

MOLECULAR EMBRYOLOGY OF FLOWERING PLANTS

Raghavan, V.: Molecular Embryology of Flowering Plants. Cambridge University Press, New York, 1997, 690 pp., ISBN 0-521-552-46, price

A comprehensive review of the reproductive biology in angiosperms covering the stages of their sexual reproduction from anther and carpel determination till mature zygotic embryo. A special section has in this context been devoted to the adventive embryogenesis with somatic embryogenesis and embryogenic development of pollen grains involved. A brief account on the genetic transformation of embryos has also been situated in the concluding section of the book.

It is not the species-specific but general aspects of individual phases and events of reproductive process in various species of angiosperms on which the stress has been laid. Structural analysis of reproductive units together with implemented approaches of molecular biology in analysing the underlying mechanisms of their developmental changes has resulted into a new insight on the individual steps of reproductive biology of plants as integrated system of the continuous morphological and molecular events. The cytological and anatomical aspects of pollen, ovule and embryo development are minimized to a reasonable extent, the emphasis being laid on the changes at the DNA, RNA and protein levels, respectively. This is the most distinct feature by which the book differs from both the classical and recent treatments on the subject.

The retrospect and prospect of reproductive biology are dealt with in the introductory chapter reviewing methodological approaches which have been traditionally used in coping with basic topics of sexual and asexual reproduction of angiosperms. The challenge for a wider application of molecular and genetic engineering techniques aims at unravelling the principles which govern the differential gene activity and gene expression during development. The scope of molecular embryology has accordingly been defined in terms of both methodology and processes associated with spatial and temporal activation of specific genes during embryogenesis. The four subsequent sections dealing with Gametogenesis, Pollination and Fertilization, Zygotic Embryogenesis and Adventive Embryogenesis represent the core of the book with very detailed and complex description of the entire reproduction process and its successive stages. The formation of male and female gametophytes is examined in the section Gametogenesis. The illustration of the process is given not only from the standpoint of a typical course of

micro- and megagametogenesis but also with respect to the pollen abortion and male sterility. Except for its structural and functional aspects, the account on physiological and biochemical bases of male sterility is also given together with the role which mitochondrial genome plays in determining this phenomenon. A separate part of the Gametogenesis section concerns the gene expression during pollen development.

Biochemistry and structural analysis of pollen germination under *in vitro* conditions have been inserted into subsequent section entitled as Pollination and Fertilization. The section is focussed primarily on the pollen-pistil interactions and within this context also on the concomitant phenomena of self- and cross-incompatibility. Both respective systems of incompatibility are looked upon as the serious barriers to fertilization whose classification, genetic determination and molecular mechanism are amply illustrated in the self-incompatibility only. The cellular nature of the sperm and double fertilization represent the final part of the section in which fertilization event is presented as *in situ* phenomenon and also as the process studied via *in vitro* approaches. Simultaneously, it may be looked upon as a transition to the next section dealing with zygotic embryogenesis in which the molecular aspects of both endosperm and embryos are summarized predominantly, the stress being laid on characterization of the genes essential for embryogenesis as well as on the pattern of their expression during the process. A considerable part of the space in the account is also reserved for the cytology and regulation of storage protein synthesis.

Within context of the individual sections and parts of the book, a special mention should be made about the list of references with a total of 4,891 items involved that are presented on 135 pages and which represent a unique source of specialized literature. This aspect alone is worth of recommending the book to the students and specialists interested in plant embryology or to those working in this field of research, not speaking about the scientific value of the remaining sections mentioned so far which make the book an extraordinarily complex and informative contribution of the kind which has appeared during the last few decades.

Andrej Kormuták (Nitra, Slovakia)