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Exploring Ethical Issues in Animal Experimentation

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by

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List of Illustrations

1. Introduction

1.1 Genesis of This Project & The Issue

We want our work as scientists and engineers to bring about positive social change. As such we need to be able to look at our work, our projects, our research, and our own community, and determine if what we are doing is something that will improve the world. We wanted to use the IQP to make WPI a better place. Hopefully this project is only one part a larger effort to create a culture within the scientific community that encourages critical thought about the ethics of our actions as scientists and engineers. For us, this is the major reason why we decided to create and pursue this project.

After reading prominent anti-vivisectionists, we have come to the conclusion that animal testing is morally and ethically wrong. We see that the ongoing exploitation as a problem both on campus and throughout the scientific community. Although all the reasons given in support of animal testing cite necessity and greater good, there still exists a culture where animals are used simply for ease or a lack of insight into available alternatives. The very notion that animal testing is justified because there are no available alternatives only serves to eliminate the need to create alternatives. We feel that animal testing should be completely abolished and that in doing so, necessity will motivate the creation of alternatives to animal testing.

Animal exploitation is pervasive throughout the bioscience industry and the scientific community. There are many companies that deal in the breeding and supplying of animals to companies and researchers. In the US, 1.14 million animals (excluding birds, mice, rats, and cold-blooded animals) are killed in animal experiments each year (USDA, 2002, p. 8). Although it is not required under the animal welfare act to keep records of mice (USDA, 2006), it is estimated that 100 million mice are killed each year (Mukerjee, 2004, p. 96). The

problem of animal testing is not exclusive to the industry and scientific community; it also stems from the consumption of animals for food. The number of animals killed for food in the U.S. each year is approximately equal to one and two-thirds of the human population of Earth (Vegan Outreach, n.d.). This creates a notion that if it is ok to eat animals then it is ok to test on them.

At WPI, animal use in the biosciences is very widespread and sometimes required of students to pass a class. There are currently a number of laboratory classes that involve animals as well as a number of MQP projects that engage in research at the expense of animals' lives and suffering. For students in WPI's Biomedical program, an Accreditation Board for Engineering and Technology (ABET) accredited program, an animal surgery course is a requirement for graduation. The ABET certification program calls for experimentations with living systems. We recommend that plants be used instead of animals, as plants are living systems and just as relevant in the biosciences as animals.

There are also economic factors to consider as WPI is involved in many technological transfer agreements (agreements that commodify the research knowledge of students) with private companies, some of which engage in animal testing. There is a fear that taking a stand on animal rights may hurt WPI economically. We propose that being a pioneer in choosing morals over profits would serve to increase WPI's global prestige and be in keeping with WPI's goals of training "Technological Humanists" (WPI, 2004).

> If the technologist and the humanist cannot be brought together, our society may well be inundated by its own technology or may reject technology altogether. There is, then, a need for an individual thoroughly familiar with the analytical approach to problem solving of the technologist who is also sensitive to and understanding of human nature (Ibid).

To compound matters, WPI is currently in the process of constructing Gateway Park, a large bioscience complex, which will significantly increase the size and scope of

bioscience research at WPI. While a greater capacity for bioscience research is a good thing for both WPI and the surrounding area, if current culture and practices remain unchanged this research will be largely animal oriented.

1.2 Why Animals Matter

Animals are thoughtful and sensitive beings, each with distinct personalities and minds. Believing that animals are sentient beings is generally an uncontroversial position, ask anyone who has adopted a dog, cat, or rabbit into their family. However, this perspective is often lost when we begin talking about animals used in experiments. Every animal who is confined in a laboratory or slated to be killed in an experiment is an individual with his or her own unique personality, thoughts, mood, and set of complex emotions. Oftentimes people critical of the animal rights position cite the fact that an animal has been bestowed a purpose by humans as a moral justification of their confinement and usage. Suddenly a moral disconnect is much easier. An arbitrary line is drawn between animals who have been given a purpose by humans, such as "lab rats, livestock, circus elephants," and those animals who have not. The "holistic" view of animals is entirely lost and we begin talking about animals used in experiments, agriculture and entertainment. These animals are transformed from living being into tools, food, and toys.

Ethnographer Michael Lynch spent three years observing and interviewing the daily lives of researchers from a variety of biomedical fields. His research culminated in a paper where he outlined the process in which animals are "progressively transformed from holistic 'naturalistic' creatures into 'analytic' objects of technical investigation" (Lynch, 1987, p. 266). He noticed that although the researchers he studied often made informal reference to the holistic nature of the rats they where using, this perspective was never represented in any of their academic work. He found that this 'holistic' view of animals was a part of "the everyday life of the laboratory, consisting of various sorts of tacit 'know-how', recipe knowledge, and experimental craft" (Lynch, 1987, p. 267) but once scientists began discussing the animals as 'analytic' models, this knowledge was omitted. Lynch discusses the knowledge about the

'naturalistic' animal as a form subjugated knowledge, meaning that the knowledge that animals are living, subjective beings was essentially repressed by the more dominant idea that animals are not subjects, but objects.

Every major moral philosophy has a faction of believers who argue for animal rights from within the constraints of that philosophy. There is also a long history of support for animal rights from a religious perspective. Seventh Day Adventists, Quakers, and Catholic Workers are Christian sects that advocate vegetarianism. The Muslim scholar Al-Hafiz BA Masri uses the Qua'ran to make arguments for animal protection:

> According to the spirit and the overall teachings of Islam, causing avoidable pain and suffering to the defenseless and innocent creatures of God is not justifiable under any circumstances. No advantages and no urgency of human needs would justify the kind of calculated violence which is being done these days to animals[.] (n.d.)

One of the most important precepts in Buddhist thought is *ahimsa*, a term translated as "harm no living thing." Many Mahayanna, Quan Yin, and Tibetan Buddhists are vegetarian for ethical reasons. In fact the Dali Lama has just recently called on his citizens and the religious devout to follow his footsteps and go vegetarian. He has said "the mass slaughter of chickens violated Tibet's traditional values" (BBC, 2004). Hinduism too has long history of support for animals' rights. Perhaps it is for this reason that India has some rather progressive legislation when it comes to the treatment of animals. For example, in India it is illegal to keep birds in cages because birds are social animals who have natural desires for open spaces. However, in this paper we will deal primarily with the secular arguments. We will address philosophies such as Utilitarianism, Feminism, Anthropocentricism, Pragmatism, and Kantian duty-based ethics. We will compare and contrast the writings of Peter Singer, Tom Reagan, Steven Wise, Carol Adams, and Steven Best. We will also, of course, address the reservations and counter-points from animal rights detractors such as Richard Posner. In each of these philosophies that argue for animal rights

there is at least a single commonality. Each simply puts forward the idea that humans should begin to consider animals in their moral calculations, regardless of how those calculations are done. The animal-rights utilitarians are calling for the suffering and happiness of animals to be considered as a valued variable in the moral equation, Kantians are calling for principles to be followed when it comes to the treatment and use of animals and rights to be established. This requires a fundamental shift in humans' collective perception of animals. For too long humans have allowed themselves to use sloppy moral arguments when it comes to the use of animals. Animal rights scholars are simply calling on us to hold ourselves to the same standard of moral discourse when it comes to animals' rights as when it comes to the rights of those being in our own species.

Richard Posner, one of the animal rights skeptics, argues for a sort of moral "instinctivism," the idea that we ought to heed our "deepest" moral instincts instead of using the more conventional approach: normative ethical philosophy. For Posner, the most accurate moral indicator is a person's gut instinct (Posner, 2004). Other animal rights naysayers argue that animal testing, among other things, is justified by citing the differences between non-human animals and humans. We even had a number of these sort of responses in our survey. For example:

> ...our want for saving individual [human] lives outweighs the lives of animals of lower intelligence.[1]

The argument typically goes that animals do not deserve moral consideration because humans and non-human animals are too different. In this paper we will show that although there are many significant ways in which certain animals differ from humans, none of these differences can be cited as morally significant. Human males and human females have many

[1] See Appendix E, Question 11, Response #721

differences, yet none of these differences imply that either women or men deserve any fewer rights. Likewise we will make the case that since animals can suffer, since animals are aware of their environment, and since animals are sufficiently similar to humans, animals deserve moral consideration.

1.3 Goals and Questions

Goals

The four members of our project team mostly share a common position regarding animal testing. When defining our goals for this project we take an abolitionist standpoint. Our ultimate goal is clearly the complete abolition of animal testing, but for this project we took a practical, dismantlement approach. We created goals for our project that were attainable and appropriate for WPI. Our abolitionist standpoint implies that we believe that there is no justification for humans to harm or exploit animals. From this standpoint we devised a set of goals that we could accomplish on campus, within the timeframe of our project.

The goals we created have two aspects: a legislative aspect and a philosophical aspect. The legislative goals involve the establishment of a student-choice policy, and the philosophical goals involve the culture and the ethics at WPI. These goals included:

- To bring awareness to the WPI community regarding the little-known facts surrounding animal experimentation on campus. Relatively few students outside the biosciences departments are even aware that live animal testing and dissection even occurs on campus. We set out to encourage discussion within the WPI community, as well as within the biosciences community, about the ethics of animal research.
- To enact a policy that ensures WPI students of their right to choice to not participate in any laboratory or classroom experiment, demonstration, etc. involving animals without being penalized. Specifics on the policy are discussed in a later section.
- To spread awareness among the undergraduate and graduate students, faculty, and administration involved in the biosciences about the numerous viable alternatives to animal testing.

- To work together with student, faculty, and administrative campus organizations to gain support for an animal testing and dissection choice policy.
- To explore the culture and rituals of animal experimentation on campus. This includes both experimentation conducted in the laboratory and classroom for both research and education. To do this we analyze and evaluate research, interviews, and surveys.
- To publish our findings as a report and encourage members of the WPI community, particularly students and faculty in the biosciences, to take a critical look at their work as scientists and engineers. To encourage the scientists and engineers in our community to reflect upon their own personal thoughts on the issue of animal testing and experimentation.

The overall spirit of the goals listed above is to reduce, with the ultimate goal of eliminating, any use of animals in science, as well as empower students to stand up and establish their rights as members of our academic community, and most importantly to increase discussion on the ethical issues at hand.

We are only working on one project, but we hope to be a small yet influential part of a wider effort to add more humanity to the scientific and engineering disciplines. Our specific future plans and goals are discussed later in the section "Our Vision for WPI".

Questions

Early on we agreed upon some key questions that we would answer with this project. We laid out these questions to help us better understand the arguments surrounding the use of animals in science. The range of questions is quite broad, from looking at how our culture normalizes the exploitation of animals to exploring how individuals in the sciences deal with personal ethical dilemmas. Through these questions we have attempted to gain a clearer understanding of how animals are used. As the project progressed we began to come to

some conclusions about animal testing and began to feel that it was necessary to recommend that WPI take certain actions to begin the process of eliminating it.

Foremost, we needed to understand the animal rights position as well as the position of its detractors, since we will be drawing on both throughout the project. We sought to understand all of the popular arguments for and against animal rights. We looked toward the philosophies of Tom Regan, Stephen Wise, Carol Adams and Peter Singer for direction. We found that the thoughtful writings of these authors fit very well with our project. Regan spends ample time refuting the arguments against animal rights, Singer creates a compelling argument for animal rights based on utilitarianism, Adams compares how animals are treated with the treatment of women, while Wise takes a practical approach to Singer's philosophical arguments and outlines why legal rights are necessary. In this project we melded each of these approaches together in order to build a framework for discussing and analyzing animal experimentation on our own campus.

Additionally were sought the arguments made against animal rights, specifically critiques of the writings of Singer, Adams, Reagan, and Wise. While the writings from these animal rights authors oftentimes addressed arguments that run contrary to their point, we felt it was our duty to further investigate both sides to this argument. We investigated articles written by U.S. judges, read pamphlets from animal research supporters and lobbyists, and filed through arguments published by graduate students.

We also investigated the kinds of rights that are currently afforded to animals in laboratories located in the United States. The most important legislation that exists is undoubtedly the Animal Welfare Act. Passed in 1966, ostensibly it requires certain bodies to treat animals with a minimum degree of humaneness (USDA, 2006). In reality it is a far cry from affording animals any concrete rights or protections. However, it does show that

politicians are progressive enough (or have been pressured enough by grassroots activists) to pass legislation that acknowledges the ability of non-human animals to sustain varying degrees of pain. The Animal Welfare Act has many shortcomings, including a definition of animals that notably does not include most animals used in experiments, agriculture, and entertainment. Later we will discuss the Animal Welfare Act and its shortcomings in detail in "Defining Animals."

2. Background

2.1 "The Problem" as We See It

Currently WPI does not conduct as many animal tests as some larger technical universities, but unfortunately that is quickly changing. WPI is in the process of opening Gateway Park, a new biotechnology facility that would greatly increase the number of animals killed on our campus. There are even whispers of a new primate laboratory being built. This is just one aspect of a changing culture at WPI, a shift in paradigm towards a privatized university that will bring with it more animal testing. At this moment the culture of WPI can proceed in two different directions. WPI can continue on the route of most biotechnological institutions and bring in more animal testing or WPI can become a leader in humane, animal-friendly practices. WPI needs to set itself apart from the other schools. If we welcome biotechnology with open arms, we will be just like any other second-tier technical university. We have an opportunity to look forward, past the short-term biotechnology trend and become leaders in ethical science.

If WPI does not forge a new path and the culture at WPI continues in the same direction, we will soon become a school with a significant amount of animal testing. The core of the problem is the culture that creates animal testing. Animal testing has persisted because there is a culture that glorifies it. There is not enough legislation surrounding the treatment and care for animals because there is not enough critical discussion about the use of animals in science. It is a circular problem. The laws never change because the culture never changes, and the culture persists because the laws never change.

Though there exists legislation regulating the treatment and care of animals, the legislation is lenient and is worded in a way as to exclude any use of an animal for industry, for profit. As well as the lack of adequate legislation, there is a lack of discussion critical of

the animal testing culture. Discussion on this topic is typically limited to animal rights activists and those within the field of biotechnology. The argument is polarized, with little involvement of ordinary people. Even when those in the biotechnology field discuss animal testing, harsh words are transformed into more gentle euphemisms, and any harsh criticisms are suppressed because it can cost on their career if they deviate too far from the company's official position.

WPI is a microcosm of a bigger problem. Currently, the only legislation protecting animals is enforced by the Institutional Animal Care and Use Committee (IACUC) which is often regarded as insufficient by animal protection organizations. There are a number of prestigious universities that have enacted policies which ensure every student of his or her right to object to animal testing and in cases where he or she is assigned a project that might involve animals, complete an equivalent alternative. At the time of this writing, WPI lacks such a policy. Within the WPI community there is very little discussion about animal testing. As with the broader culture, within the WPI community typically only students who are passionate about animal rights and biology/biotechnology/biomedical students discuss animal testing. We have met students in the biosciences who are hesitant to speak critically about animal testing at WPI for fear of risking their academic careers. No student should feel intimidated to voice his or her beliefs. Students whose majors are outside of the biosciences tend to be uninformed about what is happening on campus regarding the use of animals in science.

