Literature

Gilbert F. (ed) 1990: Insect life cycles: genetics, evolution and co-ordination. 258 pp. — Springer-Verlag. ISBN 3-540-19550-5. Hardcover DEM 148,-

This volume results from the International Congress of Entomology held in Vancouver in 1988. The 13 papers by 21 authors are organized in sections dealing with genetics, evolution and co-ordination. Each section is preceded by a short introduction by William Bradshaw, who also provides a thoughtful concluding chapter on the present and future in research on insect life-cycle evolution. All papers serve as useful reviews on their own topic. They include a large amount of work causing the book overall to offer an excellent view of life-cycle variation within and between species, of the determination of life-cycle syndromes at the individual level, and of the problems the present research is attacking.

Most papers rely on empirical results. Taxonomically the papers cover several insect orders. One major topic discussed in several papers is the correlation of life history traits. There can be genetic pleiotropy, in which the same set of genes affect several traits, which as a result become correlated. The traits may also correlate even when genetically independent if they are under the same selection pressure forming what is then recognized as an adaptive syndrome. The adaptive explanation predicts that life-cycles should vary depending on type of environment and on environmental variation. This leads to clear predictions of both intraspecific geographical variation and interspecific differences. Both these important aspects are well represented in the book. Analysis of the patterns across species makes clear the importance of the comparative method that has been much discussed in the recent literature. The joint evolutionary history of closely related species means that species do not form completely independent data points in comparative analysis, making it important to separate the effects of phylogenetic correlations from those of adaptive responses. The book emphasizes the role of systematics as a vital part in such studies.

Several papers deal with the connections between life-cycles and interspecific interactions such as those in herbivores, insect-plant mutualists and insect predators. Valerie Brown extends the discussion to the community level when she examines the effect of herbivorous insects on plant succession and the role of insect life-cycles. Three papers focus on modelling and methodological issues. Fritz Taylor demonstrates how difficult it may be to test evolutionary optimality predictions because the mean phenotype in the population can converge with the long-term optimum very slowly in temporally varying environments. Spatial heterogeneity creates habitat patches in which a species has none or few superior competitors. Bryan Shorrocks examines the significance of such 'probability refuges' for the maintenance of species diversity and of genetic diversity within a species. Derek Roff provides a very clear presentation on the role of genetic analyses. He examines the advantages and limitations of genetic models and phenotypic optimality models. As generally recognized, he concludes that these two approaches are mutually complementary. Considerable heritability of many life-history traits in various species implies existing genetic variation. Roff particularly emphasizes two factors helping to maintain genetic variation: environmental heterogeneity and antagonistic pleiotropy. The latter refers to a situation in which two characters are affected by the same genes, and selection on these characters tends to drive the gene frequencies in opposite directions. This is one aspect that makes life-cycles so interesting — adaptation is not always a simple process but involves trade-offs between different traits.

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