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Secondary and Elementary School Use of Live and Preserved Animals

Marvin B. Emmons
NASCO Industries

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Abstract

The broad use of living animals in elementary and junior school programs that are currently in vogue will be discussed as well as their use in biology classrooms at the senior high level. A comparison will be made of the present use of animals in the biology curriculum at the high school level, both living and preserved, with the use levels some ten and fifteen years ago. The implications of wildlife habitat encroachment and subsequent depletion of native species of classic animal models as well as some alternatives will be reviewed.

Introduction

The heavy influence of federal funds on the development of science curriculum, following the launching of Sputnik in the late 1950's, resulted in a rather profound influence on the use of living and preserved animals in the teaching of life sciences in both secondary and elementary applications.

Thorough and massive examination of existing science curricula was made possible with this outpouring of money. Educators, brought together through federally supported summer workshop experiences with teacher-consultants, developed new formats for teaching all sciences below the college level. This massive effort involved thousands of teachers, administrators, and federal consultants over a period of eight to ten years. The result was a new series of curriculum materials. These curriculum materials were often referred to as the Alphabet Soup Curricula: BSCS (Biological Sciences Curriculum Study), being one of the more popular life sciences; PSSC, a physics program; and SCIS, an elementary science program, to illustrate a few.

Prior to 1960, live animals were used only on a limited basis in secondary biology, and rarely used on any formal basis in elementary school programs. The occasional inclusion of goldfish in the classroom, or breeding a pair of hamsters, was about the extent to which most elementary teachers would voluntarily get involved with either life science education or the problems of handling live animals in the classroom.

There are only about 4,800 colleges in this country, and not all teach or require courses in biology. 34,000 junior/senior high schools are now present and a majority of those do require biology courses for graduation (Nasco Data Files). Traditionally, high school biology classes usually included some form of dissection, generally limited to the dissection of the frog and fish as vertebrate representatives, sometimes including

the earthworm, clam or starfish as invertebrates. Prior to 1960, only college level courses in comparative anatomy tended to include animals like the fetal pig, dogfish shark or cat.

Following the establishment of the BSCS curriculum, many high schools instituted advanced biological studies including major dissection in mammals such as the cat, mink, and fetal pig, along with an increase in the use of living animals and plants.

One concept in the philosophy of BSCS was that general biology instruction, a life science, should involve greater use of living materials in the classroom. Students should be more involved with life processes and activities as a way to better understand the role of living organisms in their environment. Many aspects of this program were exceedingly expensive in terms of taxpayers' dollars, student and teacher time, as well as placing heavy demands on field populations through direct collection of organisms.

Effect on Animal Populations

Probably the animal whose field population suffered the most was the grass frog, *Rana pipiens*. It was used in activities involving nerve responses, embryology and reproduction, and behavior (including the effects of temperature and orientation, as well as feeding responses). Other demonstrations included the effect of chemical stimuli (hormone treatment) on heart rate and flow of blood. Many of these same animals were subsequently sacrificed to observe other life functions after being deeply anesthetized or pithed, much of this dissection being preferred in BSCS curriculum over the classic dissection of the preserved frog.

The detrimental effect on the size of field collections of *Rana pipiens* populations occasioned by heavy use, has been documented in other publications (see below). The degree to which overcollection, or the effect of herbicides and environmental modification in the collecting grounds, served to reduce the population is open to some discussion at the present time. It appears, however, that in some areas of the country, some of the frog populations are making a comeback, which is coincident both with the elimination of some insecticides, restriction on some herbicides, and a now reduced demand for live frogs for instructional use.

> *U.S. suppliers, in 1969, shipped approximately nine million frogs (or 360 tons) for educational and research purposes alone. The educational demand arose from both an increased student population and from the introduction of new and improved textbooks, such as the BSCS series. The four major suppliers at that time—Steinhilber (Oshkosh, Wisconsin), Lemberger (Oshkosh, Wisconsin), Schettle (Stillwater, Minnesota), and Mumley (Alburg, Vermont)—either directly or indirectly accounted for about two-thirds of that annual volume. The organization represented by myself (Nasco-Steinhilber Company), that year processed approximately 80 tons or nearly two million frogs. Of this tonnage, 50-60% were shipped as living material, and the rest as preserved for use as special preparations, a ratio believed to be typical of the industry as a whole (Gibbs* et al., *1971).*

Another publication, *Modern Medicine* (1973), reflected a cataclysmic decline in the availability of *Rana pipiens* following 1972.

> *In 1971, three major suppliers lost nearly 90 percent of their stock and many of the other suppliers lost around one-half of their supplies; and all suppliers had larger than average losses in 1972, according to Dr. George W. Nace, director of the Amphibian Facility at the University of Michigan-Ann Arbor. Nasco's collection had also dropped during this period from more than 30 tons of frogs (almost one million frogs) in an average year, to only five tons in 1972 (Modern Medicine, 1973).*

As the price of field collected animals has skyrocketed, in many cases by a factor of 10 or more, reexamination of goals and rationales seem to be occurring on a national basis. With the broader awareness of environmental considerations, many biology students and teachers are beginning to question the wholesale slaughter of great numbers of animals for the purpose of instruction, and question whether similar factual material could not be learned in a manner less costly to these wild populations.

