

Teacher-to-Teacher

Study of Animal Behavior in a Zoo

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Any zoo, even a small one, can become an exciting arena for study of animal behavior and principles of wildlife conservation. A zoo provides an opportunity to learn how factors such as proximity of conspecifics (animals of the same species), availability of hiding places, abundance of food, and presence or absence of sleeping dens, can alter an animal's behavior. The zoo will afford students the opportunity to get a closeup view of animals engaged in maternal behavior, courtship behavior, communication, grooming, and locomotion. Thus, they can acquire some sense of how the animal would behave in the wild. Students can further analyze the stereotyped patterns of abnormal behaviors. A good understanding of abnormal behavior will help students to recognize that some of the behaviors that they observe in captive animals are not part of the animals' natural behavioral repertoire.

In addition to learning about animal behavior, students can also be made aware of the critical role of zoos in the breeding and preservation of endangered species. The presence of newborn animals at a zoo can provide evidence that the zoo has a breeding program for some of its species. Many zoos, furthermore, support populations of endan-

gered species with the intent of reintroducing some of these animals into the wild. The National Zoological Park in Washington, DC serves as a sanctuary for Péré David deer, a species that has been extinct in the wild for centuries (Bendiner 1981).

In my courses in Wildlife Ecology and Vertebrate Zoology I have regularly made use of zoos in a variety of laboratory exercises which focus on abnormal and normal behavior of confined animals.

The zoo activities are designed to give students an opportunity to learn how to observe animals and apply their observations to a practical problem. After doing some background research, students can use data that they have obtained to design an optimal zoo habitat for a particular animal. In working on this project students should become aware of how the needs of an animal can best be met within the constraints of a zoo environment.

Preparation For a Zoo Laboratory Activity

A preliminary visit to the zoo or a slide presentation about it can serve as a useful way of introducing students to the variety of exhibits available at a particular facility. This introduction will also give students an opportunity to choose animals which

would be particularly interesting to observe and to do some advance library study of the behavior and ecology of these animals. Once the students know some basic facts about the behavior of an animal in the wild, they will be better equipped to understand the behavior that they may observe in the zoo animal. Furthermore, they may then integrate their library research with their own observations to make an assessment of the quality of a zoo animal's captive environment.

The following information is particularly useful:

Communication—How does the animal make use of visual, auditory, chemical, and/or tactile communication in its interactions with conspecifics? What kinds of signals does it use most often?

Territoriality—Is the animal territorial in nature? If so, how large is the average territory? Is it defended for food, mates, and/or raising young?

Sociality—Is the animal solitary or social? If the animal is social, what kinds of social groups does it form?

Activity levels—How much time does the animal in the wild spend engaged in feeding, nest building, and other active behaviors?

Locomotion—How does the animal move? Does it normally

spend its time in the trees, on the ground, or in underground burrows?

Feeding habits—Does the animal normally feed continuously or infrequently?

Activity cycle—Is the animal diurnal, nocturnal, or crepuscular?

Zoo Laboratory-Part I: General Behavioral Observations

Armed with some background information, students may now

begin to observe behavior. I find that this exercise works best if students observe in teams and limit their observations to 15-20 minute periods.

Behavioral data can be recorded through the use of a time check sheet. A typical sheet for studying primate behavior is illustrated in figure 1.

The behaviors being observed are written onto the top line of the chart. Students can then keep a minute-by-minute record of the animal's behavior by marking the appropriate box. If

students are working in teams, one individual can call off minutes while another records data. For more detailed observations the time sheet may be broken down into 30-second intervals.

Zoo Laboratory-Part II: Observations of Abnormal Behavior

Once students have completed their observations of a particular animal, they can then use their data to evaluate the quality of the animal's zoo habitat. One

TIME CHECK SHEET							
_____				_____			
Species Observed				Name			
_____				_____			
Starting Time							
Time	Behavior						
Minutes	Sleeping	Grooming	Feeding	Playing	Fighting	Climbing	Running
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

FIGURE 1. A sample time check sheet designed for the observation of primate behavior.

way to determine how well an animal has adjusted to a zoo enclosure is to look for neurotic behavior. Students may be guided in their observations of abnormal behavior by using worksheets. Listed below are some of the questions which I use to make up a worksheet for my Wildlife Ecology class.

I. Pacing behavior

- A. Does the animal you observed exhibit pacing behavior?
- B. In what part of the cage does the animal pace?
- C. What factors in the animal's cage or outside environment might lead to this pattern of pacing? Explain.
- D. How much of its total space does the animal actually use? Does the animal's pacing take on any distinct shape?

