HUMANE SCIENCE PROJECTS AND ALTERNATIVES TO DISSECTION

WHAT IS DISSECTION?

Dissection is the cutting up and examining of a dead animal to examine how that animal's body looks and works. The animals most often used are fish, dogfish sharks, worms, mice, rats, fetal pigs, rabbits, cats, and dogs. Dissections may be performed in biology, anatomy, physiology, or zoology classes.

An increasing number of students are choosing not to dissect animals, and schools are providing alternative projects for them that do not harm animals. Contrary to the opinion of some that students refuse to dissect animals because they are "squeamish," in fact, their reasons for not dissecting are based on rational arguments.

WHAT ARE THE OBJECTIONS TO DISSECTION?

- **Animals suffer in the process of being captured, handled, transported, and killed.** The methods used to obtain or kill the animals are inhumane and may be illegal in some cases. Cats and dogs may be stolen, and wild animals may be removed from their natural habitat illegally and sold to supply houses, which sell them to schools. Animals may be injected with formaldehyde, a preservative, before they are dead, and left to die slowly and painfully.

- **Dissection teaches students that animal life does not matter and that cruelty to animals is acceptable.** Countless studies have demonstrated the link between cruelty to animals and cruelty to humans. Some students may be dissuaded from pursuing a career in science if they believe that harming healthy animals is required to earn a degree.

- **Dissection harms the environment and people.** Removing frogs from their habitat causes the insects they eat to multiply. Pesticides used to control the insects poison the environment and harm the ecosystem. The U.S. Department of the Interior has stated that the decline in amphibian populations is partly due to the use of amphibians in dissection.

  Chemicals used to preserve animals, such as formaldehyde, are likely to be harmful to teachers and students performing the dissection. According to the U.S. Department of Health and Human Services, National Toxicology Program, 2011: "Formaldehyde is *known to be a human carcinogen*....In the United States, high exposure levels were reported for...biology teaching laboratories." When the specimens and chemicals are disposed of, they are harmful to the environment, contaminating drains and groundwater.

- **Dissection wastes resources.** Animals can only be used once, while alternatives can be used many times.

- **Dissection is not the most effective way to learn.** Alternatives like computer simulations and plastic models allow repetitive trials, which results in greater learning. Computer models also include information about a particular species' natural habitat and habits. Studies have shown that students learn more from using alternatives to dissection.

  In addition, learning from alternatives that simulate the human anatomy is superior to learning on animal cadavers or even on alternatives that use animal anatomy. Unless a student plans to become a veterinarian, learning about the human body is more relevant than learning about animals' bodies.

WHAT ARE THE ALTERNATIVES TO DISSECTION?

Non-animal-cadaver methods, including interactive software on the Internet and on CD-ROMs, 3-dimensional plastic and clay models with removable organs, peel-away transparencies, videos, and charts are less expensive because they can be used repeatedly, and they are superior to dissection in teaching anatomy and biological processes. They also teach that animal life has value and that we can learn about animals without harming them.

Sources of alternatives to dissection:

Using your Internet browser, search for words such as **virtual dissection site** or **online dissections** for links to virtual dissections, including those of humans, frogs, cats, pigs and fetal pigs, rats, mice, earthworms, squid, perch, crayfish, clams, starfish, sheep's brains, and cows' eyes.

Databases of sources of alternatives to dissection:

Norwegian School of Veterinary Science, www.oslovet.veths.no/fag.aspx?fag=57&mnu=databases_1

Also search the words **alternatives to animals database** for additional online databases of alternatives.

