

# Undergraduate Animal Use at the University of Illinois: The Need for Alternatives

This document summarizes some compelling reasons why the University of Illinois needs to provide conscientious objectors to instructional use of animals with alternatives and thus, why an undergraduate campus-wide 'student-choice policy' should be enacted.

It also provides evidence of the difficulties students have experienced as a result of the lack of a policy, a description of the legal obligation of the University to provide alternatives, a brief summary of some studies which show the efficacy of alternatives, and what sort of policy would best address this situation, based on those implemented at the college and departmental level elsewhere.



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### *Abstract*

Students have had a wide range of experiences regarding dissection and vivisection in the classroom. Although it does not represent the full range of dissection and vivisection experiences, Appendix A reproduces testimonials from UIUC students, alumni, and instructors that highlight both the problems faced without a policy and the promises for a solution employing alternatives. Some students were allowed to use alternatives, and it positively impacted their learning experience. Others were allowed to use alternatives, but required to do extra work as a result. Of the students denied alternatives, some experienced severe grade reductions due to not participating, while others felt pressured to participate and regretted it. Several students have reported that they actually changed majors as a result of being unable to use alternatives. Other students who participated in animal labs have found them to be an inadequate method of teaching the material, and believe that they would have learned more with alternatives. Finally, both veterinarians and professors at UIUC have expressed their support for the proposed policy.

From the Free Exercise Clause of the First Amendment comes a strong legal argument, supported in several court cases between college students and their schools, for providing alternatives to conscientious objectors. Details are provided in Appendix B, which also explains why students need not be part of an organized religion to qualify for protection under the Free Exercise Clause.

Some instructors still object, claiming that alternatives to dissection and vivisection do not satisfy pedagogical objectives. Appendix C includes a list of 51 journal articles that counter that claim: 22 show equal performance; 13 show superior performance; 16 support the argument for offering alternatives to dissection and vivisection. There are also 6 neutral and 1 negative articles – one study shows inferior performance with alternatives, but the sample size is only 20 students and the study uses highly subjective oral examinations. Furthermore, of the five studies performed at the undergraduate level with sample sizes larger than 100 students, three show equivalent results, and two find alternatives to be superior. All 29 studies are listed and summarized in Appendix C.

Given students' negative experiences at UIUC under the current system, their legal right to accommodation, and the efficacy of alternatives, the best solution is a student-choice policy for instructional use of animals. The content of such a policy is outlined in Appendix D. In short, it would guarantee conscientious objectors the choice of an alternative exercise that satisfies the same pedagogical objectives and requires approximately the same student effort. Instructors would be required to notify students of this option, and students would not be penalized for exercising it.

Finally, it should be noted that in addition to protecting religious freedom, there are several “fringe benefits” implicit in such a policy. By purchasing alternatives now, the University will be better able to serve the needs of students with disabilities who are physically unable to perform dissections, and who may find a video screen easier to see than a lab bench. It also shifts the burden away from individual professors; they will have a library of high-quality alternatives already available when a student has an objection, rather than having to find them on their own. Finally, the alternatives could be made available to all students as a study aid, improving the learning experience for everyone.



The Student-Choice for Dissection Alternatives is supported by:

Indian Student Association  
 Marwari Rajasthani Club  
 Krishna Club  
 Buddhist Study Group  
 College Democrats  
 Students for Democratic Thought  
 Campus Vegetarian Society  
 Independent Media Center Steering Committee  
 Students for Environmental Concerns  
 Environmental Resources  
 Women's Direct Action Coalition  
 Illinois Student Environmental Network  
 Red Bison

## ***Appendix A · Student Testimonials***

Currently, the lack of a policy dealing with students who request alternatives to dissection and vivisection at the University of Illinois has led to several problems. For one thing, students are being treated unequally; while some students have been allowed to use alternatives, others have been heavily penalized. Even more troubling, some students have been forced into changing their major because they knew that their beliefs would not be accommodated.

There are intelligent, capable students who want to learn the material taught in classes that use dissection and vivisection, and the University has failed them. Since students with ethical objections are unwilling to participate in activities like dissection, the University can either offer them alternatives and ensure they learn as much as possible, or abandon them to their own devices. It is the responsibility of an institution of higher learning to educate, and the objecting students only ask to learn the same material as their peers without compromising their beliefs.

These are some of the experiences students have reported at UIUC. They have been reproduced here from signed originals without modification.

### **Veterinarians and professors support a Student-Choice Policy:**

Eric Dunayer, V.M.D.

