

BOOK REVIEWS

new theory and/or idea is proposed, even with observational/experimental connections. Hence, general attitude of scientific community remains unchanged. Indian scientists were not falling behind about the latest developments of physics then. Teachers and scientists in their lectures used to mention Einstein's work of light-quanta and relativity. Generally speaking, Indian scientists and academicians, like SNB, Saha, Raman, B. Misra, were supportive to Einstein's concept of light-quanta. However, the proposed theory by B. M. Sen questioned Einstein's concept. More interestingly, his objections remained unanswered by Einstein and the community.

Overall, it clearly establishes that some Indians had been in contact scientifically with Einstein. Also even in the early- to mid-1900s, some scientists remained neglected, like the case today.

With the rich history and tradition of working on relativity and astronomy by Indians, there are other academicians with whom Einstein had direct communication. For example, Jyotirmay Ghosh, a mathematician in the University of Dhaka, who solved some problems related to the Einstein equation, communicated with Einstein. Also the correspondence with Einstein by a 14-year-old student of SNB, later best known for his biochemistry research, Ratan Lal Brahmachary is known. Also, Einstein had correspondence with Panchanon Bhattacharyya of Krishnagar College, West Bengal, a Mathematics faculty member, correcting his confusion related to relativity. This confirms that Einstein was open to discuss matters with any academician. This example perhaps is important to put forward in the present context, when often there seems to be a tendency to narrow down the scientific window.

The book recalls a fundamental work related to general relativity and cosmology done by an Indian academician, AKR, namely the Raychaudhuri equation, even without any communication with Einstein, contrary to other cases. The book emphasizes that in the University of Calcutta syllabus, general relativity used to be taught in early 1900s itself. Astronomers in the Kodaikanal Observatory and Raman in his laboratory in Calcutta with Nihal Karan Sethi of Benaras Hindu University, performed experiments to confirm Einstein's theory.

However, Shah M. Sulaiman opposed Einstein's idea of general relativity. He

argued that observation could not confirm Einstein's theory, rather data are in accordance with his semi-classical theory. While some Indians opposed Sulaiman, some others, like Saha, A. C. Banerjee, who supported Einstein's work, also appreciated Sulaiman's independent theory. This confirms open mindedness of Indian scientists during those days.

To summarize, Indian scientists seemed to be well aware of the developments of modern theories. Many deserving Indian candidates were funded to go abroad and interact with well-known scientific personalities of the West, apart from Einstein. Many libraries had adequate books and journals even in early 1900s.

In this context, it has been attempted to establish that Einstein had communications with many Indian academicians, apart from SNB. Nevertheless, I do not think that the number is very appreciable, particularly in terms of positive science exchanges and their output, contrary to the main claimed theme of the book. I however agree with the author that the question related to 'Einstein's betraying SNB' emerged publicly only after death of SNB. The same goes with the Raman-Krishnan controversy. I do not think that Indians are too shy to speak out against their mentors when it is the question of academic integrity, definitely not in the current era. It is not easy to accept that about 60 years ago, even after passing away of Einstein, the situation was completely different, particularly in the eastern part of India, where most of the stories of the present book are based.

Overall, this book brings in many issues to trigger further discussion. While I personally do not agree with some of the conclusions drawn by the author, that does not go against the book's standing. Various facts provided in the book appear to be of excellent and unique value. I believe, the readers will enjoy it.

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Roger D. Kornberg, James E. Rothman, JoAnne Stubbe and Jeremy W. Thorner (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, California 94303-0139, USA. Vol. 88. x + 837 pages. Price: US\$ 116.

The *Annual Review of Biochemistry* is a popular and well accepted science publication on Biochemistry since its inception. It has already played a pivotal role in modern biochemistry and it publishes quality review articles in biological chemistry and molecular biology. Even after 88 years of its initiation, this publication is serving as an indispensable resource for both the practising biochemists as well as elementary students of biochemistry. Every year, the Annual Review of Biochemistry contains many important review articles on advanced aspects of modern biochemistry and serves as an important source of classical and canonical knowledge.

The book under review has various kinds of review articles on interdisciplinary subjects, including on structural biology, cell biology, cancer biology, molecular biology, genetic engineering, neurodegenerative disorders, microbiology and also an autobiographical sketch by Judith P. Klinman. As a woman, her journey in science and life is truly an inspiring story and will motivate many next generation students and scientists. This volume sheds light on advanced aspects of biochemistry and molecular biology. Biophysical techniques also played major role and have great importance in modern biochemistry and still holds good and have lot of applications in structural biology and biochemistry in depth. X-ray free-electron lasers are helping to elucidate the structural dynamics of various macromolecules such as bacteriorhodopsin. Membrane protein-lipid interactions play a major role in cellular functions. Probing the membrane protein-lipid interactions using mass spectrometry will aid in understanding cellular signalling.

