Preface

The ***genetics*** is a new subject of 20th century stemmed on the work of Mendel (1822 – 1884) who formulated the Laws of Heredity in the year 1866. However, his laws of inheritance remained hidden and came into existence with the beginning of 20th century with the rediscovery of these Laws after reviewing and recognizing their significance by three scientists in the year 1900 and coining the term *genetics* for the study of heredity and variation by William Bateson in the year1906. Thereafter, there has been tremendous progress and improvements in this field from phenotypic level of gene expression to molecular level (*replication*, *transcription* and *translation* of genetic material in the form of DNA and RNA as well as *new molecular techniques*). These tremendous advancements during 20th century made by various scientists has emerged a new branch of science called *genetics*.

Considered the need of the day to compile the entire subject matter related to *"Mendelian Genetics and Molecular Genetics"* in a single volume to meet the requirement as per syllabus of Post Graduate programme of Animal Genetics and Breeding taught in State Agricultural Universities in India. The related subject matter has been collected and compiled from different published sources covering the theoretical aspects and practical numerical problems and exercises, arranging and presenting the entire subject matter in a simple and illustrative language. The subject matter of *Genetics and Molecular Genetics* in this book has been covered in 3 parts comprising 27 chapters.

The *first part* covered *"Mendelian* or *classical genetics"* in 11 chapters dealing with introduction to genetics, sources of genetic variation, heredity and environment, Mendelism, Chromoomal theory of inheritance, Exceptions to Mendelism [Multiple alleles, gene expression (action) on phenotypic level, Linkage of genes and crossing

over], Sex determination and sex controlled inheritance. The *second part* is of the book covered *"Molecular genetics"* in 14 chapters on microbial genetics, genetic material (DNA) and its molecular structure, changes in its structure (mutation), and replication of DNA; Gene expression at molecular level (transcription and translation), Regulation of gene expression in prokaryotes and eukaryotes, Gene manipulation techniques and applications. The last *III part* covered *"Genetic Statistics"* which included 2 chapters on the probability and Chi-square testing of discrete variable.

This book on ***"Genetics"*** has been written to fulfill the hope and requirement of post-graduate students, teachers and of those intend to appear and pass the competitive examinations on All India basis like SRF, NET and ARS conducted by ASRB (ICAR), UGC and UPSC. However, the originality of subject matter is hereby not claimed by the authors but with lots of thanks to the original workers and earlier authors on different subject matter.

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The authors also welcome the readers to point out the mistakes that are likely to occur and to give suggestions for further improvement of the book.

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