

Stress and Parasitism
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Project Number 103

Purpose. To continue a study of the effect that stress on an animal has upon its parasites.

General Plan. To subject ground squirrels (*Citellus armatus*) to the stress of cold and crowding and to study subsequent variations in numbers of cecal pinworms (*Syphacia* sp.).

Procedure. Forty-three squirrels were live-trapped at various times during the summer, kept in cages in the laboratory, and supplied with food and water but without bedding. Lack of bedding meant lower ambient temperatures at night; thus they were cold stressed. They were kept in groups of 2, 5, and 10 so crowding was an additional stress factor. The squirrels were sacrificed at intervals of from 10 to 41 days and examined for worms. Adrenal glands were removed and preserved.

Thirty-eight squirrels were maintained and examined as were the stressed groups but bedding was furnished. These groups were the caged controls. Caging itself, however, is a stress factor.

Seventy-five squirrels were sacrificed in the field as soon as they were trapped and the ceca and adrenal glands taken to the laboratory for examination. These animals were trapped throughout the summer, almost every day, to determine the normal fluctuations in numbers of cecal worms.

The cecum of each animal was opened and the entire contents washed repeatedly in physiological saline and allowed to settle until the supernatant fluid was clear. Small amounts of the sediment were poured into petri dishes and examined under a wide-field microscope for pinworms. A total of 5175 worms were collected and those from each animal were weighed as a group. The adrenal glands of each major group were weighed together at the end of the summer. All animals were weighed when trapped and again when sacrificed.

Results.

	<u>Field</u>	<u>Stressed</u>	<u>Control</u>
Number of squirrels	75	43	38
Average body weight in grams when trapped and when sacrificed	311	249-308	314-372
Average adrenal weight in millegrams.	20.6	20.4	21.4
Number of squirrels infected with pinworm	53	27	22
Incidence of infection	71%	63%	58%
Average number of worms in squirrels which were infected	54.7	34.7	83.2

The temperature in the animal room ranged from a daytime maximum of 70°F. to a minimum of 50°F. at night.

Discussion. The increase in body weight during the summer was normal. There was no significant difference in adrenal weights, which might indicate good adjustment to stress. The caged controls were selected for statistical analysis since they showed the highest worm count. The t-test of significance using the controls and field animals showed a value of 1.970. The probability of exceeding this observed value is 5-10 per cent. Thus the difference in the mean number of worms in the two groups was not significant.

As the first part of a three-year study the results are especially challenging since they are at variance with most other research results in this field, including previous work by the author. Further study will be made next year using a different approach.

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Social Organization among Colonies in Ants
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Project Number 80

Work continued during the summer months in an attempt to describe the characteristics of a population of Formica opaciventris at the level of the population of colonies.

A total census of the mound nests on Moose Island included a tabulation of: density, activity level, size classes, presence of brood, release of sexuals and the occurrence of new and dead nests. Because this population has been under surveillance since 1957 we are able to establish trends in this population and begin to detect events which occur in the ontogeny of individual mounds.

Since 1957, the population size, now at 389 mounds, has declined by 9.1%. There has been a similar decrease in the proportion of active (level 3 and 4) mounds. The proportion of large (diameter > 48 in.) mounds has decreased, with a corresponding increase, by threefold, in the proportion of small (diameter < 24 in.) mounds. Brood are present in 82.9% of the mounds, and 33% of the mounds release sexuals. Of the 75 mounds which released sexuals in 1963, only 5 released females. These findings, with respect to brood presence and sexuals released are consistent with data of earlier years.

The spatial distribution of the population can be characterized as aggregated. Using the distance to nearest neighbor method, we have determined that the mounds are an average of 5.8 meters apart, and that this spacing differs significantly from that expected of a random distribution pattern.

The mean birth rate, averaged over the five years of census, is 8.23%. The mean mortality rate is 9.95%.