We believe WPI should move more toward ethical science and steer clear of animal testing entirely. At WPI this would mean encouraging more critical discussion on the topic, enacting policies that phase out animal testing, and empowering students and faculty to speak up about animal testing. On a national level this can be accomplished by altering

current legislation or creating new legislation that further defines and protects the rights of animals used in any industry. More discussion among scientists as well as the general public on the topic of animals used in science will also help in moving toward a culture of humane and animal-friendly practices. It is important for the general public to be involved in this critical discussion because it is grassroots movements that are the driving force for social and cultural change. Unfortunately there is much misinformation and lack-of-information on the topics of animal rights and animal use in science. Properly and honestly educating the public about animal testing will ensure that each individual has enough background knowledge to form a well-informed opinion on the matter.

On a campus-wide level, WPI would greatly benefit from continued discussion about the use of animals in experimentation. Facts about how many animals are used and exactly in what way they are used would add more coherence to the debate. Though discussion on the topic of animal use has typically been confined to students in the biosciences and concerned students, this project and this report will prompt more discussion among people in different fields at WPI. The project itself prompts discussion, and this report contains information to help educate the public about this issue. Hopefully these actions will begin a course towards ethical treatment of animals at WPI.

The problem, as we see it, is that WPI and the larger technological community is at risk of continuing on a course of unethical treatment of animals. Actions such as establishing policies and legislation that protect the rights of animals, and promoting discussion by raising awareness will, we believe, help change the direction of science. Through these actions, culture will develop to recognize the rights of animals.

2.2 Defining Animals

To most the question, "What is an animal?" is a matter of common sense. Yet in our investigation, it has come up again and again. When we began our research to address this question we made some very interesting observations. Merriam-Webster defines "animal" as:

> **1 :** any of a kingdom (Animalia) of living things including many-celled organisms and often many of the single-celled ones (as protozoans) that typically differ from plants in having cells without cellulose walls, in lacking chlorophyll and the capacity for photosynthesis, in requiring more complex food materials (as proteins), in being organized to a greater degree of complexity, and in having the capacity for spontaneous movement and rapid motor responses to stimulation
> **2 a :** one of the lower animals as distinguished from human beings **b :** MAMMAL; broadly : VERTEBRATE
> **3 :** a human being considered chiefly as physical or nonrational; also : this nature
> **4 :** a person with a particular interest or aptitude <a political animal>
> **5 :** MATTER, THING <the theater...is an entirely different animal -- Arthur Miller>; also : CREATURE 1c

The confusion can arise because the term "animal" has a multitude of common uses. Sometimes the word is used to distinguish humans from nonhuman animals like in the second definition. Notice that this definition is a circular one: An *animal* is "one of the lower *animals"* (Merriam-Webster, 2005). According to this definition, some animals are animals and some animals are not. One would think this kind of reasoning to be somewhat odd, but this same kind of circular wording exists in the Animal Welfare Act, in its definition of animal.

> Animal means any live or dead dog, cat, nonhuman primate, guinea pig, hamster, rabbit, or any other warmblooded animal, which is being used, or is intended for use for research, teaching, testing, experimentation, or exhibition purposes, or as a pet. This term excludes: Birds, rats of the genus Rattus and mice of the genus Mus bred for use in research, and horses not used for research purposes and other farm animals, such as, but not limited to livestock or poultry, used or intended for use as food or fiber, or livestock or poultry used or intended for use for improving animal nutrition, breeding, management, or production efficiency, or for improving the quality of food or fiber. With respect to a dog, the term means all dogs, including those used for hunting, security, or breeding purposes (USDA, 2006).

The Animal Welfare act under some circumstances excludes birds, rats, mice, horses, and all "farm *animals."* Certainly, should one ask even a child to name some animals, among

the list there would be a number of farm animals. One would never make the argument that cows (a typical "farm animal") are not animals but they are not considered as animals under the Animal Welfare Act. Notice also that how an animal is used is part of the determination of whether or not they are considered an "animal." "Birds, rats of the genus Rattus and mice of the genus Mus bred for use in research" and "livestock or poultry, used or intended for use as food or fiber" are "excluded" in the definition (Ibid). We will talk more about this later in "The Debate".

The first definition clearly provides the taxonomic basis by which the classification, animal, is given. This definition encompasses what we normally think of as being animals, human animals, and even single-celled protozoans. This definition, while the best, is difficult to apply because the notion of giving rights to single-celled organisms is difficult to accept, and not what we are advocating. Were a law to be passed prohibiting the killing of animals under this definition, every person on this earth would be guilty of a large scale slaughter of microscopic animals that exist within the human body, in the food we eat, on the ground we walk on, and nearly everywhere imaginable. This however, does not serve to discredit the case for animal rights, nor should it suggest that these or any other animals deserve to die. The difficulty we face when arguing for animal rights comes about because included within the term animal is a vast group that encompasses humans and other primates for which there is a very strong case for rights, and also single celled organisms for which it would be nearly impossible to grant rights should they be found to even deserve them. **So for the purposes of this project and as a practical point when advocating the rights of animals, when we say "Animal" we mean all animals, humans included, that have nervous systems and can likely experience pain and suffering.** We make this distinction because, as we shall show later, we have come to the conclusion that the ability to suffer is a

sufficient quality to warrant the right to be free from intentional harm. We place an emphasis on organisms that have nervous systems and can likely experience pain because the argument for their rights is so strong that only a "radical speciesist" would take the position that these animals do not deserve rights (Wise, 2002). We agree with Wise's approach, we humans ought to "start giving rights to the most deserving of organisms and we can argue over the lower limit when we get closer to it." To elaborate on Wise's statement: in the long run, humans can debate the sentience of organisms who do not have obvious nervous systems, but who do react to stimuli which points to the assumption that they feel pain. However, humans should immediately grant rights to animals who have known nervous systems and can therefore experience pain.

2.3 Experimentation on Animals Historically

For a broader picture of the animal experimentation at WPI and to better understand the current issues in animal testing, we need to look at how animal testing began and how it developed into what it is today. As with most historical trends, the history of animal testing has followed a cyclical trend. Before there was any recorded history on animal testing physicians would gain knowledge of humans and human conditions through observation. Hippocrates, a 4th Century B.C. Greek physician, "fathered the concept of clinical research" and taught his students the importance of a physician's observations (Greek, 2000, p. 22).

By the 2nd Century in Rome, the church had its own protocol for the sciences. Galen, a physician during this time, "would have continued investigation of the human model" because he was the physician for the Roman gladiators, but the church did not allow human autopsies. The next available alternative to the actual human form for Galen to use was nonhuman animals. For this Galen became known as the "father of vivisection" (Greek, 2000, p. 23). However, because Galen used animals to make inferences to be applied to humans, the theories he developed for humans lacked accuracy.

The Church's continued prohibition of human autopsies and tacit support for the use of animals contributed to Galen's erroneous medical methods, practices, and theories being referred to and practiced through the 1500s. Many unnecessary deaths were a direct result of Galen's errors. For example, bloodletting was one of Galen's methods that continued through the 1500s. Needless to say, bloodletting did not, in fact, help patients but often led to their deaths. Because of the Church's strict rules on human autopsies and because of Galen's popularity as a physician for the Gladiators, animal testing continued to be practiced by physicians and scientists.

Nearing the 13th Century some scientists began to veer away from animal models because they realized all the faults in animal-derived conclusions. These scientists realized that the data gained from animal experimentation could not be accurately applied to humans due to the differences between humans and other animals. However, the Church remained rigid, defending strict rules barring the use of human corpses. In the 13th Century Mondino de Luzzi, a Bolognese professor of medicine, published what was one of the most complete texts on the topic of human anatomy. His work was based on actual human dissection and he therefore received powerful resistance, regardless of the legitimacy and quality of his work (Greek, 2000). Around the same time Paracelsus, a Swiss physician, publicly burned a copy of Galen's work in protest of the both Church and Galen's faulty methodology. As a result Paracelsus was fired from the University of Basel (Ibid). Artist Leonardo da Vinci also kept extensive records of accurate anatomical drawings, notes, and observations based on human bodies. For better or for worse, da Vinci's work on anatomy was not recognized because at the time he was more popular as a painter than as a scientist (Greek, 2000, p. 25).

Though the three previously mentioned scientists had acted contrary to the Church's regulations, the physician who helped most to steer medical practice away from the then popular animal testing methods was Andreas Vesalius. In 1543 Vesalius dissected human corpses and published his work in *Structure of the Human Body* which finally disproved much of Galen's findings (Greek, 2000). Vesalius also disproved a long-time Church-established belief that men had one less rib than women – in accordance with the story of Adam and the creation of Eve – and was able to show that both men and women each had twelve ribs. Though the findings in Vesalius' work were considered heresy by the church, along with other scientific concepts it helped pave the way from the late Middle Ages toward the Scientific Revolution and the Renaissance.

After Vesalius' findings, human dissection was the preferred tool for medical students and it became the norm during the Renaissance (Greek, 2000, p. 26). As common sense would have it, the results from human autopsies yielded better data than animal dissection. The universities in Europe even modified and changed the curriculum for medical students to include human dissection. Throughout this period, animal dissection was seen as full of faults and the preferred method for physicians and students was human autopsy.

Even though medical science benefited greatly from this revolution in scientific methodology the Church unfortunately continued to censor human experimentation and the results of these experiments. For scientists to be able to publish and release their findings, they had to lie and falsify their data, claiming that their work was due to animal based research (Greek, 2000, p. 27). Though the Church forbade it, human dissection continued through the Scientific Revolution and Renaissance, even though it was often censored.

Toward the end of the Renaissance, science took an unfortunate turn. René Descartes was a philosopher, mathematician, scientist during the early 1600s. He is regarded as one of the most influential philosophers of our times and was definitely influential during his time as well. Descartes ideas still pervade modern culture. It can be said that "philosophy points the way for development in all other fields"(LaFleur, 1956, p. vii) and if that is the case then Descartes' philosophy has definitely had influence on the development in fields such as mathematics and science and we can assume that included in the field of science is the field of medical science. Descartes is well-known for the saying *cogito ergo sum* – "I think, therefore I am." He believed that because humans could think and reason that they could therefore rationalize their existence. "As far as reason is concerned," Descartes stated, "it is the only thing which makes us men and distinguishes us from the animals" (Descartes, 1637,

p. 2) for Descartes believed that the bodies of all living creatures, of both humans and other animals, were machines (Descartes, 1637, p. 4) and that it was human beings' ability to reason that separated us from animals.

Regarding his scientific methodology, Descartes assumed that he could compile a list of causes for any phenomena and determined which of the causes were true through experimentation (LaFleur, 1956, p. xv). Because Descartes already had the preconception that animals lacked the ability to reason, the causes and experiments he would develop for animals would be slanted toward his belief that animals cannot reason nor feel. Descartes believed that the spirits of human beings, which give humans the ability to think, reason, feel, etc., lay in the pineal gland nested in the brain. This function of the pineal gland is what Descartes believed humans to have and animals to lack. Through experiments involving vivisection, Descartes verified that animals lacked a pineal gland that functions as a human's does; therefore, he believed that animals cannot reason or feel. (On the contrary, the pineal gland has been determined to exist in animals and its function has also been determined to be part of the endocrine system as is the case with humans. The residence of one's spirit, whether it be a human or nonhuman animal spirit, cannot be anatomically determined in a realistic manner.) Though Descartes is mostly remembered as a mathematician and philosopher, anatomy was one of his other passions (that he is less noted for). He held the belief that animals had neither reasoning nor feelings and because of this he justified continuing vivisection to satiate his curiosity of anatomy.

During the 17th and 18th century most scientific advancement occurred in the fields of exploration and astronomy. However, Descartes' paradigm that animals can neither reason nor feel continued through this time and into the 1800s.

Claude Bernard, a French physiologist, was "a mediocre student" (Greek, 2000, p. 28). In the mid-1800s he studied medicine only after he did not succeed as a playwright. He is widely credited with reintroducing animal experimentation – which had regressed medical science back to Galen's time – by convincing his colleagues that if any disease could not be reproduced on an animal in the laboratory, then the disease "simply did not exist" (Ibid). Bernard believed that all living creatures could be treated as inanimate matter and therefore he could justify using animals in the laboratory. This justification was a tool for his human elitism.

Suddenly after Bernard convinced his colleagues to agree with him, animal experimentation became the norm once again in medical science (Ibid). It was also more convenient for the scientists – animal bodies were more abundant than human cadavers. By re-popularizing animal testing in the laboratory, Bernard played a role in changing the scientific method to be heavily laboratory based – a closed and flawed system. In science, a closed system is in a controlled space with set and measurable constraints and settings, and the closed system is subject to influences that are also controlled. A closed system, in comparison to an open system, is flawed because it lacks the realistic characteristics of an open system. An open system is like any natural system – it is open to external influences that a scientist may not take into consideration when designing a closed system. In medical science the applicable systems are open systems that cannot be represented with great accuracy in a closed, laboratory system.

Bernard also created a paradigm associated with the animal testing trend. He wrote that

> …the physiologist is not an ordinary man…he does not hear the cries of animals, he does not see their flowing blood, he sees nothing but his idea. (Greek, 2000, p. 29)

This paradigm that a scientist is not an ordinary human is something we have observed in our findings at WPI, which will be discussed and elaborated on a later section.

Despite the popularity of animal testing in the 1800s, there were still those who were openly opposed to the use of animals in science. In 1875 Bernard's own student, Dr. George Hoggan, helped found England's first anti vivisection society to show that physicians were well aware of the faults in animal experimentation. Dr. Hoggan called it "The Victorian Street Society." On working in Bernard's laboratory, Hoggan commented:

> We sacrificed daily…dogs…rabbits and other animals, and after four years experience I am of the opinion that not one of these experiments on animals was justified or necessary (Ibid).

Even though there were physicians and students that opposed animal experimentation, during this time these people would not openly discuss or confront their peers. Opposition to animal testing was so taboo that open opposition could cost someone expulsion from their school or job, and a bad reputation associated with their name throughout their practicing career. In contrast to the Renaissance, this hegemonic culture persisted during the Victorian era in part because of the more conservative academic/artistic environment.

Despite the enormous amount of pressure to fall in line, scientists during the Victorian age continued to provide data concluding that animal testing was unnecessary and even faulty. In 1859 Charles Darwin published his work *On the Origin of Species*. Darwin's work further challenged the Church's world view by putting forward the concept of natural selection. According to Darwin, humans are not the ideal product of God's work. This directly challenges the Church's view that humans were created in God's own image. Darwin believed that humans and other species of animals are equally ideal because each species has evolved and mutated in order to adapt properly into their own environments, what Darwin calls "natural selection" (Darwin, 1859).

