parasitic weeds, and challenges and opportunities in weed management under changing agricultural scenario. The last chapter is informative and discusses about strengthening the farmer's knowledge for better weed management in developing countries.

Although the book has many illustrations (in colour as well), most of them do not convey the intended theme. In general, the book is suitable for researchers, scientists and policy makers for integrated weed management. The editors have provided a roadmap regarding ecologically based weed management for sustainable agriculture. This book would be useful to the researchers, scientists, policy makers and students working on different aspects of weeds.

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Annual Review of Entomology, 2015. May R. Berenbaum, Ring T. Cardé and Gene E. Robinson (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, CA 94303-0139, USA. Vol. 60. xii + 667 pp. Price: US$ 99.

This volume that marks the 60th anniversary of the *Annual Review of Entomology* communicates one message loud and clear to the Indian scientific community that 'there is no escape from collaborative research and holistic approach to a scientific problem'. The collection of reviews starts with recapitulating the life of John H. Law and thus the growth of entomology as a scientific discipline. This singular article tells us why one should not compartmentalize scientific areas. A reducto-deductive method should be followed to understand a problem but not to compartmentalize science. It is time to put back the puzzle pieces of reducto-deductive method and appreciate the beauty of biological problems in their entirety.

The reviews cover diverse topics such as genetics, epigenetics, development, physiology, behaviour, inter-species interactions, biological diversity and pest management. The 21st century would perhaps be the era of the microbiome of insects and other living beings. Many research groups are engaged in understanding the role of specific microorganisms in the biology of specific insect hosts. Unfortunately, the review on diversity and function of microorganisms in insects by Douglas is grossly incomplete. For example, a scientific paper that has established the possible role of *Arsenophonus* GroEL protein in protecting the geminivirus degradation in the insect gut and thus facilitating the pathogenecity[1] has been left out. Such gross omissions and commissions are unacceptable from Annual Reviews.

The collection also contains articles on crop domestication, and insect heat-shock proteins that do not convey any future line of work that should/can be pursued, perhaps suggesting that they are just filling material used to make up the bulk. On the other hand, exploitation of the omics technologies is suggested to be gainfully employed for the understanding of not only the basic biology of termites, but termite control biotechnology and termite-modelled biotechnology. Scharf has suggested the use of termite-modelled biotechnology to recycle the large amount of bio-energy present in the form of lignocellulose.

An interesting review on small insects and limits to miniaturization by Polilov succinctly brings out the resistance of the nervous and reproductive systems to reduction in size and/or volume. This resistance by the two systems is not surprising as the 'Darwinian fitness' perhaps is critically dependent on the two, besides the digestive system. However, the review ends with a tall order of the possibility of the 'effects of miniaturization on animal physiology and ecology being used in the search for new biotechnological solutions'.

Understanding developmental mechanisms will continue to be an important research area as it holds the key to many biological concepts as well as processes. Every species has to attain a specific size to be evolutionarily successful and this size is regulated by the developmental mechanisms. It is suggested by Nijhout and Callier that minimum size of insects is limited by the needs of a fully functional multicellular body and hence every species has a lower limit beyond which reduction is not possible without compromising fitness. Unfortunately, there is no study that assesses the size ranges of any known biological species and these data need to be generated with urgency as I believe many a (static) theories relating to development will tumble out of the archaic cupboards and be replaced by some interesting and dynamic theories. In *Drosophila*, reducing amino acid transporter in fat body slows down growth and thus reduces body size. However, many studies that selected for faster pre-adult development in *D. melanogaster* reported a reduction in body size as a correlated response[2–5]. It would be interesting to understand if the same mechanism of reduced amino acid transporter is responsible for reduction in size in such cases too, as faster development means completion of protein synthesis in a short time that necessitates the faster delivery of amino acids. Further, the reduction in terminal growth phase and acceleration in metamorphosis timing due to lack of nutrition post-attainment of critical weight, I suspect will not be a general developmental phenomenon.

A review by Papantonis *et al.* on the landscape of the evolution, structure and function of chorion genes harps on the importance of insect systems as suitable model systems to understand the molecular basis of signalling-directed differential gene expression with a potential for insect population control. The importance of insects as research models is highlighted as they are relieved of the ethical issues that apply to mammals. Unfortunately, this is true only for the Western world, as the use of any life form either for teaching and/or research is not permitted in India (UGC Notification No. 14-6/2014(CPP-II), dated 1 August 2014), a decision being forced down the throat of unsuspecting academicians by ill-informed and half-baked academicians, policy makers and news mongers. The well-meaning academicians should rise to the occasion, unite and fight to protect the interests of the future generations of biology students. Policy matters aside, the understanding of the signalling-directed differential expression of the genes intricately linked to the embryo would not only help in designing ways of regulating economically harmful insect populations, but also in the effective management of beneficial insect, bird and animal species, and address issues related to human fertility dysfunction.

