

essays seem to have a different scope altogether. Ahuja discusses the case study of using insects as a form of torture practised on a suspected terrorist by the CIA. While there is an interesting thread of relationship between truth and torture, and the role of insects, in this particular case, the essay meanders too far away to make a coherent argument about interspecies. So also Mavhunga's essay about the historical *construction* of natives as pest (and their eventual *transformation* as pests). The transformation of the human into an insect was accomplished in part by invoking the legitimacy of scientific narratives. Mavhunga points out that colonialism, particularly in Africa, was 'obsessed with controlling pests' (p. 153). As a perverse extension of this, pesticides and chemical weapons enable the shift from treating 'people like animals' to treating 'people as animals' (p. 153). Politically, these notions of pest and pestilence were used to dub blacks as pests and vermin, a trend which was used to similarly describe other groups such as guerrillas. In a sense this essay is an indictment of modern civilization and uses the language and objects associated with pests to interchange humans and pests when convenient. But neither these two essays nor the last one (on an idiosyncratic exploration of the human-dog complex) really engage sufficiently with the thematic exploration of the earlier parts of the book.

The unevenness of handling this theme might make one think that there is really not enough material to sustain a coherent argument for interspecies. Moreover, the style in which these arguments are presented adds to this worry. While acknowledging that disciplines such as post-colonial studies have their own vocabulary as well as styles of argumentation, one cannot but be distracted by an excessive internal soliloquy that characterizes this book. Reading the book, I was trying to imagine how a scientist would respond to these broad claims, poetic hyperboles, 'literalizing metaphors' and in general, a tendency to make sweeping generalizations based on a snippet of an insight. Much of the material in this book might seem to play excessively on historical and cultural meanings of words. This engagement with language is precisely what scientific writing wants to avoid and hence one can expect a dismissive scientific response to these arguments.

However, can the biological sciences continue to behave as if other disciplines in the social sciences and humanities, including philosophy and literature, do not matter to their claims about the world? Can biology continue to immerse itself within its own narrow disciplinary and discursive boundaries, and refuse to engage with new conceptualizations of human and the very notion of life? More importantly, as this collection shows, whether biology as a discipline wants to do that or not is not really the point. The question is merely how long can they ignore these developments that will eventually and radically change the way we understand biology as a discipline and humans as a life-form.

Finally, I am disappointed that the book does not take its own lessons seriously. Although there is a consistent critique of Eurocentrism in science and biology, the book itself is a classic example of Eurocentric reflection on the ideas of nature and species. It is ironic that in these essays, the authors do not engage with non-Western notions of the distinctions between humans and animals, or the many complex formulations of what it is to be human, such as from the Indian traditions. While these essays critique the Enlightenment's project of separating humans and animals, they also show a marked disinterest in how these entities are conceived in other world traditions. Along with this Eurocentrism of the content, there is also the matter of style. It seems to me that the authors have made little effort to make this text meaningful to scientists, even granting that scientists are notoriously indifferent if not inimical to such efforts. There is so much of self-indulgence in the style of writing as well as in some of the arguments in the text that the notion of interspecies begins to sound like a concept in literature! And that is a pity for the book promised much but like the snake which swallows its own tail, the book is consumed pretty much by its own fetishization of its discourse.

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Annual Review of Microbiology, 2011.

Susan Gottesman and Caroline S. Harwood (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, CA 94303-0139, USA. Vol. 65, xi + 661 pp. Price: US\$ 89.

