

ECOLOGY OF HIGH ALTITUDE INSECTS

*Reviewed by*  
GORDON ALEXANDER

Reprinted from *Ecology*, Vol. 43, No. 4. Autumn 1962

### ECOLOGY OF HIGH ALTITUDE INSECTS<sup>1</sup>

It is singularly appropriate that the first comprehensive discussion of the ecology of high altitude insects should come from India, for the most extensive mountainous areas of the world are in and adjacent to India. And it

<sup>1</sup> Mani, M. S. 1962. Introduction to high altitude entomology. Insect life above the timber-line in the Northwest Himalaya. xix + 302 pp., 80 figures, 10 plates (2 in color), 15 tables. Methuen and Co., Ltd., London. 42 s (\$5.88).

was in the Himalaya—chiefly in the Northwest Himalaya, west of the Sutlej River—that Dr. Mani carried on his field studies and lead the three entomological expeditions on which this book is based.

From the title one might assume that the work is primarily taxonomic. This is not the case. Dr. Mani's studies have centered about an analysis of the factors involved in high altitude insect distribution. Over 400 species of nival insects (from timber line to 6,000 meters

altitude) were collected, and many others at altitudes just below timber line, but the taxonomic details have been and are being published elsewhere. Less than 25% of this book is concerned with the systematics of high altitude insects, and this portion is actually rather general. The emphasis throughout is ecological.

The chapter titles listed below suggest chapter contents and the organization of the work; I have added brief annotations, in parentheses after the titles, to indicate the scope and particular emphasis of each chapter: I. Introduction (principally the geography and zonation of the Northwest Himalaya); II. The Environment above Timber-line (climatic variables, treated primarily as resultants of altitude—whose direct effect on insects is slight; microclimatic conditions receive special emphasis); III. Ecologic Specializations (melanism, wing- and size-reduction, cold stenothermy, hygrophily, terricoly, diurnal activity, specialized food habits and life histories—all are treated in relation to altitude); IV. Ecologic Interrelations (pollination; food chains; importance of predators and scavengers at highest altitudes—where “wind-blown derelicts” from lower altitudes provide food; parasitism); V. Insect Communities above Timber-line (a classification of communities; these are characterized in general by small numbers of species, large numbers of individuals); VI. Some Nival Insects (systematic survey by Orders and Families; at highest altitudes Diptera predominate in species, Collembola in individuals); VII. Some Nival Arthropoda (systematic summary by Classes and Orders; mites are especially numerous); VIII. Peculiarities of Distribution of Nival Insects (vertical distributions; relations to topographic features); IX. Zoogeography (Palearctic affinities of Himalayan insects; the high proportion of endemic species); X. The Origin and Evolution of the Nival Insect Fauna (Himalayan insects chiefly of Central Asian origin; ice-free nunataks were important as Pleistocene refugia).

One notes Dr. Mani's frequent use of the word “nival” in chapter titles. As used by him this term is much more comprehensive in meaning than its etymology or former usage would suggest, for he uses “Nival Zone” to comprise everything above timber line. Among other matters over which alpine ecologists may take issue is the author's emphasis on “atmospheric aridity” as characteristic of high altitudes, the explanation of his point of view being, apparently, a failure to draw a sharp distinction between absolute humidity and relative humidity as ecological factors.

It is easy to find some grounds for unfavorable criticism in a book that, as does this one, breaks new ground and at the same time brings together such a wealth of ma-

terial in a specialized field. There are no very serious weaknesses, but a few minor ones should be mentioned: Organization of the book permits—perhaps requires—considerable repetition of ideas, these being repeated in different context in different parts of the book. The terminology is unnecessarily complex and formal; it may actually be misleading or confusing—as when (on page 271) uses of the terms “thermophile” and “autochthone” implies that these terms are antonyms. Reference maps in the first chapter are so inadequately labelled with place names that the average reader will have to use a good atlas in conjunction with the text. And, in a few cases, a suggestion with little scientific merit appears to have been accepted rather uncritically—as when (on page 74) the smaller size of high altitude insects is said to be “attributable, at least in part, to the increased gravitation.”

Dr. Mani is to be strongly commended for his general contributions. The most important of these might be called the codification of the subject matter of high altitude insect ecology. His work is more than the “introduction” he calls it. He has considered all essential aspects of the subject. His extensive lists of references, from the Indian and well as European and American literature, constitute a significant bibliographic contribution. (The references appear in separate lists at the ends of appropriate chapters, but they are all indexed by author in the general Index.) And in his numerous, ingenious diagrams he has supplied an excellent analysis of the complex of variables constituting what he calls “a single . . . factor, . . . the high altitude environment.”

Among special ecological contributions should be mentioned the author's attempt to apply a dynamic interpretation to simple insect communities above timber line, his recognition of the reason for the preponderance of predators and scavengers at highest altitudes, his descriptions of actual situations in which microclimatic factors are of major importance, his accounts of special activities and life cycle modifications adapted to the exigencies of high altitude environments, and, in general, a wealth of individual observations contributing to the whole picture.

Dr. Mani merits congratulations upon a valuable achievement. This is a major contribution to alpine ecology. And it is unique, as the first extensive treatment of insect distribution in the Himalaya, and as the first comprehensive analysis of the problems of high altitude insect distribution wherever high altitudes occur. It is an essential reference for all workers in this field.

GORDON ALEXANDER

DEPARTMENT OF BIOLOGY  
UNIVERSITY OF COLORADO, BOULDER