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It is globally well accepted that the *Annual Review of Biochemistry* is one of the highly reputed science publications on biological chemistry. This volume covers a wide range of advanced topics, including viruses.

The first chapter by Carol V. Robinson is about Christopher Dobson, a world-renowned scientist who passed away recently in 2019. It gives a brief account on the extraordinary quality of Dobson as a mentor, friend and a scientist of world-class reputation. The second chapter sheds light on the different biological properties of viruses. The third chapter deals with different properties and functional importance of ribonucleotide reductases. The fourth chapter is about synthetic genomes, and deals with synthetic genome delivery and genome editing using the CRISPR–Cas9 system. In the fifth chapter by Waterman *et al.*, discuss checkpoint responses to DNA double-strand breaks, different types of DNA damage and also different enzymes involved in DNA damage checkpoint. It is a known fact that mammalian DNA methyltransferases play an important role in development. Chapter six discusses more enzymes, mainly methyltransferases.

To understand the molecular function of DNA and RNA in various diseases and health conditions, we need proper experimental evidence. Imaging DNA and RNA in living eukaryotic cells will help in various ways and also reveal spatio-temporal dynamics of gene expression in a cell as discussed in chapter seven. Chapter eight covers different aspects of gene regulation inside living cells and explains more about molecular mechanisms of gene bursting. Chapter 9 by Field and Adelma deals with the evaluation of enhancer function and gene transcription. Chapter 10 describes gene transcription and its programming. It also covers the dynamic competition of polycomb group of (PcG) proteins and trithorax group (TrxG) of proteins, and their transcriptional programming. In chapter 11, Zylicz and Heard describe molecular mechanisms of facultative heterochromatin formation; more from the X-chromosome perspective. Recently, long noncoding RNAs (lncRNAs) are gaining attention from basic scientists as well as clinicians. In chapter 12, Rinn and Chang discuss lncRNAs and their molecular modalities to organismal functions. In 2020 Emmanuelle Charpentier and Jennifer A. Doudna were awarded the Nobel Prize in Chemistry for their major discovery that is one of the sharpest tools of genetic engineers, which is commonly known as CRISPR–Cas9 genetic scissors or CRISPR–Cas9 gene-editing technology. CRISPR is an acronym for 'clustered regularly interspaced short palindromic repeats'. These DNA palindromic sequences are mainly and commonly found in the genomes of prokaryotic organisms (bacteria and archaea). Chapter 13 deals with anti-CRISPRs, which are protein inhibitors of CRISPR–Cas systems.

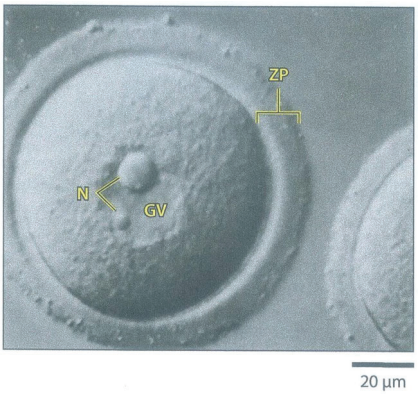
It is well-known that introns and exons play a major role in eukaryotic genome organization, gene expression and regulation. Removal of non-coding introns from a transcribed pre-mRNA, a type of primary transcript is an essential function of each eukaryotic cell by a specialized large ribonucleoprotein (RNP) complex called spliceosome. This complex is found primarily within the nucleus of eukaryotic cells. It constitutes small nuclear RNAs (snRNA), and numerous structural and functional proteins which also include some enzymes. Chapter 14 deals with spliceosome function.

Chapter 15 by Wilkinson, Charenton and Nagai discusses RNA splicing mechanism by the spliceosome. It is well known that ribosomes play a major role in protein synthesis and control cell division, and also help in various other functions. It is interesting to note how these ribosomal proteins synthesizes the whole proteome. Chapter 16 by Anais *et al.* deals with this basic aspect of cell and molecular biology. Also, quality control is essential for each cell to maintain protein turnover and also to prevent folding-associated life-threatening diseases. Chapter 17 discusses the detection and degradation of stalled nascent peptide chains as part of ribosome-associated quality control. Optical tweezers are very important tools in modern biophysics to study biomolecules at the single molecular level. Chapter 18 discusses the application of optical tweezers in biochemistry.

