

characterize the pathogen, the newer technologies are based on the detection of the host biological pathways that are highly specific to the pathogen.

Two reviews are related to treatment of human immunodeficiency virus-1 (HIV-1) infection. Effective HIV-1-specific broad neutralizing antibodies (bNAbs) have been recently identified. Their potential for prevention and treatment of HIV-1 infection are discussed by L. Gama from National Institute of Allergy and Infectious Diseases, Bethesda and R. A. Koup of Johns Hopkins School of Medicine, Baltimore. These new generation anti-HIV-1 bNAbs are potent, have multiple specificity, lower plasma half-life and improved effector function. In the second article on HIV-1, A. M. Spivak and V. Planelles from the University of Utah School of Medicine describe the current pharmacological approaches in the search for agents for HIV-1 cure. These aim to target and clean the reservoir of latent long-lived resting T cells harbouring replication competent, late proviruses.

L. I. Labzin from the MRC laboratory of Molecular Biology at Cambridge and M. T. Heneka and E. Latz from the German Center for Neurodegenerative Diseases at Bonn deliberate on innate immune system in the brain and the role of microglial dysfunction in the pathogenesis of neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease, amyotrophic lateral sclerosis and Huntington's disease. They suggest: 'It would be beneficial to better define, how microglial function can be tuned by changes in cellular metabolism or innate immune training induced by local or systemic triggers and how diet, life style and aging impact this.'

Epidemiological aspects, pathogenesis, treatment, vaccines and control of Zika and Chikungunya virus infections and Mayaro, Oropouche, Dengue and Yellow fevers are the topics covered in another review. There is another essay on the pharmacology and behavioural effects of opioids. The authors write on issues such as misuse, overdose and addiction risks associated with the use of opioids in the management of chronic pain and resulting public health problems.

The first article in the collection is on precision medicine. A higher level of precision in identification of disease risk has been possible thanks to the development of several non-invasive high-

throughput and high content technologies that provide functional measurements and information for action. Thomas Caskey from the Baylor College of Medicine, Texas, reviews the advances in high-throughput technologies such as genomic sequencing, metabolomics, proteomics, mass spectrometry, pharmacogenomics, bioinformatics, advanced imaging tools and machine learning that have helped progress in the identification of risk of diseases and strategies for specific intervention and prevention of diseases. Integration of these advances into standard of practice of medicine would require a shift from the current accent on disease diagnosis focused on organs. Increase in cost and uncertainty of test results are the other issues to be addressed.

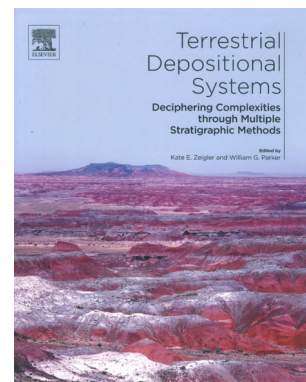
Affordable Care Act (ACA) of United States of America (USA) was considered as a chance to provide comprehensive high quality and equitable health coverage to all who live in the USA. Thanks to ACA there was an evident rise in the number of uninsured persons gaining health coverage. Three reviews deal with the ACA, which has been for the past few years, a focus of debate in the United States of America because of the rising cost of health care and concerns of access to coverage. Vivian Ho of the Rice University, Houston analyses the criticisms of the Patient Protection and Affordable Care Act (Obama Care) and the major reasons for many people's dislike for ACA. He recommends various ways to address the concerns and refine the Act. O. Carrasquillo and M. Mueller of the University of Miami Miller School provide the limitations of ACA and possible areas for refinement. They conclude that ACA attained neither the goal of universal nor equitable coverage. ACA could also not control health care costs. M. McClellan and M. Japinga of Duke University in their article, examine the future of the ACA and delineate several novel options for reforms to lower the cost of high-quality health care and spread access to affordable coverage. They emphasize the necessity for obtaining evidence on efficiency of available models of care delivery as well as the need for innovations in care for patients with the highest risk. Managers of *Ayushman Bharat Yojana* would certainly profit by studying these reviews.

The last two articles are on outcome measures that assess surgical quality. One of them presents the essential elements and requisite steps in the development of a patient-reported outcome measure (PROM) in plastic and reconstructive surgery. The authors also apprise the validity, reliability, responsiveness and limitations of PROM, future priorities and the use of PROM in clinical care and research. The second article interrogates how to recognize variations that are seen in surgical quality and how to choose the appropriate measure to assess surgical quality, and describes the advantages and drawbacks of the 'structure-process-outcomes' model proposed by A. Donabedian to measure quality in health care.

In summary, the recent volume of *Annual Review of Medicine* contains instructive and stimulating essays valuable to both physicians and medical scientists.