Organizations that lend alternatives or offer additional information:

American Anti-Vivisection Society (AAVS), www.aavs.org: Animalearn Science Bank, www.animalearn.org/sciencebank.php

The Humane Society of the United States (HSUS), www.humanesociety.org

InterNICHE, www.interniche.org — lends alternatives in the biological sciences and veterinary and human medicine, and works with teachers to introduce alternatives

The National Anti-Vivisection Society (NAVS), www.navs.org

New England Anti-Vivisection Society (NEAVS), www.neavs.org: Ethical Science & Education Coalition (ESEC), www.neavs.org/esec — lends books, videos, models, and computer programs; has a free catalogue of over 400 alternatives

People for the Ethical Treatment of Animals (PETA), www.peta.org: TeachKind, www.teachkind.org/dissectalt.asp

Physicians Committee for Responsible Medicine (PCRM), www.pcrm.org: Dissection Alternatives www.dissectionalternatives.org/alternatives/resources.cfm

One example of an alternative to dissection:

The Digital Frog: Virtual frog dissection, anatomy & ecology, http://www.digitalfrog.com/

HUMANE SCIENCE PROJECTS

The following list of humane science projects was presented by Jonathan P. Balcombe at a conference in Israel in 1994, sponsored by Concern for Helping Animals in Israel (CHAI): "Preventing Violence in Society Through Education."

Each of the projects can be tailored to suit any age group, and they can also be designed to involve most or all of the key elements of the scientific process (study design, data collection and presentation, experimental manipulation).

1. Walk your dog through the woods and study the seeds that are dispersed by clinging to the dog's fur (for students who don't have a dog, use an old blanket).

2. Observe birds at a feeder. Which species eat together? Which species leave when other species arrive? Which species eat which seeds/fruits/berries and why? Which bird species are attracted to which types of birdhouses and/or cover vegetation and why?

3. Survey a particular plant species for insect life. What sorts of adaptations do certain species have for living on this plant (e.g. camouflagic coloration)? Monitor the number of insect visitors to a small cluster of flowers/plants. How does visitation change with time of day, year, weather, etc.?

4. Conduct an invertebrate catch/release outside operation in your home. List all the invertebrates (spiders, flies, ants, millipedes, cockroaches, moths, fleas, etc.) you find. Describe their living preferences. Survey your home for ways invertebrates might enter (including on you!).

5. Food preferences of ants: design a study involving placing different food items near the entrance to one or more ant colonies and recording the behavioral responses of ants.

6. Observe nesting birds (e.g. watch nest for one hour each day). Estimate the number of insects consumed, based on the number of trips to and from the nest. Extrapolate over all the daylight hours. Do males or females perform the same amount of each parental duty?

7. Physiological self-study: test hearing directionality by blindfolding a fellow student and tapping a metal object to right, left, front, and back of the blindfolded subject. Test smelling/tasting accuracy of students (e.g. using juice from various fruits).

8. Study absenteeism in school. Relate to colds, flu, other illnesses.

9. Perform habitat analysis in a local piece of wild land. What types of trees are there? What types of animals are there? How might they interact?

10. Survey the number of animals killed on the road. Relate the numbers to different locales (rural/urban), different road types (paved/unpaved), two lane/four lane. Devise some solutions to reduce or eliminate the problem of animals being killed on the roads.

11. Compare the behavior of ducks at a pond where they are fed by humans and at a pond where they are not.

12. Find a roosting tree of starlings or other gregarious bird species. Determine from what direction most of the birds enter or leave the roost. Starlings are an excellent species for observational study. They are abundant, very active, intelligent, social, vocal, opportunistic, etc.

13. Compare the fauna on an organic farm with the fauna on a farm where pesticides are used. Relate the findings to current trends toward organic farming.

14. Do transects of natural areas, identifying and comparing the types and numbers of birds or other animals.

15. Visit a local pond where bats forage at dusk. Time the arrival of the bats on different nights and compare with the time of year (official sunset data can be obtained from a local weather station). Estimate insect abundance by counting sudden changes of flight direction in bats (attacks), etc.

16. Put up a bright light to attract insects to a white sheet. Identify the insects while they are on the sheet. Are they the same in different areas?

17. Develop an ethogram (complete behavioral repertoire of a species).

18. Study the growth of molds on food items under different growing conditions. Vary the foods and the growing conditions.

19. Count seeds on plants. How many seeds do different plants produce? How does the number of seeds vary among seed pods on the same plant? On different plants of a single species? Different species? Why?