II. Neurotic behavior

Neurotic behavior can be any behavior which is repeated over and over again, a behav-



FIGURE 2. Pacing, like other neurotic behaviors, tends to be highly fixed or stereotyped in form, with the animal moving repeatedly over the same precise pathway. Often incessant pacing will cause a distinct impression to be worn on the bottom of the animal's enclosure (Meyer-Holzapfel 1968). This ostrich occupies a square enclosure at the Baltimore Zoo. A pathway, created by pacing, is clearly visible around the inside perimeter of the enclosure.



FIGURE 3. The pacing pattern of an animal reveals a great deal about its emotional state. An agitated animal is likely to pace in a straight line. A recent acquisition at the Baltimore zoo, this Arctic Fox continues its pacing to a narrow loop along the righthand fence of the cage.

ior with no apparent purpose, or a behavior which seems highly inappropriate.

- A. Describe any behaviors that you would call neurotic. Can you suggest the reasons for these behaviors?
- B. How might you improve the environment of the animal to eliminate these behaviors?

Laboratory-Part III: Designing an Ideal Zoo Enclosure

As part of their laboratory reports students are asked to select an animal that they have observed for an extended period of time and design an ideal enclosure for it. Students need to be made aware that a zoo must cater to both the needs of the animal and the needs of the viewing public. I tell my students that they need to consider the following factors when they are designing their enclosure:

1) Barriers

- a. Animals and humans must be kept physically separated from each other, yet there must be good visibility between them.
- b. Some options include iron bars, unbreakable glass, and open air enclosures with a moat.

2) The Inside Environment

- a. The animal needs to be able to move in a natural fashion. For example, trees, tunnels, or digging earth should be made available to the animal depending on its particular needs.
- b. Objects inside the cage must be durable, yet comfortable for the animal. They must also be easy to clean. At the ape house in the National Zoo, for example, trees are made from fiberglass granite. This material is

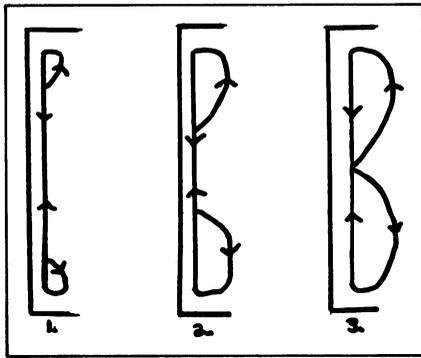


FIGURE 4. As an animal becomes more relaxed in its captive environment, its straight-line pacing pattern may evolve into a figure eight. (After Meyer-Holzappel 1968.)

strong yet flexible, enabling the branches of the trees to have a natural kind of springiness.

- 3) Feeding
 - a. Food, if properly presented, can stimulate activity.
 - b. Can the food be hidden, dangled, or presented in some innovative way?
 - c. Water should be continuously available in a way that is not dangerous to the animal.
- 4) Public Viewing
 - a. The optimal cage design will permit visitors to observe the animal from a number of different views.
 - b. The exhibit should help to educate people about the animal within.

[Modified from *What's in a House. Designing for the National Zoo's Great Apes*. (Office of Education, National Zoological Park, Smithsonian Institute, Washington DC)]

Other Zoo Activities

In addition to the laboratory exercise already described, the zoo readily lends itself to laboratory studies focusing on specific kinds of behaviors. For example, one activity might be a study of the different kinds of communication visible at the zoo. Some

of the kinds of communication that students can readily observe include:

- *Visual Communication*—This can be studied by observing facial expressions and postures of primates and carnivores.
- *Olfactory Communication*—Marking with urine will occur with some frequency in large carnivores.
- *Tactile Communication*—Touching, nuzzling, and mutual grooming are behaviors that will be seen in a variety of mammals, particularly primates.

A second interesting area for study at the zoo is maternal behavior. The interactions between a primate mother and her young can be quite varied and fascinating to observe. Typical interactions include: nursing solicitation by young, nursing behavior, food sharing, grooming, infant clinging to mother's chest, infant riding mother's back, maternal protection from other group members, maternal punishment of young (biting, hitting, or pushing).

Locomotion can also provide a

valuable area for study at the zoo. Students can readily observe a wide variety of adaptations for movement in all animal classes. A typical study could be a comparison of mammalian limb modifications for tunneling, running, leaping, climbing, brachiating, swimming, and flying.

Followup

Once students have had an opportunity to evaluate a particular zoo, they can begin to discuss the good and bad qualities of zoos in general. A few of the questions which could spark a lively discussion include the following: Is the problem of the neurotic animal offset by the often critical role that zoos play in preserving endangered species? What are ways in which zoos can optimize their roles of serving the public, while serving the animal at the same time? Does the animal's need for privacy outweigh the public's right to observe the animal? How would you improve the zoo?

