PREFACE

Interest in mechanisms of embryo implantation is increasing, particularly with the realization that failure of implantation after in vitro fertilization and embryo transfer places significant limits on the success of treatment. In addition, there is a need to provide hypotheses, and ultimately mechanisms, for the high rates of embryonic loss in women in the population at large.

Traditionally, implantation research has concentrated on genetics and endocrinology without providing many therapeutic benefits. A new era is now beginning with the application of modern cellular and molecular approaches to the investigation of the relationship between trophoblast and endometrium. At the same time, older data can be reevaluated in the light of current research into cell-cell and cell-matrix interactions.

The feeling that new avenues of research are open was apparent when an international group of scientists came together at a workshop on "The Cell Biology of Trophoblast Invasion In Vivo and In Vitro" held during the XXIV Annual Meeting of the Cell, Tissue and Organ Culture Study Group (C.T.O.C.) at Heidelberg in 1986. What was unusual about this Conference was the interdisciplinary dialogue between implantation researchers and tumor biologists, highlighting aspects common to invasion of trophoblast and tumor cells. The nature of invasiveness is still poorly understood. Nevertheless, examination of the interactions of invasive cells with cell adhesion molecules in extracellular matrix and at other cell surfaces, and of the regulation of buildup and degradation of cell surface and matrix components suggest that there are specific characteristics associated with the invasive phenotype.

As far as the host tissue is concerned, it was at this meeting that a new concept of the mechanism of hormonally regulated endometrial receptivity, an unsolved cell biological paradox, was discussed for the first time before an international forum of reproductive biologists: the concept that a partial loss of elements of apico-basal polarity may render the uterine epithelium receptive to attachment of trophoblast.

It was decided to publish these ideas in a volume of expanded and updated papers based on selected presentations from the Heidelberg meeting, as well as some related invited papers. We are grateful to Drs. R.K. Miller and H.A. Thiede, as well as to the Editorial Board of Trophoblast Research for including this volume in the series, to the reviewers for their comments, to Mss. G. Mathieu, J. White, B. Witte, and J. Crombie for taking up the immense load of secretarial and computer work, and to Plenum Press for their cooperation in producing the book.

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TROPHOBLAST INVASION AND ENDOMETRIAL RECEPTIVITY

Novel Aspects of the Cell Biology of Embryo Implantation

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