

territories or display in leks. The review outlines fascinating evolutionary scenarios for the role of male accessory gland secretions (MAGS) that are transferred to the female during mating. According to the author, MAGS may have been originally intended as nuptial gifts to influence female mate choice, and might, for example, have been important in early culicine mosquitoes, in which monogamy was the norm, and in which egg production was still autogenic (i.e. without a blood meal). In such species, MAGS would have been important. However, as sugar feeding and subsequently blood feeding also evolved, females were less dependent on MAGS for egg development. According to the author, this feeding transition was accompanied by the development of polyandry and the presence of multiple spermathecae in the female to store sperm from multiple matings. At this point MAGS did not serve any nutritional function to influence female choice; males now used MAGS as a means to curtail multiple matings by females by inhibiting female receptivity after the first mating. This is certainly an exciting and plausible hypothesis and it would be interesting to see how this reasoning holds up to further scrutiny and evidence.

The evolution of social systems has always been an appealing topic probably because humans are also social animals. A review of conflict resolution in societies should, therefore, be even more appealing, and this comprehensive review of conflict resolution by Ratnieks, Foster and Wenseleers (*Conflict resolution in insect societies*) is timely as well as highly informative and well structured. In brief, the review centres around the fact that in haplodiploid hymenopteran societies, workers are related by 0.75 to their full sisters and by 0.25 to their brothers. Therefore, from the workers' perspective, the colony sex ratio should be 3:1 in favour of females. Natural selection should, however, favour any behaviour of queens which would counter this worker bias of colony sex ratio, since the colony ratio from the queen's perspective should be closer to 1:1 as a queen is related equally to her sons and daughters (relatedness factor of 0.5). However, since males do not usually perform colony-related tasks, factors that involve colony functioning could also influence colony sex ratio. The review divides colony conflict resolution into conflicts over sex allocation, queen rearing, male rearing, caste fate determi-

nation and also conflicts between totipotent females. An example should illustrate the types of conflicts outlined in this review. In honeybees, it has been found that although 7% of male eggs in a colony are laid by workers, only 0.1% of adult males in the colony is a worker's son. The phenomenon of worker policing, wherein workers destroy eggs laid by other workers, takes care of this conflict. However, in a comparative analysis of several Hymenoptera, the proportion of males in a colony that as a worker's son was 12% on average, with values ranging from 0 to as high as 85% or even more in some cases. Therefore conflict resolution varies widely in efficiency. The review discusses possible reasons for this variation within the framework of inclusive fitness theory.

Reading this collection of reviews gave me many new ideas, and left me intellectually energized. Several other topics feature here, e.g. cannibalism in spider populations (David Wise), a review which spans all the various hypotheses erected to explain this intriguing phenomenon; I also wonder whether the fact that extra-oral digestion occurs in spiders could contribute to the need in many spiders for high levels of certain amino acids (those occurring in the large quantities of enzymes secreted extra-orally), and whether this special need could contribute to the much higher nitrogen contents found in spiders compared to other arthropod predators and also to cannibalism. Predatory spiders are known to be able to regulate their diets to obtain appropriate mixes of essential amino acids⁴. It is possible that requirements for certain essential amino acids could be most easily met by cannibalism, and perhaps the link between extra-oral digestion and cannibalism should be explored further.

Overviews of the relationship between entomopathogenic fungi and their hosts, plant-mediated interactions between pathogenic microorganisms and arthropod herbivores, Dopa decarboxylase in insects, as well as of insect odour and taste receptors, are examples of other topics of broader general interest in this collection. Those on the Tachinidae, Latin American biogeography, or tall grass prairie arthropods, may have a narrower audience. Yet, most articles are stimulating and enjoyable, all of which gives credence to Sperling's introductory remarks on the future of the *Annual Review* tradition. Sperling need not worry; there is absolutely no doubt about the outcome of a contest between

this compendium of review articles and Google. Google would lose every time.

1. Kareiva, P., *Proc. Natl. Acad. Sci. USA*, 1999, **96**, 8–10.
2. Tjallingii, W. F., *J. Exp. Bot.*, 2006, **57**, 739–745.
3. Webb, B. A. and Strand, M. R., *Comprehensive Molecular Insect Science* (eds Gilbert, L. I. et al.), Elsevier, San Diego, 2005, pp. 323–360.
4. Greenstone, M. H., *Nature*, 1979, **282**, 501–503.

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Great Tsunami. Memoir 64, Geological Society of India, P.B. No. 1922 Gavi-puram, Bangalore 560 019. 2005. 142 pp. Price: Rs 750.

This publication on the great tsunami of 26 December 2004 by the Geological Society of India in 2005 has been a timely one. The report was published in less than twelve months of the event and with more than twenty-one contributing organizations and other individuals pitching into this effort, this is no mean feat.

