

patterns in these that lead to card tricks for $k = 3$. As they narrate the way they unravelled these patterns, the audience is also led into the working of mathematics in practice, 'The problem became a part of an academic talk we went around giving and... Brad Jackson became intrigued.' And the story continues of how Jackson developed the proofs for $k = 4$ and 6, and later, they themselves evolved the proof for $k = 5$.

Chapter 5 explores the connection between the Gilbreath Principle and the Mandelbrot set, whereas chapter 6 describes neat Shuffles, the unavoidable tool for professional magicians. In chapter 7 we are taken back in time into the working of the three-object miracle divination trick and then the history of mathematical magic. We learn that Reginald Scot's 1584 magic book was written, 'to protest the growing mistreatment of the old and frail as witches', and that the first theorems of mathematical magic were found in Gaspard Bachet's 1612 book. To quote once again, 'It is interesting to note that he had come up with an early example of a generalized de Bruijn sequence.'

'What goes up must come down', is the intriguing title of Chapter 9. It is easy to guess that this chapter is about juggling, but not so easy to figure out the connection between juggling and mathematics; so that is what is tackled in this chapter. We learn of the long history of juggling, and that the sort of throws a juggler makes are not random but are restricted to definite sequences of numbers that specify the amount of time the thrown objects spend in air. With remarkable simplicity and directness, the authors explain why some sequences of throws would not result in a stable juggling pattern – the site-swap juggling sequence as they call it. The chapter concludes with a pictorial explanation of how to master the simplest juggling trick, the three-ball cascade and how to continue it indefinitely. The reader is by now used to the ease of the explanations and is not surprised when they reveal, 'One of your authors served as president of the international jugglers association, a group of nearly three-thousand jugglers around the world (with quite a few having day jobs in Computing, Mathematics and the Sciences generally).'

A story of magic would be incomplete without a chapter on famous magicians, and the authors have taken care that this

charge shall not be levelled at their book. The longest chapter in the book, 'Stars of mathematical magic' tells the reader about famous magicians and their most popular magical tricks. This section includes origami and tricks using loops and, of course, card tricks. Every reader will have a favourite among this spread of magic tricks on the offer. According to me the lines carrying the most infectious message is their tribute to Martin Gardner, 'Warning: Martin Gardner has turned dozens of innocent youngsters into math professors and thousands of math professors into innocent youngsters. We are living proof;...'

The book moves onto a short chapter on further reading and learning more math and magic. The last chapter is tantalizingly named 'On secrets', where the authors discuss the mathematics of secrets and the importance of secrets in keeping magic and mathematics effective and how this can be achieved in the era of the Internet.

While turning the last pages, the reader is bound to feel touched and charged up and would definitely be moving in an altered direction, for this is a book that will not just leave an impression, but will also suggest which path to take next.

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Annual Review of Pharmacology and Toxicology, 2011. Arthur K. Cho *et al.* (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, California 94303-0139, USA. Vol. 51. ix + 437 pp. Price: US\$ 86.

This volume offers an excellent selection of review articles by authors – mostly luminary of their fields. This series of the *Annual Reviews* has maintained its reputation as a valuable publication for all those interested in drugs. The need for the good review article is undeniable, since the ever-increasing volume of pharmacological research makes it difficult even for the expert to separate forest from trees. The chapters in this volume

are presented as review articles and cover a heterogeneous selection of subjects ranging from microRNAs – the master regulators of cellular responses to the strategies to target HIV-1 latency. Appropriately, the opening chapter is an inspiring and intriguing saga of Erik De Clercq during the 40 years of his circuitous journey in antiviral chemotherapy field.

I am sure several of us who are craving for better drugs will gratefully acknowledge the generosity of editors for giving special consideration to GPCRs, since five out of the 18 reviews in this volume have been devoted to GPCRs – the most druggable target in the human genome. Special reference must be made to the chapter by Allen and Roth, entitled 'Strategies to discover unexpected targets for drugs acting GPCRs', and a chapter by Ibrahim and Taminga, entitled 'Schizophrenia: treatment strategies beyond monoamine system'. In his review, Bryan Roth stupendously argues 'magic shotguns verses magic bullets' for psychiatric conditions, while Carol Taminga emphasizes the rationale to move beyond the monoamine targets for treating cognitive deficits in schizophrenia. Although the review by Li *et al.* entitled 'Hydrogen sulphide and cell signaling' is somewhat out of place, in the company of otherwise serious subjects, the editors have done justice to include it. It provides a detailed overview and mechanistic insights into the way to regulate several physiological phenomena by the newly discovered gas-transmitter-H₂S.

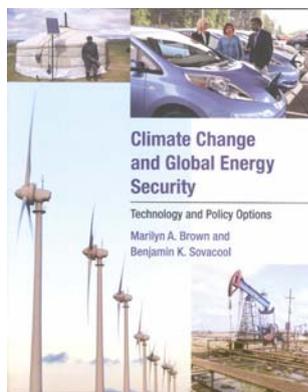
It is great to see a fitting review by Rawland *et al.*, on 'Physiologically based pharmacokinetics in drug development and regulatory science', reflecting significant advances over the past decade in the predictability of key PK parameters. Inflammation seems to be at the beginning of the majority of chronic diseases, and major efforts are dedicated to the development of anti-inflammatory drugs. Recent evidence suggests that even metabolic diseases, such as type-2 diabetes, and certain cardiovascular diseases, could be considered to have an inflammatory origin. In this context, the two chapters in this series on inflammation – one by Debra Laskin on 'Macrophages and tissue injury: agents of defense or destruction' and the other by Feldman on 'Mechanism of anticancer and anti-inflammatory actions of vitamin D' are of great interest.

