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The Senses of Shrews

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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.

Supported by the New York Zoological Society.

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Edwin Gould
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Project Number 106

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
obstacles, in a 16 x 8 foot maze set up with about 450 glass vials which were easily knocked down when struck by a running shrew. The data is presently being treated statistically.

Supported by the New York Zoological Society and Upjohn Pharmacy.

Effect of Visitors on Alpine Ecosystems in the High Tetons
Charles C. Laing
University of Nebraska
Project Number 90

In general, the work done during the summer of 1960 was a continuation of that done during 1959. Essentially no new projects were initiated, although some of the earlier work was expanded. General observations were made of visitor usage and of the activity of large mammals. More intensive and detailed studies were made of the vegetation, soil and atmospheric properties of selected "natural" sites and of the properties of trails and campsites under varying degrees of usage, including some enforced "non-usage" by the establishment of exclosures. Some additional plant collections were made.

Summary of Specific Projects

1. Soil Moisture and Temperature Studies. Biweekly collections were made of the surface four inches of soil in the major study sites. These were weighed at the time of collection and it is intended to determine their oven dry weight and water holding capacity when the samples have been taken to the laboratory. Weekly measurements were taken of the depth of water in lake solitude and in a temporary pond in order to estimate the rate of drop in the general water table. Soil temperatures were recorded on thermographs at five stations.

2. Air Temperature Studies. Seven thermographs and fifteen maximum-minimum thermometers were used to record air temperatures in major micro-habitat types at weekly intervals after the snow had melted.

3. Photographic records of the pattern of snow melt were obtained during June and July.

4. A nesting bird survey was carried out. It involved the location and observation of all located nests during the breeding season.

5. Seven exclosures were located in areas of use and in undisturbed areas. Notes were made on the vegetation and habitats within the sites.

6. Photographs were made of areas of usage; particularly, 1951 study site photographs were examined, the areas were relocated and rephotographed. Photographs were also made of grazing in the area and notes were made of the extent and nature of the grazing.