Annual Review of Entomology 1991. Vol. 36, T. E. Mittler, ed. Annual Reviews Inc., Palo Alto, California, USA. 1991. 679 pp. Price: USA $40; elsewhere $45.

Every volume of *Annual Review of Entomology* thus far published has always furnished the reader a wealth of interesting and valuable up-to-date information on diverse topics of Insect Science. The thirty-sixth volume in this series is no exception to that attribute. Authoritative treatments on subjects covering behaviour, physiology, pest management, population studies and genetics constitute the major portion of this compilation. Two articles, one on 'Self-selection of optimal diets by insects' by G. P. Waldbauer and S. Friedman and the other on 'Maternal effects in insect life histories' by Timothy A. Mousseau and Hugh Dingle are of outstanding quality. The first projects a new viewpoint in the area of insect–food interaction which, in a broader context, will help to understand better the relationships between insects and their host plants. The second deals with the complex and intricate operations of maternal control on progeny fitness in insects. The need for further in-depth study in this field and its potential value for a meaningful comprehension of the implication of such effects in the management of insect populations are also emphasized here.

The primary step in the establishment of a phytophagous insect on its host plant is oviposition. Performance of this final event in the female's reproduction has been excellently discussed by John N. Thompson and Olle Pellmyr taking into account the behavioural, genetic and ecological determinants of egg laying act of herbivorous butterflies and moths (with more emphasis on butterflies) that result in the insects' preference for plants and plant parts. In the field of insect behaviour, there is yet another article where M. F. Bowen has lucidly analysed all existing informations concerning receptors responsible for detecting host attraction in the female mosquito and the physiological factors that regulate olfactory responsiveness and host-searching behaviour.

Six articles provide exhaustive coverage on insect pest management. One of them presented by Daniel A. Potter and S. Kristine Braman is a maiden account concerning turfgrass insect pests where application of biological and integrated pest management practices on these organisms has been critically evaluated. The second written by Heikki M. T. Hokkanen examines the economic and environmental benefits of trap cropping as a feasible strategy, despite the existence of a number of constraints, in the suppression of several pests in a number of agroecosystems. In the third article, Eli Levine and Hassan Oloumi-Sadeghi discuss in detail all aspects of management tactics followed for controlling corn rootworms. The need for development of new and improved ways for checking the menace of these pests, through better knowledge of their host-finding behaviour and host-mediated chemical ecology is also stressed. There are two reviews that exclusively deal with biological control aspect. H. R. Herren and P. Neueuschwander consider at length the implementation of this control programme on cassava pests in Africa. What are the possibilities of biological control agents causing environmental damage and upsets in natural ecosystems? How can they affect public health? Francis G. Howarth addresses these questions in his contribution on this method of insect pest suppression. Sex pheromones and their application in the form of pheromone traps for employment in insect management programmes have been considered from a behavioural–ecological angle by Jeremy N. McNeil. In the present day concern for environmental safety and the need to offset insect pest resistance to insecticides, the potential advantage of using such semiochemicals as alternate control strategies is obvious and, therefore, hardly requires any emphasis. Viewed in this context, the appearance of this review is very timely and assumes special significance.

Entomologists engaged in insect population studies have always been on the look-out for adoption of more refined and mathematically based methodologies to aid them in their interpretation of the dynamic population processes reflected through life-table data. Eizi Kuno's account is a comprehensive treatment of thse techniques with particular reference to sampling and analysis of insect populations. Scope for improvement in the application of statistical procedures is also indicated. Changes in the arthropod pest density levels in relation to plant quality, presence of natural enemies and resource concentration in a mixed species of plant community presented by D. A. Andow is another review dealing with insect population.

For insect geneticists, there are a couple of noteworthy contributions. Gene amplification-esterase overproduction phenomenon in the development of resistance in an aphid and a mosquito and the occurrence of similar genetic events in other organisms and in cell cultures that develop resistance to cytotoxic agents have been highlighted in the account published by Alan L. Devonshire and Linda M. Field. On the other, a critical appraisal of the scope of gene-transfer study in insects and the limitations in the methodologies involved have been admirably reviewed by Alfred M. Handler.

On the subject of arthropod vectors, there are four reviews in this volume. The article by L. D. Foil and C. J. Issel is a diligent presentation of different factors contributing to the possibility of mechanical transmission of retroviruses by arthropods. Karamjit S. Rai provides a balanced view of knowledge thus far gained on various aspects of the biology, population genetics and vector competence of *Aedes albopictus* that has now come to stay in the Americas. R. S. Lane, J. Piesman and W. Burgdofer critically survey the literature concerning the relationship of *Borrelia burgdoferi* (the causative spirochaete agent of Lyme disease) with its arthropod vectors (ixodid ticks) and vertebrate hosts in Europe and North America). There is also a write-up by Glen R. Needham and Pete D. Teel giving an updated information on water-balance physiology and its relevance to off-host survival in this group of ticks.

