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The Vertebrate Animal in High School Biology

Alan M. Beck

Abstract

Live vertebrates afford opportunities to capture student interest and develop important educational experiences. Humane care and handling of the animals can be one of the most significant aspects of the lesson.

The study of classroom animals could include a wide range of observational and experimental protocols that do not compromise humane or conservation standards while providing background on the basics of science that encourage and prepare the student for continued education. Basic attention to detail and careful supervision will insure humane care of the animals and minimize the possibility of injury to students from bites and infection or discomfort from allergic reaction. As a general rule, only animals that can be humanely maintained and safely handled by the students should be permitted in the classroom. The animal's total existence, from source to ultimate disposition, is the ethical concern of everyone involved.

Field and zoo studies provide the opportunity to teach behavioral, morphological, ecological and evolutionary principles in ways that do not necessarily duplicate the material in textbooks but can reinforce the material while encouraging more reading and thoughtful reflection.

Part of any educational curriculum is the development of informed and healthy individuals whose moral values correspond to those of the society at large. Our society does value respect for life and therefore including the humane concerns for animals is rightfully very much part of any educational program.

Introduction

The Value of Live Vertebrates in Education

I have always felt that those who taught sex education and biology had an advantage over all other teachers for they could more easily capture the attention, and hold the interests, of their students. Sex educators could allude to the material that comes after binary fission and pollination and biologists could always utilize live animals. It seems almost all animals are of interest to young people, but vertebrates, perhaps because we are among them, hold the most fascination. Vertebrates are more than interesting, they are appealing. But users of live animals have a special responsibility; the care and fate of an animal becomes part of the lesson and very much influences the information and attitudes the student takes from it. Researchers and teachers in the biomedical and behavioral sciences must constantly be sensitive to the needs and atti-

tudes of the society served and animal care and use programs should be conducted in ways beyond reproach (Clark, 1979). Our society today takes a dim view of a callous attitude which treats animals as merely research tools, similar to glassware, microscopes or computers (Clark, 1979).

This very conference is testimony of the fact that our society is rapidly approaching a time when the care of animals is believed to be the ethical concern of all people involved in their handling.

In a more pragmatic vein, few people deny the fact that our treatment of animals is often reflected in our treatment of each other. Therefore, a wholesome treatment of vertebrates will directly benefit people by raising the humane consciousness of the students for all life.

Classroom Studies

Responsible Custodianship

Responsible custodianship involves the care, shelter, population control and disposition of all classroom animals. The users of animals should be familiar with and have ready access to any of the guides for animal facilities and care, such as those prepared by the Department of Health Education and Welfare (HEW), American Association for Laboratory Animal Science (AALAS), the Institute for Laboratory Animal Resources (ILAR), the Universities Federation for Animal Welfare (UFAW) or the American College of Laboratory Animal Medicine (ACLAM). The teacher's own knowledge, resources and the quality of the classroom's facilities should determine the kinds and numbers of animals maintained. Teachers should have firm budgetary commitments, to handle food and veterinary emergencies, before the animals are ever brought into the classroom. The teacher should try to anticipate all problems and have solutions ready. Such problems may include feeding and climate control during weekends and vacations, and classroom security.

Noninterventional Studies

It is not my intention here to outline a specific experiment for there are many books and manuals that address this aspect in great detail; e.g., The Animal Welfare Institute's (1960) *Humane Biology Projects*, and Price and Stokes' (1975) *Animal Behavior in Laboratory and Field*. It should be noted, however, that many manuals are not as sensitive as they should be regarding the handling of animals and often are deficient regarding the subsequent disposal of the animals after their use. At this time, I would like to raise areas of study that could be best addressed using small numbers of animals that could be maintained indefinitely or subsequently disseminated as pets.

Observational and behavioral studies afford an appropriate use of animals. Teachers of behavior should be familiar with some of the basic guidelines for conducting observational studies; e.g., Altman's (1974) review in *Behaviour* of sampling methods and Lehner's (1979) new book on ethological methods are excellent guides for the teacher though probably too technical for routine high school reading.

