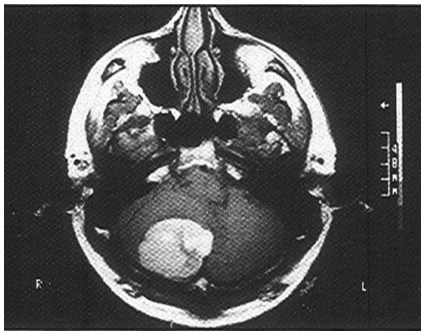

Melanocytoma of the central nervous system: hyperdense mass in the cerebellum.

Ovarian cancer is a lethal disease; this has meant that much research has gone into it. Yet, the survival rates for this disease have remained pretty much the same over the past 50 years. This is despite screening for ovarian cancer. Theoretically, an early diagnosed ovarian cancer would have better survival rates compared to late diagnosed conditions. However, early detection is not easy. A study has shown that in spite of intensive annual screening for ovarian cancer, 70% present with advanced-stage cancer and that there is no difference in the stage at detection between screened and non-screened groups.

Our understanding of the origins of ovarian cancer got a fillip – and an unexpected surprise, recently. After the discovery of BRCA-1/BRCA-2 and their mutations, and their relation to breast and ovarian cancers, some women in the West underwent prophylactic oophorectomy for the prevention of ovarian cancers. Pathologists examining the ovaries and fallopian tubes were surprised to find that it was the fallopian tube that harboured the features of early cancer. It was later hypothesized that tumour cells from these fallopian tube cancers were shed onto the ovary, and simulated primary ovarian cancer.

The current thinking is that there are two kinds of ovarian serous carcinomas – low grade and high grade. Low-grade tumours are genetically stable, unlike the high-grade tumours. Low-grade tumours are often indolent, and chemo-resistant, while high-grade cancers are at an advanced stage when discovered and are chemotherapy-sensitive. It is this latter group that must be detected early.

Of course, the path from understanding a disease to curing it, is more complex than one would imagine. The chapter on glioblastomas exemplifies this. Mammalian target of rapamycin (mTOR) is one such potential target in gliomas. mTOR exists in two complexes – mTORC1 and mTORC2 – which promote growth, survival and chemotherapy resistance of glioblastomas. Because of the importance of mTOR signalling in glioblastoma pathways, it was expected that the allosteric mTOR inhibitor rapamycin would be an effective therapy. However, phase I and phase II clinical trials showed no such benefit. It turns out that there is incomplete inhibition of mTOR signalling and insufficient suppression of mTORC1 signalling. This failure of rapamycin to achieve its intended target is similar to the resistance seen in glioblastoma patients treated with EGFR tyrosine kinase inhibitors.

Neutrophils are the soldiers of the body, a fact known to all of us right from our school days. Yet, most of us do not know much more about the functions of these cells. The complex nature of the neutrophil is elucidated in an essay, where, among the many things that we learn, is that there is now some doubt about the life span of neutrophils – they probably live for up to 5 days rather than 8–12 h, as has been believed all these years. Though neutrophils are the cells of the acute inflammatory response, they are also involved in diverse conditions. Neutrophils are involved in the regulation of dendritic cells, B and T lymphocyte function, macrophage and natural killer cells. They act on endothelial and epithelial cells as well. Finally, they have been implicated in chronic lesions such as atherosclerotic lesions (where in addition to initiation and progression of the plaque, neutrophils may contribute to thrombosis, stroke and myocardial infarction through intravascular thrombus growth), as well as in autoimmune conditions such as systemic lupus erythematosus and surprisingly, in allergic diseases as well as in anaphylaxis. Finally, inflammatory bowel disease and cancer are other groups of diseases in which neutrophils play an important role. In inflammatory bowel disease, overproduction of reactive oxygen species (ROS) by neutrophils may contribute to the development of malignancy.

Pathogen killing by neutrophils is done by phagocytosis, generation of ROS and degranulation. A new mechanism, NETosis (neutrophil extracellular trap) is a fascinating phenomenon that has been described only in the past decade. NETosis is the process by which neutrophils extrude a meshwork of chromatin fibres which are decorated with granule-derived antimicrobial peptides and enzymes such as neutrophil elastase and MPO. However, there is a flip side to NETosis: excess NET formation is related to different conditions, including vasculitis, sepsis and lupus nephritis. Thrombosis and endothelial cell injury and preeclampsia of pregnancy are also associated with it.

Not without good reason is the *Annual Review of Pathology* a journal that I and thousands of researchers around the world look forward to every year.

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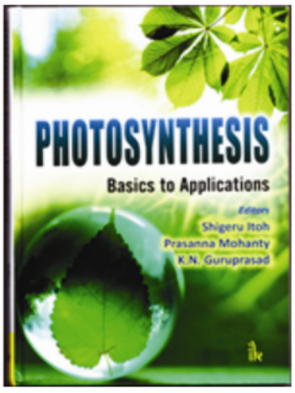

Photosynthesis: Basics to Applications, Second Edition. Shigeru Itoh, Late Prasanna Mohanty and K. N. Guruprasad (eds). I.K. International Publishing House Pvt Ltd, S-25, Green Park Extn, Uphaar Cinema Market, New Delhi 110 016. 2015. 308 pp. Price: Rs 200. ISBN: 978-93-84588-54-0.

