

BOOK REVIEWS

Advances in Ergonomics, Occupational Health and Safety. D. Majumdar and W. Selvamurthy (eds). New Age International (P) Ltd, 4835/24, Ansari Road, Daryaganj, New Delhi 110 002. 2000. 218 pages. Price: Rs 495.

Ergonomics is described in the Chambers Dictionary as 'Study of man in relation to his working environment, adaptation of machines and general conditions to fit the individual so that he may work at maximum efficiency'. Man is expected to work efficiently throughout his working life and this is possible only if the nature of his work does not degrade his health and/or makes him susceptible to accidents. As long as man was the master of his work, he could choose the tools, time, environment and work compatible to his physical and mental ability. Hunting was the first occupation of man for his livelihood. He made his tools, chose his time and place to get a kill. The next occupation for livelihood was farming. Man evolved his tools like ploughs and made use of animals for heavy work. Both the hunter and the farmer were exposed to occupational hazards. However, he being master took the calculated risk; otherwise he would have to go without food.

With the industrialization and evolution of industrial society, mass production became an important factor. Mass production necessitated special tools, trained manpower and special controlled environment in some cases to ensure quality of products. Quality and quantity of products was the main concern, with the health and safety of workers taking a back seat for some time. However, very soon it was realized that a trained and healthy worker is an asset and this gave rise to safety and health aspects in the science of ergonomics. Various legislations like Occupational Safety and Health Act in USA and Factories and Mining Acts in India were enacted to regulate working conditions of the workers. The accident rates and loss of time due to injuries and sickness became the indices of working conditions. Industries were classified as hazardous, depending on the hazards involving the worker as well as the population at large. Chemical, petrochemical and mining industries were

classified as hazardous industries and enacting Environmental Protection Act made special provisions. In spite of all these, incidents like Bhopal and Chernobyl happened and a large number of people, both from the work force as well as the general public suffered. It was realized that the man who designs, develops, produces and disposes can make an error and error rate can be reduced by better working conditions and thus the science of ergonomics evolved in fifties and sixties. Today around five hundred books are listed under ergonomics in the website Amazon.com.

In the light of the rising accidents and injuries and sickness amongst workers engaged in a variety of industries in India, the publication of the book under review is timely. It has tried to make general public aware of ergonomics and its utility in addressing the problems that the industrial society is facing. The book is a collection of 35 papers written by national and international professionals in the area of ergonomics science and technology. The papers cover practically all the areas of ergonomics right from standards, designs, and methods to its implementation. Some specific cases of occupational health concerning workers who (1) have to handle heavy loads, (2) are engaged in chemical industry, (3) have to stay in confined underground areas, (4) have to work as fire fighters, (5) have to drive in heavy and dynamic traffic conditions, and (6) work in Antarctica, are considered from physiological point of view. Their heart rates, breathing rates and other vital parameters like cardiogram are monitored during working and optimum methods of work and/or protection methods are suggested. Fault Tree methodology is considered in one paper and its applicability in ergonomic design is demonstrated. Another paper covers national and international ISO-standards and explains in detail the hurdles faced in their implementation, due to high costs involved. Work causes stress and as long as it does not end up in distress, it is good. One paper elegantly presents this aspect and the author calls the bearable stress as 'eu-stress'. In fact the value of eu-stress depends on the physical and mental strength of the worker. Practising yoga can enhance physical and mental strength. One paper has presented the usefulness of yoga.

Professional societies in the area of ergonomics and the need of consultants in this area have also been covered. It would have been more interesting if some light would have been thrown on the health of workers working for weeks at a stretch in the confined areas of submarines, manned satellites and space stations. What is the secret of the health of Sen. John Glenn, who became a spaceman at an advanced age of seventy-seven? For that matter what is the secret of our aged politicians who stand the stress and strain of their work. Maybe living without work causes more stress. Homi Bhabha would have aptly described this phenomenon as 'No work is more stressful than no work.'

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Butterflies of Peninsular India. Krushnamegh Kunte. Universities Press (India) Ltd, 3-5-819 Hyderguda, Hyderabad 500 029. 248 pages. Price: Rs 470.