The zoo lab enables students to see zoo animals in a new way, and bring together their own



FIGURE 5. The presence of a sexual partner, a companion, or food all may serve as strong attractants for the captive animal. An animal with a need to get to the next cage may pace in an asymmetrical figure 8, so that its path is skewed toward the attractive object. This black panther paces and turns his head in the direction of a black bear in the next cage.

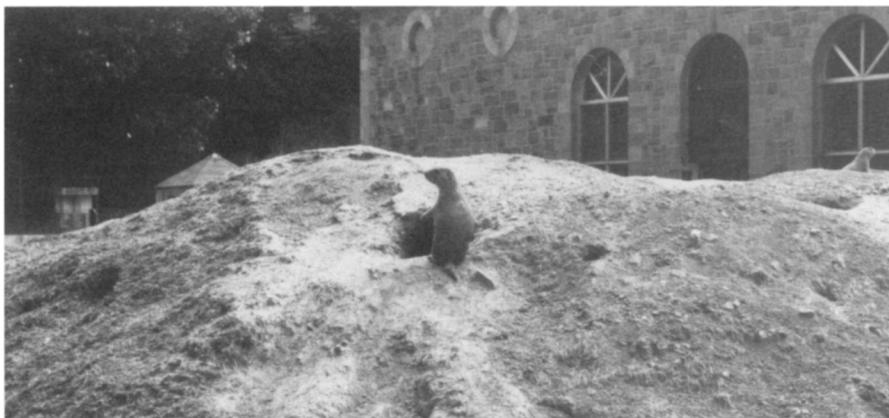


FIGURE 6. For many animals, the bottom or substrate of an enclosure is a critical factor in adjustment. Animals such as armadillos, shrews, and prairie dogs need earth rather than a concrete substrate to perform their natural digging and burrowing behaviors (Meyer-Holzzapfel 1968). The prairie dog exhibit at the Baltimore zoo does a good job of providing for the needs of animals. The exhibit contains a large mound of dirt in which the animal can build and defend burrows.

thoughts and ideas on how to create an optimum environment for a wild animal.

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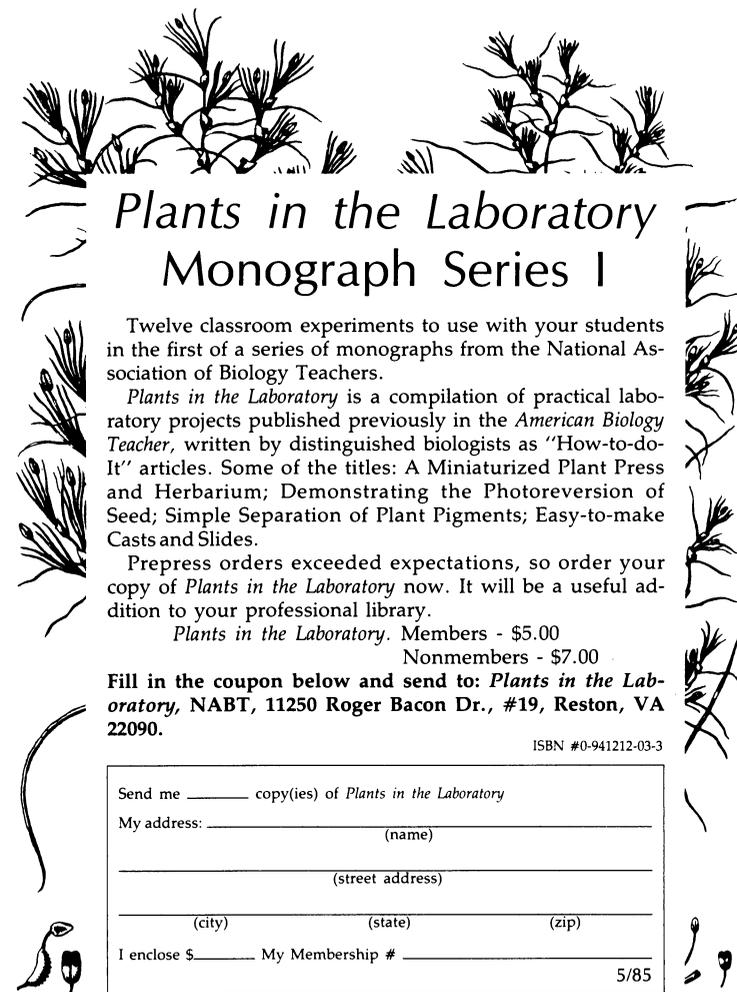
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