

the relevance of electrochemistry in cell polarity with particular reference to electric field effects in *Dictyostelium*, fish keratocytes and fungi. These reviews highlight how physics and chemistry play a role in cell development and can provide deeper insights into the process.

Several reviews revisit areas that have been extensively investigated over the years and also reviewed extensively. The topics reviewed include viruses and cell-fusion mechanisms, bacterial pathogen manipulation of host-membrane trafficking, protein sorting, various aspects of secretion, cell death, proteases involved in development, cell adhesion, immunology and mitochondria. The different strategies used by extracellular and intracellular bacteria in manipulating host-membrane trafficking machinery are the subject of the review by Asrat *et al.* Fusion of biological membranes has been extensively investigated as several crucial biological processes depend on membrane fusion. Viruses have provided important insights into how diverse proteins bring about membrane fusion. The review by Podbilewicz highlights these aspects extensively and indicates what remains to be solved. Guo *et al.* review protein sorting at the trans golgi network, highlighting the importance of the network in disease conditions. Freeman describes rhomboid proteases that are a family of conserved intramembrane serine proteases. Their participation in diverse biological functions is highlighted. Their possible use in medicine in the future is discussed. Colombo *et al.* review various aspects of exosomes and other extracellular vesicles. Their possible applications in the development of therapeutics, biomarkers and vaccines are mentioned. Ashkenazi and Salvesen highlight the current status of signalling mechanisms involved in regulated cell death. Labbé *et al.* review various aspects of mitochondrial behaviour and their roles in healthy and disease states. Though an area of extensive investigation, several unsolved issues are highlighted by the authors. Leckband and de Rooij review various aspects of the adhesion protein the cadherin. They also address unsolved problems in the area. Qi *et al.* describe cell dynamics and spatial organization of lymph nodes in relation to innate and adaptive immunity in secondary lymphoid tissue.

As with previous issues of the *Annual Reviews of Cell and Developmental Bio-*

logy, there are focused reviews on neurobiology. Molecular mechanisms of synaptic specificity are reviewed by Yogeve and Shen. Allen describes astrocyte regulation of synaptic behaviour. The cell biology of neurogenesis in relation to development of the neocortex is reviewed by Taverna *et al.* Myelination of the nervous system is discussed by Nave and Werner, highlighting various aspects of mechanism and function.

Topics related to epigenetics and gene regulation are featured in five reviews. Gallagher reviews intercellular movement of key transcription factors and transcriptional regulators in *Arabidopsis thaliana*. Non-coding RNAs and epigenetic mechanisms during X-chromosome inactivation are reviewed by Gendrel and Heard. Zygotic genome activation during maternal to zygotic transition is described by Lee *et al.* The authors address future issues in the area. Filipescu *et al.* review histone H3 variants and their chaperones during development and disease. Ivshina *et al.* discuss the action of cytoplasmic polyadenylation element binding (CPEB) proteins and their importance in neurological disease.

Considering the current interest in stem cells, particularly from a therapeutic point of view, three reviews deal with 'Mesenchymal' stem cells (MSCs) and embryonic stem cells. Aspects of embryonic stem cells and future issues are addressed by Martello and Smith. Various aspects of mesenchymal stem cells and their application in cell therapy are discussed by Bianco. Haploid mouse embryonic stem cells with reference to genetic screening and germline transmission are reviewed by Wutz.

Another interesting review is one on the dog genome, which often does not get featured in such volumes. The review would interest cell biologists and veterinarians. The dog is the subject of review by Schoenebeck and Ostrander. Considering that dogs are popular pets world over, the review would be of interest to those interested in dog genetics as well as dog-lovers. The review dwells on genetic approaches to various aspects of dog physiology such as body size, leg length, tail length as well as diseases. The issues that need to be addressed in the future are summarized at the end of the review.

The titles of the articles from volumes 26 to 30 of this series, at the end, indicate vast areas of cell and developmental

biology that have been covered over the years with hardly any repetition. The tables and schematic sketches provide updates which would be useful to those who would like to undertake research in these areas. Some of them also indicate problems that are yet to be solved. The review would be of interest to young investigators who are starting their research career as well as established researchers.

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Jonathan E. Fielding, Ross C. Brownson and Lawrence W. Green (eds). *Annual Reviews*, 4139 El Camino Way, P.O. Box 10139, Palo Alto, CA 94303-0139, USA. Vol. 36. xv + 627 pages. Price US\$ 93.

The *Annual Reviews* traditionally have a thematic 'symposium' which I look forward to. I was a bit disappointed this year with the theme 'Strategies to prevent gun violence'. In previous years, the symposium has spoken to a wider global audience. While the issue of gun violence is no doubt topical and relevant for the United States where firearm-related deaths compete with those from motor vehicles in absolute numbers, and in other countries where this is a problem, I can imagine that it will be section that many will give a skip. Fortunately, the rest of the volume is filled with interesting chapters that cater to the varied needs of individuals involved with, or interested in public health.

