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Biology of Ovarian Follicles in Mammals

With 76 Figures

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This Book Is Dedicated to My Parents

Preface

Both functions of the mammalian ovary, the endocrine and (synthesis and secretion of steroid hormones) and exocrine (production of ova), depend upon the presence and cyclic growth of follicles, as the depletion of primordial follicles from the ovary leads to cessation of these functions or female reproduction in mammals, or to postmenopausal period in humans. Actually, various fertility and sterility problems at the ovarian level are related to follicles. Therefore, a thorough understanding of the biology of ovarian follicles in mammals is of fundamental interest to a wide variety of academic and scientific disciplines. Study of their structure, function, and control involves morphology, including ultrastructure, cell biology, physiology, endocrinology, biochemistry, immunology, neurobiology and pharmacology. Zoologists take interest in comparative and evolutionary aspects of biology of ovarian follicles in many different groups of mammals. Agricultural scientists and wildlife biologists need a thorough knowledge of the biology of follicles to control more effectively fecundity in domestic animals and endangered species of mammals. Finally, clinical scientists, toxicologists and physicians want to know the normal and pathological features of ovarian follicles in women, especially in relation to health and the regulation of fertility.

Having in view the great importance of studying various aspects of biology of ovarian follicles, numerous papers and reviews on several aspects of ovarian follicles are published annually in a wide variety of scientific journals. Unfortunately, it is impossible for a scientist, student or physician to go through even a small fraction of these publications. Also, little effort has been made to integrate the vast amount of information available and then to indicate the gaps betweens the physiological, endocrinological, biochemical, histochemical and morphological parameters of ovarian follicles. A much-needed interdisciplinary approach in the biology of ovarian follicles is very difficult and thus lacking. This book leads therefore to a greater understanding of cellular and molecular aspects of ovarian follicles in relation to their growth and atresia. The purpose of this book is to present a timely, thorough review on various aspects of ovarian follicles in mammals so that the student, scientist, or physician, regardless of discipline, can acquaint himself with the current state of knowledge in this most important compartment of the ovary as well in his own as in other related areas. This book is organized in seven chapters dealing with cellular and molecular aspects of ovarian follicles and besides presenting thorough, up-to-date reviews and extensive bibliographies on various aspects of the biology of ovarian follicles, future research needs related to each chapter are also clearly outlined. Therefore, the various chapters are up-to-date reviews which will serve as an important source for investigators of the biology of ovarian follicles for years to come. Clearly, there exist still great voids in our knowledge of the biology of ovarian follicles. It is

hoped that this book will serve as a stimulus for zoologists, reproductive biologists, endocrinologists, cellular, molecular and developmental biologists, animal scientists, gynecologists, obstetricians, etc. to fill in these gaps.

Getting a book such as this by a single author in one volume is a most difficult task, and I am greatly indebted to the following internationally known experts on follicles for critically reviewing and editing the chapters/sections pertaining to their particular fields of specialization: Dr. G. S. Greenwald for Chaps. I, II, III, VI and VII, except for Sects. B and F of Chap. III; Dr. C. A. Shivers and Dr. R. B. L. Gwatkin for Sect. B of Chap. III; Dr. K. P. McNatty for Sect. F of Chap. III; Dr. J. Richards for Chap. VII and Sect. D of Chap. III; Dr. J. van Blerkom for Chap. IV; and Dr. L. Espey for Chap. V. If some lacunae still remain, the author is responsible for these. Thanks are due to Dr. V. R. Parshad for checking the references and helping in the preparation of photomicrographs and subject index, and to S. Inderjit Singh for typing the manuscript. Thanks are also due to authors and copyright holders for permission to republish some of their illustrations, tables etc. Thanks are particularly due to Dr. Dieter Czeschlik and Linda Teppert of the Biology Department, Springer-Verlag, Heidelberg, for their excellent cooperation during the completion and publication of the book. I owe a lot to my wife Surinder and my children, Gurmeet, Harmeet and Rupa for providing constant encouragement and inspiration during the execution of this most difficult job.

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