Unfortunately, Darwin's work was misinterpreted by his peers in order to fit the standards of the time. A phrase coined by Herbert Spencer that is commonly used in conjunction with "natural selection" was "survival of the fittest" (Spencer, 1864). Spencer used his phrase "survival of the fittest" to describe Darwin's "natural selection" though it did not correctly portray what Darwin meant. Through Spencer's interpretation, the fittest would survive by natural selection because nature *selected* those who were fit for survival. Even more frighteningly, racists and eugenicists misused the concept by applying it to the social realm, creating so-called "social Darwinism." They took advantage of Darwin's natural selection to justify their hostility towards those that they saw as racially inferior. The racists and eugenicists tried, and some continue to try, to use Darwinism as a way to rationalize their racist ideas. Similarly some have used Darwin's finding to justify the unequal treatment of animals. This is called speciesism. Speciesism is much in the same vein as racism. Some racists see other humans who are from a different ethnicity or who have a different skin color they believe to be inferior to them as *biologically* inferior, on par with animals. Those who have misinterpreted Darwin's work did so in order so their conclusions were in congruence with people's anthropocentrism, the belief that humans are were bestowed with dominion over nature, including all of earth's nonhuman inhabitants. (This topic is further discussed in a later section, "Patriarchy and Speciesism").

The 1800s saw much medical advancement. Three great contributions to medicine by Louis Pasteur were sterilization, pasteurization, and his development of the germ theory. All of Pasteur's contributions did not rely on animals; however, Pasteur attributed his findings to animal experimentation probably because of its popularity at the time.

Another contribution to medical science was Koch's postulates. Robert Koch wrote six postulates which are six assumptions Koch developed to reinforce Pasteur's germ theory. The last two of Koch's postulates, relating to the use of animals, are:

- The organism should induce the same disease when inoculated into an animal
- The animal should be able to pass on the organism to other animals via a culture medium

Despite Pasteur's germ theory and Koch's postulates, the vaccines that they made and developed in non-human animals failed and resulted in the death of humans. Similarly in the pharmaceutical industry today, the legal drugs developed by pharmaceutical companies that test well on animals often respond unpredictably in humans. The annual sum of deaths resulting from legal medication is around 113,000 deaths (Starfield, 2000) whereas illicit use of drugs (which includes both legal and illegal drugs) results in about 19,000 deaths each year (CDC, 2001). Nearly half of all pharmaceuticals developed in US are later pulled from the market, even though they were extensively tested on animals.

Koch realized his faults, and the faults on all scientific methodology relying on animal experimentation, and before dying he stated:

> An experiment on an animal gives no certain indication of the result of the same experiment on a human being (Koch, 1907, p. 31).

His statement was in regards to the last two of his six postulates, implying that they should be disregarded. However, scientists ignored Koch's statement and failed to realize its merit. All six of Koch's postulates are taught to and used by medical students and professionals today.

During the 1800s most major discoveries were first observed in human clinical research, autopsy, or other human-based methods. However, the discovery would be repeated on animals in a laboratory setting, and if it could be "verified" on animals then

credit to the discovery was given to animals, not the initial human subject. Examples of medical discoveries which were attributed to scientists who "verified" the observation in animal research, instead of the scientists who initially observed it in humans, are 1) effects of adrenaline in human being (regarding heart disease), 2) ovarian functions in human females, and 3) gastric physiology in human beings (Greek, 2000, p. 36). These are only a few of the many examples in which credit was given to animal experimentation, even though the discovery was first made and verified in human beings.

When there were cases where a human observation could not be repeated successfully on an animal, the findings were often simply ignored. For example, Addison's disease (a hormonal disorder) was first observed in several human patients. However, because verification of the disease failed in animal laboratories the disease was ignored for thirty more years until another physician observed the disease again and confirmed its existence in human beings (Ibid).

As technological precision increased during the 1900s biologists made more use of the microscope. During this time experimental observations could be made on a cellular level. Although the anatomy of humans and non-human animals is grossly similar, through the microscope physicians discovered that the way human cells react to diseases, medications, etc. differed greatly from how other animals' cells react. For example, the heart cells of humans, pigs, and chimpanzees all react differently to medications and diseases. There is even variation within the human species between people of different races, gender, and age. Some examples are: humans with fairer skin have different skin reactions than those with darker skin, women and men can react differently to certain medications due to hormonal differences, and the young and elderly react differently to treatments than adults due to their vulnerability. Though such major variations exist within the human species and

between human and non-human animal species, and though scientists have publicly declared how unnecessary and inconclusive animal tests are due to these kinds of variations, people still believe animal experimentation yields good results.

To side-step the claim that humans react differently to medications and diseases than animals, some people may bring up the genetic similarities between primates and humans to justify that experimentation on primates yields valid data. Though it is true that primates are very similar to humans in genetic make-up, small differences in DNA can result in large cellular, physiological, and anatomical differences. A team of clinical researchers stated:

> There is no doubt that the best test species for man is man. This is based on the fact that it is not possible to extrapolate animal data directly to man, due to interspecies variation in anatomy, physiology, and biochemistry (MacLennan & Amos, 1990).

Again, despite the insistence of many scientists that animal research yields invalid data people have continued to believe that animal experimentation is an acceptable practice.

The mid-1900s saw an increase in institutional animal experimentation. In 1930 the National Institutes of Health (NIH) was created to conduct medical research that continues through the time of this writing (NIHa, n.d.). The purpose of the NIH is to explore methods to prevent diseases, as well as to find out the causes, treatments, and cures for diseases (NIH, 2007). Since its creation, "the NIH has maintained the necessity for animal research" (NIHb, n.d.) and because it is a federal agency its legitimacy is publicly sustained.

In the 1970s a discipline called sociobiology came into popularity among sociologists and behaviorists. The aim of sociobiology is to explore the evolutionary characteristics of social behavior (Wilson, 1975). In sociobiology the explorations of social behavior were done by conducting behavioral experiments on animals. These experiments can range from simple tests on mice's reaction to different level of light intensity, to profoundly cruel tests on loneliness. In one such test a rhesus monkey infant was separated from her biological

mother from birth (PBS, N.D.), among critics, this series of experiments were called "The Pit of Despair" experiments.

Animal experimentation during the late 1900s and into 2000 is glorified with the assistance of mass media. When there is an animal experimentation-based medical discovery it is sensationalized in the news media. When this discovery is disproved there is not as much news coverage. This unbalanced news coverage greatly influences how the general public views animal testing. Public attitude on animal testing adds momentum to the animal testing industry to keep it going. And, unfortunately, it is the animal testing industry that influences the news media to provide unbalanced reports on findings regarding animal testing.

Animal testing firms like Huntington Life Sciences and Convance pay hundreds of thousands of dollars to professional Washington lobbyists, such as the "Foundation for Biomedical Research" and the "Center for Consumer Freedom", and in our society one becomes powerful when one has a lot of money. There is a lot of money to be gained in the animal testing industry (Greek, 2000, p. 19) because the Food and Drug Administration (FDA), which regulates food, drugs, cosmetics, etc., requires verification of a product's safety by using animals. This bias in support of animal testing is embodied in the FDA's guidelines. Although sometimes the FDA requires that products are tested on both humans and other animals, for the most part the FDA makes it easier and quicker for cosmetic and pharmaceutical companies to conduct animal testing than human clinical tests. The sooner a company can get their product on the market the more money they will make, so oftentimes they choose animal testing over clinical human testing for the sake of saving money. Because many consumer industries – food, drugs, cosmetics, etc. – rely heavily on the animal testing industry in order to sell their products and make money, the animal testing industry earns a

very large sum of money. With the money the animal testing industry earns they are able to have the power to sway the media, as discussed earlier, to shape public opinion which further adds to the general support for animal testing.

Animal testing is so widely accepted and is able to persist today because of the history that has led up to it. Throughout the history of animal testing, and still today, there have been many instances where scientists, philosophers, and other experts have asserted the faults of animal testing, but each time someone speaks out their words have been suppressed. Sometimes it seems like nothing but inertia keeps animal testing going, but it is important to realize that animal testing is an industry. Thousands of people have careers that depend upon the use of animals in experiments, regardless of whether or not it is good science or ethical. We can follow speciesism right back to its deepest roots in the Church's interpretation of the wording of the Christian bible. The Church has influenced nearly every facet of Western civilization, from moral/ethical aspects to socio-political aspects. Hierarchy and anthropocentrism has permeated through these aspects. Important historical figures, whether or not they were religious, continued to hold this paradigm set by Christianity simply because it was so engrained in society. These important historical figures, such as scientist-philosopher Descartes, have had major influences in modern society. The history of animal testing has shaped how we feel about the use of animals, and the large scale of the animal testing industry today and the money and power it holds reinforces and maintains these feelings.

2.4 Animal Rights Movement

The concept of animal rights has been around for quite some time. The idea can be traced back to writings in the 6th century B.C. by early philosophers such as Pythagoras (Wise, 2006). With the coming of Aristotle in the 4th century B.C. animal rights was put on the back burner. Aristotle wrote in "Politics" that non-human animals ranked below humans in the great chain of being. He argued that because of their irrationality that they could not have any interests of their own, and did not warrant respect (Ibid). This view was quite popular and has been a widely held belief ever since it was written. The topic of animal rights appeared again in the early 19th century when a group of progressive British citizens came together and formed the "Society for the Prevention of Cruelty to Animals." This organization quickly spread throughout Europe and the United States encouraging governments to pass legislation that protected the welfare of animals (RSPCA, 2007). The RSPCA and its sister organizations have fought for the proper treatment of animals, but they do not ask for the full rights that some now argue for.

In the late 1890s Henry Salt published his book entitled *Animals' Rights: Considered in Relation to Social Progress*. This writing was some of the first that began to discuss the rights that animals should have instead of simply discussing their proper treatment (Ronan, 2006). While Salt's writings failed to spark a large social movement at the time, his writings were instrumental in inspiring contemporary animal rights philosophers. The modern animal rights movement can be traced back to the early 1970s where the writings of a few forward thinking philosophers inspired a new generation of animal rights activists. The most influential of these writings is widely considered to be Peter Singer's *Animal Liberation*. Published in 1975 *Animal Liberation* drew upon the ideas of utilitarian philosophy and applied it to the relationship between humans and animals. Singer was not the first to do this: Jeremy

Bentham had done this in early 19th century when he proclaimed that "The question is not, Can they reason?, nor, Can they talk? but, Can they suffer?" (Best, n.d.). This 1975 writing developed upon this idea and provided a meaningful social context in which Bentham's idea could be understood. Singer's writing is powerful because he shows the everyday implications of our dietary and scientific decisions. This format brought philosophy to a much wider audience.

Tom Regan was another prominent philosopher in this era who wrote about animal rights. His most famous writing *Animal Rights* was published in 1983 and approached the problem from a different angle, arguing that animals are 'subjects-of-a-life' and that they too have rights. Regan reasons that if humans are attributed moral rights due to their mental ability, then animals with some of those mental abilities should be allowed the same moral rights (Regan, 2000). While Regan and Singer approach animal rights from different points of view, their conclusions are the same. Both of them call for the abolition of animal testing and the adoption of a vegan diet as morally necessary. These two philosophies did much to lay the groundwork for a morally justified social movement.

The time was ripe for a critical discussion of the status of animals. The 1970s were a time in which movements for the rights of women and people of color were fresh in people's minds, and a time when people were expressing their feelings about the war in Vietnam. At about the same time the environmental movement was also beginning to take hold. While they were concerned with how human-kind has been affecting nature, they made it easy to ask questions about how animals were being treated. We learned that farmers were spraying dangerous chemicals that were killing plants and harming ourselves, but how about other animals? This atmosphere encouraged people to come together and organize around a common cause. The animal rights organizations began to work together more and more,

until the "People for the Ethical Treatment of Animals" was founded in 1980 (PETA). At this point the animal rights movement had come into its own. PETA allowed these activists to influence policy more effectively. One of their first victories came early in their history. In 1982 PETA co-founder Alex Pacheco tipped off U.S. authorities to animal rights violations at the Institute of Behavioral Research. This tip led to the end of an experiment involving nerve stimulation in monkeys (Pacheco, 1985). Progress like this showed how strong the groups were. These early victories gave these groups even more exposure, and led to further expansion.

Groups like these remain functioning and effective forces for animal rights at the time of this writing. PETA has grown to become a powerful force in politics around the world and shapes policy both in the government and at corporations. With a $31 million dollar a year budget, it is a notable political force (PETA, 2005). The animal rights movement has not stopped with just one organization, there are more mainstream groups such as the Humane Society of The United States that engage in more reform-oriented lobbying as well as more extreme groups such as the *Animal Liberation* Front have that engage in direct action and shy away from the public sphere. Regardless of their tactical methods, their presence is proof that people are still thinking about the problems that exist with the current animal/human paradigm.

2.5 The Use of Animals at WPI in Undergraduate Courses: Living or Dead

At WPI today, animal tests go on at a number of levels both in and out of the classroom. Three of four lower level student laboratories currently use animals in one form or another, living or dead. The most obvious of these is BB 2903 Anatomy and Physiology, which engages in a number of dissection experiments on fetal pigs and other small animals (WPI, 2007). Another course BB 2904 Ecology, Environment, and Animal Behavior, focuses on observing live animals and analyzing their behavior and has a laboratory exercise that engages in an LD 50 test on Daphnia, a freshwater crustacean (Ibid). An LD 50 test is a measure of the concentration of a substance it takes to kill 50% of a population. It entails gathering a large number of animals, dividing them into groups, and giving each group an incrementally higher dose of some chemical. Whichever concentration killed off half of its group is labeled the LD 50. In this situation, like many other scientific studies, the more animals "sacrificed", the more "valid" the data obtained from the experiment. The other course BB 2902 Enzymes, Proteins, and Purifications, makes frequent use of Bovine Serum Albumin (BSA) which is purified from cow's blood (Ibid). Because three of the four available courses are required for undergraduate biology and biotechnology majors to graduate, a student who has no desire to test on animals has to take two of the courses described above. Because of this, we recommended a student choice policy that would allow students to request an alternate laboratory of equal educational value to be provided for any laboratory that used animals.

In addition to the lower level laboratories, several upper level laboratory modules make use of animals. In one such module, BB 3511 Nerve and Muscle Physiology, uses frogs for nerve and muscle studies. For this study, a procedure called "double pithing" is used:

> **Pithing** is the insertion of an instrument into the central nervous system (brain case or spinal canal) to quickly disrupt consciousness and cause death. Pithing of both the brain and the spinal cord (double pithing) may be used as the sole means of euthanasia in frogs of the genus Rana or other amphibians with anatomic features that facilitate easy access to the central nervous system (IACUC, 2007).

Pithing is done in order to kill the frog while keeping its heart beating and lungs breathing so that they can be studied. The course catalog entry for this class describes the class as "Computer and laboratory studies of nerve and muscle function" (WPI, 2007). This description sheds no light as to whether or not animals are even used in the experiment, one is left only to assume that the "laboratory studies of nerve and muscle function" entail obtaining nerves and muscles from an animal. The same is likely the case for BB 3514 Circulatory and Respiratory Physiology. The catalog describes the course as "Computer and laboratory studies of circulatory and respiratory physiology" (Ibid). The student is left to assume that circulatory and respiratory studies entail studying the circulatory and respiratory systems within animals.