Noninterventional studies could address a variety of aspects that could serve as an introduction to broader questions, e.g. the comparisons of social and solitary behavior. Gerbils and hamsters, respectively could be used. These animals could be bred in a limited fashion for studies of reproduction, development, maternal care and learning. Inbred strains of mice with differing behaviors are available for studies in the fascinating field of behavioral genetics.

Fish lend themselves to captivity, and are available in a variety of species that demonstrate a wide range of morphological and behavioral adaptations.

Interventional Studies

Basic questions about learning, conditioning and preferences can be addressed by humane manipulation. For instance, the laboratory rat is quite comfortable in captivity, and experiments with mazes can be designed to challenge the student's ability to test hypotheses while catering to the animal's natural tendency to explore and exercise. In learning experiments, positive reinforcement as opposed to punishment, should always be the protocol. Reward is more humane and effective.

Teachers should consider utilizing pets brought to the classroom for specific projects, therefore reducing the number of animals purchased for educational purposes. I always wanted to repeat some of the classical experiments demonstrating how dogs can distinguish the odors of different people including identical twins. Such a study would demonstrate that animals are not as "dumb" as they appear which would foster a greater respect for them. In addition, such an experiment would introduce the variety of ways vertebrates solve problems, and this too would encourage a greater respect for all life.

Classroom Safety

Only animals that can be safely handled by students should be permitted in the classroom; in this way even student mistakes or animal escapes pose no special problem. A record of each animal's source should be maintained in case it is ever necessary to know the animal's background. As an example certain groups of hamsters may be involved in an outbreak of lymphocytic choriomeningitis or a batch of birds may have been associated with a reported occurrence of psittacosis-ornithosis. Teachers should show great discretion in taking in wild animals; orphan skunks may be rabid and birds might have mites.

Teachers should take some general precautions to protect students from bites, infections and allergic reactions. The possibility of a bite exists with almost any vertebrate, however, the risks can be minimized. Obviously, every science room should be equipped with a first-aid kit and a protocol for treating and reporting bites. Every student that will handle any animal should receive careful and individual instruction on proper handling. Gloves can be used for new and unreliable animals. Cages should be in good repair and free of any sharp protrusions that can cut or scratch animals or people. Also, the cage-meshing should be close enough to prevent people from idly sticking their fingers into the cage.

Infections can be minimized by keeping cages clean with little accumulation of waste. Students with open wounds, cuts or irritations should not handle animals except with gloves. All personnel should wash their hands after handling animals or cages and before eating. This is especially true after handling turtles and birds because of the possibility of a salmonella infection. All sick animals should be isolated and veterinary services should be sought.

The teacher should be sensitive to the possibility of allergies and phobias, and tactfully exempt any student on request. If any student complains of sneezing, coughing or itching they should be instructed to refrain from future handling of animals.

The article: Classroom ecology and safety (Gordon et al., 1972) in the March, 1972 issue of the *Journal of School Health* is a good general outline of safety problems.

Field Studies

Field studies afford the opportunity for students to appreciate a wider variety of animals without the financial and humane concerns of captivity. In fact, one of the best introductions to biology is through natural history, for it imparts to the student an appreciation of the interactions and complexities of the natural world (Dice, 1960). To be sure, it is more difficult than the basic sciences approach for the teacher is required to have a broader range of information. Often this information is less conveniently available since localities vary. However, there are manuals and field guides, as well as local museums and residents in an area that can be of great help. There is even an office of the National Audubon Society in midtown Manhattan. In every community there are large populations of fish, birds and mammals available for study, e.g. carp, pigeons, sparrows, squirrels, rats and dogs. The readily available populations can be utilized to teach the concepts associated with activity cycles, home range, food finding, shelter, courtship, social interaction, utilization of resources, flight distance and genetic variability.

