The Alpine Insects of the Teton Range

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The Teton Mountain Range of Wyoming is considerably more extensive than one would imagine when viewing it from a distance, and embraces many significantly different alpine areas. A critical comparative evaluation was necessary to indicate the most likely regions for future extensive studies of alpine insects. The snowpack in early July inhibited insect activity above timberline, hence plans for entomological high camps were postponed until the end of the month and the first two weeks of August. Numerous exploratory trips were made into the high canyons and across the passes, resulting in considerable familiarity with the alpine terrain and with general conditions within this impressive mountain range. On every trip specimens were collected, and it has been possible as a result of these activities to arrive at many conclusions which should make future investigations of the alpine fauna of the Tetons more productive than they might be otherwise.

In any study of "alpine life" it is essential that "alpine" be defined. The writer applies this term to areas above the general elevation of "tree line" in the mountains of northwestern United States. Tree line may in turn be defined as "the region above which trees do not exceed 10 feet in height, due to climatic conditions." This narrow altitudinal band contains the "scrub forest" or "Hudsonian" life zone of early ecologists. Above this zone in many western mountains there are alpine meadows, but in the Tetons such meadows are scarce and there is more likely to be a barren, rocky area beginning among the dwarfed trees and extending to the very tops of the peaks. The regions entirely above normal tree growth may be referred to as the "arctic alpine life zone", and there are several kinds of "key" insects whose presence generally indicates that one has entered this alpine habitat, even though abnormal conditions may prevent the vegetational features from being a reliable index in certain localities.

Certain insects reach their lowest altitudinal distribution approximately at tree line, which is only 6,500 to 7,500 feet above sea level in the northern Rocky Mountains but is about 10,500 feet in the Tetons. Perhaps the best of these "indicators" of the alpine faunal zone in northern United States are butterflies of the genus Oeneis, certain black Erebia, and some of the showy blue or orange-and-blue Lycaena, but many insects of other Orders are also useful in this respect (certain Diptera, Hymenoptera, Coleoptera, Hemiptera, and Orthoptera). In the Tetons these "key" insects occur much lower in some canyons than in others, either because of the sparseness of required food-plants high in the canyons or perhaps due to more severe climatic conditions throughout those canyons. Even late in the season, when it became quite hot in the mountains, there were numerous black Erebia low in Avalanche and Hidden Canyons, but not in Cascade, Garnet, or Paintbrush Canyons at comparable elevations.

There are also very definite upper limits of insect distribution in the Tetons. Peaks that are only 10,000 to 12,000 feet in elevation are likely to be rich in their entomological fauna, but the higher peaks apparently rise beyond the normal upper limits of most insects' ranges. This research was not concerned with insects that have been transported uphill by wind and dropped onto the snowfields, but was mostly limited to those insects that seemed to be there by choice. On peaks between 10,000 and 12,000 feet elevation the insects usually became more abundant as the summit was approached, and on warm sunny days they were usually concentrated especially around the summit dome. This was the situation on Static Peak, Table Mountain, Symmetry Crags, and Mt. St. John. If a peak rises very far beyond the normal upper limit of altitudinal distribution of most alpine insects, there will be no noticeable concentration of insects anywhere, but rather a diffusion of them between their normal upper and lower distributional limits. This seemed to be true on the Grand Teton, where collecting was very poor except at the broad pass known as the "Lower Saddle".

The reasons for summit swarming by insects have been hypothesized by many investigators, but without general agreement. Most of this work has dealt with ladybird beetles, although Chapman also compiled large numbers of records of flying ants on mountain-tops and around fire lookouts. At present, the writer believes the summit swarming of ladybugs is due to high valley temperatures and a dearth of food in late summer, coupled with a condition of lipoid satiety that impels them to wander aimlessly instead of continuing to feed. They may move uphill mainly because it is cooler there, but as they near the summit they will be attracted by the odor of great masses of other ladybugs already accumulated there. In autumn the cold weather drives them down into sheltered valleys, where they accumulate by the thousands on sunny hillsides and pass the winter months clustered together. It should be emphasized that many additional observations must be made before the reasons for summit concentrations of ladybugs, flying ants, tachinid and syrphid flies, butterflies, horntails, and other insects can be more reliably ascertained.

Many other additions to the knowledge of alpine insect behavior resulted from this summer's research in the Tetons. It was repeatedly noted that tachinid flies and syrphid flies do engage in mating activities on the summits, despite widespread belief to the contrary. On Static Peak six male tachinids chased a female around the summit for several minutes, flying in perfect formation, about an inch apart, at tremendous speeds as they pursued her and hovering in that same formation whenever she hovered. When she landed on a flower the males quickly stacked up one atop the other on her back, six deep! As soon as one began to mate with her, the other five unstacked and resumed their ceaseless wandering about on the mountain-top. It is the writer's belief that such summits serve the same purpose for these flies that mating swarms do for mosquitoes and midges; the concentration of males there assures the immediate mating of any female that approaches the

summit. If all males and females remained below, on the broad expanses of the lower mountainside, they might not encounter each other frequently enough at the appropriate times.

Hundreds of insects were collected above tree line during this investigation but most of them have not yet been identified beyond the generic level. Especially interesting was the occurrence of a cranefly larva under a dry rock at 12,600 feet on the South Teton, as well as the cast puparium of a muscoid fly under a rock atop that peak and a "solitary" bee burrowing between layers of sedimentary rock above Schoolroom Glacier, at 10,400 feet. At nights, three species of ground beetles (Carabidae) were common on and near the snowfields high in Cascade Canyon. The same three species occurred in both major forks of that canyon, but in different proportions in the North Fork than in the South Fork, even though ecological conditions appeared to be nearly identical and the observations were made during the same week in both places. Space limitations prevent the inclusion of many other entomological observations based upon this research, but they have been summarized in the more detailed report submitted earlier to Dr. Clarke. That report includes much more entomological data from each of the writer's trips into the high country of Teton National Park last summer, and a more exhaustive discussion of general aspects of alpine entomology. All of the specimens collected are still in the writer's possession, undergoing identification and further study. An annotated list of these specimens will eventually be completed for publication. After the material has been accurately and completely identified, the observations recorded in the field notes and reports will of course become vastly more significant. It is hoped that those observations will be of interest and value to future biologists concerned with the alpine fauna of the Teton Mountain Range.

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The Senses of Shrews

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During the summer of 1960, an investigation was continued on the senses involved in obstacle avoidance by shrews. Live Sorex were trapped within a 35 mile radius of the Biological Research Station. They were brought back to the laboratory where a variety of operations were performed. To facilitate these operations, an anesthetic dose of nembutol was determined. Particularly, their vibrissae were cut and their ears plugged and sham-plugged to evaluate the effect of impaired senses on their ability to avoid obstacles. This evaluation was made by observing a shrew's performance, both speed and ability to avoid