Even classes where the use of animals is not the focus of the class occasionally make use of animals. For example, BB 3522 Transmission Electron Microscopy, involves the preparation of horseshoe crab blood and sperm samples for viewing with a transmission electron microscope. The catalog description states "This laboratory module will provide the student with the basic theory and practice of transmission electron microscopy. The course will include sample handling and preparation methods, use of the TEM, and photographic recording of observations made with the instrument" (Ibid). Again no indication is made that animals are used. For a student wishing to avoid testing on animals, it is quite difficult to take courses that do not use animals as there is no indication of whether or not animals will be used within the course catalog. For this (and other) reasons we have proposed a student choice policy that would guarantee that a student be able to take

any laboratory module and learn the techniques involved without having to use animals. As part of this policy, we have suggested that some indication be made in the course catalog or elsewhere that the class does use animals.

2.6 Alternatives

The Science Bank, managed by AnimaLearn.org, is a free lending library of non-animal educational alternatives for biological laboratories (AnimaLearn, n.d.). The Science Bank offers over 300 alternatives[2] (the amount of products is increasing as new alternatives become available) and more than 85 of these alternatives are suitable for college and university level students, as well as medical and veterinarian students. A complete list of the available alternatives, taken from the Science Bank's website, at the colleges and university level is given in Appendix A. The list includes alternatives for cats, dogs, drosophilia, earthworms, frogs, humans, various aquatic life, pigs, rats, and other miscellaneous alternatives. The Science Bank offers many alternatives for the college and university level, and a good fraction of these alternatives would be suitable for the Biology/Biotechnology and Biomedical curricula at WPI.

Most of all the alternatives described below are also approved of by the Association of Veterinarians for Animal Rights (AVAR) in their database of usable alternatives (AVAR(a), n.d.). These alternatives are supported by an association comprised of doctors with degrees in medicine and veterinarian medicine; therefore, these are excellent alternatives to the lives of animals used in education at the college and university level.

Fetal Pigs

As discussed earlier in "The Use of Animals at WPI," fetal pigs and other small animals are used in *BB 2903 Anatomy and Physiology*. The Science Bank currently provides five alternatives to fetal pigs:

Concise Dissection Chart: Pig Heart – a chart with high quality photography depicting complete dissection of a pig heart

Dissection Video Series: Fetal Pig – a full-color video that follows every step in the fetal pig dissection process

[2] See Appendix F for selected slides from Laura Ducceschi's PowerPoint presentation to WPI

DryLab Plus: Fetal Pig – interactive dissection video, detailed 3D images of a pigs internal and external structures

Fetal Pig Model – cast from actual specimen with all organs, major veins & arteries, with realistic color & texture

Lab Dissection Video Series: Fetal Pig – step-by-step video with close-up photography of fetal pig dissection

The alternatives listed above are ideal for students who wish to not participate in actual fetal pig dissection for many reasons. An accurate and detailed view of the innards of a fetal pig may diminish in the preservation process of the pigs, and students may wish to have the accuracy and detail that the alternatives above would provide. Other students may wish to practice more efficient methods for learning fetal pig dissection: it is more cost-efficient over time, it is time-efficient in the laboratory, and it is more waste-efficient as it does not produce any physical waste when complete. Another important reason students may have for wanting to abstain from participating is that he or she feels that fetal pig dissection is unethical and immoral.

Biology students may not want to participate in fetal pig dissection because they are opposed to using the animal's life. Many students find fetal pigs very similar in appearance to a newborn human child and dissecting the pig may invoke their empathy. Other students may be opposed to dissecting fetal pigs for religious reasons, for example Muslim biology students are opposed to dissecting fetal pigs because Islamic tradition prohibits the use and consumption of pig and pig products. A large group of students who do not want to participate in fetal pig dissection choose to do so because they wish to not support the industries behind it. Fetal pigs are typically not bred specifically for educational use in biological laboratories; usually they are the by-products of the meat industry (NRV, n.d.). Students who do not support the meat industry by not purchasing meat products would also not support it by not participating in fetal pig dissection. Though the fetal pigs come from the meat industry, the preservation of the fetal pigs is usually done by a provider for

biological products. Student may also wish to not participate in fetal pig dissection so that they would not be supporting that aspect of the biotechnology industry.

Frogs

Frogs are used in *BB 3511 Nerve and Muscle Physiology*. In this course, a procedure called "pithing" is used. The procedure for pithing is described above in "The Use of Animals at WPI." The alternatives most relevant to the course are described below:

Muscle Physiology –	a program that simulates experiments on the frog sciatic nerve and gastrocnemius muscle preparation to illustrate physiological properties of skeletal muscle
SimMuscle –	CD-ROM on the physiology of striated leg muscle of the frog with experiments that include single twitch as a function of stimulation intensity, superimposition of double stimuli, tetanic contractions, resting tension curve, curve of isometric maximum values, curve of isotonic maximum values, force-shortening velocity relationships, and fatigue experiments
SimNerve –	CD-ROM simulating experiments on the sciatic nerve of the frog with experiments that include determination of the relative and absolute refractory period, CAP amplitudes as a function of stimulation activity, monophasic CAP after ligation of the nerve, CAP amplitude as a function of the stimulation duration, and anode opening excitation as a function of the stimulation duration

Even though the biology students at WPI probably already have had frog dissection previously in high school, the Science Bank provides college/university level frog dissection alternatives described below. Even though the Biology & Biotechnology Department at WPI does not have a specific course on frog dissection, these alternatives can be useful in other courses where dissection does take place.

Vertebrate Dissection Guide: Frog –	a 42-minute video exploring the functional anatomy of the frog
Concise Dissection Chart: Frog –	chart with high quality photos depicting complete dissection of a frog
Digital Frog 2 –	CD-ROM on dissection, anatomy, and ecology of the frog
Dissection Video Series: Frog –	a full-color video that follows every step in the frog dissection process
DryLab Plus: Frog –	interactive dissection video, 100 high resolution photos and other features of a frog's anatomy and physiology
FrogLab –	a 3D programs with over 60 frog dissections
Lab Dissection Video Series: Frog –	a step-by-step video with close-up photography of frog dissection

Electron Miscroscopy

In *BB 3522 Transmission Electron Microscopy* blood and sperm are taken from horseshoe crabs and are prepared for viewing with an electron microscope. The alternative described below may be a suitable replacement for electron microscopy:

The Cell is a City 3D – interactive CD-ROM containing over 80 narrated and labeled scanning electron microscope (SEM) images, no computer simulated images

Circulatory & Respiratory Systems

BB 3514 Circulatory and Respiratory Physiology explores circulatory and respiratory physiology. It is likely that small animals are used in exploring circulation and respiration, and if that is the case then many of the alternatives provided by the Science Bank can be provided for this course:

Cat Dissection Laboratory – Using 3D display technology, this program explains over 80 dissections including an examination of the cat's circulatory & respiratory systems. The CD-ROM offers a tutorial, lecture, and quiz mode

CatLab – Multimedia dissection of the cat anatomy containing separate tutorial modules for circulatory system and heart of the cat with over 300 laboratory-quality images. Each module contains a self-assessment exam

Perch Model – life-sized perch model cast from an actual specimen clearly showing over 50 exterior and interior anatomical details. Every major body system is included: circulatory, with major arteries and veins; respiratory; etc. Hand painted for a realistic, detailed representation, and made from flexible, unbreakable materials

Vertebrate Dissection Guide: Pigeon – video with section including circulatory system

Pregnant Shark Model – shark model cast from a real specimen featuring a pup with a yolk sac in the uterus. It also shows branchial circulation; a ventral view of the viscera and circulatory vasculature; etc. Each model is made from unbreakable materials and is painted by hand to ensure the finest detail possible

Vertebrate Dissection Guide: Dogfish – video with section including circulatory system

LD-50 Tests

Currently, the Science Bank does not provide for alternatives to LD-50 tests and other similar tests. In *BB 2904 Ecology, Environment, and Animal Behavior*, behavioral and LD-50 tests are conducted. In LD-50 tests, the lethal dose, or lethal concentration, of a chemical that would kill 50% of a population is determined. To complete this test, *in vivo* or *in vitro* (meaning in the living organism or in the glass test-tube, respectively) experiments are usually carried out. A more recent method for conducting tests like these are *in silico* tests, a phrase which means performed by computer simulation (that phrase is not an actual Latin phrase the way *in vivo* and *in vitro* are real Latin phrases). *In silico* tests use computers to perform complicated mathematical analyses that model biological systems. Regarding *in silico* testing, scientists believe that "[m]athematical analysis is potentially powerful because many pairwise drug combinations can be explored computationally at much lower cost than in preclinical or clinical experiments" (Fitzgerald, 2006). It is also true that mathematical analyses can be

more cost-efficient than animal trials because a computer can compute the results of a test faster than time can pass in a laboratory.

MathWorks which is a technical computing software company (most notable on the WPI campus for their product MATLAB) has a software product called Simulink. Simulink is a software tool that models, simulates, and analyzes complex dynamic systems (The MathWorks(a), n.d.). MathWorks also produced software called SimBiology, which is more of an extension of MATLAB than Simulink, to model, simulate, and analyze biochemical pathways (The MathWorks(b), n.d.). The last two items of software mentioned are not directly related to LD-50 tests; however, MathWorks is in the long-term process of developing modeling software that is more involved on the cellular level regarding the effects of drugs and toxins.[3] Software like that can be used by students to perform LD-50 tests and other tests involving using drugs or toxins.

Humans

The discussion above is just a brief overview of all the viable alternatives available to students. In general, studying anatomy by animal dissection functions as an analogy to studying human anatomy. If the main purpose for dissection is to study human anatomy then it would make sense to use a human model before an animal model. The Science Bank provides material for studying human anatomy in additional to animal anatomy. The list of Science Bank products based on human anatomy is given in the Appendix A. We also recommend that professor who teaching student that which to eventually use their knowledge for human biomedical purposes test directly on humans, either through non-invasive, non-harmful test that involve volunteers or through the use of human cadavers.

[3] See Appendix B, MathWorks E-mails

3. Methodology

3.1 The Scope of the Project

This project focuses on animals used in science, especially those live animal experiments and classroom dissections that occur on the WPI campus. There are many compelling reasons why animals used in agriculture, entertainment, and fashion should receive just as much consideration as animals used in science. We may use animals used in other industries as an example or we may cite a philosopher who discusses the rights of animals in the context of the agriculture or entertainment, but we do so only as an analogy. This paper shall make use of animal rights philosophy to build an argument against animal testing at WPI. We chose to focus on vivisection because, as future scientists and engineers with a degree from a prestigious university, we have a great amount of influence on the future of animal testing. Perhaps we will not be the researchers who make the final decisions about whether or not to pursue animal testing, but as members of the scientific community our voices are respected by those who *do* make that decision. During our career as scientists and engineers we will be able to shape the future of vivisection.

Why focus on WPI? It is true that there are universities that conduct much more animal testing than WPI, but this is our school, our community. In the past WPI has conducted comparatively few animal tests. Dissections have never been huge part of the WPI learning experience. It is important to note that this is changing. The new biotechnology facility, Gateway Park, will bring with it much more animal testing. We deliberately made the decision to focus on animal testing at WPI because we want to improve our community, we want to help put our school on the path towards becoming a leader in ethical, animal-friendly science. Furthermore, it is our tuition money that funds the animal experiments that do occur on campus and we are the students who must take the

classes that involve dissection. This project directly affects us as individuals as well as our community. WPI can be made better and we want to contribute to enrichment of the campus culture.

3.2 Methodology of Establishing a Student Choice Policy

Drafting the Policy

As discussed in our *Goals* section above, one of our objectives was to establish a student choice policy on animal testing and dissection at WPI. A policy would have two major benefits, it would help reduce the number of animals used on campus and would empower students with the rights they have as members of an academic community. There are many existing policies available for use from other academic communities. However, WPI's is a unique academic community–students are trained not only to be technologists but also humanists, WPI is on quarter system as opposed to a semester system, it is a project-based learning environment. As such we require a unique policy created by members of the WPI community designed to best suit our needs.

Our first draft of the proposal was greatly influenced by many previously existing policies, all of which were available on the Internet. We were fortunate to discover that a number of online community have formed around animal welfare issues and student rights. These organizations shared their resources on the Internet, making it easier for concerned students such as ourselves to work towards enacting a similar policy at our school.

Our most useful resource was AnimaLearn.org, which provided us with a list of colleges and universities with student-choice policies on testing and dissection[4], a full list of veterinarian schools with non-animal alternatives[5], as well as a lending library and store with hundreds of non-animal alternatives to dissection and experimentation[6]. From AnimaLearn.org's list of universities with student-choice policies we found links to the written policies of three colleges – Sarah Lawrence College, University of Illinois-

[4] See Appendix A for the full list of "Colleges and Universities with Student Choice Policies," the full list is also available at http://www.animalearn.org/studentcenter_collegeuniversity04.php

[5] See Appendix A for the full list of "U.S. Veterinary Medical Schools Offering Alternatives," the full list is also available at http://www.animalearn.org/studentcenter_vetmed05.php

[6] The Science Bank offers over 350 non-animal alternatives, a full list is available at http://www.animalearn.org/view_sciencebank.php

Champaign, and Virginia Commonwealth University[7,8,9]. These policies included points, aspects, and details that we found to be very useful for directing us in how to draft a policy suitable for WPI. We also sought the wording used by state legislatures of laws or resolutions for public high schools regarding student choice and dissection[10]. In addition to the state laws and policies for high schools, colleges, and universities, we thought it would be important to include in our policy some influence from an institution above the undergraduate level. The Association of Veterinarians for Animal Rights (AVAR) is, as their title implies, an alliance of practicing veterinarians with the belief that they, as caring doctors for their animal patients, they must "protect the interests and needs of their patients" (AVAR(b), n.d.). AVAR provided very eloquent statements on their position regarding the use of animals (AVAR, 2006) in dissections and live animal testing. Naturally they are opposed to use of animals in dissection and animal testing. Their statements also greatly influenced the wording of our policy as well.

Below is an example of some key points, from the policy of Sarah Lawrence College, which we found to be important in contributing to the spirit and tone of the policy we had in mind to draft.

Sarah Lawrence College: Choice Policy Regarding Dissection in Biology Courses

- The policy…is printed in the college's registration packet
- Students may request alternatives because of religious or ethical reasons
- The responsibility should not be on the student to determine an alternative course of study
- A student's grade would not…be affected by the choice of an alternative
- At the beginning of the semester…instructors should inform students of the option to choose an alternative, both orally and in writing[11]

[7] See Appendix C for the full text of the choice-policy at Sarah Lawrence College, the policy is also available at http://www.hsus.org/web-files/PDF/ARI/Sarah_Lawrence_College_Policy.pdf

[8] See Appendix C for the full text of the choice-policy at University of Illinois at Urbana-Champaign, the policy is also available at http://www.dissectionchoice.org/EP_03_35.html

[9] See Appendix C for the full text of the choice-policy at Virginia Commonwealth University, the policy is also available at http://ramsites.net/~kungae

[10] An outline of the states with dissection-choice laws/resolutions for public high schools is given at http://www.hsus.org/animals_in_research/animals_in_education/dissection_laws.html it is also noteworthy that the map displayed on the website shows the that states with dissection-choice laws/policies more densely situated in the coastal regions rather than inland.