Birds are readily visible animals and often their whole life cycle can be observed. Nesting habits are not all that well known, e.g. what males do at night, so biology classes could generate new and, perhaps, publishable data which would raise the self-esteem of the student and bring home the importance of science (Dice, 1960). Shore birds, which are readily observable, demonstrate a wide variety of adaptations to the environment relating to feeding, courtship and social interaction.

There is already literature available on cats (Laundre, 1977) and dogs (Beck, 1971, 1973, 1975a; Fox, 1972, 1975, Fox et al., 1975; Nesbitt, 1975) that can be used to provide a basis for comparative observations and encourage the student to formulate new questions. I would like to propose the dog as a subject particularly suited for field observation as they are readily available, often diurnal, individually recognizable and tolerant of human proximity (Beck, 1975b). Students should be versed on how to avoid being bitten (Beck, 1976).

There are several approaches to dog studies. One is the study of specific individuals. Strays or a loose pet could be followed while building a behavioral profile, including activity patterns, scent marking, home range, and social behaviors. Another approach could be to study the animals that are in a specific area or locale.

One variation in a naturalistic study is to use a "feeding table", e.g., animals are attracted by the consistent deposit of food. While this is an intervention into the natural setting, it is not necessarily disruptive for even in nature there are naturally occurring accumulations of a resource. Feeding tables for squirrels, birds, cats or dogs would permit students to view interactions more efficiently by making the animals' appearance more predictable. Look for natural "feeding tables" such as dumps and landfills as these are often rewarding sites for study.

Zoo Studies

Zoos permit the teacher to utilize a wide variety of species in the study of behavior, evolution, anatomy, and taxonomy. Example, what similarities can be observed among animals in similar environments? What is the repertoire of behaviors that can be observed among the felids and canids? Amphibians and reptiles are often part of the collection of even smaller zoos and students can be challenged to look for adaptations of form, color, color patterns and behavior. Perhaps the students might want to classify the snakes first by morphology (size, color and color pattern) and then by habi-

tat and then taxonomically. Discuss the subsequent differences of classification. Such exercises challenge the student's natural curiosity and help develop the ability to reason logically. Hediger's (1969) book, *Man and Animal in the Zoo*, provides a good background on the nature and problems of zoos for both the student and teacher.

Photography

The role of photography in all aspects should be explored where possible. Photography could be used in the teaching of recording data as well as developing an esthetic appreciation of animals. Perhaps, future generations can use cameras as a means of experiencing the contact with nature that is now sometimes expressed by hunters with guns. Photography should not be used in lieu of good observation and photographic exercises should pay attention to the whole environment.

Human Studies

Humans are a vertebrate worthy of study, however, remember to respect the dignity and privacy of any subjects. Basic observations in cafeterias, parks or playgrounds can give great insight into spacing, grouping and general behavior (Barash, 1973, 1975; Cohen, 1971; Beck and Marden, 1977). Even automobiles afford opportunities to study human interactions (Dobb and Gross, 1968).

The teachers should remember when working in the urban environment to respect local residents, avoid private property and be careful not to frighten people unfamiliar with the goals of the study.

Conclusion

In the past, high school biology has relied on the use of animals in ways that often reflected a callous disregard for the animals' inherent self-worth as living creatures; examples include the preserved specimen, pithed frog, museum-type collection of captured animals or poorly maintained class "pets" that were merely objects of curiosity. We may never know how this callous attitude encouraged a disregard for life that may have even included our own kind.

I propose that all the fundamental basics of science that are the proper concerns of those with a secondary school education could be better taught by including a total commitment for animal welfare. In this way, not only will the basic materials be explained and demonstrated but students will be more attentive and interested in learning. The knowledge to be gained by appreciating a living creature in the class, field or zoo, can reinforce the technical material found in the texts and may very well encourage further inquiry. In addition, the lessons would incorporate patterns of behavior and social attitudes that the student will use to be a better person and more acceptable member of our society.

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