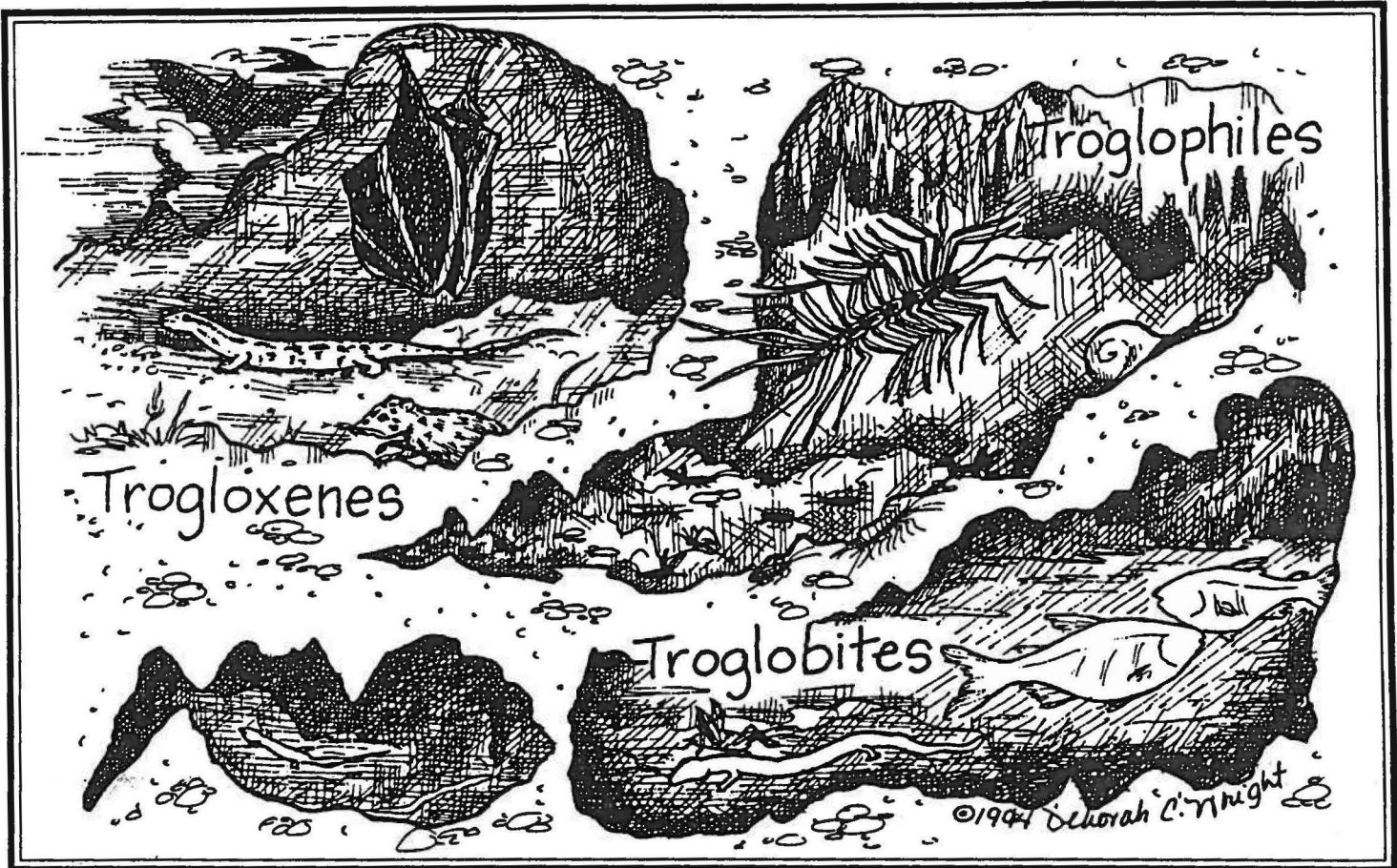


#6 - Part Time - Full Time



Focus Question:

How do animals adapt to different zones of light and dark in a cave?