For once, a comprehensive publication has been produced in the country through an initiative of the Department of Science and Technology, New Delhi, which collates the surveys and studies of numerous scientific departments, institutes and individuals across India on a single event, the 26 December 2004 Sumatra earthquake and the consequential tsunami. This is a laudable effort and bodes well for the future of scientific collaborative studies in the country. The preface mentions that the 'detailed information available in this book shall be of immense help to researchers, planners and all concerned with the earthquake and tsunami risk and mitigation in India and elsewhere in the world'. One may thus infer that the report, while scientific in nature, is meant to be accessible to stakeholders and the general public. This perhaps may account for the slim and smart layout of the report.

BOOK REVIEWS

The report is divided into eleven chapters which are short and concise. This appears to have been done with the intention of not overwhelming the reader with too much of scientific data or in-depth analysis of seismological or engineering aspects of the event and its effects, but it leaves the scientist or engineer reading the report somewhat unsatiated. The first three chapters are based on the source parameters, geotectonics and seismicity of the region. Significant information on the seismicity and tectonics of the area is accessible in the public domain and it was difficult to separate original data analysis produced in this report from information quoted and summarized from available international information. Such separation is important for a report to have scientific value. The chapter on tectonics and seismicity of the area was interesting but rather skeletal and could have been more fleshed-out. It was, for example, surprising that there was little information on the tsunamis of 1941, 1881, 1861 and 1833. One would expect that more data on these tsunamis which happened in our backyard could have been gleaned out from vernacular sources/oral histories, rather than depending on second-hand international sources. Aftershock activity data make an appearance in chapter 6. One would have expected more critical and in-depth analysis of near-field strong motion data (or rather lack thereof) obtained from our seismographs nearer to the event such as at Port Blair. Strong-motion data analysis of five aftershocks between 6 and 20 January is given in chapter 7, which I am not sure adds much to information on the main event of 26 December. It may have worked well to bunch chapters 4, 6 and 7 on seismological aspects together.

Chapter 4 deals with the tsunami impact. This chapter records the inundation distances and run-up heights along the peninsular coast of India and the Andaman and Nicobar (A&N) Islands. The

survey is carried out in a scientific manner and has good first-hand information. It is understandable that reports of damage and loss are not included in the main report but perhaps an Appendix on them may have made this report more comprehensive in the long run, as it is also meant for planners and others. As is typical with such scientific surveys, there are observations of facts but no notings of local information that add to the understanding of what really happened during the tsunami, or the socio-economic or socio-political factors that affected the response. The report makes no mention of the geographical features of the areas which had a significant effect on the way the tsunami affected different parts of the peninsular coast of India.

Chapter 5 deals with macroseismic surveys and maps the isoseismals in the Andaman Islands. The chapter is apparently an abridged version of a detailed report and makes references to buildings of 'Type B' and 'Type C' and damage grades of 2 and 3. The damage gradation and building typologies have not been referred to elsewhere in the report and hence are not comprehensible. A legend may be added for the benefit of the readers in the next edition. The isoseismal map of the Andamans is missing, which would have explained the chapter more succinctly.

Chapter 8 is perhaps the most comprehensive one in the report and is, not surprisingly, the longest chapter. It deals in detail with building damage in peninsular India and the islands and would have best followed chapter 5. The focus is on the behaviour of infrastructure and life-line projects in the A&N Islands which performed poorly. As a large number of these structures are owned by the government, the report should be a catalyst to trigger a debate on the reason for non-compliance of seismic codes in design of such structures. But the report seems to shy away from raising difficult questions.

Stakeholders would be horrified with the findings that (a) seismic-resistant design and constructions were not being followed in A&N Islands despite it being in seismic zone V and (b) recently-built RC constructions behaved worse than traditional wooden houses.

Chapter 9 deals with deformation studies in the A&N Islands. This has been a matter of much interest and debate and papers have also appeared in *Current Science* on this issue. Hence, a more detailed chapter could have been produced on this subject.

It was somewhat disconcerting to read chapters of anonymous authors. It reduces researchers/scientists/engineers to faceless technicians belonging to government institutions, who must go to sites and gather data and perhaps even contribute some original analysis but who do not deserve to be acknowledged individually. One wonders what this does to the morale of scientists and the scientific environment in our country.

The report would have greatly benefited with tighter editing. Chapter 5 especially reads like unedited field notes. One encounters change in language and tone from chapter to chapter. This would have been acceptable, even enjoyable if one could put different author name(s) to chapters. In the absence of this, the report reads as if it was hastily put together. There is no apparent logic in the system of credits for photographs. Some are acknowledged, others are not. Photograph of the same split tree appears in Plate 5.23 and Plate 9.11. References also appear to be incomplete.

In spite of these minor glitches this is a welcome book in the repository of Indian scientific literature.

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