20. Grow bean sprouts in commercial sprouters (beans and sprouters are availble in natural food stores). Compare growth rates of different types of beans and different lighting conditions. Compare different sprouter designs. Compare the taste preferences of students.

21. Sample the soil in different habitats and (with the aid of a light microscope) survey the invertebrates (insects, earthworms, roundworms, etc.) found there. How do different habitats compare? Different soil depths?

22. Conduct a comparative study of plants: e.g. compare two populations of dandelions (one growing in an undisturbed area, the other in a more disturbed area). Examples of data that could be collected: stem length, seed number, density, leaf area, seed plume length and width, etc. Advanced classes can relate the data to r and K selection.

23. Collect, grow, and study bacterial cultures from various places; for example: garbage cans, doorknobs, mouth. Compare bacteria in mouth before and after brushing.

24. Study leafing patterns of trees/bushes: which species do or do not drop their leaves for the winter? Which drop their leaves the soonest? Which leaves do or don't change color? Why?

25. Sample plants from small plots in the school ground or backyard. Relate their distribution to microhabitats, student activity patterns, etc.

26. Prepare an arboretum of plants growing on the school property.

27. Study leaf and leafing adaptations; e.g. relate leaf shape and area to habitat. Study the effects of light availability.

28. Use a water analysis kit to test water at various points along a river or stream, to associate bacterial contaminants and other things, such as turbidity, with sewer plants, run off, etc.

29. Examine air pollution by sampling (say, by rubbing them with white tissue paper) the surfaces of tree leaves (or building surfaces...) in different areas of a city. If you live near an industrial incinerator, you might compare samples taken at different distances (100 yards, 1/2 mile, 5 miles, etc.) from the incinerator.

30. Compare trunks of dead with living trees in a wooded area; e.g. compare woodpecker holes, fungal growth.

Resources

Fact Sheet:

Animal Experimentation and Xenotransplantation

Lesson Plans:

A Change of Heart
Learning About Life?
{and whatever other new lesson plans Rae is writing about animal experimentation might belong here too}

Books:

Ecology Projects: Ideas and Practicals for the Journal of Biological Education. London: Institute of Biology, 1992.

Hairston, R. *The Responsible Use of Animals in Biology Classrooms, Including Alternatives to Dissection.* Reston, Virginia: National Association of Biology Teachers, 1990.

Hancock, J.M. *Biology is Outdoors! A Comprehensive Resource for Studying School Environments.* Portland, Maine: J. Weston Walch Education, 1991.

Heintzelman, D.S. *The Birdwatcher's Activity Book.* Harrisburg, Pennsylvania: Stackpole Books, 1983.

Humane Biology Projects. Animal Welfare Institute, 1977. (Out of print, but may be available in some libraries.)

Ogilvie, D.M., and R.H. Stinson. *Discoveries in Biology: Nondestructive Investigations with Living Animals.* Toronto: Copp Clark Pitman Ltd., 1992.

Schwartz, S. (ed.). *Humane Science Projects Manual: Grades Pre-Kindergarten through Eight.* United Federation of Teachers: Humane Education Committee. 1992.

Schwartz, S. (ed.). *Humane Science Projects Manual: Grades Six through Twelve.* United Federation of Teachers: Humane Education Committee, 1992.

Websites:

Ascione, Frank. "The Roots of Cruelty and Kindness to Animals and Others." 1994 http://www.chai.org.il/en/humane/humane_ascione_i.htm **OR** http://tinyurl.com/23qqsxu

"Comparative Studies of Student Performance: Studies Demonstrating Superior Teaching Effectiveness of Humane Teaching Methods." Animallearn. http://www.animalearn.org/img/pdf/comparativestudies.pdf **OR** http://tinyurl.com/4wz688g

"Formaldehyde." Report on Carcinogens, Twelfth Edition (2011). Department of Health and Human Services: National Toxicology Program. 2011. http://ntp.niehs.nih.gov/ntp/roc/twelfth/profiles/Formaldehyde.pdf **OR** http://tinyurl.com/8x8a78t