Book Reviews

Fauna near the Limit of Tolerance

Entomology of Antarctica. J. LINSLEY GRESSITT, Ed. American Geophysical Union, Washington, D.C., 1967. xii + 395 pp., illus. $17. Antarctic Research Series, vol. 10. NAS–NRC Publication 1574.

In form, this book is a collection of 20 papers, equally divided between the systematic and ecological points of view; but in sum it is also an up-to-date review of our knowledge of the arthropod fauna of Antarctica. It results primarily from the work of the Bishop Museum (Honolulu) over the past ten years, with contributions also from British and Australian sources.

The terrestrial fauna of Antarctica is reduced and specialized. Apart from the birds and seals and their ectoparasites, the only other macroscopic animals—and the only ones depending on the resources of the land for their food—are some very small ground-living arthropods and three pterygote insects. There are 50 mites and 19 springtails, and two chironomid flies (only one actually with wings) and one nest flea. The contrast with the high arctic is striking. Even on Ellef Ringes Island, the most rigorous area yet studied, there are 17 chironomids and a dozen other pterygote species in three orders; and on Ellesmere Island and northernmost Greenland, at 82°N, there is a diversified fauna of higher insects of well over 200 species. Interest centers therefore on a fauna of land organisms that is approaching the ultimate limit of tolerance in the face of polar conditions.

The species of maritime Antarctica are related to subantarctic forms, and may have arrived, mainly via the Antarctic Peninsula, since the last glacial maximum. But the smaller fauna of Victoria Land and the interior stations is highly distinctive, and includes no less than seven endemic genera of mites and springtails. The authors agree that it may be the remains of the preglacial antarctic fauna, surviving on favored ice-free sites since Miocene times.

Maritime Antarctica has a moderate snowfall which yields water in summer, and at Palmer Station there are mossy areas that remain damp through the season and carry a fauna of about 16 species. But inland from McMurdo Sound the mean temperature of the warmest month never quite reaches 0°C, and in ice-free areas the meager snowfall is dissipated almost entirely by evaporation. H. Janetschek gives a very valuable account of the stringent conditions of life of this high antarctic fauna and makes several basic points. In summer the incident solar radiation is strong and continuous, and increases in total from the Antarctic Circle to the Pole; thus at the ground surface, and for several centimeters below, the temperature may be very much higher than that measured by the meteorologist. At 77° to 80°S, moreover, the elevation of the sun is sufficient to maintain this balance even at 0:00 hours; the "nightly" inversion familiar at all lower latitudes does not occur. Thus the thermal regime at the soil surface becomes in certain respects more favorable in very high latitudes, as has been found also in recent entomological studies in the arctic. Available moisture is the ultimate limiting factor, and the Dry Valleys, though free of snow for several months, are almost lifeless except locally where a little water liberated from the permafrost is drawn upward to dampen the surface. There microscopic algae and fungi develop, and provide for local populations of one or at most two species of springtails and mites—populations that may have survived in such places for long ages.

Many questions, of course, remain. More detailed studies of the bionomics of individual species are especially desirable. In the arctic, as the heat budget of the season decreases, the persisting species tend toward a life cycle extended over several years, with growth in a given season determined largely by chance. Presumably this opportunism is even more marked at the polar limit. Is some minimum of growth necessary? Or can such organisms persist under snow for a long succession of unfavorable years? The present book sets the stage, in very useful fashion, for many further discoveries.

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Elementary Processes

High Energy Astrophysics. Vol. 2. Lectures delivered at the 1966 Summer School of Theoretical Physics, Les Houches. C. DEWITT, E. SCHATZMAN, and P. VÉRON, Eds. Gordon and Breach, New York, 1967. xii + 332 pp., illus. $12.50.

This is the middle volume in a three-volume series based on lectures given at the 1966 Les Houches summer school on the general topic of high energy astrophysics. The first volume concentrates on extragalactic radio astronomy, the third on high densities and general relativity; the middle volume deals with elementary processes and acceleration mechanisms. The Les Houches series is a more ambitious publishing enterprise than the compact book on a "rival" summer school at Varenna, on the same subject, one year earlier. A fat series of books may seem surprising at first on a "mere" borderline subject between high energy physics and astronomy. However, these books really have the flavor of a lecture course, rather than a compact résumé, and as such give some background from each of the two parent subjects as well as information on the borderline itself. To summarize this review before giving a few details: These books are not for those readers who like the maximum of new-information content per page, but for those who enjoy the charm of a live lecture course captured in print.

The largest single chunk in this volume, written by H. Y. Chiu and his collaborators, deals with "Elementary processes in astrophysics." In some