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**Terrestrial Depositional Systems: Deciphering Complexities through Multiple Stratigraphic Methods.** Kate E. Zeigler and William G. Parker (eds). Elsevier, Radarweg 29, P.O. Box 211, 1000 AE Amsterdam, The Netherlands. 2017. xiv + 346 pages. Price: US\$ 130.

Modern depositional systems make available observable interactions between agents and processes of erosion, transport and deposition, and sedimentary

deposits themselves. The role of the surrounding environment, including climate, biotic milieu and tectonic events is also reasonably straightforward. Fluvial deposits on land are a veritable example of how the geometry, sediment composition and biotic content are strongly influenced by variation in the riverine geomorphology, capacity of the river, seasonal fluctuation in precipitation in the catchment area, latitudinal position on earth, and so on. Ancient depositional systems can be understood from the rock records which are subject to vagaries of uplift and erosion and sparse preservation. Most of the time the processes and environment of deposition are interpreted in direct comparison with modern systems, using uniformitarian approach. Commensurate with the relative distribution of land and sea on earth, Phanerozoic stratigraphic successions across the globe are volumetrically biased toward marine deposits. Historically, stratigraphic principles and methods naturally evolved in tune with such bias. Moreover, depositional systems whether on land or in the oceans are controlled by secular variation in global sea-level fluctuations and global tectonics. Terrestrial depositional systems encompass fluvial, alluvial, paludal, lacustrine and aeolian systems. Cases of coastal depositional systems are also important as they provide useful clues to understanding the interplay and link with marine depositional systems, and make way for sequence stratigraphic approach to be employed.

In sedimentological–stratigraphic parlance, the three-dimensional architecture of a deposit as preserved in stratigraphic successions, the spatial distribution of sedimentary facies and facies association, the palaeo-floral and faunal content and their distribution through stratigraphic columns are important in understanding the depositional systems. Detailed local lithostratigraphic and biostratigraphic documentation and analysis are primary steps in the run up to regional (say basin-scale) correlation. A regional to global synthesis can be achieved only through chronostratigraphic correlations where geochronological methods play a major role. Thus, presence of dateable material in local stratigraphic sections, marker beds and fossil content needs to be examined thoroughly. Wherever possible, well-mapped lithostratigraphic units containing marker horizons and biozones may be linked with the radiometric dates

establishing a firm footing for erection of chronostatigraphic units. Moreover, with the well-calibrated geomagnetic polarity timescale (GPTS) firmly in place since the beginning of the 21st century, magnetostratigraphy is playing a key role in geochronologic correlation of terrestrial, lacustrine and marine successions, particularly in the Neogene (Car G. Lange-reis and coworkers, *Newsl. Stratigr.*, 2010, 43(3)). However, the inherent nature of terrestrial deposits with rapid lithofacies variation, biozones with remains of rare land vertebrates and other factors introduce complexities that affect regional correlations and render global correlation of terrestrial successions even more challenging.

The book under review is a well-awaited discourse on the subject with chapters that deal with basic methodological concepts, details of methods, examples of meticulous application in local and regional stratigraphic analysis and interpretation, and more involved and larger issues of global stratigraphic correlation. While marine depositional systems have been the prime focus of many textbooks and edited volumes, this book is a welcome departure. It illustrates well the necessity of applying multiple stratigraphic methods in understanding terrestrial depositional systems from the rock records, particularly from the Phanerozoic. The chapters encompass application of methods in biostratigraphy, vertebrate biochronology, palynostratigraphy, magnetostratigraphy, and C-isotope chemostratigraphy in unravelling complexities of terrestrial depositional systems embodied in well-studied sections, for example, upper Triassic formations of western North America, where vertebrate fossil remains allow construction of biochrons and their lateral tracing. The lead article on biostratigraphy (Parker and Martz) emphasizes on scientific rigour for smaller studies, as ultimately goodness of regional synthesis depends on how objective the local studies are. Use of interval biochrons (cf. ‘faunachrons’) based on land vertebrates for formalizing biozones/biochrons in terrestrial deposits of western North America is a laudable attempt and really sets the path for similar attempts in other continents like India, where reports of rich late Triassic fauna including Phytosaurs are emerging. At many places the authors sound cautionary notes on the pitfalls of application of the methods, or how incomplete

understanding of concepts can lead to errors in application. For example, local biozones do not necessarily imply the first and last appearance of a particular fossil taxon, or of assemblage of taxa. Similarly, reiteration of the statement that taxonomic endemism is common at global scales, even during Late Triassic when the continents are joined together (Ezcurra, *Proc. R. Soc.*, 2010, B277), is a well-thought-of advisory on biostratigraphic practice. Further, useful pointers in the book include assertions like ‘lithostratigraphy provides the scaffolding on which biostratigraphy is built’; biostratigraphy is used as a proxy for chronostratigraphy even today, due to paucity or non-availability of geochronological dates.