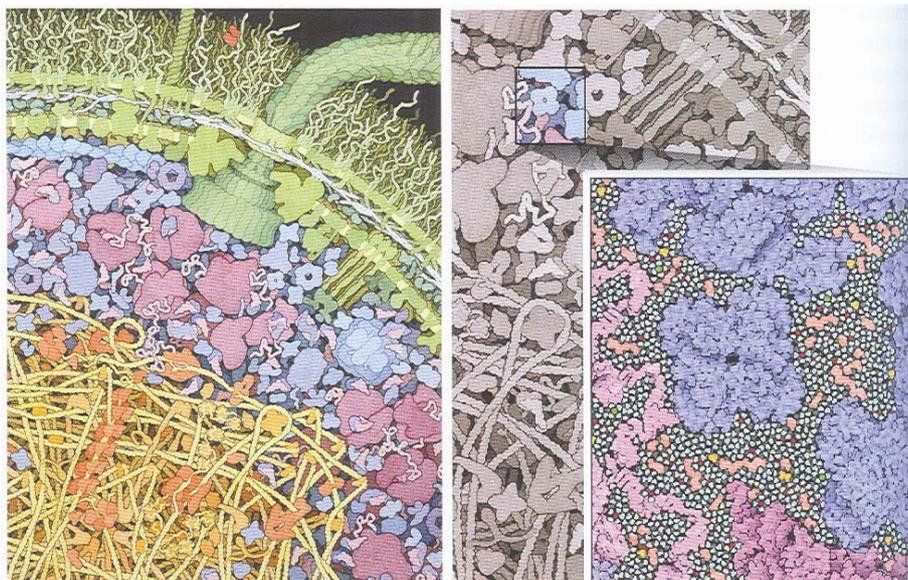
This volume contains 31 in-depth review articles or chapters covering diverse aspects of basic microbial biology (function and regulation of DnaA in DNA replication, capsule biogenesis, mechanism of protein quality control), microbial pathogenesis and interaction with hosts (bacterial as well as protozoan parasite) and well written reviews on microbial evolution.

It opens with Hiroshi Nikaido's (University of California, Berkeley) reflections on his long and fruitful career as a microbiologist starting from post-WWII Japan to Berkeley. The opening chapter is a treat to read as it describes how the combination of intelligent work, and feedback from colleagues and peers, can contribute to fundamental discoveries. Nikaido gives a nice illustration of his fundamental studies with lipopolysaccharides, a unique component of the bacterial outer membrane and the discovery of porins, which function as a molecular sieve, preventing the influx of large or lipophilic agents.

The book is treasure-house of microbial pathogenesis in general, as at least nine chapters cover the biology of microbial pathogens and host-pathogen interactions, including many pathogenic bacteria (*Streptococcus*, *Brucella*, *Coxiella*, *Staphylococcus*, *Campylobacter*) and protozoan parasites (*Leishmania* and *Giardia*).

Chapter 7 by Omsland and Heinzen describes the biology of *Coxiella burnetii*, the causative agents of human Q fever, long considered as an obligate intracellular bacterial pathogen. The chapter is interesting, as it gives an in-depth perspective of the life of an obligatory pathogen and its adaptation tactics to use the host resources. This review describes how understanding and gaining information from genomics tools, including metabolic pathway reconstitutions and nutrient typing allowed researchers to culture this obligatory pathogen *in vitro*, opening up new and exciting opportunities to study the biology of an obligatory bacterial pathogen.

The theme of microbial pathogenesis and pathogen biology in general is nicely



Cross section through on *Escherichia coli* cell.

covered in chapters 8, 17 and 20. These chapters cover diverse microbial processes in the perspective of microbial pathogenesis, which includes DNA repair and microbial social behaviour such as motility and chemotaxis. Hammer and Skaar (chapter 8) provide a comprehensive review on the mechanism and role of iron uptake in the virulence of *Staphylococcus aureus*, and how this pathogen counters nutritional immunity imposed by the host by sequestering iron for its own growth and survival. Chapter 20 by Lertsethakarn *et al.* covers two important aspects of microbial social behaviour – motility and chemotaxis in important bacterial pathogens *Campylobacter* and *Helicobacter*. This chapter provides an overview of the interlink between directional motility mediated by flagella and chemotaxis systems, and how bacteria adapt and regulate movement by coupling motility and fine-tuning environmental sensing. It would have been better if this chapter had elaborated more on the issue of environmental cues (ligands) which influence chemotaxis and movement based on comparative studies on model organisms such as *Escherichia coli* or *Myxococcus xanthus*.

