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Book Reviews

T. J. HORDER, J. A. WITKOWSKI, and C. C. WYLIE (editors), *A history of embryology* (British Society for Developmental Biology, symposium 8), Cambridge University Press, 1986, 8vo., pp. xxiv, 477, illus., £60.00.

There is a great need for a major new history of embryology, as developmental biology, the anagenic descendant of embryology, is becoming pivotal to all areas of biology. It is in a remarkable period of growth, expanding in one direction into the molecular basis of gene regulation and in another direction into the developmental basis of evolutionary change.

A history of embryology is an important complement to the histories of Needham, Oppenheimer, Roe, Haraway, and Lenoir. It begins chronologically where Lenoir's *Strategy of life* ends, and it has the virtue of continuing a conceptual history of the field to 1983 (when the conference that formed this book was convened in Nottingham). It is, of course, impossible to compress adequately such a history into one volume; for in this time, developmental biology has come to represent not merely a field of research but a way of approaching nature. Moreover, there is no central axis to the "discipline", a fact that makes the science more interesting, but its history difficult. Nevertheless, there is a remarkable continuity between the embryologists of the late 1800s and their descendants a hundred years later. In fact, the same questions are being asked: recombinant DNA probes and fluorescent monoclonal antibodies have replaced less specific staining techniques, but Wilson and Boveri would feel at home conceptually. When Eric Davidson (p. 404) displays an actin mRNA northern blot in discussing Boveri's contribution to modern science, they flow together well.

This book attempts to identify some of the important research programmes in embryology. It does not claim to be inclusive, and some of today's active areas—developmental neurobiology, cell surface interaction, and plant development—get slight mention. If there is any "privileged axis" represented here, it is the relationship of embryology to genetics, culminating in contemporary developmental genetics. After a very useful introduction and chronology by T. J. Horder, the volume begins with an important account by Frederick Churchill on the origins of Weismann's germ-plasm theory and how Weismann came to realize that heredity was not a force opposing variation but the source of variation itself. Would that more articles were written so well and paid as much respect to the scientists' data and world-view.

Mark Ridley then analyses Britain's isolation from continental science. Like Churchill, he gets beyond the rhetoric of the biogenetic law to see how practitioners of embryology (such as J. Huxley, Balfour, and Jenkinson) actually used it. Jane Maienschein recounts how the epigenesis/preformation argument evolved into a cytoplasm/nucleus debate wherein the distinction between determinative and indeterminate cleavage embryos became important. Most historians of embryology are familiar with the studies of Wolff, Haller, Wilson, Roux, and Driesch, but Maienschein shows the critical importance of His, O. Hertwig, and Whitman to this transition.

Three articles touch on the history of primary embryonic induction. Jean Brachet and the team of Lauri Saxen and Sulo Toivonen contribute reminiscences of their respective works in the field and detail the attempts to find a molecule with the activities of Spemann's organizer. T. J. Horder and P. Weindling, however, have created the keystone of the book with their provocative and intellectually exciting account of Spemann's research programme that led to the discovery of the organizer phenomenon. They show how Spemann's interpretations of his experiments mirror the transformation of the embryo from a "democratic" cellular federation (such as Virchow had formulated) into an autocracy governed by a special director. This article is especially important for English-speaking researchers as it includes references to parts of the German edition of Spemann's celebrated Silliman Lectures that were deleted in the English edition. It also gives an excellent picture, drawn from many sources, of the ambivalence that Spemann felt concerning the role of science in the Third Reich.

One problem with a multi-authored book like this is that divergent views can be expressed by separate authors but not discussed together. This occurs in the histories of genetics and embryology by Garland Allen and Klaus Sander. Allen is specifically concerned with the

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divergence of the two disciplines and Sander with their reconciliation in developmental genetics. Allen summarizes much of the work on this subject and speculates that American breeding interests were responsible for providing impetus for the separation. He states that "the dichotomy between embryology and genetics was inevitable" and that Morgan was the "unplanned agent" of this separation. Sander's analysis of both past and present attempts at reconciliation start at the opposite conclusion: "This strict separation of disciplines—one studying transmission, the other the expression of heritable traits—may have contributed to scientific progress for a time, but it is by no means a requirement imposed by Nature herself Aloof from these haggings stood Edmund B. Wilson and his *Cell*. Its first two editions (1890, 1900) antedated the schism and, if heeded by the opponent parties, might have suppressed it from the beginnings." Sander also describes contemporary research that bears upon one of the most important conceptual undertakings of modern developmental biology: relating differential gene activity to the generation of pattern. Another contemporary developmental geneticist, Eric Davidson, shows briefly how modern research is indebted to the principles established by Theodor Boveri, and Edward Yoxen looks at the relationship of genetics and embryology as seen in the career of C. H. Waddington. Robert Olby, looking at a similar period, identifies three research programmes (colloid chemistry, histochemistry, and X-ray crystallography) to study structures existing between the ultramicroscopic and molecular size ranges of the cytoplasm.

Witkowski, Wallace, and Wolpert detail the history of the "form-problem" from R. G. Harrison onward. That all three authors are from British institutions is not surprising, given the eminence of England in this field. Why this should be so would make an interesting study, but it is not addressed herein. Witkowski reviews Harrison's intellectual career, stressing the interaction between problem and technique. The contributions on pattern formation (Wolpert) and regeneration (Wallace) are too short to do justice to their subjects. Wolpert gives an excellent summary of the turn-of-the-century work on gradients, but he stops short of discussing many of the conceptual advances made in his own laboratory. Wolpert's contributions are detailed in the last chapter by the philosopher N. W. Tennant, whose essay on reductionism, holism, and determinism is written in a well-organized, non-technical style, which can even be read by scientists for whom nothing is real unless an antibody can be made against it. Tennant also respects the heterogeneity of developing organisms so that he does not talk about gastrulae or pupae in abstract, Platonic terms. His choice of Wolpert's research programme to illustrate his points is very apt.

Both embryology and history are disciplines that try to explain the present by analysing the events of the past. This volume is an attempt by both historians and embryologists to pool their historical understandings of their discipline. It comes at a time when developmental biologists are returning (with new techniques) to problems investigated and then abandoned by earlier generations of embryologists and when historians of science are realizing the importance of embryology as an intellectual endeavour at the forefront of biology. It should be widely read by both groups. Unfortunately, its price may severely inhibit its distribution. My expectation is that this will be a heavily-photocopied volume.

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W. F. BYNUM and ROY PORTER (editors), *William Hunter and the eighteenth-century medical world*, Cambridge University Press, 1985, 8vo, pp. xi, 424, illus., £35.00.

In 1983, the Wellcome Institute for the History of Medicine organized an international symposium to mark the 200th anniversary of William Hunter's death. Fourteen papers delivered at that meeting have been collected in this volume. Written by a group of well-known scholars, they represent a most valuable addition to our knowledge of eighteenth-century European medicine. In historical consciousness, William Hunter has hitherto lived in the shadow of his brother John, and readers will certainly appreciate the information on one of Britain's most influential medical figures of an enlightened age.