
Preface

The evolution of the process by which segmented body plans are formed during development has been a central theme in evolutionary developmental biology since the reemergence of the discipline in the late 1990s. Understanding of the *Drosophila* segmentation cascade, followed by the realization that many developmental genes are conserved among species, made the evolution of the segmentation process an obvious and accessible area of study. At about the same time as the segmentation process was being studied in additional arthropod species beyond *Drosophila*, it became clear that the different phyla with segmented body plans are not closely related, making the question of how segmentation evolved even more intriguing for evolutionary developmental biologists.

In the ensuing decades, we have gained a better understanding of how segments develop in embryos of different taxa, and how this segmentation process varies over phylogeny. In recent years, researchers in the field have come to appreciate the central role of cellular-level processes in segmentation. It is this appreciation that provides the underlying theme of the current volume. Segments are formed by the arrangement of cells into reiterated structures. What are the cells involved in the process, what drives their differentiation and arrangement into segmental structures, and what are the molecular players involved in the process? These are the questions this volume attempts to answer. More important, to what extent are the answers to these questions similar in different segmented taxa?

This volume is divided into three sections. The first section includes two general overview chapters: an historical overview of the changing ideas about segmentation and theories about its evolution (Chapter 1), and a survey of the different modes of segmentation found in animals (Chapter 2). The second section contains detailed reviews of the segmentation process in the three main segmented phyla (Arthropoda in Chapter 3, Annelida in Chapter 4, and Chordata in Chapter 5). Each of these phyla has a general chapter devoted to the cellular aspects of segmentation in that phylum. Two additional chapters discuss special cases of unusual segmentation processes in malacostracan crustaceans (Chapter 6) and in clitellate annelids (Chapter 7). The final chapter of this section discusses the advances in live imaging and its contribution to studying segmentation (Chapter 8). The third section goes beyond the traditional discussion of segmentation with one chapter devoted to repeated structures in taxa that are not considered to be segmented (Chapter 9), and one chapter devoted to regeneration and its relationship to segmentation processes (Chapter 10).

I want to end by thanking Brian Hall and Sally Moody for initiating this book series and inviting me to put together the current volume; Chuck Crumly from Taylor & Francis Group for editorial support; the authors of the chapters; and last but not least Netta Kasher, whose excellent illustrations enhance many of the chapters and grace the cover of this volume.

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