

Preface

Patterns are orders embedded in randomness; they may appear in spatial arrangements or in temporal sequences, and each element may appear identical or with variations. Patterns exist in the physical world as well as in living systems. In the biological world, patterns can range from simple to complex, forming the basic building blocks of life. When we see patterns in peacock feathers, leopard spots or zebra stripes, we are fascinated by the order, the variations and the beauty. The process that generates this ordering in the biological world has been termed *Pattern Formation*. Since Lewis Wolpert promoted this concept four decades ago, scientists from molecular biology, developmental biology, stem cell biology, tissue engineering, theoretical modeling and other disciplines have made remarkable progress towards understanding its underlying mechanisms. We have learned that both molecular processes and physico-chemical principles are important for biological Pattern Formation and as Guest Editors, felt that it is time to review and re-integrate our understanding of this fundamental and fantastic process.

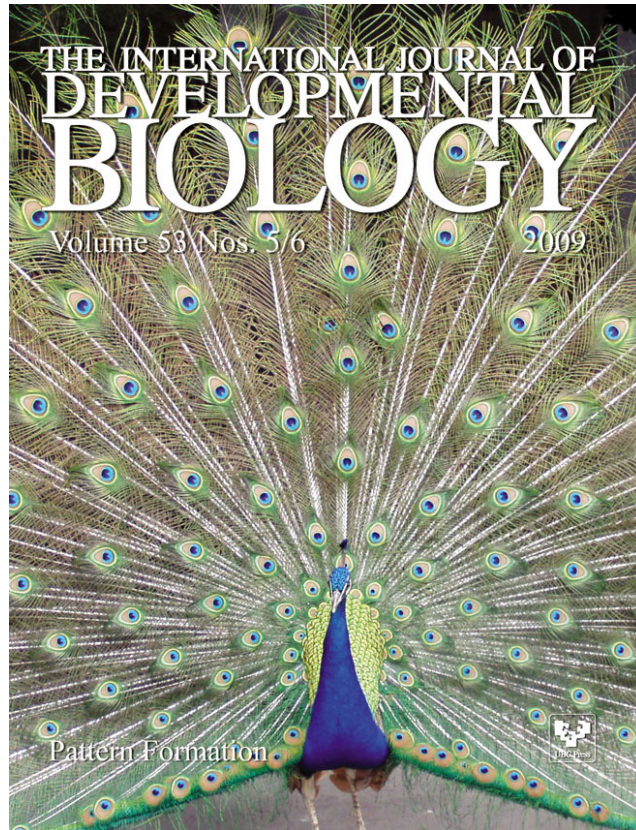
We would like to thank Prof. Juan Arechaga, Editor-in-Chief of *The International Journal of Developmental Biology*, and the *Int. J. Dev. Biol.* Editorial Team for offering us the opportunity to edit this Special Issue on Pattern Formation. As a group, we explore the origin of Pattern Formation, how the genetic code is translated into biological form, and how complex phenotypes are selected over evolutionary time. We organize these topics under the themes of 'Principles', 'Evolution', 'Development' and 'Stem Cells and Regeneration'. After consulting and discussing with experts, we invited eminent scientists to write reviews on these topics. By assembling these articles from different disciplines, we hope that this Special Issue will work as a 'virtual symposium', to catalyze further interactions among authors and readers from a wide range of backgrounds and disciplines.

One unique feature is that we have interviewed several original thinkers in the field. We tell the story of how their careers and ideas developed and matured. Through these stories, we hope to gain insight into how their research and the field of Pattern Formation have shaped each other. They are also great role models for young scientists.

We are grateful to all authors for their efforts and contributions. We warmly thank all the scientists who generously made themselves available for interviews. We would also like to thank colleagues who offered us advice on topics and authors. We regret that we could not include every major investigator in the field. For various reasons beyond our control, the production of this Special Issue has taken longer than initially expected and we thank all participants for their patience.

We have surveyed the research landscape of Pattern Formation in the multi-dimensional space of development, evolution and regeneration. Now, we have this Special Issue at hand: a sample of our current understanding of Pattern Formation as of today (2009). We do not claim to have presented all the answers, or even all the questions, but we hope this collection of papers will help to catalyze novel understanding of biological Pattern Formation.

Cheng-Ming Chuong and Michael K. Richardson
Los Angeles, USA and Leiden, The Netherlands, June 2009



5 yr ISI Impact Factor (2008) = 3.271

For all the latest on *Pattern Formation* research,
see our latest Special Issue
edited by C.-M. Chuong and M.K. Richardson.

<http://www.ijdb.ehu.es/web/contents.php?vol=53&issue=5-6>