In tune with the flourishing use of magnetostratigraphy of the Neogene and Quaternary deposits on land, the book dedicates three chapters on the subject. One of these exclusively dwells on basic concepts and, more importantly, to sampling strategies, nitty-gritty of demagnetization procedure, rock magnetic experiments, quality of data and statistical analysis. The authors’ humorous use of the phrase ‘wrestling with correlations’ in one of the subsections is a reflection on the complexities of magnetostratigraphy and using the same to forge a correlation between individual outcrops or outcrop belts. The other two related chapters bear on case studies dealing with magnetostratigraphy of the Lower Chinle Formation of western North America, and of the Morrison Formation, a rich repository of upper Jurassic dinosaurian fossils. The authors demonstrate how the magnetostratigraphic data pave the way for regional correlation of the Morrison Formation, as well as to a better understanding of environmental and latitudinal biodiversity in the Late Jurassic world.

Soil is an important interface that potentially preserves products of interaction between bedrock/sediments, biota and the atmosphere, and thus tracks the operative processes on land over short and long time intervals. It also helps in deciphering dynamics of surface agents of weathering, erosion and deposition on land. There a number of good books dealing exclusively on palaeosols, but the present chapter deals with them from a different perspective. It emphasizes on distinctive approaches in studying modern soils and palaeosols; it is important to understand how soils transform into

## BOOK REVIEWS

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palaeosols. Though palaeosols are volumetrically minor in rock records, they are important as a valuable source of palaeoclimatological and palaeo-environmental information, and thus provide a vast archive of information on earth's history. Working knowledge of palaeopedology is an enabler to sedimentologists and stratigraphers in recognizing, describing and communicating palaeosol information, as aptly pointed out in the chapter on palaeosols (Tablor *et al.*). Palaeosol horizons are useful in correlating local sections with terrestrial deposits, though one needs to keep in mind that unlike other sedimentary strata palaeosol horizon, including internal zonations, follows the local (palaeo-)topography which may have significant relief.

Carbon isotope chemostratigraphic methods as applied to continental deposits rely on the principle that perturbations in global ocean surface carbon concentrations are also reflected in terrestrial systems through land-ocean connection mediated by a well-mixed atmosphere. Excursions in  $\delta^{13}\text{C}$  in bulk organic carbon from continental deposits are expected to reflect the surrounding vegetation (plant material) and potentially correlatable with similar excursions in marine deposits of corresponding age, as reflected in many studies of Cretaceous and Palaeogene-Neogene age. The last

chapter of the book (Suarez *et al.*) illustrates the application of carbon isotope chemostratigraphy to Cretaceous continental deposits of the Cedar Mountain Formation, Central Utah, USA, to test whether the measured carbon isotope excursions can be correlated with the standard excursions from known marine sequences and thereby further settling the debates arising out of previous geochronologic and biostratigraphic studies. While also pointing out the complications and pitfalls of chemostratigraphic methods, the authors conclude that 'C-isotope chemostratigraphy is a powerful tool in correlating global C-cycle perturbations to the continental record, constraining age and correlating sections across depositional basins.' However, stand-alone chemostratigraphic analysis in terrestrial deposits is unadvisable.

Addressed to research students and professionals, the book serves as a manual with integrated techniques for analysis of terrestrial basins. While the general concepts, techniques, outcrop-to-outcrop or inter-basinal correlations are illustrated with case studies covering mainly Mesozoic stratigraphy, for the sake of completeness some Precambrian examples would have been a welcome addition. To some the main title may appear a little misleading, as the book is more on stratigraphic methods to deci-

pher terrestrial depositional systems, rather than on sedimentology of the terrestrial deposits as such. However, to this critique, the subtitle explains it all. The subtitle is where the real subject matter of the edited volume finds its true expression. The editors who also author between them half of the chapters, provide a firm perspective on how to build from local biostratigraphic and lithostratigraphic models, a regional synthesis on the depositional systems embodied in the rock records. The well-researched upper Triassic of North America peeps through several chapters, to this reader not as a bias, but as an expert demonstration of thoroughness and scientific rigour necessary even at the outcrop scale for forging dependable local lithostratigraphy and biostratigraphy, the foundations of regional/basinal correlations. The well-illustrated and exhaustive, up-to-date reference list would serve the readers well. The book would definitely be a valuable addition to a library collection on reference books catering to earth science graduates and professionals.

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