Review: Pioneers of Embryology
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to raise their level of historical awareness and philosophical sophistication will find this study of Metchnikoff extremely valuable.

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Pioneers of Embryology


When we think of embryology around the beginning of this century, we might imagine that in those days progress was made slowly by investigators who worked in isolation and, unlike those of the present day, had time to think. Perhaps we even assume that recent advances, particularly in cell and molecular biology, have answered most, if not all, of the questions of those days. This book should dispel any such assumptions. It shows the pioneers of the discipline energetically competing for publication, disputing each other's findings, and traveling around the world to collaborate and disconcertingly reminds us of just how many of our current views about developmental control mechanisms are 100 or more years old.

Before about 1880, embryologists were addressing questions about developmental mechanisms almost exclusively by means of direct observation and drawing conclusions by extrapolation and imagination. One might describe their work as anecdotal, rather than mechanistic. Then Wilhelm Roux and contemporaries (1870–1910) such as Eduard Pflüger, Oskar Hertwig, Curt Herbst, and Hans Driesch began to use experimental manipulations to address specific questions about the rules governing cell behavior in the embryo, which we are now starting to rediscover. Some of the insights on which modern ideas are based came directly from their work. The first few chapters of the book concentrate on these early efforts (1800–1910), tracing in a concise and readable way the origins of the approach that became known as experimental embryology or developmental mechanics (Entwicklungsmechanik).

Johannes Holtfreter's autobiographical chapter, in which he reminisces about his life and career, is of a rather different nature from the rest of the book. It is in fact a letter, written in 1981, sent as an apology for Holtfreter's inability to accept an invitation to attend a meeting in Japan. For this reason, it is not exactly scholarly, but it is a real gem, particularly because Holtfreter recollects his feelings more than his science and records his perception of other contemporary scientists as people rather than just of their ideas.

The book is eclectic, but all the chapters are important and make interesting reading. Two themes recur throughout the book and give it a coherence uncharacteristic of collective volumes. One is the development of the concept of embryonic induction, by which one group of cells emits a signal that changes the direction of differentiation of another group of cells. Holtfreter's statement that "today there is barely anybody around who is still active in this once so exciting area of research" sounds ridiculous in 1992. But through the book one can trace the origins of this concept that is central to the way in which we now view development. It was not the famous experiment of Spemann and Mangold (1924) that led to the idea, nor even Spemann's earlier work on lens induction (1901–1906). These experiments were the culmination of a long-standing dispute over whether differentiation of the lens was a process arising entirely from within the cell.

"The worries of an embryologist." [Johannes Holtfreter, in A Conceptual History of Modern Embryology]
Drosophila Unfolded


The 1980s were years of extraordinary excitement in developmental biology because of the explosive coming together of genetics and molecular biology: for the first time mechanisms that direct the unfolding of the egg into a complex multicellular animal, the fruit fly, became clear. We now understand, at a satisfying level, quite a bit about the development of this animal.

Peter Lawrence has put together much of what we know in his new book. From a deliberately personal and biased viewpoint, he describes what is known about early axis determination, segmentation, segment identity, bristle formation, and eye development.

Lawrence does not attempt to cover everything that is known about fly development. He has selected topics that he is particularly interested in, and in most cases these are areas in which he has made a personal contribution. It is a tribute to Lawrence’s scientific good taste that his career has covered a broad range of fundamental issues in development. Segmentation, compartments, segment identity, muscle development, intrasegmental patterning, bristle spacing, and eye development are all areas that Lawrence knows intimately through his own work. He covers the facts in each of these areas, spicing them with his individual perspective.

Because of the range of topics covered and the chatty, easy-to-read style, this book will be of particular value to those with some background in developmental biology who would like an overview of the current understanding of Drosophila development. Physically it is a pleasure to read: it is printed on high-quality paper; the print is not cramped on the page; there are lots of figures.

Given the scope of the book, Lawrence makes amazingly few mistakes of fact. However, the facts are very dense in places. For instance in the segmentation section, I was concerned that the nondrosophiliast who didn’t already understand the relationship between nanos and luncreak and knrips would throw up his or her hands and complain again about all those silly gene names.

At some points I think Lawrence’s informal style makes concepts murkier than they need to be. The analysis of genetic pathways is always a complicated business, and in his attempt to be easy to read Lawrence is sometimes imprecise to the point of being misleading. For instance, in several places he says that “downstream” genes serve “subordinate” functions. This is confusing because “subordinate” inevitably connotes being of lesser importance; surely he does not mean that the Bithorax Complex is less important than Polycomb, but I fear he could.

Leon Browder’s insight in including this volume in his “comprehensive synthesis” of developmental biology is laudable. Equally worthy of praise is Gilbert’s choice of authors, although a brief reading list of other books on the history of developmental biology would have been nice. But this is a quibble. This book, together with Viktor Hamburger’s The Heritage of Experimental Embryology: Hans Spemann and the Organizer (Oxford University Press, 1988), should be on the shelf, if not at the bedside, of every developmental biologist and should be read by everyone new to the field. It will be a source of real inspiration.

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"Heads of related species of Drosophila. These can be arranged in a series stretching from the mundane to the fantastical." [From The Making of a Fly]