*Veterinarian on staff at the UIUC-affiliated Urbana Animal Poison Control Center*

My own experiences as a life sciences student, research assistant, and veterinarian have convinced me that dissection at the high school and undergraduate levels has little relevance to learning about life processes. Year after year, animals are used to demonstrate the same well-known principles, although sophisticated models, videotapes, and computer simulations could easily substitute. These humane alternatives have many advantages, including reusability and durability. In addition, the right of a student to learn without doing harm to nonhuman animals should be recognized. I, therefore, fully support SILA's student choice initiative.



Linnaea Stull, DVM, Class of 2002

*College of Veterinary Medicine*

As an undergraduate Zoology student, I was not exposed to dissection or vivisection. It was the policy of my University to provide alternatives where they were available, in accordance with the Animal Welfare Act. My lack of dissection experience did not hurt my acceptance into University of Illinois's Doctorate of Veterinary Medicine program. Further, I found that the non-animal alternatives I had studied as an undergraduate prepared me to an excellent degree for my veterinary curriculum.

A Student Choice Policy in Dissection at the University of Illinois follows the intent of the Dissection Alternatives Act passed by the Illinois State Legislature in 2000. This law requires educators through the high school level to inform students of alternatives to animal experimentation or dissection in their classroom. Here at the University, the College of Veterinary Medicine passed a Student Choice Policy in 2000, similar in language to the Dissection Alternatives Act. A Student Choice Policy passed by the undergraduate university would fill a gap between the high school and post-graduate level; students at every level of education deserve a humane alternative to dissection and vivisection in their classrooms. From personal experience, I find these alternatives to dissection to be of superior educational value.



Jeff McMahan, Professor

*UIUC Department of Philosophy*

I have read the Student Choice Proposal of Students Improving the Lives of Animals and I applaud and support its aims.



Linda P. Case

*Lecturer, Companion Animal Science  
Department of Animal Sciences*

Given the increased sophistication and commercial availability of models, interactive computer programs, and videotapes, coupled with numerous controlled studies demonstrating the educational effectiveness of these alternatives, this proposal is both reasonable and necessary. It is reasonable because the

proposal neither prohibits nor limits the use of animals in undergraduate courses at the University of Illinois. Its intent is not to ban animal use in courses, but rather to provide options for students who, for religious or ethical beliefs, choose to not dissect animals during their undergraduate program. The proposal is needed because there is currently no written university policy that provides a uniform and consistent protocol for handling student requests for alternatives to dissection. As a result, students' experiences have varied from very positive (an alternative readily provided with no penalty), to very negative (no alternative provided, and a penalty applied for abstaining). Moreover, the Student-Choice Resolution upholds the University of Illinois's Nondiscrimination Statement in its Code of Policies and Regulations by ensuring that students who choose not to dissect for religious or ethical beliefs are not subjected to discriminatory practices in the classroom. For these reasons, I fully support the University of Illinois's proposed Student-Choice Resolution.



### **Some students were allowed to use reasonable alternatives:**

**Beth Ferraris**  
*English*

I flat out refused to dissect in Physiology 103. My professor was very nice and open about it. He even offered the first day for us not to dissect. I had planned to drop it, but when I found out about the dissection, I was ready to re-arrange my entire schedule so that I did not have to. I am now doing the alternative assignments and Dr. Favahvar has been wonderful about it. If more teachers were that open, more students could follow their true interests!



**Courtney Heather Smith**  
*Kinesiology*

I did not want to do the 10 dissections required of my Physiology 103 class. When I emailed Prof. Meisami I was told that I would have to learn through other means and would have to spend three hours on each lab. I am currently following through with the alternatives to dissection.



### **Some students were allowed to use alternatives, but their instructors made them do extra work:**

**Lindsay Robinson**  
*Microbiology*

I am a student in the Biology-Honors department. During Biology 251 most of the 2nd half the class involved labs dealing with animal experimentation. To avoid the cruelty to animals I had to write two extra 12 page papers about each of the physiological concepts that the experiments are on. It was about 4-5 times the extra work as the other students, who did not have to do outside class work. I felt like I was being punished for caring for animal welfare. I am going to school to learn to protect animals, not to torture and kill them.



