



# Bioinformatic approaches for Livestock Genome Analysis

Rapid advancements in the molecular biology and genomics especially various genome sequencing projects, created a new major area of interest to the biologists, Bioinformatics, where biology merges with the computer science and information technology. Bioinformatics continue to be the main focus of attraction in the coming years, especially in the livestock production, as it will find more application in diagnostics, vaccine development, veterinary medicine, animal breeding and other disciplines of animal sciences. Also the advancements in next generation sequencing technologies will assist the animal scientists to understand the cellular and molecular mechanisms under different environmental conditions.

This book acquaints the readers with the basic bioinformatic tools which are essential for any molecular biology work like Various databases, Primer designing, Sequence alignment, Submission to Bankit and Molecular Phylogeny analysis. Further the book also introduces and details various advanced topics like Real time PCR, Next Generation Sequencing, Transcriptome Analysis, Genome Annotation, Computational Approach for development of DNA signature and applications of marker based technologies in Animal Breeding. The simplicity of language and clear illustrations in various bioinformatics softwares will help even a beginner to learn the tools with a clear understanding. The concise and clearly written book will provide invaluable resources for both the beginners and established researchers in various fields of animal sciences; as a well acquaintance with basic and advanced bioinformatic and in-silico tools can be acquired.

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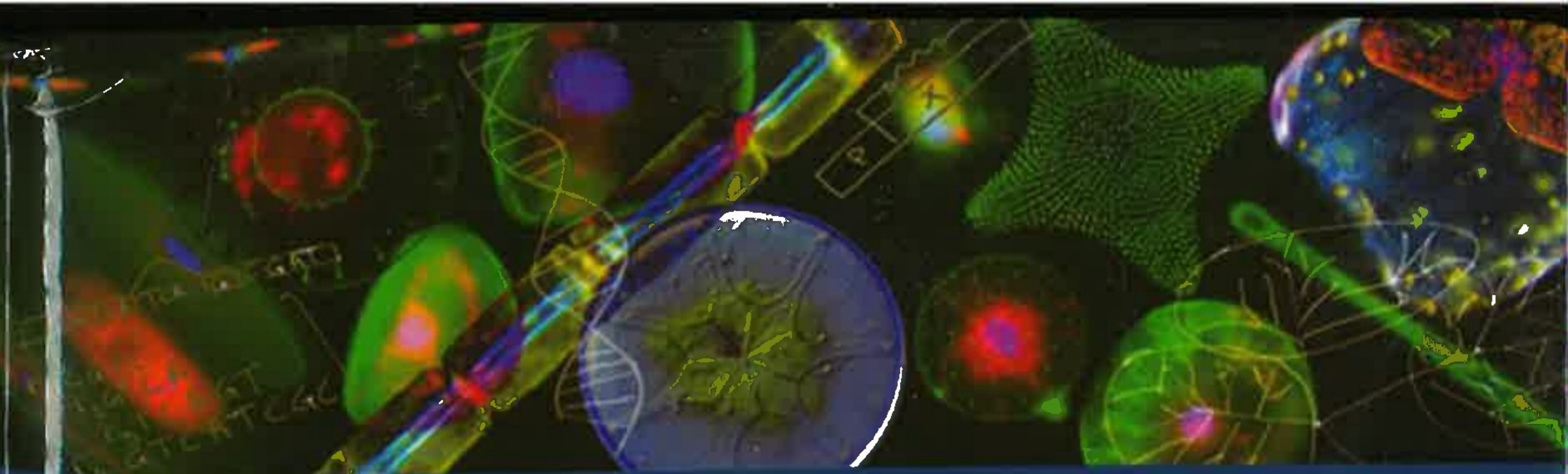
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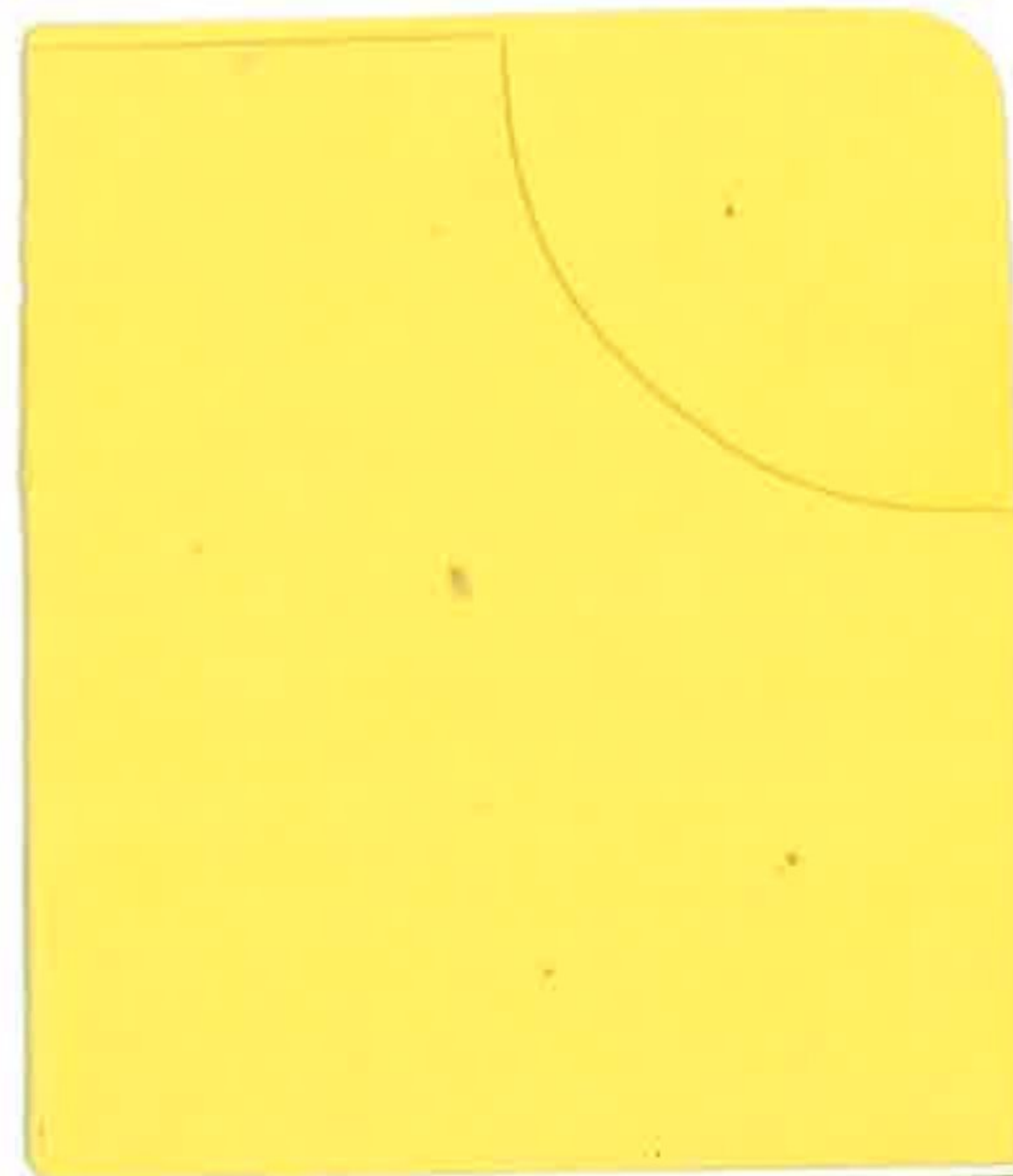
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Chapter 1

