

Annual Review of Nutrition, 2019. Patrick J. Stover and Rudi Balling. Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, California 94303-0139, USA. Vol. 39. xii + 348 pages. Price: US\$ 116.00.

The *Annual Review of Nutrition* is a series in the subject area of nutrition. The other publications in related areas of nutrition by the same publishers are *Annual Reviews of Animal Biosciences, Biochemistry, Food Science and Technology, Physiology, Public Health, and Statistics*, and nearly 45 different subject areas spanning from anthropology to linguistics and vision science.

In this volume, there are 14 chapters by 53 authors and many of whom are well known in the field of nutrition. It has nearly 320 pages of text with excellent colour illustrations of high quality, and figures and tables which add to the presentation and quantification of data analysed and conclusions drawn in the various chapters. Due to paucity of space, it may not be possible to review each chapter. I have clustered them by closeness of subjects and provided comments and have reviewed the same briefly.

The first chapter by Janet King on 'Maintaining balance' is a biography and covers the various areas she has worked on as a dietician, faculty in academia and leadership in research encompassing 55 years of her career. This is a good way to capture one's professional contribution. The author has connected with documentation as a narrative recording almost half a century of experience in a few pages. King has done an excellent job of connecting nutrition science with career-building and the different aspects of her work with links leading to a consolidated and concise article befitting to her contribution in the area of nutrition.

The next few chapters are on diet-related aspects like dietary fuels in athletic performance, evidence-based dietary guidelines and the role of metal ions (like copper) transport and functions in the body, iron supplementation in pregnancy and in children – risks and benefits, and the role of exercise and training in nutrition for professionals like athletes. The role of carbohydrates, restoration of energy and glycogen in post-exercise diet in certain special diets like ketogenic diet, is well captured. So also the pre-exercise and post-exercise pro-

tein replenishment is shown to be important in building muscles when it is specific metal ions like copper and iron. The current concept of copper ions having beneficial effects (a traditionally well-known way of storing water in copper vessels in India and other countries) of the metal in its oxidized form is well substantiated on evidence based science. Iron deficiency in children and its effects in later life and homeostasis of iron are addressed in depth. Overall, the articles (four) mentioned above are not in order in the book. Perhaps they could have been subgrouped as metal ions and nutrition, and dietary role of the same in nutrition, which would have made it more reader-friendly.

As regards organ functions and dysfunctions in the context of nutrition, the chapters on ocular carotenoids status, the role of brain barriers and vitamin transport, pancreas, and microbiota crosstalk, are excellent. For example, the role of carotenoids in eye health is well represented pictorially, with real data and colour contrast which is worth reading even for a non-nutritionist. The evidence-based approach of dietary guidelines is also addressed. There is no mention of dietary guideline policies that need to be changed with regard to nutrition in any of these chapters. These are linked to the economic situation of a region in particular context. This agenda of economic situation and nutrition is not fully addressed from the bottom of the pyramid approach, which is a practical way to move forward than the top-down approach of only the policy. It is always a combination of both. The microbiota and its role in pancreatitis, pancreatic insufficiency and pancreatic cancer is a small chapter compared to the volume of information available. This is an important subject area and there could have been an in-depth analysis and a broad-based separate chapter related to pancreatic diseases.

The last group of chapters which I have clubbed together are the bile acids as metabolic regulators, mitochondrial DNA mutation and diseases, time-restricted eating to prevent and manage chronic diseases, and economic reforms in taxation of sugar-based sweetened beverages (this is out of alignment with the science chapters in this volume). The article on mitochondrial DNA mutation is well-written and comprehensive. A detailed discussion of mutation in disease

condition on the cellular basis of disease development is the focus in this chapter. Similarly blood–brain barrier and nutrients from a different perspective of how even though the diet is rich in nutrition, when it comes to mutation in DNA or addressing the issues of the blood–brain barrier the energy driven cellular steps will dominate the events is not brought out very clearly from a thermodynamic point of view. This is more chemistry driven channels especially for vitamin transport, etc. in the origin of cause of certain diseases. These two articles could have been grouped together for a better perspective of adaptation of the body to external aberrations. The topic of time-restricted eating has not received much attention in many reviews and books. I am glad it is addressed here. The editors have given it a prime place and relating it to physiology and organ functioning and gut health is a drive-home point. The chapter is well written and even a non-nutritionist can understand the concepts and practice it for a healthy lifestyle to prevent and manage certain non-communicable diseases. This chapter misses the long hours of fasting and its role in health, which is practised in many parts of the world as tradition.

Overall, the present volume of *Annual Reviews of Nutrition* is a good reference material to nutritionists globally, and covers a wide range of topics on basic nutritional sciences and scientific evidence compiled. Except for the fact that the connected chapters are not grouped together to completely comprehend the essence of this volume. It serves as a very useful addition to any library.

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Annual Review of Astronomy and Astrophysics, 2019. S. M. Faber, Ewine van Dishoeck and Robert C. Kennicutt (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, California 94303-0139, USA. Vol. 57. xii + 674 pages. Price: US\$ 116.00.

