25

Natural Stresses and Parasitism Glenn A. Noble Biological Sciences Department California State Polytechnic Project Number 103

The original proposal to study stress in squirrels infected in the laboratory with <u>Leishmania</u> was abandoned after reading a recent report showing malaria in reptiles may be carried by phlebotomine flies that live in ground squirrel burrows during the night. <u>Leishmania</u> is carried by phlebotomine flies so I did not want to risk even the remote chance of causing the establishment of leishmaniasis in local ground squirrels. Since coming to Jackson Hole this summer, however, I have been unable to find the flies in ground squirrel burrows. I used special insect traps placed over burrow openings during the night.

All studies of stress and parasitism in animals have so far involved bringing the animals into the laboratory and subjecting them to various stressors. My plan this year was to study the effect of natural stressors in the field. I selected three areas containing squirrels in approximately the same densities and examined the cecum of each for <u>Entamoeba</u>, coccidia and the pinworm, <u>Syphacia</u>. Thirty animals were trapped from each area and twelve of each of the thirty were used for weighing adrenal glands as an indication of stress. Squirrels were trapped randomly from each area from 2 July to 15 August.

The three areas were: (1) a pasture near Teton Village on the Aspen Ranch where conditions appeared to be normal, (2) fields near the Research Station, Moran, where stressful conditions obtained because another researcher had been walking over the area and trapping almost daily for two months and was continuing his activities during my operations, (3) the highway near Teton Village where squirrels were running across the road much of the day, several of them being killed daily. This area I assumed to be considerably stressful to the animals. Estimates of the numbers of cecal protozoa were made with the aid of a hemacytometer, following procedures developed during other studies, and the total numbers of pinworms were counted directly.

	Aspen Ranch pasture	Research Station	Highway near Teton Village
Average body weight of squirrels in grams	306	286	326
Percent of squirrels infected with amebas	87	97	97
Numbers of amebas per 100 g squirrel body wt.	2407	1985	1845
Percent of squirrels infected with coccidia	60	59	85
Numbers of coccidia per 100 g squirrel body wt.	0.39	0.33	0.28
Percent of squirrels infected with pinworms	53	17	17
Numbers of pinworms per 100 g squirrel body wt.	12	23	16
Mean adrenal weight per kilogram of body weight in milligrams	66	68	106

RESULTS

It can be seen that, judging from adrenal weights, squirrels in the Aspen Ranch pasture were the least stressed, those from the Research Station area were essentially similar to the Aspen Ranch individuals, and those in the highway near Teton Village were subjected to significantly greater stress. The numbers of parasites, however, indicated the opposite condition; the greatest stress occurring in the Aspen Ranch area.

CONCLUSION

All data on the 90 squirrels will have to be analyzed thoroughly before definite conclusions can be reached. Certainly there are significantly larger numbers of some parasites in squirrels of one region compared to another. Assuming there is no essential difference in the opportunity to become infected, increased parasitism may be due to stress. The discrepancy between adrenal gland weights and relative numbers of parasites may have been due to the fact that the adrenals from only 12 squirrels out of each group of 30 were weighed. Increase in adrenal weight and increase in numbers of parasites are both, normally, indicators of stress. Increase

The research was interesting and may prove to be significant. It has, as so often happens, opened the door to further studies. I am deeply grateful for the opportunity to carry on my investigations once more at the Biological Research Station.

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of either may, of course, be due to other factors.

3