

quantitative tools including statistics, signal detection theory, and dynamic and linear programming. Insights are also provided on the comparison of models, alternative interpretations, problems such as the limitations of linear operator models, and the unity that can arise from apparently disparate results (e.g. risk aversion and risk proneness). Amid their vigorous defense of adaptationism, the authors acknowledge topics for which further research is needed, as in the cases of partial preferences and customizing general models to specific contexts. On the other hand,

workers interested in the metabolic and behavioural aspects of feeding, such as individual differences, will feel that these aspects have been given short shrift in being treated merely as constraints to functional issues. Nevertheless, as a work focused on the state of foraging theory, this volume provides an excellent exposition.

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Ecology and Evolution of Darwin's Finches

By Peter R. Grant. 1986. Princeton University Press, Princeton, New Jersey. xiv + 458 pp., illus. Cloth U.S. \$55; paper U.S. \$22.50.

This is an important book, well-written and attractively presented. It will presumably be bought by the libraries of most academic institutions with biological pretensions, should they still have funds for acquisitions. It should be bought by many individual biologists, as an intellectual stimulant and as a model of lucidity. But how many biologists buy, read, and take pleasure in owning books on topics not related to their current concerns?

The peculiar merit of Professor Grant's book is that it performs two overlapping but substantially different tasks, and performs both of them unusually well. The larger part of the book reports the results of intensive and lengthy field studies on the distribution and behaviour of the group of 14 species of passerines forming the subfamily Geospizinae, confined to the Galapagos and Cocos Island, which, from a common ancestry, have come to exhibit a remarkable diversity of form and functions. The field studies were supplemented and guided by detailed work on beak shapes and sizes, and on the underlying musculature and mechanisms. Having set the scene geographically, taxonomically and morphologically, Professor Grant centres the work, first, on study of the diets of the different species and the importance of what food is available in imposing limits on finch populations and, second, on the mechanisms of species recognition and mate choice. These have been popular academic topics in the last decade or so.

The discussion then proceeds to some less fashionable but more fundamental subjects, including evolution and speciation, competition, adaptation, and the reconstruction of phylogeny,

most of which received more attention (from a much smaller corps of biologists than now exists) in the 19th and first half of the 20th century than they have in recent years. This re-examination and illumination of major themes that had been set aside has been made possible by intensive work by Grant and his associates since 1971. They have greatly enriched one of the classical examples in "biological history".

For someone who is not a specialist in this field a second theme emerges, not wholly explicitly, which is a contribution to the "history of biology". The Geospizinae have been known as Darwin's Finches for over 50 years, in recognition of his part in bringing them scientific fame, although he was not the first to see or describe them. But Darwin was so puzzled by the Galapagos finches that he made no reference to them in the *Origin of Species*. Part of his puzzlement was due to the genuine complexity of the situation, part to the fact that he spent only five weeks on the islands and collected specimens of only 9 of the 14 species. Most endearingly to those of us who have also made elementary blunders in our own research (and who has not?), he made things harder for himself by failing to label separately the specimens he collected on different islands. So he had the good sense to "say nowt about it" except in his *Journal of Researches*, that wonderful quarry of observations and ideas.

The surge of recent interest in the Geospizinae began in 1931, when the American H. S. Swarth, basing his work on a large collection of material made on behalf of the California Academy of Sciences in 1905-1906, produced the first modern taxonomic treatment. In 1936, in Germany, Erwin Stresemann, also working with museum specimens and with no first-hand knowledge of the islands and

the living birds, developed ideas on the diversification of the finches. Then David Lack, from England, who spent more than three months on the islands in 1939, and published several papers on the Geospizinae during the Second World War, published the monograph *Darwin's Finches* in 1947, which built on the ideas of Swarth and Stresemann and enriched them with his own first-hand observations. That monograph became a classic, and was reissued very recently, with an introduction by Peter Boag.

As Professor Grant makes very clear, the major advances he and fellow workers made on the studies by earlier generations of ornithologists were possible because of improvements in logistics and in funding, which have made working conditions on the "nearly always unpleasant" (Lack's phrase)

Galapagos Islands and in other harsh places much less unpleasant. The islands are now part of the national parks system of Ecuador and the Charles Darwin Research Station was set up on Isla Santa Cruz in 1966. Scientists can now stay for long periods, work in teams, and make repeated visits. No wonder that they can obtain more and more reliable results than their predecessors. But it takes a first-rate scientist to tell as absorbing and convincing a tale as does Professor Grant, aided by publishers who have produced a book that is very good to look at. A warm note of thanks to everyone involved.

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A Systematic Study of the Nearctic Larvae of the *Hydropsyche morosa* Group (Trichoptera: Hydropsychidae)

By Patricia W. Schefter and Glenn B. Wiggins. 1986. Life Sciences Miscellaneous Publications, Royal Ontario Museum, Toronto, Ontario. 94 pp., illus. \$14.25.

For any biologist faced with the task of sorting benthic samples and identifying aquatic insect larvae, the genus *Hydropsyche* represents a considerable challenge. The head capsules of the relatively large larvae often are plainly marked with striking color patterns. Because of this there has been a strong temptation to utilize the markings for species identifications, and several authors have published keys to species that are based largely on head capsule color pattern. None of these efforts have been entirely satisfactory because there is a high degree of generally unrecognized intraspecific geographic variability. The need for more reliable characters that are less variable over the entire range of each species has been apparent for some time. This volume, although restricted to species of the *morosa* group, presents a careful analysis of characters that appear to meet this need.

The result of several years of study, this book is important for two reasons. First it will introduce caddisfly workers and other systematists to a new suite of setal characters that will prove to be immensely valuable for the identification of caddisfly larvae and that also will prove to be indispensable for phylogenetic analysis. Although Wiggins previously has discussed the potential for setal characters for systematic study of Trichoptera (Williams and Wiggins 1981), the present

publication is likely to have greater significance because it clearly demonstrates the practical utility of setal characters. There is a small school of students of Trichoptera, including a few young newcomers, who consistently ignore the immature stages in phylogenetic analysis. The usual (invalid) argument for slighting larvae has been the paucity of characters compared with the adults. The large number of characters demonstrated in this work by Schefter and Wiggins, and in work by Wiggins' other students should go a long way in helping to dispel such attitudes.

Second, it will be the standard reference of *morosa* group larvae for many years to come. The nature of the characters and their newness has led to the keys being rather long. But with careful attention to the clear exposition of the setal types at the beginning and reference to the numerous illustrations throughout, biologists will soon discover that they are able to consistently and correctly identify larvae that they previously had lumped under *Hydropsyche* spp. The authors examined a large number of specimens from all parts of the ranges of most species ensuring that virtually all significant geographical variation has been accounted for in constructing the keys and writing the diagnoses. This thoroughness and the use of morphological characters rather than color patterns have resulted in a highly reliable and practical key.

The book is successful both as an identification manual and as a vehicle demonstrating the



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