Understanding the rapid changing and advanced aspects of biochemistry and molecular biology is the need of the hour. Christopher M. Dobson reviews the emergence of structural biology, multiplicity of biophysical techniques, heterogeneity of macromolecular structures, the characterization of macromolecular

interaction revolutions in X-ray crystallography and deals with future aspects of these applications. Henry N. Chapman reviews X-ray free-electron lasers for structure and dynamics of macromolecules. Cecilia *et al.* discuss about the structure of bacteriorhodopsin and its structural insights using X-ray lasers and synchrotron radiation.

The review on membrane protein–lipid interactions probed using mass spectrometry by Jani Reddy *et al.* gives information on membrane proteins and the applications of mass spectrometry to study these membrane proteins and the review is supported by another review article for assessing integrative structure modelling.

The eukaryotic base excision repair mechanism is one of the important topics in molecular biology. William *et al.* review new approaches to study the base excision repair mechanism and the enzymes involved in this biological process. They also discuss more about DNA end cleansing activities, macromolecular assemblies, step to step coordination in base excision repair and its regulation and finally their perspective about base excision repair mechanism. Jacqueline *et al.* review redox chemistry in the genome damage in association with the role of 4Fe4S cofactor in repair and replication.

There is an elegant review article which discusses more about evaluating and enhancing target specificity of gene-editing nucleases and deaminases. This review also discusses about CRISPR nucleases and Cas9 enzyme-mediated gene editing mechanism. All these gene editing and repair mechanism associated review articles add to our knowledge on cause for various cancer initiation and development and progression mechanism.

The BRAC genes are well known in cancer biology, especially their association with breast cancer. These BRCA tumour suppressors have major role in

homologous recombination and DNA damage repair function. Very commonly known mutations in the BRAC1 and BRAC2 genes predispose afflicted individuals to breast, ovarian and other cancers especially in women. The encoded product from these genes form protein complex with other tumour suppressor proteins and also with the recombinase enzyme RAD51 to mediate chromosome damage repair by homologous recombination. This review helps us in understanding these tumour suppressor function and also more about foundation for developing targeted cancer therapeutics. Along with this review, Garry *et al.* have discussed about cancer treatment in the genomic era. They discuss identification of cancer relevant genomic alterations, what makes an ideal predictive genomic biomarker? How to identify and validate clinically relevant cancer genomic alterations, the landscape of genomic alterations in cancer and actionable targets, implication of genomic data for clinical trials.

Ribosome is one of the important cellular machineries which aids in protein synthesis. Understanding the eukaryotic ribosome assembly is important from the point of cellular and molecular biology. Jochen Babler and Ed Hurt review eukaryotic ribosome and its assembly. The organizing principles of eukaryotic ribosome recruitment are presented in another review by Jerry and Nahum Sonenberg. There is also one more article which reviews mechanism of cotranslational maturation of newly synthesized proteins.

Adolfo and Jack Taunton review lysine-targeted inhibitors and chemoproteomic probes. Lingyun *et al.* review article gives more knowledge on application of the cellular thermal shift assay (CETSA). Another article reviews soluble methane monooxygenase enzyme and its application.

Lai *et al.* in their review discuss application of glycoengineered antibodies for modulating immune functions. Berna-

dette Breiden and Konrad Sandhoff's review lysosomal glycosphingolipid storage diseases. Another article reviews role of exosomes in cancer, neurodegenerative disorders, immunology, cell biology. Werner Kuhlbrandt reveals more knowledge about structure and mechanisms of F-type ATP synthases.

Shenghong *et al.* discuss cellular signalling pathways, especially the Hippo pathway. This review gives insight about the role of Hippo pathway in pathophysiology of various human diseases including cancers.

Xiaoyu *et al.* review small-molecule-based fluorescent sensors for selective detection of reactive oxygen species in biological systems. Johan Elf and Irmeli Barkefors review single-molecule kinetics in living cells and its application. Thomas D. Pollard and Ben O' Shaughnessy's article gives new information on molecular mechanism of cell division. Another review article discusses about mechanism of regulation of centriole and cilium biogenesis.

It is well known that propagation of protein aggregation is the major cause for neurodegenerative diseases. Commonly known proteins such as Amyloid, tau, prion are involved in these diseases. Jaime Vaquer-Alicea and Marc I. Diamond discuss these proteins and their role in formation of protein aggregation in these diseases. A review article on Botulinum and Tetanus neurotoxins reports on harmful effects of bacterial toxins.

I recommend this volume for general biochemistry students as well as advanced biochemistry researchers.

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