The planning of user-friendly field guides for animals and plants with the aim of promoting awareness of the myriads of species, besides accelerating interest in their diversity, also provides food for thought regarding their conservation. It is the ingenuity of Madhav Gadgil that led him to plan a series of fascicles under Project Lifescape, visualizing a broad spectrum of Peninsular India's biological wealth. In this effort the Indian Academy of Sciences, Bangalore has supported the publication of this first fascicle on the *Butterflies of Peninsular India*, one that reflects the splendour, uniqueness, richness and diversity of the butterflies of Peninsular India. Quite unlike any traditional publication, the author has drawn the attention of users to several useful features of butterflies to be able to recognize and identify them in the field.

The introductory chapter merits careful reading with some aspects of general classification and biodiversity of butterflies, followed by a lucid exposition of the ecology of butterflies. Emphasis has

been laid on (a) the geographical extent and importance of vegetation types to butterflies, food and feeding in larval caterpillars and adults, mate acquisition strategies, in particular 'mud puddling' or gathering supplementary nutrients from wet soil, a strategy wherein males offer supplementary resources needed by the females to produce more eggs; (b) intraspecific colour polymorphism, with seasonal variation in colour form; (c) flight periods and seasonality, as well as migration and local movements; (d) aspects of population ecology involving age groups, population fluctuations and role of parasites and predators; (e) survival strategies with camouflage or resemblance to inanimate objects, unpalatability due to storage of toxic compound, mimicry of unpalatable species and larval association with ants; and (f) threats to butterfly diversity as a result of habitat destruction, degradation and fragmentation, role of fire, application of pesticides and weedicides and measures to conserve butterflies. To kindle the interest of young naturalists, an attempt has been made to suggest student projects under each of the aspects discussed in the area of butterfly ecology, as also alongside with the description of species.

The major part of the book deals with the description and biological notes on 76 species of butterflies from Peninsular India under the families Papilionidae (swallow tails), Pieridae (white-yellows), Lycaenidae (blues) and Hesperidae (skippers), with brief characterization of some of the important subfamilies in each. Every species bears details on field characters, habits, reproduction, larval host plants, economic significance and polymorphism. To facilitate easy usage by naturalists, each species bears common names such as common Jay, tailed Jay, birdwings, sword tails, blue mormon, Paris peacock to mention a few. Among the significant aspects of this handy volume is a long list of larval host plants which would enable studies on the life history

of the various species. A short, useful glossary and a brief list of references are also included.

Interesting information provided on several aspects of the biology of different species reflects the observational acumen of the author. Of the red pierrot (*Talycata nyseus*) it is mentioned that the little caterpillar neglects so-called hygiene and by hunting for leaf pouches



Common Lascar

full of wet droppings, it is possible to discover it. An equally interesting behavioural aspect relates to the common evening brown (*Melanitis leda*), where the adult searches for alcohol-rich fruits and tree sap and fallen and rotting fruits attract this butterfly, which can be baited by wine, toddy, etc. Of the crepuscular nocturnal butterfly, the giant red eye (*Gangara thyrus*), it is said that the wing beats are so powerful and quick that they are audible from a distance of a few metres during the silent hours of the night. Its extremely long proboscis in comparison to its body length is able to suck nectar from the largest flowers of the forest. Even its caterpillar produces gnawing sound also audible a few metres away. Of the powers of migration of the common albatross (*Appias albina*), it is said to migrate in swarms from anything between a dozen and thousands of indi-

viduals and the swarms in wet soil sometimes consist of several hundred butterflies. On the stream banks a dozen or more individuals seem to fly in a single file in a 'follow-the-leader formation', turning and twisting as their leader moves. As regards the driving forces in the evolution of sexual dimorphism and its advantages, interesting information regarding racially polymorphic butterflies is provided, besides a superb example from the Western Himalayas, where the Indian white admiral has five forms, geographically separated from one another by gigantic mountain ranges. As for the survival strategies, a good example is that of the southern birdwing (*Troides minos*) which due to its extraordinary large wing span, longer than those of small birds, advertizes that it is unpalatable to birds due to the presence of aristolochic acids. Similarly in the common rose (*Pachliopta aristolochia*) an interesting swallow tail, both the caterpillar and butterfly are protected by aristolochic acids, smelling and tasting unpleasant. Similar information about almost every species makes this book interesting reading.

Thirty-one plates, including well-reproduced colour pictures of the various species of butterflies add to the utility of this volume, besides black and white illustrations depicting various aspects of butterfly morphology of every species discussed. It will certainly not be an overstatement to say that this fascicle represents the outcome of the passion of the author for butterflies, which has found expression in a very lucid form 'opening the doors to young naturalists and future scientists and turn on the light' as has been very aptly indicated in the foreword to this book by no less a person than E. O. Wilson.

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