My bias for the history of medicine led me to read the chapter by Alfredo Morabia first. The chapter is entitled 'Has epidemiology become infatuated with methods? A historical perspective on the place of methods during the classical (1945–1965) phase of epidemiology'. A chapter like this would appeal to anyone with a sense of the history of science, particularly in a rapidly changing discipline. Morabia starts off by highlighting the close connect that epidemiology has traditionally had with public health

action. He quotes two doyens of the discipline to reinforce this stand; Abraham Lilienfeld, who in 1973 vituperated against ‘those in our discipline who seek to separate science from practice’, and the renowned medical statistician Bradford Hill who in 1953 quipped that the ‘biostatistician must acquire a taste for lying down with the epidemiologist’. Morabia traces the evolution of epidemiological methods in terms of the use of standardized measures of disease and risk, study designs, confounding and bias, interactions and causal inference, to suggest that improvements in methods have resulted in a theoretical framework that did not exist before, in epidemiology gaining more respect as a science because it has become methodologically stronger, and that it has made its public health mission more likely to succeed because of this stronger methodology. The chapter is excellently written.

An increasing concern for the population burden of non-communicable disease (NCD) prompts Paul Whelton to discuss ‘The elusiveness of population-wide high blood pressure control’. Many reports have identified high blood pressure as one of the best examples of a surrogate measure of cardiovascular disease, particularly stroke. High BP is, of course, a modifiable risk factor for cardiovascular disease. Worldwide estimates at the turn of the century suggested that 1 billion adults had hypertension, two-thirds of them in the developing countries. This topic is thus relevant for India. In the US, the recent NHANES survey suggested that approximately 82.7% of the population was aware that it had high BP, 75.6% was treated for it and only 51.8% was adequately controlled. These data speak to the need for simple interventions that can address the gap between awareness, treatment and BP control. In a country like India, awareness is likely to be lower, as also treatment and adequate control – we are also likely to observe large variations in these measures across geography and social class. Thus, this article is a timely reminder that ‘enhanced efforts to prevent and treat high BP are feasible, and pursuit of cost-effective approaches that will yield substantial benefits should be a very high priority for societies and the public health community’.

An article of particular concern to India, given its rapid pace of industrial-

ization, urbanization and efforts to boost agricultural productivity is that of Bruce Lanphear on ‘The impact of toxins on the developing brain’. The litany of toxins grows ever longer and includes those from industrial pollutants, indoor air pollutants, pesticides, etc. Evidence has slowly accumulated that environmental toxins at relatively low exposures are related to a range of issues, including low birth weight, shortened gestation and intellectual deficits. Lanphear argues persuasively for the link between low-dose toxin exposures and ‘new’ morbidities such as autism, learning disabilities and attention-deficit hyperactivity disorder (ADHD). The focus of his article is the impact of toxins on the developing brain and the possible long-term implications of this. Early in his article he draws our attention to the infamous Minamata outbreak of mercury poisoning from contaminated fish, which demonstrated that the placenta was not a barrier to toxins, contrary to the beliefs of the time. I found this article particularly gripping and was swayed by the strong rationale that while small exposures to toxins on the developing brain are usually subtle for an individual child, the damage can be substantial at the population level. For those whose interests are not specifically in the area of environmental pollutants, or who do not want to wade through the data that the article provides, a 7 min lucid video has been developed by the author (available on YouTube) called ‘Little things matter’. In a related article, Silbergeld *et al.* write on ‘Regulating chemicals: law, science, and the unbearable burdens of regulation’. Using the situation of the US, they highlight the limitations of the law in dealing with the issues of new toxins and chemicals generated by industry. They also highlight the failure of science in influencing the amendment of law and close their article with a discussion of the European model (REACH, passed in 2007), which places the burden of proof to demonstrate safety prior to authorization to market its products on industry – ‘no data, no market’. Interestingly, a number of Asian countries have now adopted the European model including China, Japan, Taiwan and South Korea. The REACH model emerges as an important point of focus for all economies to follow, to ensure an effective environmental health policy while maintaining economic momentum.

Public health research has had to constantly direct its energies to changing circumstances. Conflicts, widely disparate economies, and natural disasters and catastrophes, among other issues, have resulted in the mass movements of people. Although predating the present migrant crisis in Europe, the article ‘Immigration as a social determinant of health’ by Castaneda *et al.* seems particularly pertinent. The social determinants of health model are critical in the thinking of public health researchers and continue to set them apart from a large number of health practitioners ensconced in a more biomedical model, with a focus on immediate but limited gains. The authors argue that the social determinants of health model, which has been used extensively in public health have been applied in a rather limited manner to immigrants. Yet, applying this model is essential to ensure optimal health and equal access to health care for immigrants.

