



Medical Education in Western India: Grant Medical College and Sir Jamsetjee Jejeebhoy's Hospital. Sunil Pandya. Cambridge Scholars Publishing, Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK. 2019. xxiv + 561 pages. Price: £70.99.

This book reflects extensive scholarly activity by the author Sunil Pandya, on medical education in western India in general, and more specifically the early history of his alma mater, Grant Medical College (GMC) and Sir Jamsetjee Jejeebhoy Hospital (JJ Hospital), Mumbai. This book review is in two parts. The first part will inform the reader how the book is structured and what broad information they can expect to find in it. The second part deals with my own interpretation of the book, its value and messages for our times.

The book is divided into eight parts. Part I is a relatively short introductory section which sets the stage for the remainder of the book and deals with medicine in India before the advent of the Europeans, The East India Company and the education of local citizens in Bombay in English. Part II addresses medical education and practice in Bombay Presidency before the setting up of GMC and JJ Hospital. Contained in this part are chapters on indigenous medical education and practice before 1826, public health in Bombay up to 1845, early medical institutions in Bombay and the Bombay Native Dispensary, and The Native Medical School, among others. Part III is, understandably, the largest section of the book, and focuses on the genesis and early history of GMC and JJ Hospital. Within this section are described the early administration, including the rules and regulations, the scholarships

and prizes, and an analysis of students admitted into the college, among others. An important chapter in this section relates to Dr Charles Morehead's (the first Principal, Superintendent and Professor of the Principles and Practice of Medicine in the new college and hospital) comments on medical education. Part IV is devoted to the development of the medical college following the departure of its founding Principal, Dr Morehead; a reader cannot but be drawn to his charisma, zeal and outstanding leadership. While several events and issues are covered in this section, the chapter which gripped me was the one which discussed the decline of the medical college following the departure of Dr Morehead. A question that could occur to a reader is whether medical education in GMC in its early years was comparable with the medical education in countries abroad and with that of the already established medical colleges in India in Calcutta and Madras. The author anticipates this question and devotes Part V of the book to this comparison – it is a matter of pride that under the farsighted leadership of Dr Morehead, GMC had instituted a rigorous system of clinical training at the bedside and an examination 'for the protection of the community' and the 'character of the profession'. In this matter, the training of GMC was superior to that of medical colleges in Europe, Britain and USA, or indeed, in Calcutta and Madras, where medical students were most often poorly trained due to the absence of systematic clinical instruction. Part VI focuses on later developments in Bombay, particularly as it pertains to the education of women in medicine and of the development of nursing. Parts VII and VIII are relatively small sections of the book that relate to the establishment of the Bombay Medical Council, a forerunner of the later Medical Council of India (MCI) and other miscellanea. The value of the book is considerably enhanced by the appendices, two of which have extensive biographical notes on medical doctors/administrators who influenced medical education in Bombay Presidency and in GMC. The extensive list of references is not only a testimony of the work involved in the writing of this book, but a huge resource for scholars who wish to delve deeper into the field. The index is a welcome addition – I found it particularly useful when I was searching for some of the content I wanted to re-read.

Those who have attempted to write institutional history will readily appreciate the quantum of work involved in writing this book. Those who read institutional history will value this book as a welcome departure from the hagiography that so often characterizes commissioned institutional histories. What Pandya has attempted to do, and in my view succeeded unequivocally, is to present an in-depth, erudite rendering of medical education in western India before, at the time of the founding of the GMC, and in the immediate aftermath of its beginning. The extensive quotes from primary sources allow readers to form their own opinions, and, at the same time transport them to a different time in history. I found myself responding to these quotes in an almost visceral way. I felt indignant when I read James McAdam's words in 1832 that 'medical knowledge is not communicable to the natives of this country', but was uplifted and inspired by the actions and words of Sir Robert Grant and Dr Morehead, two key individuals in the genesis of GMC. This is, however, more than an institutional history. By placing the history of GMC in a wider context of 'native' education and healthcare in Bombay Presidency, Pandya presents us with a book that has an appeal to a wider audience. I have often encountered people who believe that institutions maintain an 'archive' from which history can be readily written. While this may exist in a few institutions, most institutional archives as they exist are incomplete, poorly catalogued and also poorly maintained. The vast bibliography of this book indicates the care with which Pandya has gone about accumulating information from multiple sources, over what I can imagine is a considerable amount of time to piece together a remarkable story. The book is peppered with illustrations, photographs and tables which tell a story of their own, and which enhance the extensive narrative.

Does the book have contemporary value? We could argue that all knowledge does. In the specific context of medical education, however, the book has innumerable lessons for today over a 150 years after the founding of GMC. The wisdom of Dr Morehead, who promoted bedside teaching and clinical examination so that the public would not be inflicted with incompetent doctors, resonates today in the new competency-based

medical curriculum of the MCI that will be rolled out later in 2019. At the same time, it is a stark reminder that for over 150 years we have failed to capitalise on the initial foundations that were laid in the early GMC curriculum. The book also reminds us that things can deteriorate if we do not continually align ourselves to the fundamental purpose for which an institution is started. These are only a couple of the many lessons that speak to us today. There are many more.