Objective:

The students will select from a list of animals known to frequent caves and determine which characteristics of that animal have facilitated its survivability within a cave ecosystem.

Suggested Grade Level:

Grades 9-12

Overview:

An ecosystem is a delicate balance of a myriad of life forms. Dependent and interconnected, animals and plants share environments and sources of energy. Throughout the sunlit world these exchanges have been the focus of interest, study, and in many cases, exploitation. Vast forests of ancient redwoods, the crisis of the oceans and rain forests, temperate green spaces and the bio-responsibility issues have dominated much of the ecological research for the past dozen years. With this in mind, the understanding and preservation of the life forms above and below the surface of the planet is everyone's responsibility. Caves are the domain of a very complex and yet to be fully understood community of animals. As one descends the confines of a cavern, light fades into blackness. It is in the zones of diminishing light that the speleologist begins to examine and categorize those life forms encountered. The troglloxenes, animals that use caves for shelter and protection, are found first. Lower in the dimming light are the troglophiles, those animals that adapt to both the light zones and the dark. Furthest from the light and living in the

perpetual blackness of the cave are the troglobites, animals completely given to the zone of darkness. Adapting over thousands of generations, the animals of the cave exist in a precarious world of limited resources. Exploiting every potential for sustenance, the groups of animals offer students and scientists a window of natural selection and adaptation.

Trogloxene: temporary cave resident, seeking out such a habitat from choice as for protection they never complete their entire life cycle in caves: Many animals frequent or utilize caves a specific listing would include mammals, estivating reptiles and many insects. Bats, bears, raccoons, foxes are frequent temporary cave dwellers.

Trolophile: animal group that may exist in either location, but individual species are confined to specific life cycle including life with the threshold zone of caves. Members would include bats, salamanders, earthworms, species of flies, bees wasps, cockroaches, crickets, moths, mosquitoes and flies.

Troglobite: true cave dweller, living in total darkness. Cave beetles, various forms of fresh water crustaceans such as isopods, amphipods, water fleas, blind crayfish, blind salamanders, blind cave newts, blind fish, snails, and freshwater worms are members of this group.

Procedure:

Note to the Instructor: Establish a method of access to a library or media center. Divide the class into three groups: troglloxenes, trogllophiles, and trogllobites. Establish a minimum grade of "C" as the performance criteria. Each group will accomplish the following:

- A report (instructor should determine length and format)
- Five sources are to be used, and the bibliographic notations should adhere to those standards used in English classes. When the assignment is completed, each group should turn in reports bound together for class discussion.

Each member of the group will perform the following:

Grade "C" minimum requirements:

- Write a definition of the specific group assigned, i.e., trogllophile is a animal that lives both in and out of the cave environment.
- Select an animal belonging to the animal group assigned.
- Draw a representation of that animal.
- Describe six characteristics of that animal that are examples of special adaptations to its cave environment.
- Write 1 to 2 pages on the life style and habits of the animal.

Grade "B" minimum requirements - all of the above PLUS:

- Research the Federal Endangered Species Act and write a 50-100 word synopsis of its contents
- Contact the state government agency responsible for the protection of endangered animals, and write a 25-50 word response listing animals frequenting cave environments that are found on or will be added to a list of endangered species. *In Virginia contact: Department of Conservation and Recreation, Division of Natural Heritage, Main Street Station, 1500 E. Main Street, Suite 312, Richmond, Virginia 23219.

Grade "A" minimum requirements - all of the above PLUS:

- List locations of endangered cave animals within state if information is available.
- Identify two or more endangered cave animal specialists or experts.
- Correspond with one or more of these individuals.

Conclusion:

The particular ecosystem of the cave is inhabited by some of the most fragile life forms on the planet. Their precarious niche is the result of countless generations of selection and adaptation.

Further Investigations:

The following are additional areas of inquiry that complement the study of caves: bacteria within caves, the role of fungi within a cave, algae and artificial lighting.