The chapter by Fournier and Raoult (chapter 10) is a must read, as it provides a comprehensive overview on future prospects of combining modern genomic and proteomic tools useful for clinical microbiology laboratories in understanding intraspecific genetic variability

among species and contribution of strain-specific atypical phenotypes associated with many clinical isolates.

The article on kin discrimination and cooperation by Strassmann *et al.* is intriguing, as it provides a comprehensive theoretical background of kin selection based on genetic relatedness and gives many elaborate examples in the microbial world where kin (kind) selection is the driving force of cooperative behaviour. As cooperative social behaviour is important in microbes such as biofilm formation, quorum sensing and virulence, it also has a drawback that public goods will be utilized by non performer/s, creating extra cost or burden for producers in a microbial community. This chapter elaborates on several examples by which microbes have evolved to maintain long-lasting cooperative behaviour by adopting strategies such as production of bacteriocins, in which cells benefit their own kind by poisoning others, and production of strain-specific adhesins which promote attachment of cells of the same kind.

Adaptation of bacteria to changing environmental condition, particularly under different types of stress, plays an important role in survival under these adverse conditions. Chapters 3 and 11 describe the role of alternative sigma factor belonging to the $\sigma 70$ and $\sigma 54$ family in bacterial adaptation to stress and changing environmental conditions. Chapter 11 in particular gives a comprehensive overview of mode of regulation of gene

expression by alternative sigma factor, particularly by RpoS ($\sigma 54$) of the model organism *E. coli*. The review begins with the RpoS-dependent general stress response and how RpoS levels are regulated in the cell by complex transcription, translational and post-translational processes which includes the role of small RNA (sRNA) and Hfq (RNA chaperone protein) in facilitating translation of RpoS by overcoming the stem-loop structure formed at the 5'-UTR of the RpoS transcript. These two chapters also provide an insight into the role of (p)ppGpp, which acts as a small-molecule alarmone and effector of stress response by regulating the activity of core RNA polymerase and modulating the RpoS levels by increasing the transcription of Hfq.

With the advancement of new genomic techniques which include next-generation sequencing approaches, the study of uncultured bacteria and other small, complex microbial eukaryotes is becoming popular. In chapter 19, Wisecaver and Hackett provide an interesting review on dinoflagellates, an enigmatic group of microbial eukaryotes. Dinoflagellates are economically and ecologically important microorganisms, and also the primary producers in marine environment. The review throws light on genome evolution of dinoflagellates, which was earlier difficult to study due to large genome size and presence of condensed liquid-crystalline chromosomes. On this line, the review on approaches to capture and design biologically active small mole-

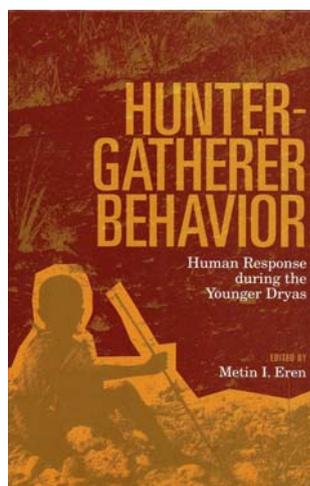
cules by gaining insight from the genome of uncultivable and symbiotic bacteria is useful (chapter 22). It gives a nice overview of metagenomics and environmental metabolome of uncultivated bacterial communities using next-generation sequencing techniques, metagenomic library construction and screening to obtain information and design novel small-molecule natural products with potential to be used as novel drugs and bioactive natural products.

There are many more exciting reviews in this volume as pointed out by Susan Gottesman, one of the editors – ‘...if every microbiologist randomly chose a half-dozen reviews to read from this volume, they would learn something new and pertinent to their own work that they may never encounter in a PubMed search’.

ACKNOWLEDGEMENT. I thank D. P. Kasbekar for his useful comments and suggestions.

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Hunter-Gatherer Behavior: Human Response during the Younger Dryas. Metin I. Eren (ed.). Left Coast Press, Walnut Creek, CA 94596, USA. 2012. 281 pp. Price: US\$ 79.00. ISBN 978-1-59874-602-0.

