ABSTRACT

The field of developmental physiology, by focusing on physiological function during ontogeny, is an integral part of evaluating and predicting the effects of a changing environment on animal populations. Developmental physiology is especially relevant in the context of determining how biological systems cooperate across multiple biological levels of integration, in response to the complex physiochemical dynamics of the environment. In Environment, Development, and Physiology: A Synthesis, we illustrate that the results of these interactions are more than the simple sum of the parts, especially when considering the multiplex of processes occurring during early development coupled with the wide range of possible environmental stressors. Intended for advanced students in the sciences and industry professionals, this book offers a unique approach to explain the physiological constraints that developing animals face from both natural and anthropogenic stressors as we explore both current and time-honored methodologies used in laboratory and field-based developmental research. The utilities and limitations of developmental physiology research are outlined in thematic sections, each of which contains multiple chapters. The themes discussed in detail in each section are then put into a “real world” perspective in “case studies” that draw upon real interactions between environment, development and physiology in a way that highlights the complexities of development in a changing environment and the importance of developmental biology within the field of environmental sciences. In doing so, this book explores current trends and perspectives in developmental physiology in an environmental context, where stochastic interactions necessitate a holistic approach to understanding environmental influences on development, and the effects of environmental stressors on the population at large. Environment, Development, and Physiology: A Synthesis differs from others through its highly integrative nature (hence, the post-colon component of the title – “A Synthesis”.) Rather than a loosely connected list of facts/topics, this book blends a representation of virtually every field that surrounds the use of developing animals in environmental science. In doing so, the book will help define the scientific collective within these highlighted fields to both those readers that are outside of a particular field (students and professionals alike) and those that work within a field, where multiple iterations of the same job description exist. Both the chapter descriptions and the author choice fully support this goal as the editors and contributors of the book represent contemporary thought and experimentation in their respective fields – ranging from developmental physiology through environmental toxicology to medicine. As such, this volume should have very wide appeal to any scientist or trainee interested in the nexus of environment, development and physiology.

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