

Plant Transgenesis

Guest Editors

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Preface

Thirty years of transgenic research in plants

In 1983, the first transgenic tissues and plants were generated by means of disarmed *Agrobacterium tumefaciens* strains, in which the oncogenes had been replaced by antibiotic resistance markers. Hence, this Special Issue of *The International Journal of Developmental Biology* celebrates 30 years of transgenic research in plants! Eminent scientists working in the field of plant transformation or plant biotechnology have contributed to this publication and reviewed the state-of-the-art of their particular subdomain or summarized the importance of transgenic research in the discovery of new mechanisms and the establishment of an entirely new field, such as epigenetics (Peter Meyer). The first part starts with a “personal impression” of Patricia Zambryski and a dialogue with Marc De Block, who both recalled the early stages and first successes in plant transgenic research of the Ghent research group headed by Marc Van Montagu and the late Jeff Schell. Of course, an interview with Marc Van Montagu could not be omitted, because he is one of the founding persons of plant biotechnology. He is still passionate about it and is actively involved in discussion forums and advisory boards and committees about genetically modified (GM) plants that are important to enhance yield in a changing climate and to feed the ever-increasing world population.

This Special Issue is divided in four parts. The first section, including the personal reminiscence and dialogues mentioned above, consists of an introduction to the principles of higher plant transformation from the agrobacterial and plant sides (Vitaly Citovsky, Mieke Van Lijsebettens, and Kan Wang). The second part highlights the importance of transgenic research in basic plant biology. Indeed, the functional analysis of genes was boosted by genetic transformation and construction of knockout and overexpression lines, not only in model plants, such as *Arabidopsis thaliana* (Minami Matsui), but also in crops, such as Leguminosae (Pascal Ratet). Three reviews (Darren Wells, Miriam Gifford, and Dave Jackson) illustrate the prospects of the use of reporter genes in the cell biological analysis of gene functions, in the biochemistry of protein-protein interactions, and in the monitoring of hormonal fluxes. Although the focus of this publication is mainly on higher plants, one paper was included that reviews the potential of *Physcomitrella patens* in evolutionary and basic biology research (Wolfgang Frank). The third part concentrates on biotechnological applications, such as metabolic pathway engineering (Paul Christou), antibody production in seeds for passive immunization (Ann Depicker), biotechnological aspects of nutrient uptake (Luis Herrera-Estrella), and emerging transgenic research in Liliaceae (Richard Immink). The fourth section consists of a compilation of promising novel technologies to position precisely the transgene of interest within the plant genome (Kathleen D’Halluin, Holger Puchta, and Alexander Vainstein), the engineering of B minichromosomes in barley (Andreas Houben), and the state-of-the-art on mitochondrial genome transformation (Claire Remacle).

No doubt that the quality of this Special Issue is the result of all the excellent contributions of our colleagues! A special thanks to Martine De Cock for her invaluable help in preparing it. Finally, we would like to acknowledge the Editor-in-chief, Juan Arechaga, for the invitation and suggestion of the plant biology-related theme. His advice and assistance have been greatly appreciated throughout the nine months of elaboration of this Special Issue, from selecting the topic, contacting colleagues, planning the different phases, and, last but not least, in the realization of the cover. We also enjoyed very much the collaboration with the Editorial Team of the *International Journal of Developmental Biology*.

Plant transgenesis has been of major importance in understanding how plants develop, function and adapt to their environment and has a growing impact on agriculture and the bio-industries. We are therefore convinced that the readers will find this Special Issue valuable for their research and teaching, and hope that it will be a source of inspiration for further explorations in basic plant biology and its applications!

Mieke Van Lijsebettens and Geert Angenon
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