When I was asked to review this book, I readily agreed. There is a paucity of in-depth literature on medical institutions in India, and this book is a valuable addition to this literature. It would be good if this book inspires others to probe their own institutional history and disseminate it. This book is not one that you can read and keep aside – I found myself going back again and again to review various aspects as I continued in my daily work as a medical educator. This book should find a place in every library, particularly in medical college libraries – I am glad it has a place in mine.

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Annual Review of Plant Biology, 2018. Sabeeha S. Merchant, Wilhelm Grissem and Donald Ort (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, California 94303-0139, USA. Vol. 69. vii + 815 pp. Price: US\$ 112.

Last year I reviewed the *Annual Review of Plant Biology (ARPB) 2017*. This year when I received an invitation to review this volume of *ARPB*, I readily accepted as this gives me an opportunity to update myself on different topics that are reviewed by the experts in their research areas. However, I did not realize that this volume has 29 chapters running into 815 pages, including the prefatory chapter, lot more compared to the 2017 volume which had 21 chapters included in 586 pages. The size of *ARPB* is increasing, which reflects the pace at which the

science is advancing, and many interesting and important discoveries are being made almost on weekly basis.

One of the important areas of research that has been a focus of many plant laboratories is to understand the mechanisms of perception of external stimuli, and biochemical and molecular components for transducing the information to regulate plant growth and development. In this context there are three chapters that deal with protein kinases. Liang and Zhou describe the nature of receptor-like cytoplasmic kinases which are involved in transmembrane signalling; specifically they have reviewed their role in defence responses against microbial pathogens. The receptor-like cytoplasmic kinases, many of which have been identified, seem to interact with receptor kinases that perceive brassinosteroids to regulate various developmental processes like pollen tube guidance, floral organ abscission and even abiotic stress responses, possibly thorough phosphorylation relay mechanisms. As shown in figure 3, receptor-like cytoplasmic kinases also interact with mitogen activated protein kinase (MAPK) cascade. Komis *et al.* bring out in detail, the role of MAPK in cellular functions and development. They have given a detailed entry of functions and localization of MAPK cascade members, as reported from different species, and have lucidly presented in figure 2, the main MAPK modules involved in the development of vegetative parts, as also during flower development. Since plants possess a cell wall, how do signals get perceived and transduced at the level of the cell wall? Lately, plant malectin-like receptor kinases, also known as *Cathranthus roseus* receptor-like kinase 1-like proteins (*CrRLK1Ls*) have been shown as potential cell-wall sensors which also can interact with receptor-like cytoplasmic kinases, mentioned above, and other signalling partners, like RALF peptides, or RAC and Rho GTPases, etc. to control plant processes. Such malectin-like kinases have been reviewed by Franck *et al.* They discuss in more detail the comparative genomics of these kinases and also their important role in plant immunity, reproduction, hormone signalling and abiotic stress tolerance.

During the last decade various cellular signalling components have been described which function on their own or crosstalk with others to regulate gene expression and development. In this

volume, the role of a few of them has been presented. Production of reactive oxygen species (ROS) is mostly considered to be toxic to plants, and hence the system has built up antioxidative mechanism to remove or reduce the impact of such oxidants as ROS. However, during the last decade or more, ROS have emerged as a major regulatory molecule.

Waszczak *et al.* have compiled relevant papers on the production of ROS in different organelles, mechanisms of ROS sensing, which can be determined by local sensors, and how increased ROS production can initiate signalling between organelles as well as between cells. They have discussed in detail the role of ROS in plant development, especially during stomatal closure and in plant immunity. One of the regulators that can coordinate immune and growth responses are jasmonates. In the complexity of signal network is the major stress hormone, jasmonate and the receptor active conjugate jasmonyl-L-isoleucine (JA-Ile) which regulate transcriptional responses to environmental cues. All this is reviewed by Howe *et al.* It has been brought out clearly that JAZ proteins, which are transcriptional repressors of transcriptional factor MYCs, contribute to diversity of jasmonate-regulated processes by forming various JAZ interaction modules. One of the precursors of JA-Ile is jasmonic acid, an oxypilin. During the last decade, the mechanism of action of oxypilins, especially jasmonates, and their role in plant stress responses have been elucidated in a number of cases. Wasternack and Feussner have covered in detail the biochemistry and function of oxypilins, and their important role as signalling molecules in defence and development, which occurs also by fine-tuning the homeostasis of the active and inactive compounds generated by oxypilin metabolism. In addition to these somewhat related signals, this volume has a detailed account on nitrate as a signalling molecule by Wang *et al.* During the last decade lot of information has accumulated on the mechanism of nitrate transport, distribution within different parts, and on the perception and signalling pathways. A detailed listing and possible roles of NRT1 and NPF transporters from different systems have been given as also how transgenic approaches using some of these components have been used to improve nitrogen use efficiency, plant growth and yield.