An article on avermectins by Joan A. Lasota and Richard A. Dybas is also found in this volume. These macrocyclic lactones of soil bacterial origin have recently gained increasing importance for their toxic effects on parasites and insect pests that affect human and animal health. The authors, in their presentation, provide a comprehensive state-of-the-art on this subject with special reference to their role in the control of various groups of insects and

other arthropods. Interestingly, this is the second review published on this topic within the same year. The first one 'Invermectin as an antiparasitic agent for use in human' by W. C. Campbell appeared in *Annual Review of Microbiology*, vol. 45, 1991.

Insect damage to trees is another area of special concern to entomologists. To what extent and what type of induced responses trees exhibit to such herbivory and how do they regulate herbivore populations are issues considered in the review written by Errki Haukioja. The range of insect pests associated with eucalyptus and the magnitude of destruction caused by them to this forest tree have been comprehensively presented by C. P. Ohmart and P. B. Edwards.

Other articles of interest included in this volume are: a) 'Biosystematics of the chewing lice of pocket gophers' by Ronald A. Hellenthal and Roger D. Price, b) 'The function and evolution of insect storage hexamers' by William H. Telfer and Joseph G. Kunkel, c) 'Arthropod behaviour and the efficacy of plant protectants' by Fred Gould, d) 'Sensilla of immature insects' by Russel Y. Zacharuk and Vonnie D. Shields, e) 'Whitefly biology' by David N. Byrne and Thomas S. Bellows, Jr. and, f) 'Bionomics of leaf-mining insects' by H A. Hespenheide.

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As usual this thirty-seventh volume of *Annual Review of Entomology* enlightens us with reviews on the advancing aspects of entomology. It is hardly possible to achieve a balanced coverage of this vast subject, nevertheless this review caters to a diverse readership. Critical and in depth analysis is rampant throughout the review and changing perspectives of many subject areas have been redefined and delineated. In my opinion, the one on chemical ecology of aphids as a fundamental topic and the other on tactics of management of pesticide resistance as an applied topic stand out as the most appealing.

This volume has, in all, twenty-six reviews, of which many are on the fundamental and applied aspects of ecology. The frontier areas in physiology and biochemistry rank next while morphology, systematics, evolution, bionomics, biological control, pathology, toxicology, agricultural entomology, apiculture and medical entomology get their due coverage. Indeed, there are few topics of specific interest, viz. forensic entomology, poly DNA viruses, and integrated pest management in woody landscape situations; perhaps these had been chosen due to the desire for critical and indepth reviews in these areas, and to meet the changing needs. With this overall view gathered at first glance, let me be prudent to discuss the reviews.

The review on blood sucking parasites highlights the distinction between the qualitative and quantitative values of vectorial capacity and reproduction number. Thereby it proclaims a revolutionary, comparative approach to the epidemiological problems, which can be applied to plant diseases and their vectors as well. Thought provoking ideas on the phylogeny and evolution dominate the scene in the review on small ermine moths. It will certainly enrich our knowledge on phylogeny and evolution of insects as a whole. The voluminous information that had flown in the past decade on aphids with regard to their alarm and sex pheromones and their chemical ecology is superbly condensed in another review. The concept of the receptors on the antenna, namely the primary and secondary rhinaria had been made clear and all relevant details of host location and mate selection with reference to the chemical ecology are explained. Management of pesticide resistance in arthropods had been attempted so far with tactics that seemed theoretically capable. These tactics had been found to be either too naive or unrealistic for large scale field implementation. An excellent review on this aspect brings to light this fact and it has been now established that pesticide resistance management is tangible only if it is fought as a socioeconomic cum scientific challenge.

Abundant information has flown in on the function of insect wings and all these have been brought out in a nutshell in yet another review. Integration of information available on morphology and insect flight has been achieved with the evidence obtained through scanning electron microscopy studies, high speed cinematography coupled with computer software to analyse the flight patterns and aerodynamic interpretations. However, the information given under evolution, gross form, and functional differentiation of wings of different orders of insects seems to be available in many textbooks and these details could have been curtailed. Yet another contribution to the chemical ecology is the one on use of infochemicals by natural enemies. The information is distinctly significant as it deals mainly with third trophic level. The observation that current plant breeding practices unfortunately do not consider effects of plants on this trophic level is timely and thought provoking. It is hoped that a good beginning will be made in this regard immediately. To make us aware of how an introduced species of bees had extaordinarily established in an alien situation to an extent of becoming notorious and a threat to beekeeping, a nice review is included on africanized honey bees. This categorizes their biological differences to enable their management. Precious and scanty information on iron economy in insects is analysed well in all its consequences by a review which focuses the many problems to be solved. Biochemical properties of insect yolk proteins in relation to their interaction with receptors on the oocyte surface is a novel topic as not much is known on this. This volume has a marvellous article on this aspect of cell biology of insects, entirely devoted to biochemical and molecular biology of yolk proteins. No doubt, it will be well received by the biologists, physiologists and biochemists.

Insect science could be used for strange purposes and indeed this point is nicely anchored in an article on forensic entomology. The manner in which such obscure information is collected and presented in an indepth review deserves appreciation. Insect cuticle has chitin and sclerotin, of which the details of the former had already