of the sciences of animal life at mid-century. She attributes the triumph of the physicalist physiologists less to their making political alliances than to anatomists’ interest in unburdening themselves of physiology to the physiologists least likely to trespass on their turf. Meanwhile, those “morphologists” who were being defined out of this “modern” physiology found other homes. Some pursued developmental studies of tissues and cells in institutes of anatomy; others rallied round the banner of “scientific zoology” and successfully challenged Humboldtian collectors and classifiers for the crop of new zoological institutes. Having discussed German responses to Darwin, Nyhart goes on to question the standard view that the evolutionary morphology of the zoologist Ernst Haeckel and the anatomist Carl Gegenbaur soon dominated their respective disciplines. Combined with the new microtome, Haeckel’s gastraea theory met the demands of the crowded next generation for quick results that they could give wide theoretical significance, but more cautious men got chairs of zoology when they became available in the 1880s. Gegenbaur’s tightly

defined research school lost out because practitioners of other orientations could make stronger claims to proficiency in basic teaching of systematic and microscopic anatomy. In the closing chapters on the 1880s and after, Nyhart offers a multi-layered reassessment of what William Coleman and Garland Allen described as a wholesale “revolt from morphology”, at last providing a discussion of changes in Germany to complement work on the United States. Her main conclusion is that evolution and experiment were unusually opposed for Haeckel, Hans Driesch and the historiographic tradition they inspired, but that historians should pay much more attention to what was going on in the rhetorical gap between them.

This book will be an important resource for researchers, and its clarity and accessibility will also assure it a firm place in teaching the history of the life sciences. But Nyhart’s focus is quite close; the study might almost have been called *German professors and bureaucrats discipline morphology*. And whilst the survival of research orientations in the struggle for chairs was a crucial part of the “morphological economy”, it is obviously only a part of the story. Further work might expand the history of morphology to include more practices, more arenas and more actors.

First there is exploration beyond the tantalizing snippets Nyhart offers of university morphologists’ own varied activities when they were neither scheming over promotions nor pontificating on the nature of their science. They engaged in a range of material practices, and especially in performing and teaching the complex series of operations required to represent form. In this connection, that such a well produced book uses pictures so sparingly and so casually contrasts markedly with the striking wall charts still to be found in older zoological and anatomical institutes. Historians of science and medicine, increasingly skilled in the analysis of visual images, regularly make more out of much less. Second, though the dominance of the universities was, of course, the distinctive feature of German science in the nineteenth century, Nyhart is right to be concerned about her exclusively academic

## Book Reviews

focus, and is now herself studying the relations of the universities to other institutions. There is considerable scope, even in Germany. To give one example, although university professors kept the committee of the German Zoological Society firmly in their hands, its founding meeting in 1890 was held not in a university town but in Frankfurt am Main, in the Zoo, where the host was the chairman of the local Senckenberg Society for Research into Nature. Third, investigating other sites of morphological research and other arenas in which the science was produced for its audiences is the most obvious way to bring a host of other actors and their often very different perspectives into view. In the only case in which a wider social movement makes a difference to her account, Nyhart deals with zoology professors' problem that evolution, the most powerful generalization their discipline had to offer, was political dynamite. Cleverly, she almost makes us believe that Haeckel, perhaps the most famous German zoologist, failed because he was just not stolid enough. But though ministers may have preferred "sunder" men, undisciplined others reckoned that Haeckel remained *too much* the German professor.

Nyhart also looks forward to a richer social and cultural history, but boldly reckons her account of morphology in the disciplines will stand up to it. I cannot help thinking that the very processes of academic life that she describes are likely to ensure that new work will do more than simply flesh out her narrative. But I am sure that the book will remain indispensable to historians of the life sciences and medicine for many years to come.

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**Urban Wiesing**, *Kunst oder Wissenschaft? Konzeptionen der Medizin in der deutschen Romantik*, Medizin und Philosophie, Band 1, Stuttgart, Frommann-Holzboog, 1995, pp. 365, DM 78 (3-7728-1634-7).

It would be difficult to imagine that Martin Heidegger, Ludwig Wittgenstein, Saul Kripke,

or any other twentieth-century philosopher could have such an impact on today's medical profession that this be divided into opposing camps, each promulgating from its partisan philosophical premise a different view of the status of medicine. Yet just such an important role was played by philosophers in the Romantic era when many of Germany's leading physicians defined the foundations of their profession in terms of the philosophical conceptions of Immanuel Kant, Johann Gottlieb Fichte or Friedrich Wilhelm Joseph Schelling. Several historians have addressed the question of how fruitful these discussions were for the subsequent development of medicine. Wiesing keeps this contentious issue at arm's length, and focuses on what the authors of the voluminous literature of German Romantic medicine had to say about the question: "Is medicine an art or a science?"

The Leyden physician Hermann Boerhaave had decreed that theoretical medicine was a science and that practical medicine belonged to the arts. But around the turn of the eighteenth century, with the prestige of the life sciences rising, a number of different solutions were proposed to the age-old conundrum "science or art". Wiesing recognizes four of these and accordingly defines four groups of Romantic physicians. First, there were the empirical-eclectic ones, such as Christoph Wilhelm Hufeland and Carl Arnold Wilmans, who stuck to the traditional science-art dichotomy and attributed a doctor's effectiveness to his experience and personal talent. Second, there were the Kantians, most famously represented by Jacob Friedrich Fries. They, too left the dichotomy of art *versus* science intact, but were preoccupied with the notion of experience, arguing that what doctors collected in practice were merely loose observations and that proper experience required the mental faculty of judgement ("Urteilkraft"); medicine could not be elevated to a science.

A subsequently notorious, third group were the nature-philosophical doctors, followers of the Jena philosophers Fichte and, more influential, Schelling. To them, medicine was not only a science, but the very flower of the