[11] See Appendix C for the full text of the choice-policy at Sarah Lawrence College, the policy is also available at http://www.hsus.org/web-

The other two colleges which make their policies public and the various state laws regarding dissection choice are very similar in wording.

The positions AVAR holds are poignant and also noteworthy for both our policy and our report:

> - [AVAR] believes…educational programs should embrace an attitude of respect and reverence for all life. We, therefore, are strongly opposed to the use of…animals by…secondary school students when that use or experimentation results in…pain, distress, suffering,…or death to the subject. When nonhuman animals are used…in this manner, the students become desensitized to the inherent value of other life forms, and the knowledge gained is tainted and lacks meaning from an ethical perspective…animals should not be taken from the wild or bought from biological supply houses for this purpose…The moral and ethical questions raised by human intervention with nonhuman life should be raised and addressed.

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files/PDF/ARI/Sarah_Lawrence_College_Policy.pdf

- …AVAR is philosophically opposed to the use of nonhuman animals in research that is not directed at helping the individual animal. Whereas the AVAR recognizes that there may be benefits from using nonhuman animals in research, we do not believe that the end justifies the means…There are no morally relevant differences between human and nonhuman animals that would justify treating the latter group in such a radically different manner from the former…[D]ifferences between humans and other animals are largely arbitrary and prejudicial…AVAR promotes an end to our perceived dependence on the use of nonhuman animals in research that leads to their harm…[U]ntil human beings as a group place nonhuman animals within their sphere of serious moral concern, the AVAR recommends reform in the following ways: 1) increased legislation to control and monitor research using all nonhuman animals, vertebrate or invertebrate, 2) strict enforcement of laws that pertain to nonhuman animals used in research, 3) formation of a national or international data bank of information to assist investigators in eliminating unnecessary duplication of particular lines of inquiry, 4) shifting of our research funding emphasis away from invasive nonhuman animal studies to a concerted search for alternatives, 5) an increase in clinical and epidemiological research with an emphasis on preventive measures instead of 'cures,' and 6) immediate discontinuation of certain lines of inquiry because the ethical costs in terms of nonhuman animal suffering and death cannot offset the perceived good to be gained.
- …(AVAR) is opposed to the harming or killing of…nonhuman animals in the teaching of…sciences in the veterinary medical school curriculum…Another objection to the harming or killing of nonhuman animals in basic science education stems from philosophical concerns. There are no morally relevant differences between the nonhuman animals who are used in these labs and the future patients of the students. For many students, this creates a serious conflict between becoming a 'healer' and killing the very subjects for whom they are in training to help. Regardless of how instructors present the rationalization for the use of nonhuman animals in these laboratories, an attitude of a certain degree of callousness and irreverence for nonhuman animal life is inherent. For some students, unfortunately, this attitude may be the one which they will carry into their practice of veterinary medicine. Other students may be highly disturbed by this lack of compassion and may even leave school as a result…In summary, the AVAR finds unacceptable the continued use of nonhuman animals in the basic science courses where that use leads to harm or death of the animals. We strongly promote the use of already proven alternatives such as computers and videotapes and the further development of new alternatives. These alternatives will save the lives of many animals and should help to make the educational process in veterinary medicine more consistent with one of the expressed goals of the profession, namely compassion. Furthermore, the use of alternatives could conceivably result in the shortening of laboratory time allotted to basic science courses, leading to an increased amount of time available for clinical and surgical training which would be of direct benefit to future patients (AVAR, 2006).

Though more lengthy than the student-choice policies, AVAR's statements of position provides us with more of a philosophical background for the student choice policy.

Using the points shown above, we laid out the essential points and drafted a policy we thought would work for WPI. Below is our first draft of the policy:

Animal Testing/Dissection Choice Policy at WPI
As of January 2007

1. Alternatives to any class exercises, labs, or demonstrations that involve the use of animals must be available in all classes for students who choose not to participate for moral and/or religious reasons.

2. The responsibility for creating an alternative lies with the instructor, not the student. The alternative assignment shall require a level of time and effort by the student that is comparable to but not greater than the level of time and effort required by those students participating in the exercise involving animals.

3. Requiring the student to watch others participate is not an alternative; the student must be allowed to leave the room while the exercise is taking place.

4. Students will not be penalized or ostracized in any way for choosing the alternative exercise. Nor should students be rewarded for participating in assignments involving animals.

5. A student's choice to participate or not to participate in assignments involving animals shall be respected by all school faculty, and the student shall be treated in a nonjudgmental manner. A student must feel free to choose the alternative without fear of being singled out or pressured.

6. All students must be informed in writing of their option to choose not to participate in assignments involving animals. This must happen at the beginning of each academic term during which the assignment is scheduled, a minimum of three weeks prior to the assignment.

7. Those instructors who still use animals in their classes must verbally announce the policy to all students on the first day of the academic term and on the day of the assignment involving animals.

8. Those instructors who still use animals in their classes must include a copy of this policy in the course syllabus.

9. All classes that involve animals shall mention that they use animals in the Course Catalog.

With the first draft of the Animal Testing/Dissection Choice Policy (ATCP) complete, we were able to share it with members of the WPI community.

Gaining support and input on the Policy from the WPI Community

After we drafted the first revision of the policy, we sought the input and recommendations of significant administration and faculty members. We first attempted to schedule a meeting with WPI's current President, Dennis Berkey, because the issue we were raising was one of campus-wide importance. Unfortunately, the President had no availabilities so we were redirected to another member of the administration, the Dean of Undergraduate Studies.

We met with the Dean in January of 2007. A copy of the sample policy shown above was prepared for the Dean, and he was given an explanation of our IQP and its objectives. Together, we read over the policy word-for-word, with unwritten verbal elaborations after each numbered point. Once the policy was read over, we asked the Dean for comments, questions, suggestions, etc. regarding the sample policy. In general the Dean liked the policy and had an overall positive attitude toward it. Our specific interest was the Dean's suggestions on what to do next with and where to take the policy – he suggested that we

gain support and input from the WPI community. Specifically, he said to gain student support, and then take it to the Student Government Association (SGA), who would then take it to Faculty Committee on Academic Policy (CAP).

To gain support for the policy from the WPI community, we organized info-sessions held on campus almost every other Friday night from February to March, 2007. These info sessions were open to everyone in the community – students, faculty, staff, and administration – anyone who would be interested in giving input, suggestions, or voicing support (or opposition) to our policy proposal. The info sessions through C- and D-term gathered both undergraduate and graduate students who all had good input on how to make the wording of the policy better, stronger, yet more acceptable to the faculty.

Unfortunately, professors and other non-student members of the WPI community did not able to attend the info-sessions, perhaps because they were held in the evening (5:30pm) at the end of the working week, on Fridays. Regardless, we met individually with faculty outside of the info sessions setting.

Early in the year we set up meetings and interviews with important faculty and staff in the biosciences. When conducting these interviews and meetings we guaranteed our interviewees anonymity so that they were able to speak freely without any concern about judgment upon the release of this report. At these meetings we sought information for both our project (regarding the ethical issues surrounding animal testing) and our policy. Regarding our policy, we asked faculty members for their personal and professional input on what we could do to make the policy more appealing to them. As with the Dean, the faculty were generally receptive to the idea of the main objective of the policy. For the most part, they requested minor changes in the text, but the minor changes do not change the overall value of the policy.

However, some faculty in the biosciences had bigger concerns than the wording of the policy. They had questions about what sorts of alternatives exist, how the Biology/Biotechnology Department will know which alternatives are suitable for WPI's Biology/Biotechnology and Biomedical Departments, and whether students who have used alternatives are still eligible for ABET accreditation.

Regarding their first issue, we had a general idea of the alternatives available. We gather information about the available alternatives by contacting AnimaLearn.org and we were fortunate to have the director of AnimaLearn.org Laura Ducceschi reply to us. Laura offered to fly into Massachusetts from Pennsylvania (where the headquarters of AnimaLearn.org is located) to give a presentation on the different non-animal alternatives to dissection and experimentation. Working with the faculty in the Biology/Biotechnology Department, we chose a convenient date and time for Laura to give her presentation to the WPI community. Laura's presentation was open to all members of the community, as were all of our info sessions. Her presentation included demonstrations of the software, pictures of models, screenshots of videos, etc., all specifically designed for different levels of education, ranging from middle school to university level[12]. All of the non-animal alternatives that Laura demonstrated were available for loan (free of charge) or for purchase from the Science Bank which has over three hundred non-animal alternatives[13]. The Science Bank was founded in order to provide free alternatives to dissection and animal testing to any educator.

Presenting the Biology/Biotechnology Department with hundreds of alternatives did not entirely convince the faculty. The faculty's second concern was how they would know which alternatives were the best ones to purchase and use in their laboratories and

[12] See Appendix F for selected slides from Laura Ducceschi's PowerPoint presentation to WPI.
[13] The Science Bank offers over 350 non-animal alternatives, a full list is available at http://www.animalearn.org/view_sciencebank.php

classrooms. Since the Science Bank provides lends out models for free, we suggest that the laboratory instructors borrow models and evaluate them, possibly even testing them out in laboratories next school year. We also suggest that future IQPs and MQPs address this issue. This is further addressed in a later section, "Our Vision".

The faculty's third concern was a tougher one for us to handle. Typically, when a student majoring in Biomedical Engineering at WPI earns his or her degree, it is accredited by the Accreditation Board for Engineering and Technology (ABET). ABET is the leader in accreditation of college and university programs in science, computing, engineering, and technology (ABET, 2007). The faculty was concerned that if a student were to complete all the Biomedical Engineering courses and laboratories to satisfy degree requirements but had used exclusively non-animal based alternatives that they might not meet the requirements of ABET accreditation. The concern was that these students may not be worthy of accreditation because through their academic career they would not have completed ABET's guidelines to accreditation in Biological Engineering. In ABET's "Criteria for Accrediting Engineering Programs" for the 2007-2008 Accreditation Cycle, the criteria for Biomedical Engineering degree is very brief. It reads:

> The structure of the curriculum must provide both breadth and depth across the range of engineering topics implied by the title of the program.
> The program must demonstrate that graduates have: an understanding of biology and physiology, and the capability to apply advanced mathematics (including differential equations and statistics), science, and engineering to solve the problems at the interface of engineering and biology; the ability to make measurements on and interpret data from living systems, addressing the problems associated with the interaction between living and non-living materials and systems[14].

The criterion for accreditation in Biomedical Engineering does mention living systems. However, the criterion does not specify between living *animal* systems or living *plant* systems. For clarification we attempted to contact ABET, but as of now they have not replied to us.

[14] See Appendix F for selected pages of *Criteria for Accrediting Engineering Programs,* the full text is also available at http://www.abet.org/Linked%20Documents-UPDATE/Criteria%20and%20PP/E001%2007-08%20EAC%20Criteria%2011-15-06.pdf

A possibility is that ABET left the wording for the criterion purposely vague so that students who are able to work with non-animal living systems can still receive ABET accreditation.

Although we were not able to get in contact with ABET regarding their criteria for Biomedical Engineering, in order to address the faculty's concern regarding this issue we created a list of schools that are ABET certified and that have alternatives/policies for students in the biosciences. To compile this list of schools we cross-referenced the lists of colleges and universities from AnimaLearn.org with the list of ABET accredited schools with degrees in the bioengineering (ABET, 2006). Below is a list of colleges, universities, and veterinary medical schools with ABET accreditation of degrees in the bioengineering as well as dissection and animal testing student choice policies.

Colleges and Universities with Student Choice Policies
Cornell University ABET ACCREDITED IN BIOLOGICAL ENGINEERING
Oregon State University ABET ACCREDITED IN BIOENGINEERING
University of Pennsylvania ABET ACCREDITED IN BIOENGINEERING
Virginia Commonwealth University ABET ACCREDITED IN BIOMEDICAL ENGINEERING
Virginia Tech College ABET ACCREDITED IN BIOLOGICAL SYSTEMS ENGINEERING
Wright State University ABET ACCREDITED IN BIOMEDICAL ENGINEERING

Veterinary Medical Schools Offering Alternatives
Auburn University ABET ACCREDITED IN BIOSYSTEMS ENGINEERING
Kansas State University ABET ACCREDITED IN BIOLOGICAL & AGRICULTURAL ENGINEERING
Louisiana State University ABET ACCREDITED IN BIOLOGICAL ENGINEERING
Michigan State University ABET ACCREDITED IN BIOSYSTEMS ENGINEERING
Mississippi State University ABET ACCREDITED IN BIOLOGICAL ENGINEERING
Ohio State University ABET ACCREDITED IN FOOD, AGRICULTURAL, AND BIOLOGICAL ENGINEERING
Oregon State University ABET ACCREDITED IN BIOENGINEERING
Purdue University ABET ACCREDITED IN AGRICULTURAL AND BIOLOGICAL ENGINEERING
ABET ACCREDITED IN BIOLOGICAL AND FOOD PROCESS ENGINEERING
Texas A&M College of Vet. Medicine ABET ACCREDITED IN BIOLOGICAL SYSTEMS ENGINEERING
ABET ACCREDITED IN BIOMEDICAL ENGINEERING
University of Georgia ABET ACCREDITED IN BIOLOGICAL ENGINEERING
University of Pennsylvania ABET ACCREDITED IN BIOENGINEERING
University of Wisconsin ABET ACCREDITED IN BIOLOGICAL SYSTEMS ENGINEERING
ABET ACCREDITED IN BIOMEDICAL ENGINEERING
Washington State University ABET ACCREDITED IN BIOLOGICAL SYSTEMS ENGINEERING

Universities researching alternatives to animal testing:
The Johns Hopkins Center for Alternatives to Animal Testing ABET ACCREDITED IN BIOMEDICAL ENGINEERING

This list of colleges and universities demonstrates that it is possible to have an ABET accredited Bio-engineering program that also allows for a student to have worked on living systems other than animal systems. Since each of these schools has a dissection and animal

testing choice policy as well as ABET accreditation, we can conclude that animal testing is *not* an ABET requirement.

Advocating for the Policy

As suggested by the Dean, once we gained general support from the WPI community for the policy we would be able to take it to the Student Government Association. Senators in the SGA suggested we first take it to a subcommittee of SGA, the Committee on Academic Issues (CAI). On February 13 we gave a formal presentation similar to the one given to the Dean, the students at info sessions, and the faculty at individual meetings to the CAI. The objective of this meeting and the outcome we desired was that the CAI would support taking our policy to the SGA body. Aside from the few semantic concerns that most people have had, the CAI supported bringing the policy proposal to the SGA. One of the members of CAI offered to draft a formal resolution[15] to bring to the SGA.