BOOK REVIEWS

Among the other topics dealt with are molecular mechanism and treatment options for muscle wasting disease, curing HIV: pharmacologic approaches, mechanism of monoclonal antibody and drug interaction.

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Climate Change and Global Energy Security: Technology and Policy Options. Marilyn A. Brown and Benjamin K. Sovacool. The MIT Press, 55 Hayward Street, Cambridge, MA 02142, USA. 2011. x + 416 pp. Price: US\$ 29.00.

Brown and Sovacool begin chapter 4 (on geoengineering and adaptation) of this book with the example of Mughal Emperor Akbar in the 16th century having a new capital built at Fatehpur Sikri, 40 miles west of Agra. Presumably for safety and aesthetic (panoramic views) reasons, it was built on higher ground than the surrounding areas. Within 15 years after it was completed and occupied, the capital had to be abandoned because it was too difficult to transport sufficient water up from the surrounding areas. Eventually Akbar moved his capital back to Agra, closer to a perennial river.

The authors give this as an example of a mal-adaptation to one's environment. A recurring theme in this book is why people do not act when they should, especially when there are examples of people not acting and having suffered, or of acting and having benefitted? One

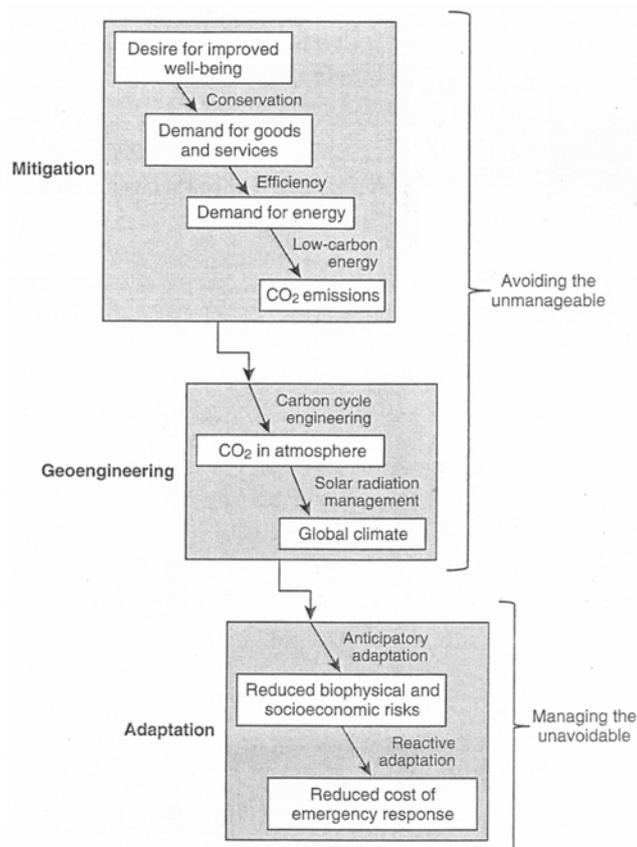
problem of teaching by example (the case study method) is that for every example, human life is diverse enough to have thrown up a counter example. With similar topography, Bangalore was established almost 100 years before Fatehpur Sikri on a plateau higher than the surrounding landscape. Water was made available by creating hundreds of man-made lakes. Today, most of the lakes are gone. Those that remain are no longer a source of drinking water. Water is pumped from the Cauvery River, a hundred kilometres away, thanks to cheap electricity. Different times, different solutions.

The book contains a useful chapter on technologies for mitigating climate change (chapter 3). Barriers to effective climate and energy policies are discussed in chapter 5, and ways to overcome them in the next chapter. The book contains descriptions of eight successful case studies that succeeded because, the authors claim, they used 'polycentric' methods of implementation. From Asia the two case studies are Bangladesh's

Grameen Shakti and China's Improved Stoves Programme.

Whenever I read of geo-engineering options as a means of responding to climate change, I am reminded of a quip the trade unionist Lane Kirkland (AFL-CIO) made 30 years ago to characterize the policies of Henry Kissinger: 'when two wrongs don't make a right, try three'. The same utilitarian mindset that causes the problem in the first place by the use of fossil fuels (cheap and easy), that refuses to mitigate the problem (alternatives are too expensive and complicated), looks to geo-engineering as a possible saviour (because it offers a cheaper and easier alternative to mitigation; p. 129, 137).

The authors give the example of Mexico City which banned driving cars on alternate days based on odd or even license plate numbers to address congestion. The response of people was to acquire two cars to drive on alternate days. This did keep many cars off the road, but did little to reduce traffic congestion or pollution. The book uses both climate



Schematic diagram of mitigation, geo-engineering and adaptation approaches. Adapted from Marilyn A. Brown, 'The multiple dimensions of carbon management: mitigation, adaptation and geo-engineering', *Carbon Management* 1, 2010, no. 1, pp. 27–33.