There are four reviews on agricultural pest, role of parasitoids in biological control and IPM. The volume editors could have done better by asking the four groups to collaborate and come up with an integrated review identifying knowledge gaps and suggestions for a specific line of research. Unfortunately in the absence of such an exercise, we have to live with the voluminous bulk.

A number of reviews have focused on different strategies adopted by plants to counter pest menace, and insect adaptations to botanical challenges.

Reviews by Johnson, Yan *et al.* and Czaczkes *et al*. deal respectively, with honey-bee toxicology, role of epigenetics in regulation of behaviour and longevity, and role of trail pheromones in colony organization of social insects. None of the three reviews has anything substantial to offer to the reader that they would not already know. However, the review on honey-bee toxicology suggests a few research topics that need to be addressed on an immediate basis for the benefit of the bee industry. The trail pheromone review suggests some interesting questions related to decision-making and adaptation.

A few reviews dealing with insects associated with human and animal diseases stress the importance of understanding the reproductive ecology in order to devise effective control measures.

Two reviews deal with the evolution of traits and their implication, and are certainly a treat to read.

Overall, the collection of reviews drive home the importance of three points: (i) collaborative research, (ii) holistic approach as against reducto-deductive method, and (iii) inclusion of organisms from different trophic levels, that is some sort of systems/community biology. The coming decade will be that of the microbiome and its role in modulating health and disease not only of humans, but also of other animals and plants.

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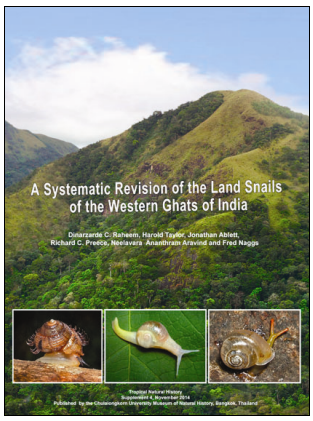

A Systematic Revision of the Land Snails of the Western Ghats of India. Raheem, D. C. *et al.* Tropical Natural History (Chulalongkorn University), Supplement 4, 2014. xiv + 294 pp. ISSN 1513-9700.

The recognition of the Western Ghats and Sri Lanka as a global biodiversity hotspot at the turn of the millennium focused fresh attention on the astonishing wealth of plants and animals of this region, which spans the almost 2000 km between Surat and Cape Comorin. The 'hotspot' designation of the Western Ghats, however, was based largely on floral endemism: faunal diversity remains to be fully assessed almost everywhere. Despite the establishment of the Zoological Survey of India in 1916, official survey initiatives in the post-colonial era have been few. Happily, even as Government agencies have floundered, organizations such as the Ashoka Trust for Research in Ecology and the Environment (ATREE, a partner in this project), the Bombay Natural History Society, and the French Institute of Pondicherry have stepped into the breach. Much of the survey activity that does happen nowadays is the work of NGOs, university-based academics and amateur naturalists.

Biodiversity assessments anywhere, however, are contingent on the existence of a sound taxonomic foundation. Sadly, in the case of many Western Ghats faunal groups, and especially invertebrate groups, the most recent taxonomic revisions date back almost a century. In the case of land snails, the go-to work until now has been the *Fauna of British India* series, published between 1908 and 1921. The compilation of survey-based faunal inventories since then has been handicapped by the lack of a taxonomic literature that facilitates the identification of species and allows the differentiation of potentially new taxa. India's colonial legacy amplifies the problem: the majority of the early type specimens are scattered among museums in the West, a problem exacerbated by anti-biopiracy laws making the cross-border movement of specimens for scientific purposes nearly impossible. In the absence of scientific names – and data on identification, distribution and population – conservation initiatives are useless.

It is this void that has now been expertly filled, in the case of land snails of the Western Ghats, by a team led by Dinarzarde Raheem, a Sri Lanka-born malacologist based at the Royal Belgian Institute of Natural Sciences in Brussels. In this book (pdf available at http://www.biology.sc.chula.ac.th/TNH), Raheem *et al.* review the available names, including synonyms, for all 277 snail species described from the Western Ghats region and provide a stable nomenclature upon which future workers could build. Importantly, they have tracked down all the name-bearing type specimens that still exist (mainly in the Natural History Museum, London). Based on these original collections they show that 200 of the 277 species (and 5 genera) are endemic to the region. Many of these are undoubtedly micro-endemics with ranges smaller than 100 sq. km and, given the region's dwindling forest cover, in urgent need of conservation assessment and attention. Equally important is that future surveys of the region are likely to reveal that about as many species again remain to be discovered.

In addition to synonyms and chresonyms, each species account provides the current name, authority, list of type material, an excellent colour photograph of