CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Shara D. Cohn

Project Number
S1901

Project Title
Zooplankton Trophic Interactions at Eagle Lake, California as Determined by Nitrogen and Carbon Stable Isotopes

Abstract

Objectives/Goals
The goal of this project is to determine the trophic interactions of zooplankton at Eagle Lake, California and demonstrate the inherent complexity of zooplanktonic interactions.

Methods/Materials
Zooplankton samples were collected with a plankton tow and Schlinder Trap monthly for two years at Eagle Lake, California. Both mixed and taxonomically separated samples of zooplankton were rinsed and dried for analysis of Nitrogen and Carbon Stable Isotopes. ANOVA statistics and bivariate analyses of Nitrogen and Carbon Stable Isotope ratios (N15/N14 and C13/C12) were used to determine zooplankton feeding interactions.

Results
Copepods were found to be one trophic level above daphnia during the early summer. At the same time, copepods were often found inside the egg-carrying brood chambers of the large daphnia morph. Copepods were found to be between trophic levels during the rest of the year. Leptadora fed on the highest trophic level throughout the entire course of the year. Daphnia fed consistently on the lowest trophic level. The copepod and large Daphnia pulicaria morph populations peaked in early summer. The smaller daphnia morph population peaked the following month. Arms of Eagle Lake, California demonstrated distinct Carbon ratios and day-to-day fluctuations of carbon ratios were identified while Nitrogen signatures remained constant.

Conclusions/Discussion
Copepods are, during the early summer, predating daphnia eggs. During the rest of the year, however, when the large morph is not so abundant, copepods are forced to eat between trophic levels. Because the large daphnia more is heavily predated, the smaller, less predated daphnia morph flourishes throughout most of the year. Leptadora are consistent carnivores while daphnia are consistent filter-feeders. The complexity of these trophic interactions demonstrates the significance of zooplankton in the food web. Each of the arms of the lake is identified as having distinct ecosystemic properties. However, winds on the lake cause masses of water, with distinct carbon signatures to move across the lake, creating carbon variability at constant sites within the lake. The presence of multiple basal carbon sources is a new consideration for stable isotope ecology and undermines the belief that constancy in diet equates constancy in carbon isotopic values.

Summary Statement
This project determines the feeding relationships among lake zooplankton.

Help Received
Joan Druckman Cohn, Bruce Cohn, Mrs. Cindy Suchanek, Dr. Tom Suchanek, and Collin Eagles-Smith edited report; Used lab equipment at University of California, Davis under the supervision of Dr. Tom Suchanek; Dr. Tom Suchanek and Collin Eagles-Smith helped with protocol; Participant in Young