Embryology of Angiosperms

Edited by B. M. Johri

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Foreword

Thirty-four years have elapsed since the publication of the late Professor P. Maheshwari's text, *An Introduction to the Embryology of Angiosperms*, a work which for many years served as an invaluable guide for students and a rich source book for research workers. Various texts dealing with sections of the broad spectrum of topics encompassed by Maheshwari in his book have appeared in the interim, but a compendious modern work dealing with the whole field has been lacking. This present volume splendidly meets the need, and it is altogether fitting that Professor B. M. Johri, long an associate and close colleague of Professor Maheshwari and himself a prolific contributor to the subject, should have undertaken the task of editing it.

When Maheshwari wrote, it was still feasible for one author to handle the subject, but today even someone with his fine breadth of vision and depth of understanding could not, alone, do it justice. So the effort has to be a collaborative one; and Professor Johri's achievement has been to bring together a team of authoritative collaborators, assign them their responsibilities, and put them to work to produce a text as integrated in its treatment as the diversity of the subject would allow. The product vividly illustrates the advances that have been made in the study of angiosperm reproductive systems in the last 30 years, and the book is surely destined to become the new standard for student and researcher alike.

Like many surveys of its kind, the text inevitably shows just how dependent progress during the last few decades has been on the advent of new technologies. The great observers of earlier generations reached the limits set by the resolution of the optical microscope in their investigations of the cytological and karyological phenomena associated with plant reproduction, and were restricted further by the preparation techniques they had available. Their modern successors have been blessed with new extensions of vision – on the one hand through the advent of electron microscopy, and on the other, through the further technical development of optical microscopy, marked, for example, by the introduction of phase and differential interference contrast, fluorescence techniques and image-processing systems. At the same time, specimen handling methods have improved apace, and the crumbling of hitherto stoutly maintained interdisciplinary barriers has meant that many workers today have gained a new competence to interpret what they observe through the support of physiological and biochemical experimentation. All this adequately accounts for the flood of new information. Yet, if one

message emerges from the present text as a whole – urged by author after author – it is that we are now but on the threshold of a new wave of discovery. No living group shows the diversity of reproductive method to be seen in the angiosperms; and no task in the whole field of biological research is more important for mankind than working the systems out and finding how to manipulate them for practical ends, for after all the flowering plants provide the indispensable basis of human life on earth. This volume is not only an epitome of knowledge, but an invitation and a challenge – a challenge, particularly, for the next generation of workers, some of whom may well find in its pages good reason for ignoring the facile appeal of test-tube biology in favour of making their contribution towards finding out more about how real plants go about the job of reproducing.

July 1984

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Preface

Since the publication of *Recent Advances in the Embryology of Angiosperms* (ed. P. Maheshwari) in 1963, there has been phenomenal progress in almost all areas of reproduction in flowering plants. This progress has resulted from investigations based on optical, electron (TEM, SEM), fluorescence, phase contrast, and interference (Nomarski effect) microscopy, cytochemistry, histochemistry, physiology and biochemistry. However, all this knowledge is scattered in a large number of periodicals and it has become a formidable task for both teachers and students to collect the necessary information. Hence this volume *Embryology of Angiosperms* – an advanced treatise comprising 16 chapters written by specialists who have devoted years of study to the subject.

The significant advances of the last 20–30 years have been discussed. The authors have raised several questions to seek new information, and have made appropriate mention of many unsolved problems. The text is adequately illustrated with line drawings and half-tones, including electron micrographs.

Every effort has been made to present a comprehensive up-to-date account. I have earnestly endeavoured to achieve uniformity in the format. Suggestions for further improvement would be most welcome.

I have no doubt that post-graduate and research students will find *Embryology of Angiosperms* a good source material. To those teaching "reproduction in flowering plants", the volume offers a fount of ready-made material.

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Acknowledgements

Through Dr. G.A. Nogler, Dr. Konrad F. Springer invited me to prepare an English translation of Professor A. Rutishauser's book *Embryologie und Fortpflanzungsbiologie der Angiospermen*. My experience of teaching undergraduate and postgraduate students for over three decades at the Universities of Agra, Rajasthan and Delhi has provided a deep insight into the various aspects of plant embryology. Also, over a span of almost 50 years, I have had unique opportunities to discuss problems of angiosperm embryology with eminent embryologists during my numerous visits both in India and abroad, and at international meetings. The idea of editing a volume consisting of contributions on recent developments in the embryology of angiosperms emerged out of these interactions. Dr. Springer readily agreed to my suggestion, and I am deeply indebted to him.

Professor J. Heslop-Harrison has done me a great favour in agreeing to prepare the "Foreword" to this volume.

I am grateful to the authors who accepted my invitation to write the chapters. The manuscripts were read by my colleagues in the University of Delhi and I especially thank Professor N.S. Rangaswamy, Dr. N.N. Bhandari, Dr. M.R. Vijayaraghavan, Dr. K.R. Shivanna and Dr. S. Natesh for offering valuable suggestions. I greatly appreciate the help rendered by Dr. K. B. Ambegaokar, who redrew several diagrams, reassembled many plates of illustrations, and prepared the indices.

Professor Dr. G. Melchers (Tübingen) provided photographs of the tomato + potato somatic hybrid. Professor Dr. E. Battaglia (Rome) sent a reprint containing the original diagrams of Fritillaria type of embryo sac. Professor Dr. F. Pospisil (Prague) sent photographs of pollen embryo sacs. Professor Dr. O. Erdelská (Bratislava) prepared an illustrated write-up on the role of microcinematography in embryology. Dr. Scott D. Russell (Norman) sent me his unpublished manuscripts, and electron micrographs of male gametes and fertilization in *Plumbago*. Dr. R. Wunderlich (Vienna), Dr. M. Luxova (Bratislava), Dr. L. Ahlstrand (Göteborg) and Dr. B.A. Fineran (Christchurch) made available the literature needed. I am much obliged to all of them for their gracious help.

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