

-16-

demonstrating nucleic acids.

6. Experiments to determine viability of cysts under varying periods of desiccation and other environmental conditions.
7. Determination of possible pathogenicity of these protozoa to elk and other hosts.

(Grant from National Science Foundation.)

#### Altitudinal Distribution of Ant Communities

Gerald and Coral Scherba  
Chico State College, Calif.  
Project Number 80

Objectives - During this second season the goal of the project has remained the analysis of ant faunal characteristics and relationships within distinct communities, and the comparison of these parameters of the ant fauna in biotic communities at increasing altitudes. We expect that this study will lead to an increased understanding of biotic communities in general; and the highly important ant fauna within them, in particular, and to a better understanding of the changes in biotic communities that occur with increasing altitude.

Procedure - Operationally the project has been divided into three phases:

Phase 1: collection of ants in distinct plant communities at increasing altitudes together with observations on their nesting site, associations with other ants, relation to other animals and effect on the vegetation.

Phase 2: a statistical description of the ant fauna of 5 selected communities, Big Sagebrush, 6500 ft., Lodgepole Pine, 6500 ft., Big Sagebrush 8500 ft., Spruce-Fir, 8500 ft. and Alpine Tundra, 10,500 ft. In this phase the composition, relative density, nesting sites and spatial distribution of the ants on a single selected stand are determined by quadrat sampling.

Phase 3: analytical investigation of community dynamics within the ant fauna obtaining a quantitative measure of diurnal periodicity of foraging activity, vertical stratification, food preferences, territoriality and home range of the dominant species.

Results - In addition to the communities at which we have collected during 1955 we have collected the ant fauna of the following communities:

1. Grass meadow, 6500-7000 ft.
2. Grass-sedge meadow, 6500-7000 ft.
3. Grass-sedge-willow flat, 6500-7000 ft.
4. Gravelly streamside, 6500-7000 ft.
5. Grass-sedge meadow, 8500-9000 ft.

Collecting was made at several stations in each type of community. Ants have been preserved in alcohol for determination.



-17-

Most of our attention, however, has been focused on the statistical description and analysis of the ant fauna of the Jackson Hole Big Sagebrush community at 6700 ft. In proceeding a stand was selected on the glacial outwash plain south of Signal Mountain. The area was mapped, coordinates assigned within the stand and the location of L-shaped paired quadrats, 5 x 50 meters, was randomly determined by picking numbers from a hat. On the basis of 19 such quadrats we find that there are 15 species of ants present within the stand with an average density of 0.12 nests per square meter or  $29.63 \pm 2.87$  nests per quadrat.

TABLE I

## AVERAGE SPECIES AND NEST DENSITY PER QUADRAT SAMPLE

	Mean $\pm$ S.E.	Standard Deviation	Coefficient of Variability in %
Density	$29.63 \pm 2.87$	12.55	42.30%
No. of Species	$6.31 \pm 0.51$	2.21	35.02%

Of these 15 species, however, four of them comprise 76.2% of the total number of nests found. Further attention therefore, was concentrated on these four species, Tapinoma sessile, Formica oreas comptula, Formica neogagates and Myrmica lobicornis fracticornis.

We then asked this question. How do these four species partition the food and nesting resources of the community in order to coexist? The nesting site of each of the four species is tabulated below with the predominant nesting site for each species underlined.

TABLE II

## NESTING SITES OF FOUR DOMINANT SAGEBRUSH COMMUNITY ANTS

	In Soil	At Base of Sage	Under Rock	Under Dung	Mound Nest
<u>Tapinoma sessile</u>	51	139	11	7	0
<u>Formica oreas comptula</u>	8	38	9	0	42
<u>Formica neogagates</u>	50	8	3	0	0
<u>Myrmica lobicornis fracticornis</u>	46	11	1	0	0

From the table it is apparent that Tapinoma sessile, Formica oreas comptula and Formica neogagates are each most abundant at different nesting sites while Formica neogagates and Myrmica lobicornis fracticornis are in competition for nesting sites in the soil; actually Myrmica nests in the soil under wild buckwheat pads while F. neogagates nests in bare soil so that each of the four major species in the



Sagebrush community nests predominantly in a separate microhabitat. It is this relationship that suggests to us the testable hypothesis that the availability of suitable nesting sites is one of the most important factors limiting the nest density in this community. In terms of the relative importance of the different nesting sites, for a total of 565 ant nests, nesting sites were distributed: in soil - 38.3%; at base of Sage - 41.5%; under rock - 10.7%; mound nest - 8.0%; under dung - 1.5%.

Data were also collected on differential food preferences and activity periods which tentatively indicate that while there are broad overlaps in food preferences between each of the four species the time of maximal foraging activity differs for each species.

At the end of the season numbered stakes were placed next to 100 nests in a census of ant mounds on Moose Island in the Snake River. The population of mound nests is of two species, Formica fusca and Formica opaciventris with definite relationships between the two species. It is large, between 500 and 600, and offers an unusual opportunity for population studies and certain other problems connected with mound nests.

#### Summary and Conclusions

1. The ant fauna of 12 distinct plant communities ranging over 4,000 ft. in altitude has been collected at 55 stations in Western Wyoming, together with pertinent observations.

2. In the Big Sagebrush community of Jackson Hole there are 15 species of ants with an average density of  $29.63 \pm 2.87$  nests per quadrat or 0.12 nests per square meter.

3. Four of these 15 species constitute 76.2% of the total nests, and hence may be considered dominants.

4. Distribution of nesting sites is such among these four species that each is most abundant at a different nest site. This strongly suggests that suitable nesting sites may be an important limiting factor in determining population size and density in the sagebrush community.

5. Food preferences overlap, but there are differences in the time of maximal foraging activity from species to species within the community.

6. The ant population of Moose Island, estimated at 500-600, offers an unusual opportunity for a wide variety of ecological studies.

(Grant from New York Zoological Society.)