**Jon Fisher, Class of 2001**  
*Forestry & NRES (biological option)*

I was required to take BIOL 104 (Animal biology) for my major, but I figured that it would probably be heavily dissection-based. So, as soon as I had the contact information for the lab coordinator (Carla Barnwell) I contacted her and scheduled an appointment to talk about my ethical objections. I told her that I was unwilling to participate in dissection for ethical reasons. She responded that I was the first student she'd dealt with who had had this problem, and that she wasn't sure what to do instead of have me dissect. Her first suggestion was that I watch others do the dissection in class. I told her that I still would be very uncomfortable with this, as it was still a form of participation. However, she didn't want to let me just skip the labs for two reasons:

—I'd be getting a lighter workload

—I'd be at a significant disadvantage for the lab quizzes

The lab quizzes basically involved going in and looking at pinned parts of animals and identifying them (there was also a purely written part, but the ID was the part of concern). She wouldn't let me skip the lab quizzes because that was the material that we were supposed to learn. So, I suggested that I find pictures of the animals online, and study in that fashion. She agreed, but to make sure that I did the work and that I was learning, each week I had to send my TA (Jeff Heilveil, who was very cooperative) URLs for the web sites I visited, and

a brief report detailing how good I thought the sites were, which ones were the best, and how I thought this experience compared to an actual dissection.

I did this for a while, and my progress was closely monitored. It was made clear to me that if I didn't do well, they'd have to rethink the system (i.e. I couldn't keep using alternatives). Due to outside reasons, I was doing poorly in the class at first. They talked to me about this, and expressed concern, but I was actually doing OK on the ID part, it was only the written part that was dragging me down. Since I did fine on the part relating to dissection, they allowed me to continue. Eventually I pulled my grade up to an A.

On the last day of class, the lecturer (Susan Fahrbach) thanked me for having shown them alternative learning in action. She said that she was interested in computer alternatives (more as a supplement than a replacement, I think), and was encouraged to see someone do OK with them. I sent her a list of the websites that I found had the best pictures for the animals we looked at, as well as websites for "Virtual Dissection" software. She indicated that in the future she was considering incorporating such software into her class.

So, overall I had an OK experience. Looking at the pictures (and the animals in the quizzes) was unpleasant, but at least I didn't have to dissect something myself or fail the class. The only things that made it difficult were the added pressure to succeed and the fact that I had no idea where or how to look for alternatives, so the web searching sometimes took a lot longer than the actual lab. It would have been extremely helpful if high-quality alternatives had been made available to me.

#### **Other students were refused alternatives and were penalized with grade deductions:**

**Michelle Rodrigues**  
*Ecology, Ethology, and Evolution*

I am a pre-med student who is currently in Bio 121 and I contacted the lab coordinator, Melissa Michael, last semester because I did not want to participate in the animal dissections, which include euthanized rats, and live frogs that have their spinal columns severed to demonstrate nerve impulses. She said she would get back to me after discussing with her

colleagues, and then e-mailed me to tell me that they were developing a policy for all biology classes regarding animal issues. I met with her this semester again, and she basically told me my options were to enter computer data, but not actually physically do the dissection, but still participate in the lab or to not show up, and take a 60-75 point deduction. She said I might be able to write and introduction to the lab write-up for 4-5 points per lab.

These labs comprise 4 labs out of the semester, and 3 out of the 8 labs that have a write-up for credit. I considered dropping the class and attempting to proficiency, but I think I am going to stay in the class and take the point deduction. When I questioned her about the policy they developed, and the official policy is that they feel animal dissection is necessary, so they will continue to require these labs in their courses. In addition, she mentioned that they will soon be altering the Bio 120-121-122 course sequence, and thus, at this point, are not going to invest the interest in developing or providing alternatives for current students in these classes.



#### **Other students were refused alternatives but participated reluctantly:**

**Frank Hassler, Class of 2000**  
*Ecology, Ethology, and Evolution*

In the fall of 1997 I was in my sophomore year attaining the University of Illinois and I was enrolled in Bio 121. The first few weeks of the class we studied basic ecology which was of interest to me as a student in Ecology, Ethology and Evolution. The class then moved on to plant physiology and finally, animal physiology.

There were several labs involving the dissection of bullfrogs. I was very unhappy with the prospect of dissecting these frogs; I felt it was a waste of a beautiful living creature, one of many I had become fond of as a child exploring the creek near my farm home. It was these experiences as a child which made me decide to study ecology, and now there we were, destroying a piece of that beautiful experience.

I feel the unnecessary destruction of nature's beauty is morally offensive. I asked my TA, Joe, if there was a way I could get out of the labs and he informed there was none. I was too timid

to pursue the matter further, I felt obliged to participate in the labs or my grades would suffer. My form of protest was to never directly participate in the frogs' dissection. I ran the computer, monitoring the results of the lab. This way I could be the least responsible for this waste of life.