Based on suggestions and recommendations, we made a number of revisions to the policy proposal. The final revision of the policy read:

1. Alternatives to any class exercises, labs, or demonstrations that involve the use of animals must be available in all classes for students who choose not to participate for moral and/or religious reasons.
2. The alternative assignment shall require a level of time and effort by the student that is comparable to but not greater than the level of time and effort required by those students participating in the exercise involving animals. The responsibility for creating an alternative lies with the instructor, not the student.
3. Requiring the student to watch others participate is not an alternative; the student must be allowed to leave the room while the exercise is taking place.
4. Students will not be penalized or ostracized in any way for choosing the alternative exercise. Nor should students be rewarded for participating in assignments involving animals.
5. A student's choice to participate or not to participate in assignments involving animals shall be respected by all school faculty, and the student shall be treated in a nonjudgmental manner. A student must feel free to choose the alternative without fear of being singled out or pressured.
6. All students must be informed in writing of their option to choose not to participate in assignments involving animals. References to this policy shall be made on the biology department website.
7. Those instructors who still use animals in their classes must verbally announce the policy to all students on the first day of the academic term and on the day of the assignment involving animals.

[15] See Appendix B for the full text of the Resolution presented to the SGA, drafted by Alison LeFlore

8. Those instructors who still use animals in their classes must include a copy of this policy in the course syllabus.
9. All classes that involve animals shall mention that they use animals in the Course Catalog. This policy shall appear in its entirety in the Course Catalog.

On March 13 the above policy was brought to the SGA at large. The presentation was similar to most of all our other meetings with the minor exception that the group we were giving our presentation to was much larger. As with our other meetings, we discussed the scope of our IQP and the policy proposal with the aid of information packets[16]. Similar to our meeting with the CAI, our objective was to gain SGA support and have the SGA recommend that the Faculty Committee on Academic Policy (CAP) address the issue. After our presentation there were rounds of questions that were monitored by the President of the Student Government. Similar semantic questions, which we have encountered before, were raised. Once all members of the SGA were finished asking questions, the SGA President carried out a quick verbal "yea/nay" vote on whether the SGA supported bringing the policy to CAP. The outcome of the vote was very positive: all but one voted in support of the policy.

After dozens of meetings with faculty, staff, students, teaching assistants, and others, we made another revision to the policy. Prior to our meeting with we incorporated all of the changes in a new policy. More importantly, in an effort to be more diplomatic, we added a preamble to the policy proposal. Our intention was to make the point that wording issues and even the structure of the policy was not as important to us as the spirit of the document. The preamble read:

> Throughout our meetings with faculty and discussions with students we discovered that this is an important and personal issue for everyone. We found that everyone involved generally agrees upon the spirit of this policy. However, as with any policy, there are some minor disagreements on the specific wording. The sample policy below is open to change in wording and other minor changes as long as the general spirit of the policy remains intact.

[16] See Appendix B for the full text of the Letter to the SGA

> There are core principles that should be included the policy to ensure that the spirit of the policy remains intact. These principles ensure that all students should:
>
> - be well informed of their right to choose an alternative
> - be entitled to an alternative assignment that does not involve the use of animals, regardless of religious/moral views
> - not feel forced to complete any assignment that involves animals
> - not be punished for choosing an alternative assignment, nor should students be rewarded for choosing the assignment that uses animals

Junior members of CAP, who are also in the SGA, presented the policy proposal to the CAP. Shortly thereafter the CAP invited us to further discuss the policy with them. On April 6 we met with the Committee on Academic Policy and presented our proposal[17]. We gave a 20 minute presentation which addressed all of the issues raised by faculty and students. The committee members were impressed by the policy and did not foresee much trouble with it. There were some specific concerns about the wording, including the use of the words "shall" and "must". One member of the committee was concerned that the policy was too strongly worded, but the chair of the committee disagreed. The chair believed that although faculty never like more policies that mandate a certain behavior, any policy needs to use words like "shall" and "must". One professor wanted to make the definition of animal more specific. Initially this seemed to us to be a common sense issue but we learned that when writing policy it is important to be very specific about all definitions, even if they are colloquial. (This issue is discussed at length in the "Defining Animals" section.) Overall, the meeting was a resounding success. Although there may be a few minor changes to the policy, it seemed like the CAP was going to make any necessary changes and put it to a full faculty vote.

By the end of D-term 2007, the policy we proposed has been shaped, modified, and improved by students, faculty, administration, and ourselves. The full text of the proposal, as it is at the time of this writing, reads:

[17] See Appendix B for the full text of the Letter to the CAP

Animal Testing/Dissection Choice Policy At WPI

Preamble

Throughout our meetings with faculty and discussions with students we discovered that this is an important and personal issue for everyone. We found that everyone involved generally agrees upon the spirit of this policy. However, as with any policy, there are some minor disagreements on the specific wording. The sample policy below is open to change in wording and other minor changes as long as the general spirit of the policy remains intact.

There are core principles that should be included the policy to ensure that the spirit of the policy remains intact. These principles ensure that all students should:

1. be well informed of their right to choose an alternative
2. be entitled to an alternative assignment that does not involve the use of animals, regardless of religious/moral views
3. not feel forced to complete any assignment that involves animals
4. not feel intimidated to request an alternative
5. not be punished for choosing an alternative assignment, nor should students be rewarded for choosing the assignment that uses animals

Policy

- No student shall be forced to participate in any animal experiment that they feel conflicts with their religious/moral beliefs.
- Alternatives to any class exercises, labs, or demonstrations that involve the use of animals must be available in all classes for students who choose not to participate for moral and/or religious reasons.
- The alternative assignment shall require a level of time and effort by the student that is comparable to but not greater than the level of time and effort required by those students participating in the exercise involving animals. The responsibility for creating an alternative does not lie with the student.
- Requiring the student to watch others participate is not an alternative; the student must be allowed to leave the room while the exercise is taking place.
- Students will not be penalized or ostracized in any way for choosing the alternative exercise. Nor should students be rewarded for participating in assignments involving animals.
- A student's choice to participate or not to participate in assignments involving animals shall be respected by all school faculty, and the student shall be treated in a nonjudgmental manner. A student must feel free to choose the alternative without fear of being singled out or pressured.
- All students must be informed in writing of their option to choose not to participate in assignments involving animals. For example, references to this policy shall be made on the biology and biomedical engineering departments' websites.
- Those instructors who use animals in their classes must verbally announce the policy to all students on the first day of the academic term and on the day of the assignment involving animals.
- Those instructors who use animals in their classes must include a copy of this policy in the course syllabus.
- All classes that involve animals shall mention that they use animals in the Course Catalog. This policy shall appear in its entirety in the Course Catalog.

As of the writing of this, it is our understanding that the faculty it not yet voting on the policy. If we continue at this pace we can encourage the faculty at WPI will plan a vote on the policy by the beginning of the next academic year, and WPI will be phasing in the policy soon thereafter.

3.3 Surveying Process & Addressing Bias

As described in our "Goals" section, we wanted to increase discussion and raise awareness about animal testing in the WPI community. We accomplished this by creating a survey. The survey was distributed over the internet to as many members of the WPI community as possible through e-mail notification that requested everyone's help for an IQP. When reviewing the responses to our survey we noticed that there were a handful of responses in which people indicated that they believed there was a bias in the survey (to review all the questions and possible answer to our survey, please see Appendix E). Between 15 and 20 out of the 804 respondents used one of the comments fields to indicate that they felt the survey was biased, that is between 1.9% and 2.5%. Most of the comments that suggested bias asserted that there was a bias against animal testing (to review all of the responses to our survey, see Appendix E).

Our group undeniably has a certain perspective on the use of animals in experiments. After our reading and research we have become certain that animal testing is wrong. However, we did not create questions intending to skew the results – we had no plan to use the statistics or demographics obtained from the survey results. We were most interested in reading the longer answers to the final two questions. The answers to the final two questions were analyzed, and qualitative observations were made on the animal testing culture at WPI.

Throughout the survey we posed challenging questions to the respondent, and then at the end gave them textboxes where they could talk back to us about what had been going on in their heads during the survey. We would not be able to interview such a large number of people personally. We did, however, conduct a handful of one-on-one interviews with undergraduate students, graduate students, faculty, and professors. Much like in the other parts of the project, we wanted to take a more qualitative, ethnographic approach. We

believe there is value to the results of the survey, even if they do not follow traditional scientific surveying methods. In a subsequent section, we recommend that a future IQP group construct and run a more scientific study to compile more concrete statistics on the views of the WPI community. It would also be interesting to compare those results with the data we gathered.

Furthermore, it is important to understand that there currently exists an institutional bias in support of animal testing. Animal rights activists are often brushed off as sentimental "animal lovers" (Singer, 1975). The US government has even recently deemed animal rights activist "terrorists" (Philipkoski, 2004). There is no doubt that dominant culture is challenged by the pervasiveness of the animal rights critique. The critique challenges a number of traditional American institutions: vivisection, the meat industry, and fur and leather industry, etc. Relative to other schools, WPI is a rather politically apathetic campus (Princeton Review, 2007).

We had all of criteria described above in mind when crafting our survey. As discussed in our "Goals" section, we set out to encourage discussion in the WPI community about animal testing. In keeping with our goals, we intended to write a provocative and controversial survey that would invoke discussion among faculty, administration, and students at WPI. It was our intention to use our survey to encourage critical thought and to hopefully get more thoughtful justifications and/or critiques of animal testing in the longer-answer questions. On this topic, one professor said after taking the survey, "I think your IQP is the best kind, [it] has the potential to spark a real debate and maybe change policy on campus."[18]

[18] See Appendix B, E-mail from Professors

One respondent did not like that we did not include "it depends" as an option more often:

> Your questions do not allow for 'depends on the situation' as an alternative to all questions, suggesting a biased questionnaire.[19]

We included "it depends" as a choice answer for some questions, but not in the questions where we felt we gave respondents enough detail about the situation to make a discrete judgment. For example, in the question about the medical benefit of animal testing we made a point of addressing the fact that there are some scientists who disagree that animal testing has a medical benefit to humans. We made a point of asking respondents to disregard that fact and answer assuming that in the particular situation animal testing did have a medical benefit. We felt that allowing respondents to answer "it depends" to this question did not make sense, because we believed we had given a full enough description of the situation. However, having more choices on the survey would surely have improved it. We tried to construct the questions and sufficient answers in such a way that we felt we would not need to include "it depends" as an option by providing enough context for people to make an informed decision on their views on the situation, and avoiding "easy" or "deceptive" answers. The animal testing debate is sometimes reduced to absurdity by framing it solely as a choice between saving a blond-haired, blue-eyed young girl or a simple mouse. Every year, millions of animals are killed in cosmetic testing: the testing of household products such as shampoo, lipstick, and bleach. The debate is not solely an issue of biomedical research.

It is also worth noting that there were some technical and time limitations on the survey as well. Most online IQP surveys use SurveyMonkey.com, a service which will generate a webpage with your questions in an HTML form. We could not use

[19] See Appendix E, Question 11, Response #28

SurveyMonkey because the cost of their service was outside of the range of our (non-existent) budget. They do, however, offer a free service, but it unfortunately only allows one-hundred responses and ten questions per survey. We made the decision to draw on programming knowledge of the computer science students in the group to design our own survey. Within the time constraints and given our knowledge of databases, HTML, and JavaScript, we settled for only including text boxes as open answers for the last two questions, not as an option for every single question. There were further time constraints that we controlled – we chose to leave the survey open for completing for a limited time. By limiting the time we allowed for the survey to be taken we allowed ourselves ample time to analyze the data obtained from the survey. The manner in which we determined the cut-off time for taking the survey is by observing the declining frequency of people taking the survey per given time. Once we decided that survey-taking frequency was low enough, we cancelled the survey and left a note stating the survey's completion in its place.

Given our intentions for the survey and its time limitations, we developed a survey that gave us a good indication of the animal testing culture at WPI, though the survey may not have been regarded as entirely unbiased. Through this survey we were able to asses the animal testing culture at WPI and ultimately through this report we are able to share our analyses with the WPI and broader academic communities. This survey also aided in accomplishing one of the goals of increased discussion on campus pertaining to the topic of animal testing: during and after the surveying process we have observed and overheard increased discussion among students and faculty about the survey and in general about animal testing. We acknowledge that our survey was not entirely unbiased, and though we regret that many did not find our survey neutral we appreciate the information we obtained and the discussion it raised.

4. Findings

4.1 Animal Testing Culture at WPI

4.1.1 Analysis of Interviews and Findings

We conducted a handful of formal interviews with faculty and students. These interviews primarily occurred toward the beginning of the project. As we become more involved with the Animal Testing and Dissection Student Choice Policy, the topics of our meetings, for better or for worse, tended to focus more on the policy than strictly on the ethics of animal experimentation. Throughout all of our meetings we made a number of qualitative observations on the culture of animal experimentation at WPI, some of which were in line with Michael Lynch's paper on the issue. We noticed how scientists ritualized the act of transforming animals from "holistic" beings to abstract data, how language was used to obscure the reality of animal experimentation, and how "practical" considerations such as job security and "mortgage payments" played into scientists' moral judgment. In this section we will discuss each of these observations in detail.

Michael Lynch spent three years studying the daily lives of neuroscience researchers who routinely conducted experiments on nonhuman animals. As an anthropologist and ethnographer, he was most interested in the culture of animal experimentation. First of all, it is important to note the time period of his research. Lynch spent 1975-1977 observing his subjects. *Animal Liberation* by Peter Singer, one of the most influential animal right books ever written, was originally published in 1975. *Animal Liberation* is often credited with sparking the modern animal rights movement. Lynch's observations took place shortly before vivisection became such a hotly debated political issue. Now-a-days laboratories that use animals are much more likely to be more protective and restrictive than they may have

been in the mid-1970s. Lynch had a unique opportunity to observe researchers who engaged in vivisection before there was a public stigma associated with it.

Lynch discusses how scientists in the laboratory, perhaps unknowingly, differentiate between what he calls the "holistic" animal and the "analytic" animal. The holistic animal is the animal who is perceived as a complete being with thoughts and emotions, whereas the analytic animal is the animal who is represented by data, apparently void of thoughts and feelings. The irony, of course, is that Lynch is referring to the same animal in both cases. Although he refers to them by different names, he is only referring to the two different *perceptions* of the animal on the part of the researchers, one as a living, breathing, thinking subject and the other as a piece of laboratory equipment. We noticed this differentiation persists among scientists to this day. In one of our interviews we noted that the professor would change the pronouns that they used, depending on the human-assigned role of the animal. When they were talking about pets – animals used for companionship – they used gendered pronouns: he or she. Whereas when they referred to animals used for science, they refer to them with the neutral pronoun: it. This is an example of how one animal can be perceived as a subject and another as an object, even if there is no difference between the two animals, beside his or her human-ascribed purpose.

