

Preface

To become proficient in teaching, research, and applications of genetics, the underlying concepts, phenomenon, hypotheses, theories, laws and principles must be thoroughly understood at the molecular level. The blueprint or genetic material responsible for the physical appearance of an organism resides inside the cell. This genetic material stores all the information for the development and survival of the individual and transmission of biological properties from one generation to the next. The first step for studying molecular biology/genetics/biotechnology is to gain an in-depth understanding of the nature, structure, molecular forms, location, biosynthesis, organization, analysis, sequencing, organo-chemical synthesis, packaging, replication, recombination, damage, repair, protection and evolution of genetic material in viruses, prokaryotes and eukaryotes. Genetic material performs its function by organizing itself in the form of genes, popularly called units of heredity. Knowing above-mentioned aspects of genetic material sets the stage for knowing about gene. In order to understand how a gene expresses itself to perform its function, its various aspects & gene structure, gene organization, genome evolution, gene function, transcription, RNA processing, genetic code, and translation, and fate of finished proteins, ribosomes and used messenger RNAs & need to be understood. This book *Gene Expression* has been written with the objective of providing comprehensive knowledge on these aspects of a gene. However, it is assumed that the reader has knowledge about the fundamental principles of genetics, and structure, organization, evolution and properties of genetic material.

Gene Expression is primarily designed as a text book. However, teachers and research scholars can very conveniently use it as a reference book. Undergraduate and graduate students, teachers and researchers in any discipline of life sciences, agricultural sciences, medicine, and biotechnology in all the conventional and agricultural universities, research institutes, and molecular biotechnology companies/colleges/institutes/schools across the world should find it useful.

This book provides a brief historical background in introductory paragraph(s) of every chapter. Recent progress is also discussed. Nobel Prize winning works find a special mention. Various hypotheses, principles, concepts, phenomenon of molecular genetics have been dealt with in a simple and lucid language. The text is supported by sufficient number of original references, tables, figures and flow diagrams where necessary. Special attention has been paid to the precise definitions of various terms in the subject in light of the present day knowledge. For this, there is a separate section on glossary of important terms used in the book. Recent literature relevant to the subject matter has been cited in the text and all such references have been listed at the end of every chapter. Where there are more than six authors, only first three have been mentioned, followed by et al. Throughout efforts have been made to pin-point applications/implications of different discoveries in the area of molecular genetics and biotechnology. Extensive cross-referencing has been done. *Gene Expression* should be extremely useful to those who are preparing for national and international level competitive

examinations, entrance tests, and interviews for jobs/fellowships. I trust the book will be an enjoyable reading experience. Strenuous efforts have been made to include all relevant information; however, if something is missing, the readers are urged to inform the author so that deficiencies can be corrected in a subsequent printing/edition. Style of presentation and selection of examples are purely my choice. I am responsible for any omissions and commissions. Readers' feedback will be appreciated.

Students have always been a guiding force to me in an indirect way in deciding order of different chapters in the book and organization of the contents in a chapter. Thus contribution of my present and past students in my books has been tremendous. During the writing of this book I have consulted a large number of original research papers, review articles, books, monographs, and web sites. My head bows with respect before all these great authors for their landmark works. I thank various copyright holders for granting me permission for use of their works in this book.

I am grateful to Dr. Kuldeep Singh, Director, School of Agricultural Biotechnology, Punjab Agricultural University, Ludhiana, India for his moral support and for providing facilities for my work.

Dr. S.S. Gosal, Director of Research, Punjab Agricultural University, Ludhiana, India, who himself is an experienced author, made very useful suggestions in the preparation of this book.

Stewardship provided by Dr. Manjit Singh Kang, former Vice-Chancellor, Punjab Agricultural University, Ludhiana, India, who himself has edited and authored several books in the area of genetics, is gratefully acknowledged. I also thank him for writing the Foreword of this book.

I must make mention of my immediate family, relatives and friends without whose involvement and support, completion of this book would not have been possible. No one can do any creative work such as writing of a book without the cooperation of his/her spouse. My wife Harjit showed utmost patience and cooperation during the preparation of this book. My son Jemmy and daughter-in-law Parvi made sure that I was free of tedious household duties like depositing bills and making purchases from the market. My daughter Simmi and son-in-law Shally motivated me by checking up on the progress of the book. My grandchildren, Prabhasis, Harmehar and Bhavneet were more of an encouragement rather than a disturbance to me. Because of his experience in writing manuals and books, I often consulted my dear nephew, Dr. Sandeep Singh, Assistant Entomologist, Punjab Agricultural University, Ludhiana. He also assisted me in compiling the subject index.

Mr. Gagandeep Singh typed the manuscript and drew figures meticulously. Mr. Gurdeep Singh of ALPS Educational Services, Ludhiana formatted the book for camera-ready printouts. I am very happy the way the book *Gene Expression* has come up with respect to format and design. For this, I whole heartedly thank Mr. N.K. Mehra, Managing Director, Narosa Publishing House Pvt. Ltd., New Delhi.

Gurbachan S. Miglani

Visiting Professor

Former Adjunct Professor

School of Agricultural Biotechnology

Professor of Genetics (Retired)

Department of Plant Breeding, Genetics and Biotechnology

Punjab Agricultural University, Ludhiana

Email: miglanigs1945@gmail.com