**Basic Bioinformatics Tools for  
Molecular Data Analysis**

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"Bioinformatics" is the branch of biological science which deals with the application of computer technology for management of biological data particularly the information generated on the genome of any organism. Computer software programmes are used to collect, store, analyze and integrate biological and genetic information. Bioinformatics also deals with algorithms, databases, artificial intelligence and soft computing. The bioinformatics tools shall be used in data mining, studying the evolutionary relationship of gene and protein sequences, studying the biological pathways and networks which are important parts of system biology. Molecular biology deals with the molecular basis of biological activity and overlaps with other areas of biology and chemistry, particularly genetics and biochemistry. Molecular biology chiefly concerns itself with understanding and the interactions between the various systems of a cell, including the interactions between the different types of DNA, RNA and protein biosynthesis as well as learning how these interactions are regulated. Bioinformatics is the field of science in which biology, computer science, and information technology merge into a single discipline which helps in sequencing and annotating genomes and their observed mutations in genetics and genomics. The ultimate goal of the field is to enable the discovery of new biological insights as well as to create a global perspective from which unifying principles in biology can be discerned. The amount of biological data is increasing at an exponential speed. Sequence data, both nucleotide and amino acid, has become one of the most important data types in bioinformatics. This has resulted in huge quantities of data in the databases which need to be analyzed