Chapter 19 by Lill and Freibert deals with mitochondrial iron–sulphur protein biogenesis. Mitochondria are essential organelles in eukaryotic cells. They play an important role in ATP synthesis and also control cellular respiration. Therefore, mitochondria are commonly known as the power house of the cells. Chapter 20 deals with mitochondrial proteases, which regulate various functions of mitochondrial plasticity. Mitochondrial dysfunctions lead to several diseases, including metabolic syndrome and cancer. Therefore, maintaining mitochondrial plasticity is important for a proper mitochondrial function.

The protein folding mechanism is essential for cellular function. Improper protein folding may result in various life-threatening diseases. Chapter 21 by Sebastian and Shoulders sheds light on proteostasis. In a biological system, to study various functions and also to design a drug for a particular disease we need to screen various drug molecules. Generally these drugs are small molecules and they can easily enter inside the cells. Once they enter inside the living cells they may bind to their specific known receptors or unknown proteins (orphan receptors). Chapter 22 deals with quantifying the target occupancy of these small drug molecules within the living cells. Ion pumps also play a major role in cellular communication and in membrane potential. Chapter 23 deals with the structure and mechanism of P-type ATPase ion pumps.

Chapter 24 by Thomas and Tampé deals with the ABC transporters. It provides information about the various functions of ABC transporters and their molecular mechanisms, including information about multidrug resistance. The



Light micrographs of the mouse zona pellucid (ZP). A light micrograph (Nomarski differential interference contrast) of a fully grown mouse oocyte showing the ZP, germinal vesicle (GV; nucleus) and nucleolus (N).

endoplasmic reticulum has many important cellular functions including lipid biosynthesis, calcium transport, ubiquitination, protein synthesis, etc. Chapter 25 deals with various functions of the endoplasmic reticulum. Chapter 26 discusses the myosin family of mechanoenzymes, and various therapeutic approaches.

Chapter 27 by Litscher and Wassarman sheds light on zona pellucida proteins (a glycoprotein layer surrounding the plasma membrane of most mammalian oocytes), fibrils and matrix, and their functional and structural importance. Cell-mediated immunity is also essential to fight against various pathogens, including the SARS-COV-2 virus. Scientifically, it is known that this type of immune response does not involve the production of antibodies. This cell-mediated immunity is mainly involved in the activation of phagocytes (which protect our body by ingesting harmful foreign antigens, particles, bacteria, viruses and dead cells), antigen-specific cytotoxic T-lymphocytes and also the release of different kinds of cytokines in response to a foreign antigen. Chapter 28 by Djaoud and Parham discusses HLAs, TCRs and KIRs.

Chapter 29 is about bacterial glycolipids. These biomolecules play a protective role in bacteria, but they may trigger inflammation and various kinds of diseases in humans or other hosts. A chapter 30 by Gunnar C. Hansson deals with mucins and the microbiome. Recently, the microbiome has gained attention among scientists from all over the world. Mucins have a protective role in our digestive system, especially in the stomach, small intestine and large intestine. Also, recently, gut microbiota research has changed the global biological science scenario with a lot of new and exciting information. Chapter 31 explains about photosynthesis in plants, and also discusses the mechanism of water oxidation in photosystem II and its relation to XFEL data.

Natural rubber is produced from the *Hevea brasiliensis* tree, and is classified as a polymer. It is an essential raw material for various large-scale industries and is used in the manufacture of vehicle tyres, medical devices, surgical gloves, aircraft and pacifiers, clothes, toys, etc. The final chapter by Yamashita and Takahashi deals with the molecular mechanisms of natural rubber biosynthesis and its applications.

Overall, this book is useful for elementary students of biochemistry as well as established scholars, scientists, teachers and faculties of biological science.

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