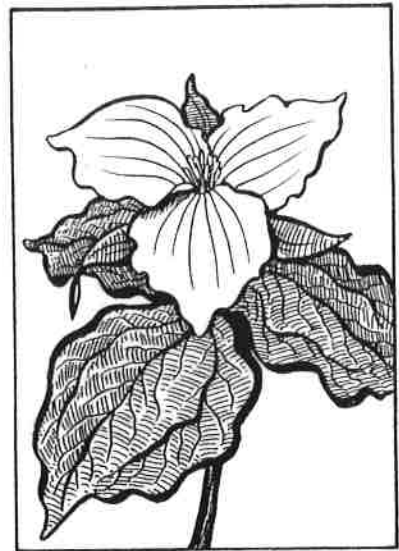


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ABSTRACTS OF THE NINETEENTH ANNUAL SCIENTIFIC RESEARCH MEETING



**Great Smoky Mountains National Park
May 19, 1994**



A flying flashing male produces a species-typical burst of 5 to 8 flashes, about one flash every 500 msec. The time between bursts is 14 to 19 sec. Using groups of caged males, we showed that flashing began concurrently, ended concurrently, and the flashes within a burst occurred concurrently, resulting in group unison synchrony. Using single caged males and computer-simulated flashes to trigger the firefly, we showed that a stimulus flash that occurs during the interburst interval can advance or inhibit the next flash burst. Contrariwise, a stimulus flash interjected during the interflash interval has no effect on the time between flashes within a burst.

We suspect that unison synchrony involves a phase-resettable interburst oscillator and a phase-nonresettable interflash oscillator and works via the mechanisms of anticipatory synchrony. We also suspect that the same two oscillators are involved in wave synchrony, but they are triggered by refl  x mechanisms rather than anticipatory mechanisms.

COMPARISON OF SMALL MAMMAL POPULATIONS IN AREAS OF LIGHT, MODERATE, AND HEAVY SPRUCE-FIR DECLINE

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Since the balsam woolly adelgid (*Adelges piceae*) was found in the Southern Appalachians in 1957, the Fraser fir (*Abies fraseri*) populations have been rapidly but variably declining. This is accompanied by a decline in red spruce (*Picea rubens*) caused by both shock effects of the dying fir as well as air pollution and other weather effects. The result of these declines has been varying change in the high elevation spruce-fir habitat found on mountaintops above 5600 ft in the Southern Appalachians. The spruce-fir habitat in some areas such as the Great Smoky Mountains and Mount Mitchell have been decimated, while others, such as Roan Mountain and particularly Mount Rogers, have been minimally damaged. Studies have attempted to survey the effects of temporal changes on the small mammal populations by sampling these populations on the same mountain over periods of time. However, due to different sampling techniques or yearly population fluctuations, these studies have not succeeded in determining the effect of the habitat change. The purpose of this study was to comparatively sample small mammal populations on mountains with heavy spruce-fir decline (Great Smoky Mountains and Mount Mitchell), moderate decline (Roan Mountain), and light decline (Mount Rogers). The objectives were: (1) to determine the size and composition of the small mammal populations on each mountain, and (2) to determine whether the species composition and population sizes of the mammal surveys correlate with the amount of damage seen in the spruce-fir habitats. The hypotheses of this study were as follows:

Null hypothesis: species diversity and population sizes will remain constant across the decline gradient.

Alternative hypotheses:

1. As spruce-fir decline increases, the community structure will be skewed back toward early successional species. The vegetation will consist of more herbaceous and shrub cover with more r-selected species.
2. The mammal population sizes will probably increase with the increase in spruce-fir decline due to the greater abundance of food and small mammal cover in the understory.

3. In any one year at any single subsite, species diversity will be lower if the subsite is a heavily declining site. Increased decline in the spruce-fir habitat will lead to lower species diversity in any one year.

The initial data evaluation supports these hypotheses.

VISITOR PERCEPTIONS OF CUDJO CAVERNS: STUDY CONDUCTED AT CUMBERLAND GAP NATIONAL HISTORICAL PARK

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A study of visitors who toured Cudjo Caverns was conducted to provide the National Park Service with information concerning cave visitors' perceptions of the tour. The study was conducted to capture visitor information prior to the assumption of management of the Caverns by Cumberland Gap National Historical Park. The objectives of the study were to: (1) identify visitor characteristics, (2) determine how the cave tour was related to their overall vacation trip, (3) determine visitor expectations concerning the various aspects of the tour, (4) ascertain perceptions about possible future management decisions, and (5) determine to what degree the tour met visitor expectations.

Sampling was conducted from August 7 to September 7, 1992. Every adult visiting the Caverns was asked to complete an on-site survey developed for this study. The survey instrument listed 37 questions on the front and back of a single printed form. The survey was divided into a pre-tour and a post-tour survey. The pre-tour portion (the front page) was completed outside the cave entrance immediately prior to the tour. The post-tour portion (the back side of the form) was completed upon exiting the tour outside the cave. One hundred and seventy-two adult visitors completed the survey. Less than 2% of the visitors refused participation.

One hundred and fifty-nine respondents (83%) considered Cudjo Caverns to be part of their overall visit to Cumberland Gap National Historical Park. Ninety respondents (52.3%) planned to visit the park during that vacation trip. Eighty-two (47.7%) of the respondents indicated that they did not plan to visit the park on that trip. Ninety-six respondents (56.5%) stated that this was their first visit to Cudjo Caverns. Seventy-four respondents (43.5%) previously had toured the Caverns; prior visits ranged from 1 to 40. Return visits are an indicator of customer satisfaction. In this study, the 43% of return visitation illustrated a high level of satisfaction.

Respondents ranked the importance of seeing cave features (that is, animals, rock formations, large rooms, historic objects), seeing a natural cave, and the leadership of a knowledgeable tour guide. The data evidenced the ranking of all six aspects listed (based on mean response) as between "very important" and "moderately important." The most important aspects were a knowledgeable tour guide and viewing rock formations. Also very important was seeing historic objects inside the cave. Viewing a natural cave and encountering large rooms ranked between "very important" and "moderately important." Seeing cave animals was significantly less important than the other five listed aspects. However, seeing cave animals was still "moderately important" to the visitors.