This book was inspired by an International Conference on Photosynthesis held at the University of Indore in November 2008, in honour of Govindjee, an inspirational and indefatigable teacher and a distinguished researcher, who is known internationally for his contributions to photosynthesis research. Selected participants from the conference were invited to contribute research and review articles. The first edition of this book was published in 2012 entitled *Photosynthesis* –

Overviews on Recent Progress and Future Perspective. Three experts in the field – Shigeru Itoh, late Prasanna Mohanty and K. N. Guruprasad, have edited both the editions. The second edition, dedicated to Govindjee, also pays tribute to one of the editors of the book; Prasanna Mohanty, who contributed three chapters, but passed away before its publication.

The Foreword is written by George C. Papageorgiou, an eminent scientist and the first Ph D student of Govindjee. He has also provided an Appendix that lists all the books in the series 'Advances in Photosynthesis' (now 'Advances in Photosynthesis and Respiration Including Bioenergy and Related Processes') that was founded by Govindjee in the early 1990s. This in itself provides a useful resource for teachers, students and researchers alike for finding information on many topics covered in the area of photosynthesis.

As the title suggests, the book covers a wide variety of topics that will be of interest to postgraduate students of photosynthesis as well as to research scientists. It contains 19 chapters. All of them contributed by leading experts in the respective areas from across the world: Azerbaijan, Canada, Germany, India, Japan, Korea, Russia, Sweden and USA. The first chapter 'Dissecting oxygenic photosynthesis: the evolution of the "Z"-scheme for thylakoid reactions' sets the tone for the book and is written by two great educationists and researchers in the field: Govindjee and Lars Olof Björn. It gives a lucid explanation of the 'photosynthetic unit', the minimum quantum requirement of oxygen evolution, and the ideas and experiments that ultimately gave shape to the 'Z'-scheme that we all use in our teaching. The chapter includes up-to-date structural models of the water oxidizing complex of photosystem II, F_0F_1-ATPase and organization of various complexes in the thylakoid membrane. It is like reading a mystery story where the pieces of the puzzle fall into place one by one till the final picture emerges and makes for a great read.

The second chapter 'Molecular architecture of photosynthetic apparatus' describes the modular organization and spatial interactions of the various complexes involved in the photosynthetic process and extends these concepts to all metabolic pathways by concluding that 'a leap of faith in imagination and technology would be required to conceptualize the molecular architecture *in vivo* for precise functions and regulation of metabolic pathway'. The next five chapters are devoted to various topics: state shifts or state transitions (chapter 3), dissipation of excess energy absorbed by photosynthetic apparatus (chapter 4), functional sites of electron transfer cofactors of photosystem II (chapter 5), and delayed fluorescence and emission/excitation spectra and activation energy (chapters 6 and 7). In addition to the theoretical groundwork, chapter 3 discusses various experimental techniques used to probe these changes, while chapter 5 describes the theory, sample preparation, and technique of pulsed EPR. Chapter 6 discusses the interesting and intriguing chlorophyll *d*-based photosystems I and II in the cyanobacterium *Acayochloris marina*. Chapter 7 presents results that demonstrate delayed fluorescence in a millisecond time range as a probe for donor site-induced photoinhibition. It is a non-invasive technique that can be widely applied for *in vivo* measurements in plants, cyanobacteria or algae.

The next three chapters cover leaf variegation in *Arabidopsis thaliana* (chapter 8), transcriptional response to low-O_2 conditions in *Synechocystis* (chapter 9), and mutants of chlorophyllide a oxygenase (chapter 10). These chapters describe the latest molecular biology approaches that have been used to address the topics, including the use of site-directed mutagenesis and microarray analysis. These approaches, combined with classical techniques of spectroscopy and fluorescence measurements, make a powerful combination for both basic and applied research in photosynthesis – the theme of the book.

How photosynthetic organisms cope with and adapt to various biotic and abiotic stresses has been an area of intense investigations. The remaining nine chapters (11–19) are devoted to stress responses and adaptation strategies adopted by photosynthetic organisms to a variety of stresses and senescence. Topics include the effects of nitrite anions on photosynthetic electron transport chain (chapter 11), redox and ROS-linked metabolic shuttles between mitochondrial oxidative metabolism and photosynthetic carbon assimilation (chapter 12), leaf senescence and abiotic stresses (chapter 13), heat stress (chapter 14), salinity tolerance in mangroves (chapter 15), metal toxicity (chapters 16 and 17), senescence and sugar signalling (chapter 18), and UV radiation (chapter 19). All chapters provide comprehensive recent progress in the study of molecular mechanisms of stress responses. They combine information from various classic photobiology and modern molecular genetics techniques, thus providing a useful and handy reference for a beginner as well as an experienced scientist.

The strength of the book lies in a vast landscape of the field of photosynthesis, and in uniting the early research on the organization of the photosynthetic machinery with the latest ideas and approaches. All chapters give excellent overviews as well as describe pertinent results with illustrations and references. In short, it is a useful resource for any department concerned with teaching and research in basic and applied photosynthesis at not only postgraduate, but also at graduate and undergraduate levels. I recommend this book to all libraries at universities as well as at research institutions.

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