

EFFECTS OF ENVIRONMENTAL VARIABLES ON SOME PHYSIOLOGICAL
RESPONSES OF MICROTUS MONTANUS UNDER NATURAL
CONDITIONS

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Objectives

Cyclic fluctuations in the population density of microtine rodents have been known since antiquity. However, factors responsible for this phenomenon are not known.

The objectives of this long term study are essentially threefold. First, to characterize those environmental variables that might affect Microtus montanus in different seasons of the year. Second, to record the growth, maturation and reproductive activity of the voles under natural conditions. Third, to determine the maturational as well as the seasonal pelage changes of these rodents. The data resulting from the execution of the above objectives would be correlated in an attempt to determine the causes underlying the multiannual fluctuations in the population density of these microtine rodents in Grand Teton National Park.

Methods

Microtus montanus were livetrapped and sacrificed as soon as possible after capture. Age estimation for all animals was based on weight, total length, and pelage characteristics. Reproductive organs, the spleen, and the adrenal glands were collected from the animals and preserved in Lillie's buffered neutral formalin for further histological study. Flat skins were prepared from all animals. All tissues are currently being processed at the Department of Biological Sciences, University of New Orleans.

In 1984 field observations in Grand Teton National Park were carried out over three study periods: spring (15 April - 26 May), early summer (18-22 June) and late summer (29 July - 12 August).

Results

Breeding in Microtus montanus on a population wide basis began during the third week in May 1984. As in the spring of 1983, litter sizes were among the highest ever recorded in this study. However, in contrast to the findings in 1983, of all the females trapped during the spring approximately 30% were not pregnant.

The population density of Microtus montanus declined below the levels recorded in 1983. However, all summer data for 1983 must be interpreted with caution,

since the summer study period of 1984 was different from the study period in all the other years. Since I attended two meetings (one of them abroad) in the summer of 1983, no animals were collected between 12-28 July, the customary collecting time in other years. Instead, a collection was made in the second half of June, a time at which I have never collected Microtus in the study area in the past. The principal problem that results from this change is the difficulty in comparing litter sizes of 1984 with litter sizes of all other years. In other words, litter size measurements are ordinarily based predominantly on the third and fourth litter of the season. In 1984 litter sizes were collected from predominantly the second and fourth litter. Consequently, comparisons of litter sizes of 1984 with other years cannot be made at the present until histological work has been completed.

As predicted in 1983, the population density of Microtus montanus declined in 1984, and the numbers of Mustela increased (indeed, this was the highest population density of Mustela observed in the area since 1981). However, since sampling times in 1984 differed significantly from those of other years, it is difficult to make a prediction for 1985. Nevertheless, the available data indicate that the population density of Microtus and of Mustela will decline in 1985.

Conclusions

Based on the data obtained during 1984 it is proposed that the population densities of both, Microtus and Mustela will decline in 1985.

I was granted sabbatical leave by the University of New Orleans for the spring semester of 1984. Consequently, I was able to arrive at the UWNPSRC to collect ground squirrels as they emerged from hibernation. Data were collected primarily on the gonadal status of the ground squirrels, from the time of emergence through the end of their breeding season. Data were also collected at the end of the summer, prior to the entry of the animals into hibernation. All tissues are being processed for histological examination. The results will be used as the basis for a study of factors that control the gonadal cycle of the Uinta ground squirrel, Spermophilus armatus.

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