Each year's Annual Review is a treat, and this year's (2019) collection of

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reviews has kept the promise. The first article every year is a memoir of a distinguished astronomer, and this year, it is from a person who held the position of Chief Astronomer at NASA almost from its inception, from 1959, for two decades. Nancy Grace Roman not only steered the very first astronomy satellites launched by NASA, but was also responsible for the development of the Hubble Space Telescope, which was finally launched in 1989 and revolutionized astronomy, which earned her the nickname 'mother of Hubble' and rightly so. She studied astronomy in an era when women were not encouraged to take up science in high school, let alone in universities. In this memoir, which she submitted just before she passed away, she writes about her struggles and achievements, the story of her problems with Ph.D. supervisor William Morgan at the University of Chicago, and how she steadfastly overcame the obstacles because of her determination and mental strength. She even mentions the legendary S. Chandrasekhar, who was a faculty in the department, and who once remarked that it was not the policy of discrimination against women, but that they could get women 'for less' to do the same work, which makes her wonder how a person who must have faced discrimination among the Europeans and Americans, could have been insensitive to the problems faced by women. It is a memoir that should be read by all practicing scientists, even if to remind ourselves the long way we have come. Personally, I was inspired by her taking up computer lessons in mid-fifties, learning to write programs at an age that most of us would likely to simply manage with what we already know and be a science manager. She always took up the challenge of learning new things, and did not think less of going back to teaching children after her retirement.

Other articles are no less interesting. Among the reviews on solar system bodies, there is one on cometary chemistry, after the adventurous rendezvous of Rosetta mission with the Comet 67P. The detailed results obtained from the mission revealed that the amount of organic molecules that could have been delivered to the Earth by comets was substantial. The variation of deuterium to hydrogen ratio in different comets is now thought to be due to variation of the ratio in the protoplanetary disk, which was inhomogeneous, and from which comets originated.

Another article on the relation between solar corona and solar wind reviews the important work that have been done on this topic in recent years. There are still many unanswered questions in this regard, and the data are not yet sufficient to cull the right theoretical model, and the article points towards the direction of future observations that can help resolve the issues. A related review of the solar chromosphere shows how detailed 3D simulations have helped to understand the role played by magnetohydrodynamic shock waves in the energetics and dynamics of chromosphere, that was not possible with previous simpler 1-dimensional models.

A review of the studies of atmospheres of exoplanets shows that the field is on the verge of a revolution of some sort. Very detailed observations are now available for tens of exoplanets. Recent studies have also revealed a rich diversity of chemical compositions and processes in those atmospheres than astronomers had expected from the studies of solar system objects. It appears that astronomers are hopeful of detecting biosignatures in an exoplanet over the next decade, which would be an exhilarating discovery.

Going beyond the solar system, the evolution of star clusters is the topic of a fascinating review. We learn about recent findings regarding the formation of stars in molecular clouds, and the aftermath of this process. Molecular clouds are inherently inhomogeneous, and stars form in the densest parts. This process also pushes the gas away, except from very dense regions. The continuous removal of gas for a hundred million years can unbind a cluster, which then slowly disperses. These processes leave a signature on the cluster mass function, because they are not equally effective over all mass scales.

A variety of highly luminous supernovae have intrigued astronomers for the last decade or so, and a review in this collection sums up the data as well as the theoretical ideas. It is perhaps too early to expect theoretical models to develop to the extent of explaining the rich collection of data. It could be that the source of enormous energy lies in a rapidly spinning magnetar or an accreting black hole, or in some cases, even some radioactive isotopes such as ^{56}Ni . How-

ever, despite the difficulties in understanding the phenomena, the prospect of using such supernovae as standard beacons for cosmological studies is exciting indeed.

Another intriguing phenomenon that has kept astronomers agog is that of fast radio bursts. These short, milli-second bursts of radio signals have several aspects that challenge simple interpretations. Some of them are seen to repeat, while some others are not, and in some cases, it is apparent that magnetars are the culprit behind the burst. The distances can sometimes be measured, but the amount of gas that the radio signals have appeared to have passed through is so enormous that it defies simple explanations. These bursts are sure to keep astronomers busy for some time to come.

Moving to extragalactic objects, a review on galaxy evolution through the observations of bright lines emitted by them is timely. Stars typically do not emit bright lines, and only show absorption lines in their spectra, and so galaxies, being collections of stars, mainly show absorption lines. However, regions of star formation, in which photons from stars excite gas and make them emit bright emission lines, can be a useful probe for studying the properties of galaxies. Another review on very faint dwarf galaxies, which form the lowest rung in the hierarchy of galaxies in the universe, shows that they are not only interesting from the point of view galaxy evolution, but also for testing dark matter physics.

In addition, there are also reviews on jets from active galactic nuclei, and cosmological tests of gravity. On one hand there have been attempts to test the general theory of relativity to more accuracy than ever, and on the other hand, to go beyond the standard theory in order to explain some of the cosmological observations. The detection of gravitational wave has also opened the way to study the cosmological importance of variations in these models, and this article discusses some ideas for future tests, which may herald a new golden age for the study of general relativity.

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