Lynch also observed that through a series of ritualized behavior, animals used in laboratories are "progressively transformed from holistic 'naturalistic' creatures into 'analytic' objects of technical investigation" (Lynch, 1987, p. 266). He argued that this is done in much the same way as a religious person might follow a ritual. Scientists who use animals in laboratories follow a certain procedure to transform the profane into the holy, the animal subject into the animal object. Carol Adams also discusses this idea as it pertains to the consumption of animals. Adams argues that animals killed for food under go "thingification"

in order to be rendered into a product, meat. (For more on Carol Adams and "thingification" see the section "Patriarchy and Speciesism"). The word "sacrifice" is universally used to mean "kill an animal subject." There is a certain irony in the fact that scientists would use the religious language to express their scientific endeavors. After all, scientific explanations of the universe are generally directly at odds with faith-based explanations.

Language is powerful. By wording something in a certain way one can make it sound acceptable or questionable. In our writing we have attempted to use a matter-of-fact language to describe what happens in animal experiments. Sometimes this blunt language puts people off. We received a few comments about our survey suggesting that, based on the language we selected to use, the survey was biased. In order to address this claim, it is important to realize the breadth of the institution bias is in *support* of animal experimentation. During our interviews every person we talked to used the word "sacrifice" as a euphemism for killing an animal in an experiment. Some have argued that our use of the word "kill" in the place of "sacrifice" indicates that we are biased. This is not the case, "kill" is as value-neutral of a word as we could find. We purposefully avoided language that obscured reality. To say that an animal was "sacrificed" for an experiment implies that the experiment had a greater purpose. This is not necessarily the case; we need not look any further than the testing of household chemicals to find some of the more frivolous animal experiments. No doubt the researchers who killed animals in these tests also referred to their lives as a "sacrifice." Likewise we did not choose to use loaded word such as "murder" or "harmed in animal testing." The fact is that animals are killed for dissection and animal testing. In order to have an honest debate about the ethics of animal testing it is imperative that we use more value-neutral language. Using words like "sacrifice" only perpetuates a culture where

scientists feel justified in thinking of animals used in science as *ontologically* different from the dog or cat at kept as a companion as home.

4.1.2 Reflection on Establishing the Student Choice Policy

As of the writing of this paper, the student choice policy is somewhat in limbo. Although key members of the faculty, administration, and student government have voiced support for the policy, the future of the policy is somewhat unclear. The faculty committee on academic policy have recently decided that they do not currently want to hold a faculty vote on the matter. They plan to wait until they are confident that the policy would pass without a hitch. Unfortunately, they do not currently believe that a faculty vote would garner enough support to pass a resolution and enact the policy. For much of the past year the policy has seen nothing but growing support, and that is still the case. We believe that it is only some small kinks that need to be worked out before the policy is ready to be voted on. There are a number of reasons why this policy has been difficult to pass. In this section we will discuss some of the difficulties and successes that we had throughout the project.

Difficulties

For the most part, the student choice policy has been very well received and has a wide base of support. Many students, faculty, staff, alumni, and administrators have voiced supported for the spirit of the policy, but some have had specific recommendations and/or concerns. Some professors have been concerned that the policy may come at the expense of professors' academic freedom. We have also heard that some have felt that we did not seek enough input from the faculty before making a formal presentation to CAP. Others were disappointed that we did not incorporate all of their recommendations into the policy proposal. Despite some hitches, we still firmly believe that it is possible to create a student choice policy with which everyone involved is happy. Most of the difficulties stemmed from the fact that there was not an abundance of time for the project.

There were a few cases where people voiced concerns about the academic freedom of the faculty. They were afraid that the student choice policy would limit the freedom of professors to teach course material in the best way that he or she sees fit. We too believe that professors need to have the widest latitude possible to teach their students. However, it is not as though there are no limits whatsoever. WPI has made it very clear that discrimination based on skin color, ethnicity, religion, sexual orientation, or sex is not acceptable in any situation. It would unacceptable for a professor to ostracize a student based on any of those traits. In fact WPI even has an anti-discrimination policy that each employee is required to follow. It states:

> It is the policy of WPI that all our employees should be able to enjoy a work environment free of disruptive elements (e.g. noise, scents, etc.), discrimination and harassment. This policy refers to, but is not limited to, harassment in the following areas: (1) race, (2) sex, (3) age, (4) color, (5) national origin, (6) religion, (7) handicap, (8) marital status, (9) sexual orientation, and (10) veteran status. Harassment includes display or circulation of written or electronic materials or pictures degrading to either gender or to racial, ethnic, or religious groups; and verbal abuse or insults directed at or made in the presence of members of a racial, ethnic, or minority group (WPI, 2006c).

It is also mandatory that all clubs and campus organizations have an anti-discrimination policy included in their constitution. The student choice policy is much in same vein as these other anti-discrimination policies. It could be argued that any anti-discrimination policy limits the freedom of a professor; however, such an argument would not be given much weight. Of course it is somewhat true that the animal testing and dissection choice policy will somewhat limit freedom of the professor to teach in any way he or she pleases, however the "loss of academic freedom" in turn give much more religious and moral freedom to the student body. This sort of situation is a balancing act. Students should have the right to religious and moral freedom, but professors should also have the right to academic freedom.

In this particular case, since the student is the main focus of learning, we believe that the student should be given precedence. It is important to recognize the professors' rights, but we are of the opinion that in a classroom setting students should be the focus. The proposed policy would by no means force professors to teach certain material or exclude certain material from being taught. The policy simply allows for the case where a student has a sincere moral or religious objection to the use of animals in a classroom exercise. We think in this specific case the rights of the student outweigh the rights of the professor.

Another problem we encountered during the push for the policy was that every person we talked to wanted to take the policy in a slightly different direction. When we had a group meeting with the key faculty in the biology department they gave us great feedback and had us make a few minor changes to the policy. When we took those changes to the person we had been talking with in the biomedical engineering department, he wanted us to remove all of the changes. Without being able to have everyone in the same room at the same time, it sometimes made revisions a headache. Often times the discussion about the policy, unfortunately, became a debate about wording or tone, which were unimportant to us. In fact, in an attempt to avoid semantic arguments, we added a preamble to the policy proposal. It read:

> Throughout our meetings with faculty and discussions with students we discovered that this is an important and personal issue for everyone. We found that everyone involved generally agrees upon the spirit of this policy. However, as with any policy, there are some minor disagreements on the specific wording. The sample policy below is open to change in wording and other minor changes as long as the general spirit of the policy remains intact.
>
> There are core principles that should be included the policy to ensure that the spirit of the policy remains intact. These principles ensure that all students should:
>
> - be well informed of their right to choose an alternative

- be entitled to an alternative assignment that does not involve the use of animals, regardless of religious/moral views
- not feel forced to complete any assignment that involves animals
- not be punished for choosing an alternative assignment, nor should students be rewarded for choosing the assignment that uses animals

The policy that we proposed was never meant to be the final revision. We refined the sample policy as much as possible before bringing it to the attention of CAP, but we do not expect that it will remain exactly the same after comments and edits have been made by the faculty at large. The fact is that we are not experts at creating new policy. We identified a problem and tried out best to address it with a sample policy, but we do not have the same experience as the members of the faculty's CAP or the student government's CAI. We are most interested in enacting a policy that addresses the core issues of the student choice policy. We will still be satisfied with if that policy ends up looking completely different than the one we proposed. As long as the spirit of the student choice policy remains intact, we will be happy.

At times it was difficult to move forward with the policy because we got the feeling that we were considered "outsiders" by faculty. It is true that there were a number of times where we were unaware of internal departmental issues, but we tried our best to talk to everyone we could. When we were told that a certain professor was the best to talk to about how the policy would work with the biomedical engineering department, we set up a meeting with him. We tried to follow every lead we could, we unfortunately could not talk to every single bio professor individually. In an attempt to the narrow scope, we began read through old MQPs and IQPs in order to determine which professors had sponsored projects that involved animal experimentation. There were also a series of debates on the issue of animal experimentation that were sponsored by two professors in the biology department and one in the humanities department. We talked to both biology professors about their

views on animal testing, their experience, and asked for their input on the policy. We made a strong effort to include the voices of anyone who has a stake in the matter. We set up dozens of individual meetings with faculty in the biology, biochemistry, and biomedical departments. We talked to the head of the biology department, the person in charge of laboratory work, the professor who conducts the majority of animal testing laboratories on campus, the provost, the dean of undergraduate students, the student committee on academic issues, the president of the student government association (SGA), as well as a number of individual SGA senators, the chair of the faculty committee on academic policy (CAP), a number of current and former CAP members, bioscience graduate students, teaching assistants in the biosciences departments, and undergraduate students from every major. We even tried, without success, to meet with the WPI President, Dennis Berkey. For three terms--five calendar months--we held bimonthly info-sessions and discussions, where we invited all members of the WPI community to give us input on the policy, as well as to discuss the ethics of animal testing and dissection. We had over 150 people come out to our info-sessions and over 200 people sign our petition. We encouraged everyone who wanted a say in the matter to come to our meetings to help us put together a good policy proposal. Ideally we would have loved to include everyone in the process; however, despite our strongest efforts to be accessible to the whole community, we did not have a chance to talk to everybody.

Successes

Despite some of the difficulties and even though the animal testing and dissection choice policy is not yet enacted, we believe the IQP has generally been successful. There has undeniably been much more discussion on campus about animal testing and dissection on campus. A handful of people—students, alumni, and faculty—sent us emails thanking us for

the doing the project and for pushing for the student choice policy. The student government voted almost unanimously in support of the student choice policy, only one person did not vote for it. We organized a talk on the topic of alternatives to dissection and animal testing, which was attended by laboratory instructors and professors in biology and biotechnology department. Our provocative survey spurred many discussions about animal testing. We received emails from many people who were unaware that WPI even conducted animal experiments before taking our survey or attending an info-session. As a result of our project, and even without a formal policy, we have heard from students in the biology and biomedical departments that more students are speaking up and requesting alternatives.

Although the IQP is completed and the paper written, we will still pursue the policy. At this point, it should only take a little more work to make sure the policy has enough support to pass a faculty vote. Furthermore, judging by how many students have signed the petition and have shown their support for the policy, it should not be difficult to find students willing to spend time talking to faculty and work on getting support for the policy.

4.1.3 Analysis of the Survey

On April 17, 2007 we sent out an online survey to email lists of all undergraduates, grad students, faculty, staff, and email lists for students in their major. After 5 days we closed the survey with 804 responses. To put this in perspective, in 2007 WPI has 2,861 undergraduates, 1042 full- and part-time graduate students, and 324 full- and part-time faculty members (WPI, 2006d). That is a total of 4,227 people, which means 804 responses represent approximately 19% of the WPI community.

The responses to our survey indicate a campus with very diverse beliefs on the subject of animal testing. Some respondents indicated that they were entirely unaware that WPI even conducted animal testing at all. Others were outright hostile in their comments, some even suggesting that concerns for animal welfare are unimportant. We noticed that although a majority believe that animal testing was justified in the case of medical testing, a majority also came out against cosmetic testing. We were also interested to find that nearly all bioscientists were aware of animal testing but that much fewer non-bioscientists were aware of that fact.

The graph below shows that a majority of respondents believed that if an animal experiment were to yield medical benefits for humans, they would support it.

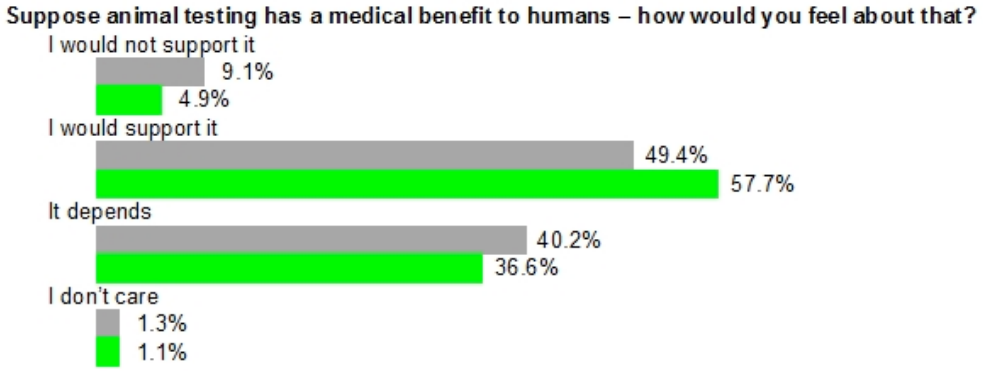

Fig. 4.1: Gray represents everyone. Green is only those respondents who indicated that they were in the biosciences.

As shown below, 63.3% of everyone surveyed was against cosmetic testing, 22.7% supported cosmetic testing and 14% said that didn't care.

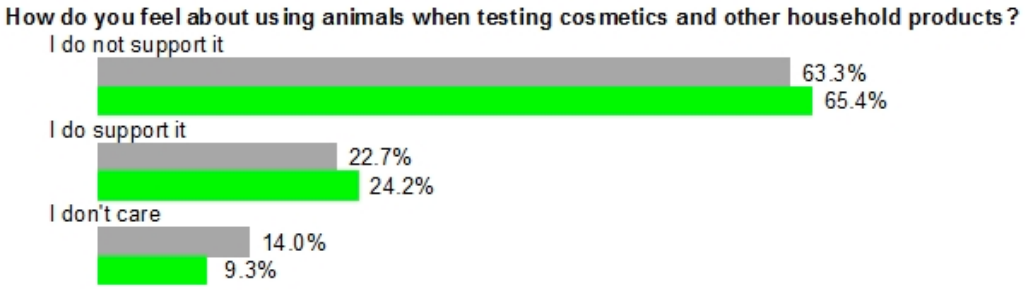

Fig. 4.2: Respondents who agree/disagree with cosmetic testing. Gray represents everyone. Green is only those respondents who indicated that they were in the biosciences.

