

## BOOK REVIEWS

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from around the world that describe novel techniques and brief results and it is heartening to see one from the Western Ghats featured here.

There are a few typos and a picture of the common langur has been described as a 'macaque from the Western Ghats'. Apart from these, the book is well edited and has useful illustrations and photographs that help in visualizing and describing the techniques detailed in the text.

The 5th International Canopy Conference held in India in 2009 was a shot in the arm for canopy research in India, providing a platform for researchers from across the world to share their work with peers in front of an Indian audience. Many scientists and students from the Asian region also participated and will find this book a valuable addition to their libraries. This book would serve not only as an introduction to research on canopies, but as an inspiration for students and researchers looking to reach new heights.

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This Annual Review starts with 'A conversation with Leonard and Leonore Herzenberg' and once again emphasizes the very porous boundaries for the subject of Physiology. Some of us would argue that there is, indeed, no need to define boundaries at all. I was riveted while reading this article. The Herzenbergs are best known for developing fluorescence flow cytometry and the technology of hybridomas, but the free flowing conversation that they have with one of their former students, Mario Roederer, a senior investigator at the Vaccine Research Centre at the National

Institutes of Health, provides many more insights. It is a conversation that reveals the difficulties faced by women in science and the prejudices that they have to overcome. It is a story of the intersecting circles of science and politics, and the difficult choices that scientists have to make. It is a revelation of the changes in the funding environment, not only in quantum but in emphasis, and how this impacts the progress of science. It is about the value of informal learning, the open sharing of great minds around a coffee table or a glass of wine – of advice and knowledge freely given and shared without restriction. It is also a story of using disadvantage as a stepping stone to success. While this is a story of a different place and perhaps for young people in science, a different time, the themes of the 'conversation' seem ever-enduring and worthy of quiet reflection. This is definitely a part of the annual review that I would recommend everyone reads regardless of their specialization.

As it often happens when I first see the Annual Review, my attention then shifts to the 'Special Topic' which in the current volume focuses on the 'Role of gut hormones in nutrient homeostasis'. The thought that immediately came to mind is the seminal work of Bayliss and Starling who discovered the first hormone 'Secretin' in 1902, and then opened the flood gates for a whole new area of study. It was, however, only in the 1970s and 1980s that the study and discovery of new gut hormones really took off. I remember as a post-graduate student being completely fascinated by the work of Stephen Bloom at the Royal Post-graduate Medical School at Hammsmith Hospital where he pioneered the discovery of several gut hormones, carefully elucidating their physiology. The special topic in this volume is a reminder of the time and continued research required to translate early physiological findings into clinical practice. This is, in fact, the focus of the introduction to the section by Patricia Brubaker entitled 'Gut hormones fulfill their destiny: from basic physiology to the clinic'. The specific hormones that are discussed include ghrelin, glucagon-like peptide-1, glucagon-like peptide-2 and the gut hormone peptide YY and their role in appetite control and weight maintenance, glucose homeostasis and diabetes, as well as mucosal integrity and nutritional support of patients. All these are clinical issues of

current concern and I can see this section having a particular appeal to basic scientists working in the area, nutritional physiologists and clinicians.

It is many decades since Bernard Katz won the Nobel Prize for his work on neuromuscular and synaptic transmission. The quantal release of acetylcholine by exocytosis at the neuromuscular junction which gives rise to the end plate potential is part of standard teaching in physiology. Over the years, however, a more nuanced understanding of the molecular events related to exocytosis at the neuromuscular junction has emerged. The section on Neurophysiology has three articles which help us better understand the variations in the mechanisms of exocytosis and endocytosis, and the regulatory implications; the molecular mechanisms of neurotransmitter release; and the plasticity of dendritic spines.

Students of physiology will all be aware of the counter-current mechanisms involved in the concentration and regulation of urine production. The Loops of Henle with their differential permeability at different segments help to generate the medullary concentration gradient while the hair-pin loops of the blood vessels (the vasa recta) help to maintain the concentration gradient. The present section of renal physiology has an outstanding chapter on the changing concepts of the urine-concentrating mechanism. The article focuses on three key advances in our understanding: first, a better resolution of the anatomic relationships in the medulla; second, a better understanding of the regulation of water, urea and sodium transport proteins, key to the generation of the medullary osmotic gradient, and finally, improvements in the mathematical modelling of the urine concentrating mechanism. This chapter is a 'must-read' for all postgraduate students of medical and general physiology.