The Last Glacial Maximum (LGM) occurred about ~18,500 BP. This was followed by a global warming period which

coincided approximately with the end of the Pleistocene (1.6 to 0.12 Ma (million years ago)). Then, a global climate event called Younger Dryas (YD) affected the world. This took place between ~12,900 cal BP and ~11,600 cal BP. This period was characterized by cooling and drying. The temperature is estimated to have fallen by 7–15°C then. The period, Younger Dryas, has been named after an indicator alpine tundra wild plant, *Dryas octopetala* (Rosaceae). Incidentally, the Older Dryas occurred before the YD. It lasted about 3000 years, between ~18,000 and ~15,000 cal BP.

YD was first reported from northern Europe in 1901 CE. It is assumed to be a global phenomenon. It has been most acutely felt in Greenland. Here, the cooling had approached that of the LGM. YD has been also reported from several other regions of the world, mostly in the northern hemisphere. Elsewhere, its severity appears to have been moderated by local or regional climatic events. There is still no unanimity about the causes and full consequences of this climate event. Incidentally, the timing of YD has been critical from anthropological and climatological angles. First, this period marks the transition from the cooling Pleistocene to the warming Holocene. Second, it approximately coincides with the transition from hunting-gathering stage of humans to the beginning of a sedentary living and hunting-farming stage, especially in the Levant (eastern Mediterranean region).

This book is the outcome of a symposium, Hunter Gatherer Transitions through the Younger Dryas, A Global Perspective, arranged by the Society for American Archaeology at their 73rd meeting held in Vancouver, Canada in 2008. It had two objectives: first, to understand how dramatic YD climate and environmental change was in different geographic locations; second, to determine the manner in which the terminal Pleistocene hunter-gatherers adapted behaviourally and technologically during the YD. Archaeologists nowadays accept that climatic and environmental changes do not wholly determine prehistoric cultural and technological changes. However, comprehending the extent of behavioural variability that humans are capable of will help us understand basic questions about the mechanisms of human adaptation and survival. The book under review is a sequel to the above symposium.

The book comprises eleven chapters. The first one by M. I. Eren, the editor of the volume (from the Department of Anthropology, University of Kent, Canterbury, United Kingdom), gives a preview and background of the subject matter of the book. This is followed by nine chapters – two dealing with South America (South America, southern South America), three chapters with USA (coastal California, southeastern USA, Rocky Mountains area), and two each with Europe (Central Europe and funerary, behaviour settlement and animal resources) and Asia (West Asia, Northeast Asia). The 11th chapter is a synthesis and overview by David Meltzer and Ofer Bar-Yosef. Both the authors are pioneers and leading scientists in the area.

There are some gaps in geographical coverage – Canada and Greenland, North and South Europe, the entire Africa and Australia, and most of Asia (South, Southeast and East Asia). The main reason appears to be that there have not been much systematic studies on this aspect in these regions. There are a few publications on some of these areas, notably Greenland, Australia and China. The second, and possibly a more plausible reason, might be that the effects of YD in these regions were minimal. If YD did produce any effects, they had been moderated by regional climate events. The monsoon for instance is known to greatly affect the climate of much of the Old World tropics and subtropics.

The regional reviews indicate that YD had produced mixed effects in different regions. As stated in chapters 2 and 3, YD was not a major event in South America. And, if it occurred in some regions, it had only marginal effect on human adaptations. The detailed studies conducted in USA (chapters 4–6) indicate that the Palaeoindians were constantly adjusting their subsistence and behaviour patterns with climatic changes, but in consonance with their hunting-gathering lifestyles. In Europe (chapters 7 and 8), while in the northern region, YD produced some significant environmental and cultural changes, in Central Europe it had only a ‘subtle’ effect. In West Asia (chapter 9) – which is one of the earliest centres of agricultural origin and crop plants domestication – the YD period was an important one. The adverse climate changes appear to have brought about a reduction in the distribution and productivity of wild cereals, then a staple