With about 250 students in the class, and one frog being used per four students for three different labs, I figured that just under two hundred frogs were being wasted for these labs. And I do mean wasted. In our first lab we amputated the leg of a recently killed frog and plugged sensors and an electrical supply into its quadriceps. We then shocked the muscle and tested its response to the electrical impulse, supposedly to learn more about how the nervous system works. The whole frog had to die so that we could make its leg twitch. Over the following two weeks each lab group dissected two more frogs.

I feel a sick feeling thinking about those labs. The same sick feeling I felt as a child when I saw a dead frog, shot by a neighbor kid in my creek. The same sick feeling I felt when I saw smallmouth bass poached in the Fox River near my home as an adolescent. The same sick feeling I felt when I found that a railroad prairie in Tolono had been bulldozed. And the same sick feeling I felt when I saw a pedestrian struck and killed by a car in Phoenix, AZ during a spring break trip.

Had there been an alternative to dissection available, I would have taken it. I am quite certain that I would have learned a great deal more from a video or computer simulation. My moral opposition to the procedure resulted in a great deal of discomfort and disinterest on my part during that portion of the course. I learned nothing in those labs that I could not have learned even from a well written book, in fact, they stifled my learning. My grades dropped from an A during the ecology portion of the course to a final grade in the C range. There is no doubt in my mind that my grade and more importantly, my education suffered as a result of those frog labs.



#### **Other students were refused alternatives and changed majors:**

Elena Beis  
*Submitted as Animal Science major;*  
*switched to English*

I was to participate in a lab [Animal Behavior with Dr. Johnson] where first I was to watch my TA scalp a chicken and drill a metal tube into its head to inject hormones into its brain. We were to watch the chicken's behavior after they injected a hormone which caused the chicken to eat more. I was appalled and dropped the class.

This experience was the \*sole\* reason for me to switch my major, which is English now.



Anna Zielnska  
*Submitted as Biology major;*  
*switched to Political Science*

I am a freshman who is thinking of majoring in Biology but the thought of dissection is unbearable to me. Because of that I was thinking of changing my major which I think is unfair: It's one thing to dissect when you are a med. or vet graduate students and a totally another to do it when you are an undergraduate majoring just in Biology.



#### **Non-objecting students have questioned the irreplaceability of dissection and vivisection:**

Lizzet Jasso  
*Microbiology*

In this class we dissected many animals and in addition to our dissections, there were large models and diagrams in the books. At every dissection everyone just used the model because the insides of the animals were so messy that you couldn't even identify the parts if you wanted to. So everyone ended up using the models and large pictures instead of using the animal.

I did not learn anything I did not know already when I dissected.



**Note: the following student was not an undergraduate, but the same lab is taught in Physiology.**

**Nithya Sunder**  
*College of Medicine*

During my first year at U of I's College of Medicine in Urbana I attended a physiology lab session in which students injected chemicals into an anesthetized pig to see how the cardiovascular system reacts. Reactions were assessed by watching the monitors to look for changes in vital signs. The pigs were brought up for the school for such experiments and then slaughtered. During the lab the instructor admitted that dogs had previously been used until students voiced their objection to using animals they often see as pets for these tests and then killing them. He did not seem to accept that to some students using and killing any animal is no less heinous. We were also told that the pigs were anesthetized with a chemical not used in humans that produced visible tremors in the pig during the whole session. For this lab about eight students stood around one pig, yet in our cadaver labs for anatomy fourteen students had to share one body. As students we were told that this experience would be invaluable because we would see "hands-on" how these chemicals worked although some students had difficulty concentrating on both the pig's visible response and the monitors. The chemicals did not always elicit the appropriate responses leading me to further question the worth of this lab. I also know that some students felt that this material could have been taught using other sources including a videotape available on the web for free. This would allow students to watch essentially the same experiments and the monitors on the same screen without having to buy and kill more animals. I wish that I had known of this tape and presented it as an alternative before attending this lab session. I hope the university considers this option in the future.



**Jennie Wise, Class of 2001**  
*Natural Resources and Environmental Sciences*

Last fall I took Biology 121. In the lab, we had to do a lot of frog physiology labs. In these labs the frogs had been killed a few minutes before when a metal rod was rammed into their head. This enabled us to do experiments with a frog with a beating heart. I found the experiments pointless. The majority of these experiments did not work. The frog data

did not register on the computers we were using, and many of the chemicals we were using did not react well with the frog physiology. My guess is about 800 frogs were killed for Bio 121, and I don't think anyone learned anything from the actual dissections.

