

# The Hydra Model System

*Guest Editor*

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# *Preface*

## ***The Hydra Model System***

The freshwater *Hydra* polyp emerged as a model system in 1741 when Abraham Trembley not only discovered its amazing regenerative potential, but also demonstrated that experimental manipulations pave the way to research in biology. Since then, *Hydra* flourished as a potent and fruitful model system to help answer questions linked to cell and developmental biology, as such as the setting up of an organizer to regenerate a complex missing structure, the establishment and maintenance of polarity in a multicellular organism, the development of mathematical models to explain the robust developmental rules observed in this animal, the maintenance of stemness and multipotency in a highly dynamic environment, the plasticity of differentiated cells, to name but a few. However the *Hydra* model system is not restricted to cell and developmental biology; during the past 270 years it has also been heavily used to investigate the relationships between *Hydra* and its environment, opening new horizons concerning neurophysiology, innate immunity, ecosystems, ecotoxicology, symbiosis.

The variety of the articles included in this Special Issue of "*The International Journal of Developmental Biology*" reflects the integrative nature of this simple model system; each of the papers provides an overview of one specific aspect of *Hydra* biology, as well as a detailed description of the experimental tools currently available to address the pending questions. The most recent books on the *Hydra* model system were published in 1988, at a time when the molecular biology of *Hydra* had just been launched. We hope that this Special Issue will fill the gap, showing on the one hand the amazing conservation of the molecular machinery, e.g. components of the extra-cellular matrix, signaling pathways and transcription factors, and on the other hand, the taxon-specific bricolage that led to original designs. Finally, for over 270 years, and I hope for many years yet to come, *Hydra* appears as a magnificent vehicle to stimulate the scientific curiosity of a lay audience, to enhance the creativity of students of any age to design experiments, and to promote clearer, rational thinking among all of us.

I am very grateful to Juan Aréchaga who convinced me to edit this Special Issue and provided me with constant positive support in this endeavour. I wish to thank all the authors for their time and efforts to produce a highly relevant scientific contribution. Finally, I would like to express my thanks to the editorial team of *The International Journal of Developmental Biology* for their high-quality work, and especially to David J. Fogarty for his patience and enthusiasm as Managing Editor, throughout these final months of preparation.

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