An important area of current public health research is the use and evaluation of new and emerging technologies to address a variety of public health issues. Mobile text messaging has been used in the promotion of healthy behaviours, smoking cessation, treatment compliance as well as monitoring treatment outcomes such as blood pressure and blood sugar. Amanda Hall *et al.* address this area of research in ‘Mobile text messaging for health: a systematic review of reviews’, with the aim of identifying mobile text messaging interventions designed for health improvement and behaviour change, and to derive recommendations for practice. In an interesting and related article on new technologies, Oldenberg *et al.* describe community interventions such as the North Karelia Project and the Stanford Community Studies, which demonstrated the influence of lifestyle-related factors on chronic disease and were conducted within the ‘old communications landscape’. The authors then go on to discuss new technology interventions for health, including mobile or mHealth interventions, computer or internet/web-based interventions, telehealth and the use of social media and social networking programmes. While these newer technologies are promising, several challenges have emerged which are related to the user profiles of these technologies and the quantum of data that are generated,

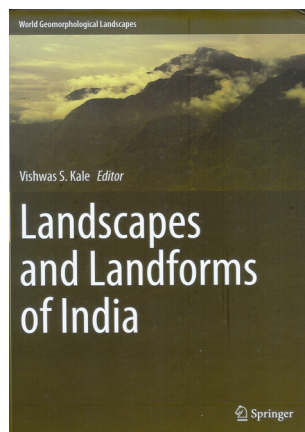
among others. The authors argue that conventional methods of evaluation of interventions need to be replaced by newer paradigms and methods, many of which are in the process of being tried out. This chapter is an essential read.

I close this book review with mention of an article that I believe addresses all individuals involved in public health and public health research: 'Translating evidence into population health improvement: strategies and barriers' by Steven Woolf *et al.* There is no public health researcher I know who does not believe or hope that his/her work will ultimately impact policy. Unfortunately, this is most often not the case. This article written in an easily readable style, while drawing on a large body of literature sets the stage with a simple fact – 'key questions chosen by investigators and funders may not always align with the information priorities of decision makers, nor are the findings always presented in a form that is useful for or relevant to the decisions at hand'. This, I believe is sage advice for those in public health, who chase research publications as an end in itself and believe that translation is an organic process that naturally ensues. The authors offer four suggestions for success: 'research that is responsive to user needs, an understanding of the decision-making environment, effective stakeholder agreement, and strategic communication'. A clear lesson is that researchers cannot be closeted in their ivory towers – they will need to move out, strategize, network and acquire new skills.

I found the absence of any articles on infectious diseases disconcerting, given that we have far from won these battles as evidenced by the ongoing Ebola outbreak in Western Africa (three new cases in Liberia, at the time of writing this review), and the disturbing reports of increased antibiotic resistance worldwide. These will no doubt be dealt with in the future. As a reader and researcher, despite some misgivings that I have voiced, I found that this volume in the tradition of its predecessors continues to educate, and to challenge us to think, reflect and act.

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Landscapes and Landforms of India. Vishwas S. Kale (ed.). Springer Dordrecht, Heidelberg, 2014. xiii + 271 pages. Price: €99,99.

This book is the third volume in the *World Geomorphological Landscapes* book series published by Springer under the scientific patronage of the International Association of Geomorphologists (IAG). It portrays the immense geomorphic variety of the Indian subcontinent with straightforward descriptions and copious illustrations. The main goal, as outlined in the Preface, is to highlight the significance of geomorphology in understanding the landscape; thus, an emphasis on the processes of formation, preservation and heritage value of landforms is apparent as one peruses through the pages of this book. It has been partitioned into sections ensuring a smooth reading, commencing with an overview of the factors controlling landscape development, and concluding with the cultural and tourism significance of landscapes. The book, in my opinion, is an outstanding compilation of geomorphic information on the various morphotectonic provinces of India and the development of distinct landforms therein, evolved under the influence of past and present climates. The editor, Vishwas Kale, deserves all the credit for putting together the contributions from several authors to assimilate information from diverse landscapes in the Indian subcontinent.

The contents of this book are divided into four parts. The physical environment and geomorphic history comprises part I, whereas the details of the major geomorphic provinces are given in part II. In part III, distinct landscapes and landforms from within various provinces are

described, while part IV focuses on the geoheritage and geotourism aspects.

Part I contains a prologue on the physiography and landscape evolution of the Indian subcontinent, which sets a background for understanding how the landforms have taken shape through time and the factors that have actually controlled their existence. The three chapters provide a lithological, tectonic and climatic context to the geomorphic set-up in India. The chapter on 'Geological and tectonic framework of India: providing context to geomorphologic development' by Tandon *et al.*, is a crisp account of the geomorphological evolution of the Indian subcontinent into orogens, cratons and basins in the light of geological and tectonic processes during different eras. This is followed by an up-to-date overview of the Indian monsoon and its variability through time, also discussing the regional response to global forcings and the associated heterogeneities by Singhvi and Krishnan in the chapter entitled 'Past and present climate of India'. The last contribution in this section is 'Geomorphologic history and landscapes of India' by Kale, which delves into the geomorphic manifestations of the earth processes and a brief introduction to the major geomorphic provinces of India. Overall, this section, through the description of the geological, tectonic and climate-change processes from Archaean to Quaternary time-frame, provides a platform for the discussion on the resultant geomorphic provinces in the subcontinent. This forms part II of the book, where the major geomorphic provinces of India, viz. the Himalaya, the alluvial landscape of the Ganges, the Peninsula, the Thar and the coastal landscape have been elaborately described. These chapters contain colossal information that is supported by concerted synthesis and well-illustrated



This landscape in Ladakh preserves some of the finest examples of alluvial fans and moraines of great antiquity.