Brown adipose tissue (BAT) plays an essential role in the newborn in protecting the baby from hypothermia and is also abundant in hibernating animals. Brown fat persists into adulthood in humans, in smaller quantities in the inter-scapular area and around the kidneys, and is regulated by  $\beta 3$  adrenergic receptors. Brown fat differs from white adipose tissue in many ways but importantly in a protein called the uncoupling protein which allows for the enhanced generation of heat. Work aimed at eluci-

dating the role of brown fat in adult humans struggled with the development of techniques that could evaluate brown adipose tissue function noninvasively, a barrier that was significantly overcome with newer functional imaging methods. Valuable insights were gained on BAT thermogenesis and its role in cold-induced thermogenesis and in overall energy homeostasis. Subsequent research has shifted to understanding the developmental lineages of thermogenic adipocytes, and the control of thermogenic adipocyte development and function. I found the article by Kajimura and Saito on BAT biology particularly lucid and comprehensive. Another article within the endocrinology section continues to address the issue of energy metabolism, but in relation to the central control of feeding and metabolism, particularly in relation to the function of the hypothalamus. Students of physiology will recall classical experiments of lesioning and stimulation which led to the discovery of the feeding and satiety centres in the hypothalamus. Continued work in recent times has raised our understanding of the developmental origins of adult disease and hypothalamic function. The article by Lee and Blackshaw titled 'Feed your head: neurodevelopmental control of feeding and metabolism' focuses on early-life environmental regulation of adult metabolism, during gestation and in the early postnatal period, and on the epigenetic regulation of metabolic imprinting. The chapter is important and topical in that it provides a robust physiological framework for some of the clinical discourse on the rapidly rising rates of obesity and its co-morbid conditions (cardiovascular disease, diabetes

and cancer, among others) and the role of nutritional excess or scarcity on the development of the foetus and on 'metabolic imprinting'.

The section on Respiratory Physiology is a mix of relatively novel areas and more conventional areas with new understandings. Thus, there is an article on 'Live imaging of the lung' by Looney and Bhattacharya which focuses on the use of intravital lung imaging techniques to evaluate the role of mitochondria in lung immunity. I would imagine that most physiologists, including myself, are not familiar with the intricacies of the technique. In addition, however, the authors also take pains to explain the possibilities, and application and limitations of the technique and my sense is that we will be reading a lot more of findings using this method. Another topical issue that is discussed in this section is the article 'Nanoparticles, lung injury, and the role of oxidant stress' by Madl and colleagues. The review examines the state of understanding of the health effects of incidental and engineered nanoparticle exposure on the lung. Tobacco exposure-induced morbidity and mortality continues to be a public health concern despite public health campaigns. The article by Morse and Rosas on 'Tobacco smoke-induced lung fibrosis and emphysema' is a stark reminder that despite decades of research there is still much that we do not know. Among other issues, the authors use the two lung phenotypes of fibrosis and emphysema to try and throw some light on why only some people exposed to tobacco smoke develop disease and why the manifestations of those who do develop disease vary widely.

I found this volume of *Annual Review of Physiology* gripping as always. There is much in this volume that would be of interest to integrative and comparative physiologists, basic scientists and academic clinicians. The themes covered are varied, as are the approaches and the scope. The exposure to new techniques in a comprehensive but readable style will be a benefit to students. So how is the *Annual Review of Physiology* best read? Without meaning to be instructive, I came across this quote from Susan Hill which I thought particularly relevant – 'Fast reading will not get us cadence and complexities of style and language. It will not get us anything that enters not just the conscious mind but the unconscious. It will not allow the book to burrow down into our memory and become part of ourselves, the accumulation of knowledge and wisdom and vicarious experience which helps to form us as complete human beings. It will not develop our awareness or add to the sum of our knowledge and intelligence. Read parts of a newspaper quickly or an encyclopaedia entry, or a fast-food thriller, but do not insult yourself or a book which has been created with its author's painstakingly acquired skill and effort, by seeing how fast you can dispose of it.' I enjoyed a slow and easy paced read of the review – there was much to mull about.

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