

Insect Adaptations

Evolution of Insect Migration and Diapause.

Papers from a symposium, Washington, D.C., Aug. 1976. HUGH DINGLE, Ed. Springer-Verlag, New York, 1978. xvi, 286 pp., illus. \$22.80. Proceedings in Life Sciences.

Ideas about insect migration have changed radically since about 1950, and migration is now seen as an integral part of the life histories of very large numbers of diverse species. Phenomena whose importance is now recognized include the regulation of the migration syndrome by external stimuli mediated by the endocrine system and the role of migration in population ecology and dynamics. Diapause, also an endocrine-controlled "escape mechanism," is a static counterpart of those phenomena and is similarly significant. It has taken time for population ecologists to use these concepts, but the last decade especially has seen attempts to explore and quantify the adaptive changes in life histories associated with migration and diapause. This is what the 12 papers in this volume do. Much new quantitative information, from laboratory and field, is given for a selected range of species, the main issues being as follows.

The proportion of a population, or a species, that migrates, as well as the performance of its individual members, varies in time and space; all members may migrate or only some, with varying durations of flight. In some populations flight is only local or even entirely absent, and, indeed, wing muscles and wings may not even develop; such variation is genetically based and environmentally controlled. Because both migration and diapause are physiologically associated, through endocrines, with development, especially that of the flight apparatus and ovaries (ovarian development is commonly delayed by migration and more so by diapause), they also affect the traditional population parameters such as birth rate, generation time, and voltinism; these parameters vary with changes, often extreme, in the environment (mainly involving climate and light) and in resources (such as food), as when reproduction is delayed until the new habitat is reached. Losses in transit and during dormancy also contribute to mortality. Population density thus varies and can also affect migration directly. The possible adjustments are many, especially with respect to reproduction, and fitness varies accordingly.

The claim made by the editor of this volume that migration and diapause provide rich material for studies of evolution

is amply justified. Though the promise is perhaps better fulfilled by the papers on diapause, all the papers in the volume are of a high standard and well documented. Those that I found particularly illustrative and informative were M. A. Rankin's on hormonal control of migratory behavior, K. Vepsäläinen's on the genetic and environmental determinants of wing length, flight, and voltinism in *Gerris*, Tauber and Tauber's on tendencies to speciation in *Chrysopa* of diverse phenologies, and S. Masaki's on clines of diapause and voltinism in crickets on climatically different islands.

Migration has, indeed, been much overlooked in population models created by entomologists, and this volume is particularly welcome in that it begins to rectify this neglect.

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Books Received

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Aging into the 21st Century. Middle-Agers Today. Lissy F. Jarvik and Helene Kratz, Eds. Gardner Press, New York, 1978 (distributor, Halsted [Wiley], New York). x, 214 pp. \$18.

Atoms and Molecules. Mitchel Weissbluth. Academic Press, New York, 1978. xvi, 714 pp., illus. \$59.50.

Basic Microbiology with Applications. Thomas D. Brock and Katherine M. Brock. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1978. xiv, 608 pp., illus. \$18.95.

Basic Sciences and Agriculture. Proceedings of a symposium, New Delhi, Oct. 1975. Indian National Science Academy, New Delhi, 1978. xii, 256 pp., illus. Paper, \$10. *INSA Bulletin* No. 55.

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Climates of Hunger. Mankind and the World's Changing Weather. Reid A. Bryson and Thomas J. Murray. University of Wisconsin Press, Madison, 1977. xvi, 172 pp., illus. \$8.95.

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Current Topics in Developmental Biology. Vol. 12, Fertilization. A. A. Moscona and Alberto Monroy, Eds. Academic Press, New York, 1978. xiv, 254 pp., illus. \$23.50.

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