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Population Dynamics of the Utah Chub, Gila atraria,
in Two Ocean Lake
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The chub, Gila atraria (Girard), population of Two Ocean Lake presents a favorable opportunity for a study of the origin and survival of deformed members of a natural population. About 1% of the chubs are afflicted with curvature of the spine. The pattern of the deformity in individuals varies from a moderate, scarcely detectable type to extremes in pronounced lateral and vertical flexures.

Preliminary investigations, carried out during the summer of 1956, were intended to provide information on the methods and techniques best suited to capturing the chub alive so that they might be returned to the lake after processing for the records. During the spawning season, which began in the latter part of June and ended in early August, large quantities of adult chubs were captured with traps designed after the standard hoop net. Immature chubs are largely segregated from adults and frequent shallow waters near shore thus being readily captured in seines during daylight hours. Seining operations conducted at night proved very effective in capturing adult chubs. Gill nets capture large numbers of chubs, but because they damage the fish fatally and because the removal of the fish from the mesh is time-consuming, gill nets are used primarily to sample the population over deeper waters and to provide a reference for comparison on the composition of the samples taken with other types of gear. The total catch from Two Ocean Lake during the summer of 1956 was 20,003 chubs.

Secondly, the work this summer was designed to show which methods might be used in obtaining fertilized eggs for breeding experiments to investigate the role played by genetics in the production of deformed chubs. Successful crosses of all possible combinations of parents were made between normal and deformed fishes and the eggs were carried through hatching. However, owing to inadequate facilities for controlling experiments, the results showing the percentages of deformed offspring produced by various crosses do not lead to any conclusions on the cause of the deformities. This aspect of the work will receive priority attention next year.

Chub populations in Emma Matilda Lake, Enos Lake, and the Snake River were sampled in a search for information on the occurrence of deformities outside of Two Ocean Lake. One deformity in a sample of about 2000 fish was found in Enos Lake. Similar deformities, of low frequency, were found in Richardsonius balteatus hydrophlox, and Catostomus fecundus in Two Ocean Lake, and in Richardsonius of Emma Matilda Lake.

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A variety of chub predators feed at Two Ocean Lake: cut-throat trout, great blue heron, pelicans, gulls and mergansers. But no measure of the rate of predation was obtained.

The data on hand are presently being analyzed to find the frequency of deformities per year class and thereby to provide information which might show whether or not the survival rate is different for normal and deformed chubs. The same information will serve as an index to measure changes in the chub population in the event of a measurable change in the predator population.

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Metabolic Differences Associated with Altitude

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This project is concerned with certain physiological aspects of altitude, particularly those affecting animal metabolism. It has now run through two summers, a preliminary phase extending through the summer of 1955 and a more extensive study of selected leads followed up during the summer of 1956.

During the first summer it appeared that rather definite differences in rate of oxygen uptake were present in certain groups of arthropods, notably the ant, where the same or closely related species existed at different altitudes. In the report for 1955 reasons were enumerated showing why the ants provide unusually favorable material for this type of study. The work of the summer of 1956 is essentially a continuation of and expansion of this aspect of the project begun in 1955.

With the help of Dr. Gerald Scherba, who made the identification, a single species of carpenter ant, Camponotus pennsylvanicus modoc, was found to live over a range of more than 3000 feet altitude in the Jackson Hole area, from a colony in the Research Station grounds at 6750 feet to colonies in the neighborhood of Two Ocean Mountain on Togwotee Pass at elevations around 10,500 feet. This species, along with Tribolium confusum, the flour beetle, formed the principal focus of the work of 1956.

I shall not attempt in this report to give final results on the experiments of the summer since the data require considerable further analysis. However, some trends appear which suggest the general direction of the results. As the data of last summer indicated, the groups occurring at higher elevations continued to