### ***Appendix B · The Legal Argument For The Right Of Students To Use Alternatives***

Students who have moral and religious objections to animal dissection have successfully brought lawsuits against Ohio State University, the University of Pennsylvania, the University of Colorado, and SUNY-Stonybrook for attempting to require them to dissect. Other students have filed formal complaints and been accommodated without lawsuits.

Students who object to dissection and vivisection on religious/ethical grounds are protected under the First Amendment. From some religious/ethical perspectives (such as Jainism, Buddhism, and veganism), the suffering and loss of life inherent in dissection/vivisection are an affront to the sanctity of life and are thus forbidden. Therefore, in order for UIUC, an arm of the state, to require students who sincerely hold these beliefs to dissect/vivisect, UIUC must demonstrate two things. First, that the required dissection/vivisection serves a compelling interest of the state, and second, that the required dissection/vivisection serves this compelling interest in the way that least restricts religious freedom.

UIUC may be able to show a compelling interest in teaching principles of anatomy and physiology as training for future doctors, scientists, and so on, who will someday serve the state. But the same principles of anatomy and physiology can be taught using non-animal alternatives, which many recent studies conclude to be as effective as – if not more effective than – dissection/vivisection. Because these non-animal alternatives are less restrictive than dissection/vivisection, UIUC cannot force students to use dissection/vivisection. Under the First Amendment, then, students objecting to dissection/vivisection are protected and should be allowed a non-animal alternative. Further details can be found in *Vivisection and Dissection in the Classroom: A Guide to Conscientious Objection* by Gary Francione and Anne Charlton.

Although students in some majors are not required to take classes with dissection, students choose their courses and majors based on career goals. In the courses in question, the objectives are learning not dissection but anatomy and physiology, which can be effectively learned through alternatives. Required dissections are therefore a needless obstruction to their career goals that are in accordance with their religious or ethical beliefs. Thus, students' pursuit of their career goals in state institutions is protected by the Free Exercise Clause of the First Amendment.

Note that the legal definition of "religious" for this purpose is that the beliefs must be sincere and meaningful, and have a significant influence on the way the student lives their life. Thus, in addition to a Buddhist or Jain, a vegan student who does not use animal products or products tested on animals, and has a belief in the sanctity of all living things has a religious basis for objecting to dissection and vivisection. The courts have recognized that you need not be a member of a theistic or organized religion for your beliefs to be protected.

Without a Student-Choice Policy at UIUC, current course requirements for dissection and vivisection abridge students' Constitutional rights. Students are forced to choose between their academic success and their religious beliefs. By providing objecting students with non-animal alternatives to dissection and vivisection, a Student-Choice Policy will protect students' rights and solve the problem as similar policies have elsewhere. SILA's proposed Student-Choice Policy (Appendix D) creates uniform, campus-wide protection for undergraduate students objecting to dissection/vivisection by guaranteeing them the option to use a non-animal alternative at no penalty. Furthermore, it requires instructors to inform students of the availability of alternatives. Policies like this have been successfully implemented at many schools at a departmental level, including UC-Berkeley, Cornell, and Virginia Tech, and in grades K–12 in the state of Illinois without substantial administrative burden.

The University has already shown its commitment to accommodate religious beliefs in other arenas; professors who schedule tests on a holy day or Sabbath are required to offer alternative test dates for students who observe those days. As with dissection alternatives, this could be argued to be contrary to academic freedom. However, in both cases the same material is being taught and tested on, the only difference is the way it is administered.

The University has also shown great interest in accommodating students with disabilities; by purchasing and offering alternatives (especially videos), it will be better equipped to deal with students whose disabilities prevent them from taking part in a dissection or vivisection. For example, students who are paralyzed or have severe cerebral palsy may find it difficult to watch someone performing a dissection; an elevated video monitor would serve them better. So, by purchasing alternatives, the University will be able to meet its commitment to accommodating both the disabled and students with religious objections.

Academic freedom is often raised as an objection to a policy mandating that alternatives be provided. However, “academic freedom” is traditionally the freedom instructors have in discussing whatever material they feel appropriate, not in requiring students to take whatever actions the instructor feels appropriate. So, when it comes to classroom dissection, an instructor relinquishes very little academic freedom; after all, the instructor still defines the educational objectives and evaluates the student’s performance, all while teaching the non-objecting students in whatever manner the instructor pleases. On the other hand, in not providing alternatives, the instructor protects that small amount of academic freedom, but at great cost to the religious freedom of the student. The solution that protects the greater interest and prevents the greater harm – and the solution supported by the courts – is to provide alternatives. A student with religious objections should

not be required to participate in dissection any more than a Muslim should be forced to eat pork in a food science class.

