

Preface to the Series

The term *genome*, the basic gene complement of an individual, is almost synonymous with the chromosome complement of both nucleus and organelles. Refinements in cellular, genetic and molecular methods in recent years have opened up unexplored avenues in genome research. The modern tools of gene and genome analyses, coupled with analysis of finer segments of gene sequences in chromosomes utilizing molecular hybridization, are now applied on a wider scale in different groups of plants, ranging from algae to angiosperms. This synergistic approach has made the study of biodiversity highly fascinating, permitting a deep insight into the molecular basis of genetic diversity. Simultaneous to the enrichment of fundamentals in systematics and phylogeny, the plant system, because of its inherent flexibility, has permitted genetic engineering and horizontal transfer of genes with immense importance in agriculture, horticulture and medicine.

Despite the fact that the data on plant genomics with its impact on the assessment of biodiversity and evolution show a logarithmic increase, a comprehensive series on the aspect covering all groups of plant kingdom is sadly lacking. In view of this lacuna, the present series on Plant Genomics: Biodiversity and Evolution has been planned. It aims to cover, in successive volumes, *comprehensive reviews, concepts and*

discussion on the results of genome analysis and their impact on systematics, taxonomy, phylogeny and evolution of all plant groups. We have not gone out of our way to seek original articles, but in course of reviews and discussions, research articles, if any, are welcome.

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Preface to this Volume

The present volume of the series on *Plant Genome—Biodiversity and Evolution* is the first one on "Lower Groups", including researches on algae, fungi, lichens and bryophytes. In researches on genomics, phylogeny and evolution, the lower groups of plants have not been targetted to the extent they deserve. This situation is rather ironical in view of the fact that the genome of yeast fungus *Saccharomyces cerevisiae* was the first eukaryote to be sequenced in full. Studies on lower groups, over and above their applicational value, are of paramount importance in our understanding of the origin, evolution and phylogeny of the plant kingdom.

This initial treatise on *Lower Groups* has a fair representation of fungi and one each of the other groups. It starts with the red algae *Florideophyceae* dealing with different lineages in the phylogenesis of the group. The importance of different parameters has been highlighted, indicating also the change in perspective through recent molecular studies.

Representation of fungi starts with *Leptosphaeria* complex, the ascomycete attacking the crucifers. The different parameters chosen for the study of genetic diversity, systematic status and phylogeny, include along with other features, production of toxin, biochemistry and molecular characteristics. Another representative of the ascomycete, the *Erysiphales* or the Powdery Mildew has been extensively dealt with

emphasizing the importance of rDNA sequences in outlining major lineages. The morphological evolution of this group vis-à-vis host expansion has been adequately stressed in view of its presence in diverse flowering plants. Finally, the well explored fungal group, the yeast has been covered reviewing the different levels of genome analysis, and genome evolution in the Hemiascomycetes. In the basidiomycete, the genomics, evolution and phylogeny, were studied in the oyster mushroom. The review has highlighted the use of rDNA sequences along with compatibility and biochemical data in the study of phylogeny. There is a chapter on phytopathogenic fungi in general, covering oomycetes as well. Concrete evidences have been presented demonstrating the importance of EST sequences in the study of comparative genomics gene expression and genome evolution in fungi.

Next group to be represented is Lichens—the symbiotic product of algae and fungi. Their origin, diversity and present status in evolution, as influenced by molecular studies, have been discussed in detail. Despite the data on genomics, the lacuna in relation to genes involved in symbiosis, has been pointed out.

In the liverwort, a special feature—the sex chromosomes and dioecism has been covered. The stepwise evolution of male and female determining sequences in Y and X chromosomes and the impact of *in situ* hybridization in this study have been demonstrated. Of the mosses, in Bryophytes, the use of the model system in *Physcomitrella* in functional genomics has been elaborated. The gene knockout experiments, in addition to recombination and biochemical mutation, are reviewed as tools for functional genomics.

The last article of this volume deals with the semi-autonomy of the organelle metabolism bringing forth the evidences of the transfer of the nuclear encoded genes to the organelles in course of evolution. The discontinuous evolution of the plastid genome is stressed, which is of fundamental importance.

This volume covers a wide range of genomics of lower groups with up-to-date reviews on specific topics. It provides the reader with a clear understanding of the present state-of-art in lower group genomics—its impact in evolution and a glimpse of the shape of things to come.

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