Presently, there seems to be a decline in the use of live material. To what extent due to increased sensitivity and to what extent due to increases in cost and decreases in budgets is difficult to determine.

One of the alarming things about this entire federally funded program, was the rate at which implementation through federally funded workshops and institutions were able to instate this curriculum in more than 80% of the schools in something less than ten years from conception to implementation.

In the early 1960's, a similar federally funded curriculum development resulted in the Science Curriculum Improvement Study (SCIS), which brought the level of involvement of live animals down to the elementary classroom. Many of these activities were imaginative and of interest to youngsters when properly presented.

The biggest impediment to the implementation of these programs was the general lack of background among elementary teachers in the areas of science in general, as well as the specific requirements for proper maintenance of live animals in a classroom environment.

Again, extensive federally funded institutions and workshops, followed by private funding (Rand McNally, who purchased the rights initially to the SCIS program), were able to accomplish in a few short years the greatest single modification of elementary science instruction in the history of education. The SCIS program involved quantities of guppies, tadpoles, fruit flies, land snails, crickets, sowbugs, and literally millions of dollars worth of material on an annual basis.

Without adequate supervisory support and practical assistance, these programs became increasingly difficult to sustain. After being implemented in a great majority of elementary school districts in the country through the early 1970's, we find now a shift toward more conservative use of live animals at these levels.

Incidentally, in the early development of the SCIS program, very little attention was paid to the dissemination by elementary students of potentially damaging populations of organisms, the snail, *Helix aspersa*, being the largest offender. Very often they were released into local areas (parks, streams or school yards) at the conclusion of class activities. These animals are now creating feral populations in strange distribution patterns around the country. Only in the last few years has action been taken to limit this form of animal introduction.

The author also serves as editor for the "Biologic" Newsletter, published by Nasco, and mailed to thousands of teachers of science and biology. Last spring's issue, Volume 3, Number 3, included a reference to the meeting of the Institute for the Study

of Animal Problems in Washington September, 1979. Not one response has been forthcoming from the academic community. Surprisingly, two responses have come from secondary school students, both excerpted here.

> *. . . I think that biologists should be the only ones to experiment with animals. I think if the high schools want preserved animals to dissect fine. Probably over half of the science teachers aren't sure how to care for the animals. My science teacher did an experiment with gerbils. After the experiment was over, the animals just sat there in their cages. Most of the cages were filthy. They kept breeding and finally he had to give them away. (Richard Harland, Louisville, KY.)*

> *I am a science research student at Beach Channel High School, who recently undertook a project involving the effect of extremely low dosages of caffeine on a mouse's ability to run through a maze, and to adapt to light. Out of the 15 mice I used in my experiment, there were no deaths; and after the end of the experiment, there were over 22 births. Because of an outdated rule, my project is banned from the Westinghouse Fair, one of the most prestigious fairs in the country. I do not feel my project should be banned, when other projects involving extreme cruelty to invertebrates are allowed. (R. Schroeder, New York, NY.)*

Conclusion

Surely the use of some live animals in the classroom is not unreasonable. Today, youngsters need to become actively involved in the learning/discovery process. Use of live material sustains greater interest, provides greater motivation, and probably assures more permanent retention.

Regulation of activities will continue to be important. Attitudes displayed by the teacher do create a learning experience intentionally or not, negative or positive towards the advance of humane attitudes.

I would like to see an orderly progression of limitations, disseminated through teaching journals, workshops, etc., and avoiding extremist positions. This could be accomplished by enlisting cooperation of teacher training institutes and industrial sponsors, Westinghouse and others, in establishing a uniform set of standards for live animal use.

References

Gibbs, L., Nace, W., and Emmons, M.B. (1971) The live frog is dead, *BioScience 21 (20)*, October 15.

Modern Medicine (1973) Where have all the frogs gone? November 12, pp. 20-24.

Understanding and Attitudes Derived from the Use of Animals in Schools*

Peter J. Kelly

Abstract

A general review of the variety of activities involving the direct use of animals which are undertaken in secondary schools. An assessment is made of their value (positive and negative) in terms of knowledge and attitudes (including ethics) which are, or might be, derived from them. Alternative methods also are reviewed with an assessment of their value in relation to live animal studies.

The British Context

British schools have a long tradition of keeping and of using animals. This has its roots in the nineteenth century attitude portrayed, for example, by Robert Patterson in his book *An Introduction to Zoology* published in 1848 where he says: "The great object should be to bring natural history knowledge home to the personal experience of the pupil . . . Small collections of objects made by the pupils themselves would, under the guidance of a judicious teacher, be of great value in this species of mental culture and would form the much-prized ornaments of the school room." No biology room or laboratory since seems to have been without its geranium plant, skeleton, aquarium and the inevitable pet mouse, rat, rabbit or guinea pig. The type system of teaching zoology initiated by Thomas Henry Huxley reinforced the tradition. In this a limited set of species representing the major phyla is studied and a display in the laboratory of living animals, dead specimens and their parts, and pictures of the species is a frequent accompaniment.

This Victorian legacy still hangs on to some extent but in recent years it has been modified by several influences, including the curriculum development projects of the nineteen sixties, which have broadened the scope of biology teaching beyond taxonomy, morphology and physiology to include behaviour, ecology, genetics and other aspects of the subject. In particular, the human species has become an increasingly important focus of interest.

These projects have tended to enhance the status of practical work, especially

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