### **Appendix C • Journal Articles Comparing Animal Labs To Alternatives**

Note: this list was compiled by the Humane Society of the United States. Both SILA and the Student Senate subcommittee on this issue have paper copies of all of these articles, and they are available upon request. Furthermore, 30 new articles have been added to this collection, although they are not described here for the sake of brevity. 23 of them support the efficacy of alternatives alternatives, 6 are neutral (they didn't compare alternatives to traditional dissection or had mixed results), and one showed dissection to be superior to peer teaching.

#### **Studies with sample size greater than 100 students, conducted at undergraduate level:**

—Downie, R. & J. Meadows. 1995. 'Experience with a dissection opt-out scheme in university level biology.' *Journal of Biological Education* 29(3), 187-194.

Cumulative examination results of 308 undergraduate biology students who studied model rats were the same as those of 2,605 students who performed rat dissections.

—Guy, J.F. & A.J. Frisby. 1992. 'Using interactive videodiscs to teach gross anatomy to undergraduates at Ohio State University.' *Academic Medicine* 67: 132-133.

Performance of prenursing and premedical students using interactive videodiscs was not significantly different from that of students in traditional cadaver demonstration labs (473 total students).

—Huang, S.D., and J. Aloï. 1991. 'The impact of using interactive video in teaching general biology.' *The American Biology Teacher* 53(5): 281-84.

150 U.S. biology undergraduates using a computer-assisted interactive videodisc introductory system that included dissection simulations performed significantly better than students who had not used the computer-aided instruction.

—Leonard, W. H. 1992. 'A comparison of student performance following instruction by interactive videodisc versus conventional laboratory.' *Journal of Research in Science Teaching*, Vol. 29, No. 1, pp. 93-102.

In the use of videodisc or traditional laboratories, no significant difference was found for 142 biology undergraduate students' laboratory grades. However, the videodisc group required one-half the time

—More, D., and C.L. Ralph. 1992. 'A test of effectiveness of courseware in a college biology class.' *Journal of Educational Technology Systems* 21: 79-84.

Biology knowledge of about 92 students using computer courseware increased more than did that of approximately 92 students using traditional animal based laboratories.



#### **Studies demonstrating equal or comparable student performance between dissection and alternative methods:**

—Bauer, M.S., N. Glickman, L. Glickman, J.P. Toombs & P. Bill. 1992. 'Evaluation of the effectiveness of a cadaver laboratory during a fourth-year veterinary surgery rotation.' *Journal of Veterinary Medical Education* 19(2): 77-84.

Learning outcomes were similar between two groups of fourth-year veterinary students, one who were taught surgery using a terminal and cadaver laboratory format, the other taught using survival laboratories.

—Cohen, P.S. & M. Block, 1991. 'Replacement of laboratory animals in an introductory psychology laboratory.' *Humane Innovations and Alternatives* 5: 221-225.

Undergraduate students who studied feral pigeons in a city park scored equally well on evaluations as did students who studied operant conditioning with rats in a traditional lab.

—Dewhurst, D.G. & A.S. Meehan. 1993. 'Evaluation of the use of computer simulations of experiments in teaching undergraduate students.' *British J. Pharm. Proc. Suppl.* 108: 238.

Undergraduate students using computer simulations performed equally well as students using traditional approaches in physiology and pharmacology laboratories.

—Dewhurst, D.G., J. Hardcastle, P.T. Hardcastle & E. Stuart. 1994. 'Comparison of a computer simulation program and a traditional laboratory practical class for teaching the principles of intestinal absorption.' *American Journal of Physiology* 267 (*Advances in Physiology Education* 12/1): S95-S104.

Six undergraduate students working independently with a computer program gained equal knowledge, at one-fifth the cost, as did eight supervised students using freshly killed rats.

—Fawver, A.L., C.E. Branch, L. Trentham, B.T. Robertson & S.D., Beckett. 1990. 'A comparison of interactive videodisc instruction with live animal laboratories.' *American Journal of Physiology* 259 (*Advances in Physiology Education* 4): S11-S14.

Use of interactive videodisc simulations yielded equivalent test performance and greater time efficiency in teaching cardiovascular physiology compared with instruction in a live animal laboratory.

—Greenfield, C.L., A.L. Johnson, D.J. Shaeffer & L.L. Hungerford. 1995. 'Comparison of surgical skills of veterinary students trained using models or live animals.' *JAVMA* 206(12): 1840-1845.

Surgical skills of veterinary students were evaluated following training with dogs and cats, or soft tissue organ models; performance of each group was equivalent.

