

# Placenta

*Guest Editors*

Joan S. Hunt and Kent L. Thornburg

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*Allen C. Enders*

*Scientists often have the good fortune of rubbing shoulders with giants as part of their quest for discovery. The editors of this Special Issue are pleased to present the work of Allen C. Enders, one of the giants in placental development in our time. Because of his outstanding efforts in investigating the interactions of embryonic and maternal tissues, we have a better understanding of the mysteries of implantation, as well as of placental growth and function. His beautiful micrographs remind us of the intimate nature of a mother and her child in the making. We are grateful to Allen for his wonderful contributions to Science and his willingness to make himself accessible to the broader placental community across the globe. In appreciation, we honor the scientific work of Allen Enders and dedicate this Special Issue of The International Journal of Developmental Biology to the man who has greatly enriched our lives.*

# Preface

*The International Journal of Developmental Biology (Int. J. Dev. Biol.)* is well known for its outstanding Special Issues on systems, processes and organs. In this Special Issue, the placenta is the topic of discussion for the first time. In women, this unique organ develops and declines within the nine months of pregnancy. One portion of the placenta, the trophoctoderm, is the first identifiable layer of differentiated cells in the blastocyst. The trophoctoderm and its descendents, the trophoblast cells, overlie mesenchyme, a mixture of cell types supplied by the inner cell mass. The mesenchyme is contiguous with the fetal umbilical cord that is attached to the fetal abdominal cavity.

During its lifetime, the placenta serves as the sole conduit between the mother and the embryo/fetus, conveying nourishment to the fetus and eliminating fetal waste. These basic tasks are only part of the job of the placenta; it must also produce peptide and steroid hormones required to sustain the viability of the pregnancy, synthesize these and other substances to protect the fetus from maternal immune responses, and ultimately prepare for its own demise. Studies on the placenta may therefore focus productively on many aspects of Developmental Biology, including cell growth and differentiation, organ development encompassing epithelial-mesenchymal interactions, gestation-related functions influencing both the fetus and the mother, and mechanisms leading to cell death and organ dissolution.

This Special Issue is in no sense an exhaustive review of placenta research. Instead, the articles are meant to introduce the reader to some of the personalities, institutions, concepts and technologies that serve as the framework for today's research. To set the stage, the reader will first find a discussion by the editors with Allen Enders, a major contributor to the discipline, commentary on the special environment of Cambridge University that fostered the development of research on several continents by Boyd and Boyd, and an article recapitulating understanding of the placenta in a historical sense from Longo and Reynolds. The balance of the Issue is composed of comprehensive reviews and original research articles authored by knowledgeable placentologists from across the world.

In organizing this Special Issue, the editors worked forward in a temporal sense from implantation conditions and events to development and differentiation of the various placental cell subpopulations. The third section speaks to issues of placental and extraplacental membrane regulation of fetal nutrition and, finally, parturition. Next, three sections address immunological aspects of placental function, characteristics of placentas in disease states and descriptions of the novel and unexpected pathways taken in the development of certain mammalian placentas and their trophoblastic cells. The Issue concludes with four articles describing how the placenta may influence not only the embryo/fetus *in utero*, but also functioning of both the mature adult in later life and future generations through epigenetic modulation of gene expression.

In 1968, E.C. Amoroso pointed out as he accepted a Doctorate of Science conferred by the University of Illinois, that as early as 1651 William Harvey appreciated the benefits of deliberate experimentation. Harvey encouraged his contemporaries to explore the scientific method. He apparently inspired Sir Thomas Browne, a physician in Norwich who wrote "*Fly not only on the wings of Imagination: join Sense unto reason, and Experiment unto Speculation...*" (*J. Anim. Sci.* 1968 27: 214-222). The editors hope that thoughts conveyed in the articles in this Special Issue similarly inspire researchers of the twenty-first century. Our thanks to Juan Archeleva, Editor-in-Chief of the *Int. J. Dev. Biol.*, to his editorial team in Bilbao, and to Renee van Erp, Coordinating Editor, University of Kansas Medical Center, for their support and assistance.

*Joan S. Hunt and Kent L. Thornburg*  
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