Aging Gametes

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Aging Gametes
Their Biology and Pathology

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Emil Witschi 1890-1971

This volume is dedicated to the memory of
Emil Witschi, Mysterii Generationis Indagator Diligens,
who throughout his lifetime encouraged these writers
and all other investigators of aging gametes.

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Preface
Multicellular organisms are characterized by time-dependent, reproducible alterations in the structure and function of the cells composing them. Aging is an accepted property of such organisms. Eggs and spermatozoa share in this property but, in sharp contrast to multicellular organisms, do not have the opportunity to throw off spontaneous or induced mutations. Aging of gametes may lead to their partial deterioration or to loss of their vitality; consequently their normal development may be interfered with even at the earliest stages of segmentation. It is increasingly recognized that only those eggs that are fertilized at the stage of optimal maturity and vitality may develop normally and that conditions of overripeness of both male and female gametes are a major cause of developmental failure. Gametes become overripe either by retention in their storage chambers (ovaries in the female and excurrent ducts in the male) or by delay in fertilization after normal ovulation. Defective oocytes are more the cause of developmental anomalies than is a hostile uterine environment. Thus, fertilization of a devitalized egg may lead to abnormal development that may express itself in death and spontaneous abortion or resorption of the embryo or, more tragically, in the birth of a child with developmental abnormalities or with subtle deficiencies, including the full range of mental retardation. The exact time of ovulation in the human cannot as yet be determined. Therefore the aging human gamete presents us with a key and timely problem. The use of the rhythm method in family planning may significantly increase the number of aged oocytes that are fertilized. The ever-increasing number of vasectomies have led to the formation of ‘sperm banks’ for possible use in the production of progeny. There are insufficient data in the human on the length of time sperms retain not only their fertilizing ability but also, and more importantly, their ability to produce normal progeny after prolonged periods of cryogenic preservation. For whatever value lies in the comparison of species, cryogenic sperm preservation has been carried out in cattle over many years. It is regrettable that the data from this gene pool have never been critically enough evaluated to be of much comparative use.

Although the phenomenon is well documented, we are utterly ignorant of the mechanisms that control the progressive degeneration of millions of oocytes in the ovaries of the human female between birth and menopause. In considering the mass destruction of intraovular oocytes, the possibility exists that some of the eggs released intermittently during the fertile years, may suffer damage from aging, thereby devitalizing ova, which, when fertilized, lead to reproductive wastage.
The inescapable characteristic common to all aging systems is progressive and irreversible change. Eggs and spermatozoa are ideal cells with which to explore these systems in detail. It was the primary objective of this symposium to stimulate thinking about the aging processes in gametes and, by extension, to all cells. Thirty-five scientists from a variety of disciplines met for three days of discussion, evaluation, and planning at the University of Washington in the hope of opening the way for new directions in the search for meaningful information on this and related areas. To the reader many of the facts presented here may seem repetitive, useless in prospect or in immediate retrospect. Without the wearisome steps up the mountain there is no view. Whatever success this book may achieve is owing solely to the efforts of its contributing authors.

Acknowledgments

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