—Jones, N.A., R.P. Olafson, & J. Sutin. 1978. 'Evaluation of a gross anatomy program without dissection.' *Journal of Medical Education* 53: 198-205.

Learning performances of freshmen medical students using films, computer-assisted instruction and prosected human cadavers were the same as those of students taught by traditional lecture and dissection.

—Leathard, H.L. & D.G. Dewhurst. 1995. 'Comparison of the cost effectiveness of a computer-assisted learning program with a tutored demonstration to teach intestinal motility to medical students.' *ALT-J* 3(1): 118-125.

No significant difference was found in the performances of

preclinical medical students who used a traditional live animal laboratory and those who used a computer simulation on intestinal motility.

—Lieb, M.J. 1985. 'Dissection: A valuable motivational tool or a trauma to the high school student?' Unpublished Thesis, Master of Education, National College of Education, Evanston, Illinois.

Post-test scores were equivalent for high school students who dissected earthworms and those who received a classroom lecture on earthworm anatomy.

—Pavletic, M.M., A. Schwartz, J. Berg, & D. Knapp. 1994. 'An assessment of the outcome of the alternative medical and surgical laboratory program at Tufts University.' *JAVMA* 205(1): 97-100.

No difference was found in surgical confidence or ability of veterinary graduates who had participated in an alternatives course of study versus those who had participated in a conventional course of study.

—Prentice, E.D., W.K. Metcalf, T.H. Quinn, J.G. Sharp, R.H. Jensen & E.A. Holyoke. 1977. 'Stereoscopic anatomy: evaluation of a new teaching system in human gross anatomy.' *Journal of Medical Education* 52: 758-763.

Based on physician-assistant student learning performances, the authors concluded that use of labeled sequential slides of anatomical dissections provided a viable alternative to dissection.

—Strauss, R.T. and Kinzie, M.B. 1994. 'Student achievement and attitudes in a pilot study comparing an interactive videodisc simulation to conventional dissection.' *The American Biology Teacher* 56(7): 398-402.

Two groups of high school students performed equally on a test following either animal dissection or interactive videodisc simulation.

—White, K.K., L.G. Wheaton & S.A. Greene. 1992. 'Curriculum change related to live animal use: a four-year surgical curriculum.' *Journal of Veterinary Medical Education* 19: 6-10.

After hesitancy in their first live tissue surgery, veterinary students from an alternative surgical laboratory program performed on par with students with a standard laboratory experience.



### **Studies indicating that alternatives were more effective instructional aids than dissection:**

—Dewhurst, D.G. & L. Jenkinson. 1995. 'The impact of computer-based alternatives on the use of animals in undergraduate teaching.' *ATLA* 23: 521-530.

Use of computer packages saved teaching staff time, were less expensive, were an effective and enjoyable mode of undergraduate biomedical student learning, and significantly reduced animal use.

—Erickson, H.H. & V.L. Clegg. 1993. 'Active learning in cardiovascular physiology.' Pp. 107-108 in Modell, H.I., & Michael, J.A. (editors). 'Promoting Active Learning in the Life Science Classroom.' *Annals of the New York Academy of Sciences* Vol. 701. New York, NY.

Of fourteen learning methods for basic cardiac teaching and ECG interpretation, computer-based active learning was rated the highest in veterinary student evaluations.

—Fowler, H.S. & E.J. Brosius. 1968. 'A research study on the values gained from dissection of animals in secondary school biology.' *Science Education* 52(2): 55-57.

High school students who watched films of animal dissections (earthworm, crayfish, frog, perch) demonstrated greater factual knowledge of these animals than did students who performed dissections on them.

—Henman, M.C., & G.D.H. Leach. 1983. 'An alternative method for pharmacology laboratory class instruction using biovideograph videotape recordings.' *British Journal of Pharmacology* Vol. 80: 591P.

Undergraduate pharmacology students using biovideograph performed significantly better on post-laboratory tests than those participating in the organ-based laboratories.

—Johnson, A.L. & J.A. Farmer. 1989. 'Evaluation of

traditional and alternative models in psychomotor laboratories for veterinary surgery.' *Journal of Veterinary Medical Education* 16(1): 11-14.

Inanimate models effectively taught basic psychomotor skills, and had the advantage over live animals that they could be used repeatedly, enhancing the acquisition of motor proficiency.

—Kinzie, M.B., R. Strauss & J. Foss. 1993. 'The effects of an interactive dissection simulation on the performance and achievement of high school biology students.' *Journal of Research in Science Teaching* 30(8): 989-1000.

Findings suggest that an interactive videodisc was at least as effective as actual dissection in promoting high school student learning of frog anatomy and dissection procedures.

—Lilienfield, L.S., & N.C. Broering. 1994. 'Computers as teachers: learning from animations.' *American Journal of Physiology* 11(1): *Advances in Physiology Education*, pp. S47-S54.

Medical and graduate students who used computer simulation achieved a significantly higher grade in the cardiovascular section of the final exam than their classmates.

—McCollum, T.L. 1987. 'The effect of animal dissections on student acquisition of knowledge of and attitudes toward the animals dissected.' Unpublished Doctoral Dissertation, University of Cincinnati.

Approximately 175 high school biology students taught frog structure, function, and adaptation via lecture performed better on a post-test than did approximately 175 high school biology students taught by doing a frog dissection.

—Phelps, J.L., J.O. Nilsestuen & S. Hosemann 1992. 'Assessment of effectiveness of videodisc replacement of a live animal physiology laboratory.' *Distinguished Papers Monograph, American Association for Respiratory Care*.

Nursing students who studied using an interactive video program on cardiac output principles performed better on a post-test than did students taught by lecture and live animal physiology laboratory.

—Samsel, R.W., G.A. Schmidt, J.B. Hall, L.D.H. Wood, S.G. Shroff & P.T. Schumacker. 1994. 'Cardiovascular physiology teaching: computer simulations vs. animal demonstrations. *Advances in Physiology Education* 11: S36-S46.

Medical students used both computer demonstrations and animal (dog) demonstrations, and rated the former higher for learning cardiovascular physiology.



**One study that showed dissection to be a more effective instructional aid than an alternative method:**

—Matthews, D. 1998. 'Comparison of MacPig to Fetal Pig Dissection in College Biology.' *The American Biology Teacher*, 60(3): 228-229.

Eight biology undergraduate students who dissected fetal pigs scored significantly higher on an oral test with prosected fetal pigs than did twelve students who studied on a computerized pig (MacPig).

### *Appendix D • What The Policy Should Include*

Recently, the School of Molecular and Cellular Biology created a separate track for their majors who wish to avoid animal use in labs. Although their efforts to offer classes that do not require the use of vertebrate animals is certainly commendable, there are several problems with this approach.

First of all, it does not allow students with objections to learn the same material as other students. Furthermore, it would be difficult to ensure that all incoming freshmen are made aware of exactly what the differences between the tracks are, and some of them may end up in the wrong one. Finally, many students experience a shift in their religious or ethical beliefs during college. If a student on the track that used animal use became uncomfortable with these labs, they should not have to start over on a new track.

Consistency across departments is essential to allow equal access to all students at the University. Without a University-wide policy, students will continue to have the same disparate experiences that they have in the past and present. There is no reason for a student to be accommodated in one class, but denied alternatives to similar labs that happen to be in a different department. The main points such a policy should cover are outlined below:

1. High quality alternatives (e.g. anatomical models, interactive computer software, and videotapes) that are educationally comparable, meet the instructor's educational objectives, and are commercially available should be made available in all undergraduate classes that use dissection or vivisection of a nonhuman animal.
2. Students should not be penalized in any way for choosing an alternative, nor should it be noted on their transcript.
3. Students should be made aware by their professors or teaching assistants on the first day of class, one week before the laboratory in which the animal is used, and in the syllabus that they have the option of an alternative and that they will not be penalized for choosing

the alternative.

4. The instructor should provide an alternative to students upon request without requiring students to seek out alternatives on their own. Students should be responsible for requesting the alternative from their instructor no later than one week prior to the scheduled laboratory.
5. Opting for a non-animal alternative should not require students to be present at class sessions in which animals are dissected or vivisected. Furthermore, testing and evaluation of students following the laboratory should not include mandatory use of animals.
6. Students should not have to "prove" their belief system in order to use alternatives. Any student who feels that participating in dissection and vivisection would constitute a hostile learning environment should be provided with them.
7. The amount of time and effort required to complete the alternative assignment should be comparable to that required for the dissection or vivisection. Furthermore, the alternative should teach the same principles.
8. A grievance process should be set up for students who feel that their professor is in noncompliance with the policy.
9. Exemptions to this policy may be appropriate in cases where the broadest goals of a course lie necessarily outside the interests of conscientious objectors; for instance, a laboratory course teaching methods of meat production would not have to provide alternatives. All claims to such exemption should be subject to careful, external review, and an exhaustive list of exempted courses should be maintained by the University. The University timetables and course catalogs should clearly indicate these courses.



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