It is also interesting to note that there was a lower percentage of bioscientists who did not care, a higher percentage of respondents in the biosciences fields who were against cosmetic testing, as well as a higher percentage who are in support of it. Despite this intriguing difference, the ratios of the two populations are roughly equal. For the entire population there were 2.8 people against cosmetic testing for every person in support of it, whereas for the subset of population who identified as bioscientists there 2.7 against cosmetic testing for every person in support of it. Many respondents indicated that they

were against cosmetic testing, but believed that animal testing was justified in some cases. One person said:

> All other sources of experimentation should be exhausted before testing on humans. For example, cell cultures can be used for a lot but not everything. **I do support it because animal testing is a critical step in testing products.** I mean, we could jump right to human testing; I've got no qualms with that so the people who are against animal testing under any circumstances can volunteer if they wish. Also, testing on animals for cosmetics is just pointless and unnecessary. **Scientific research and medical research are the only acceptable forms of animal testing to me, and only if it is necessary.** Dissecting something just to dissect it for a 2000 level lab is pointless and students should have the opportunity to do something else.[20]

Another respondent also said that he or she supports animal testing in the case when it could result in a cure for disease, but not when testing cosmetics or household products:

> For the record, this survey is very slanted. The questions clearly indicate to me that the group is opposed to animal testing. In the future, when preparing surveys, it would be good to work on non-leading questions that do not give away your position. Now, to answer the question you asked, I do believe that research on animals has led to discoveries that are beneficial to humans in terms of battling chronic diseases. **As someone who suffers a chronic disease, I must support research that might someday provide me with a cure.** No doubt that sounds selfish, but I do believe that the health and welfare of millions of people trump the rights of the laboratory animals. **I do not condone animal testing on products for cosmetic or household use, as that is not a life-saving situation.[21]**

Here is another:

> I believe that as animals, both human and non-human, there are sufficient commonalities in our biology such that research on both types of animals can yield benefits to both groups. I tend however to reserve this category for significant issues, such as research into disease. Cosmetic testing on animals is not something I support because the end result cannot be mutually beneficial. I also believe humans should be used as test subjects wherever possible.[22]

Some, however, did not believe that potential human benefit was sufficient reason to support animal testing. One person said:

> Most of it is just wasting life, especially the testing for cosmetics and household stuff. How much of the medical testing is really necessary or results in treatments beneficial to humans??? A very small fraction, I would guess. Breeding animals for the sole purpose of experimentation is immoral, in my view.[23]

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[20] See Appendix E, Question 11, Response #59 (bold emphasis added)
[21] See Appendix E, Question 11, Response #81 (bold emphasis added)
[22] See Appendix E, Question 11, Response #289
[23] See Appendix E, Question 12, Response #31

It was also interesting to find that a majority of respondents were aware of animal testing occurring on the WPI campus, although it is important to note that of the 182 bioscientists who responded, 92% of them were aware of animal testing. This high percentage would increase the percentage of the general body who are aware that animals are used in experiments and killed at WPI. As shown below, 61.8% of the entire sample population indicated that they were aware of animal testing and 38.2% indicated that they were not. This sharply contrasts with the fact that a very high percentage of bioscientists, 92%, indicated that they were aware of testing on campus. Based on this we would recommend a greater effort to inform the WPI community about ongoing live animal testing and dissection.

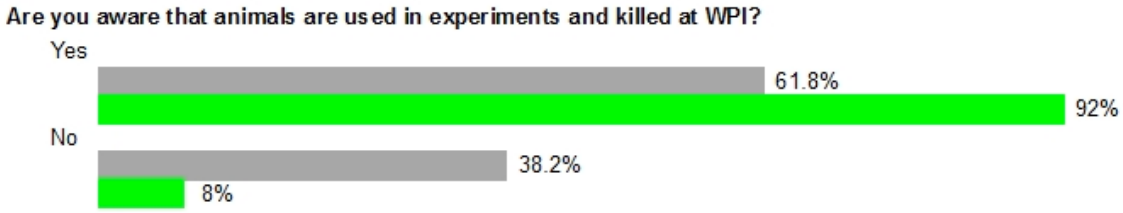

Fig. 4.3: Respondents who were aware/unaware that animals are used in experiments and killed at WPI. Gray represents everyone. Green is only those respondents who indicated that they were in the biosciences.

For more graphs summarizing the data, please see Appendix E.

4.2 The Case for Abolishing Animal Testing

4.2.1 Defining Rights

For the sake of clarity it is important for us define what we mean when we refer to 'rights' in this paper. When we refer to animals' rights, we are certainly *not* asserting that animals ought to have exactly equal rights to humans. As Peter Singer points out in *Animal Liberation*, "there are obviously important differences between humans and other animals, and these differences must give rise to some differences in the rights that each have" (Singer, 1990). In order to achieve animal equality it would not require exactly equal rights for humans and other animals. For example, it would be meaningless to give a dog the right to vote, since no dog has the means to exercise that right. "The basic principle of equality does not require equal or identical treatment; it requires equal consideration" argues Singer. This is at the core of the argument for the rights of animals.

Throughout this paper when we refer to the rights of animals we are not referring the right to vote or the right bear arms. We are instead referring to rights that correspond to specific animals' interests. For example, since animals have nervous system much like our own, it can be inferred that they most likely suffer as we do. Animals have the capacity to suffer both physically and mentally, hence animals have an interest in being free from suffering. From this we argue that animals deserve to be free from intentional harm inflicted upon them by humans.

4.2.2 The Debate

In our society, humans have rights, but nonhuman animals do not. Some nonhuman animals have some legal protections concerning how they can be treated, but they are legally considered property. There have been a number of efforts to change the legal status of an animal from property to a legal person, most notably in Australia. However in most of the world, the basis for granting rights is currently membership in the species *Homo sapiens*. While it is important for us to make the case for granting rights to nonhuman animals, we feel that the burden of proof should more greatly lie with the case against animal rights. In other words, animal testing must be justified not by its benefit to humans, but by proving that animals are not deserving of rights. Peter Singer claims:

> To avoid speciesism we must allow that beings who are similar in all relevant respects have a similar right to life – and mere membership in our own biological species cannot be a morally relevant criterion for this right.

To simply say that humans are the only animal deserving of rights because they are human is not enough. This is not a just reason anymore than giving rights to only white humans simply because they are white or giving rights to only men because they are men. Speciesism is as arbitrary a distinction as racism and sexism. When we conducted a survey of the WPI community, we asked a series of challenging questions that culminated with our respondents who were in favor of animal testing, being asked to defend it. We asked:

> *If you support animal testing what makes it acceptable to test on animals? Specifically, what makes non-human animals sufficiently different from human animals to justify testing on them, while at the same time sufficiently similar to yield relevant data?*[24]

These questions were designed to challenge the respondent to provide the case for which nonhuman animals could justly be deprived of rights. We received many responses in defense of animal testing, but very few responses actually provided a reason that nonhuman

[24] See Appendix E, Survey Questions and Possible Answers

animals had no claim to rights. The benefits of nonhuman animal testing cannot be used to justify depriving nonhuman animals of rights for the simple reason that it does not cite any morally relevant difference between human and nonhuman animals. We would surely benefit if we tested on other humans against their will, but the human morality and consequently our law has identified that as unjust. Human slavery was of tremendous benefit to those humans who were not enslaved, yet it has almost entirely been eliminated worldwide because it is immoral (Wise, 2002).

Other rationales cited moral relativity along the lines of "Just about everyone, with few exceptions, eats meat."[25] This is not a valid criterion for denying rights to nonhuman animals; it merely raises the question "should we be eating meat?" The fact that a majority of people eat animals does not in any way justify further exploitation of animals. One survey respondent cited his belief that humans have God-given dominion over animals claiming:

> I believe that there is a very clear difference between humans and animals - in ALL cases. As someone who believes that humans were created in the image of God, I believe that we have been set above all animals and that it is OK to use animals to further the human cause. That is not to say that I think it is OK to abuse animals and kill them for no reason.[26]

We are not in a position to argue religious dogma as there is no definitive evidence on either side of belief, and it is an entirely separate philosophical debate in of itself. However, as we live in a secular society, we need a secular means of treating nonhuman animals. Similarly we have secular law in regards to slavery and secular law in regards to women's rights (Wise, 2002, p. 19). If someone were to make a religious argument in support of human slavery or against the rights of women, we would most likely not lend much credence to their argument.

[25] See Appendix E, Question 11, Response #19
[26] See Appendix E, Question 11, Response #22

Some who argue against the animal rights position cite some type of "natural order" as their rationale, the idea that human use of animals is simply the way things are and are supposed to be. We have identified some of these "natural order" rationalizations to be that laboratory animals are "bred for a purpose" or also that we are playing by the rules of nature or evolution (i.e. "Survival of the fittest").

> The animals used for testing are bread [sic] for that reason. They should be treated humanely in laboratories. To a certain extent testing and educational demonstrations are done with humans and cadavers as well, however terminal experiments are not done on humans because they are not bread [sic] for this reason.[27]

To cite a human assigned purpose for animals as justification for that purpose is circular reasoning. To paraphrase, animal testing is justified because humans decided that using animals is justified. "Survival of the fittest" cannot be used as a justification as we do not allow stronger humans to enslave weaker ones. Similarly we would not allow one human who happens to be more intelligent than another use the less intelligent in any where he or she deems appropriate. These reasons are not be valid criteria for denying rights to animals, as they are not consistent with our criteria for granting rights to humans (all humans) (Wise, 2002).

The remainder of the arguments cited one of a number of qualities that supposedly all humans have and all nonhuman animals do not. Steven Wise argues that in order

> ...to avoid speciesism and still justify depriving every nonhuman animal of rights, we must identify some objective, rational, legitimate, and nonarbitrary quality possessed by every *Homo sapiens,* but possessed by no nonhuman, that entitles all of us, but none of them, to basic liberty rights (Wise, 2002, p. 24).

The importance of this lies not only in identifying a quality that humans have and nonhuman animals do not, but also in determining that whatever criterion is proposed also be a criterion for granting or denying rights to humans. For example, were it to be determined

[27] See Appendix E, Question 11, Response #82

that humans are the only animal that walks on two legs, it would not be sufficient to say that nonhuman animals do not deserve rights because they do not walk on two legs. The ability to walk on two legs, although in this hypothetical case is a characteristic that distinguishes humans from nonhuman animals, is not a valid criterion for denying rights, because there exist humans who cannot walk or are missing legs but are still given rights. Here we will search for such a quality and evaluate the rationale and shortcomings of each. We see the most common qualities believed to set us apart from animals to be intelligence, self consciousness, emotions, pain, and language.

Human intelligence is certainly the most standout characteristic and most likely candidate for the criteria for human only rights. However, humans vary greatly in intelligence, ranging from genius to severely retarded and even vegetative. Humans possessing limited and nonexistent cognitive ability are still accorded the same rights as a super genius. Intelligence, even if it is shown to set all humans above all human animals, is not a valid criterion as humans are not denied rights based on their intelligence. That said, plenty of scientific evidence suggests that many animals possess intelligences comparable to children. Koko, the world famous signing gorilla, consistently achieved scores between 70 and 95 on standard human child intelligence tests (Wise, 2002, p. 230). If we cannot accept a nonhuman animal's intelligence score as valid evidence of nonhuman animal intelligence, then surely we hold nonhuman animals to higher standards than we hold people. Charles Darwin said that "[a]n American Monkey, an Ateles, after getting drunk on brandy, would never touch it again and thus was wiser than many men" (Darwin, 1871). More importantly, Darwin argues against grouping humans separate from nonhuman animals on the basis of intelligence:

> **Some naturalists, from being deeply impressed with the mental and spiritual powers of man, have divided the whole organic world into three kingdoms, the Human, the Animal, and the Vegetable, thus giving man a separate kingdom. Spiritual powers cannot be compared or classed by the naturalist: but he may endeavor to shew, as I have done, that the mental faculties of man and the lower animals do not differ in kind, although immensely in degree. A difference in degree, however great does not justify us in placing man in a distinct kingdom, as will perhaps be best illustrated by comparing the mental powers of two insects, namely, a coccus or scale-insect and an ant**, which undoubtedly belong to the same class. The difference is here greater than, though of somewhat different kind from, that between man and the highest mammal. The female coccus, whilst young, attaches itself by its proboscis to a plant; sucks the sap, but never moves again; is fertilized and lays eggs and this is its whole history. On the other hand, to describe the habits and mental powers of worker-ants, would require as Pierre Huber has shewn, a large volume; I may, however, briefly specify a few points. Ants certainly communicate information to each other, and several unite for the same work, or for games of play. They recognize their fellow-ants after months of absence, and feel sympathy for each other. They build great edifices, keep them clean, close the doors in the evening, and post sentries. They make roads as well as tunnels under rivers, and temporary bridges over them, by clinging together. They collect food for the community, and when an object, too large for entrance, is brought to the nest, they enlarge the door, and afterwards build it up again. They store up seeds, of which they prevent the germination, and which, if damp, are brought up to the surface to dry. They keep aphides and other insects as milch-cows. They go out to battle in regular bands, and freely sacrifice their lives for the common weal. They emigrate according to a preconcerted plan. They capture slaves. They move the eggs of their aphides, as well as their own eggs and cocoons, into warm parts of the nest, in order that they may be quickly hatched; and endless similar facts could be given. **On the whole, the difference in mental power between an ant and a coccus is immense; yet no one has ever dreamed of placing these insects in distinct classes, much less in distinct kingdoms. No doubt the difference is bridged over by other insects; and this is not the case with man and the higher apes. But we have every reason to believe that the breaks in the series are simply the results of many forms having become extinct** (Ibid, p. 147).

As Darwin points out, the intelligence of many humans may be greater than that of most animals, but there is no fundamental difference in the kind of intelligence. Since nonhuman animals have been shown to have at least some intelligence, and since all humans are given rights regardless of their intelligence, intelligence is not a suitable criterion for denying rights to nonhuman animals.

Similarly self-consciousness cannot be the basis for granting rights to humans since there are a number of humans who through neurological disorders or injury do not have self-consciousness. Self-consciousness is defined as the awareness that one exists and is an individual being (Merriam-Webster). The standard test for self-consciousness among animals and people is termed the Mirror Self Recognition test or MSR (Wise, 2002, p. 36). There is debate on both sides over whether or not the MSR accurately reflects an animal's self-consciousness. A number of animals species have had members that "passed" the MSR.

The idea behind the MSR is that when the subject is not looking, some kind of mark is placed on their body. Then he or she is presented with a mirror. If he or she attempts to investigate the mark on their own body, then it is likely that the subject has a sense of self (Wise, 2002). One problem with this test is that it cannot serve to disprove self-consciousness but only to provide strong evidence in favor of self-consciousness. In order to pass the test, it is likely some concept of a self is required, but the test may also require an understanding of how mirrors work (Ibid). The MSR might also fail as it may be possible to have a self and experience a self without having a concept of a self. It also may not be sufficiently interesting for some animals. Some counter that the MSR test is not indicative of self-consciousness at all and that it tests something else. This argument is used against the notion that nonhuman animals have self-consciousness. The problem with this argument is that it cites a lack of evidence rather than evidence to the contrary. Self-consciousness in humans cannot even be conclusively proven in any test (Singer, 2004). To say that nonhuman animals do not have self-consciousness because of a lack of evidence, while maintaining that humans do is a logical fallacy. Additionally, since one is not required to prove that he or she has self-consciousness in order to receive rights, it is therefore arbitrary to require animals to prove self-consciousness in order to receive the same rights.

Today, very few will deny that nonhuman animals feel pain and have emotions similar to humans. On nonhuman animal pain and emotion, Charles Darwin said:

> The lower animals, like man, manifestly feel pleasure and pain, happiness and misery. Happiness is never better exhibited than by young animals, such as puppies, kittens, lambs, &c., when playing together, like our own children. Even insects play together, as has been described by that excellent observer, P. Huber, who saw ants chasing and pretending to bite each other.
>
> The fact that the lower animals are exited by the same emotions as ourselves is so well established, that it will not be necessary to weary the reader by many details. Terror acts in the same manner on them as on us, causing the muscles to tremble, the heart to palpitate, the sphincters to be relaxed, and the hair to stand on end (Darwin, 1871. p. 38).

Even in 1871, when Charles Darwin wrote his *Descent of Man*, a controversial book explaining the origins of humans, he felt it obvious that animals feel pain and have emotions. Darwin did not even feel a need to justify this position. Since then a great deal of evidence has emerged to support this. Dolphins, elephants, chimpanzees, and many other animals have been known to mourn their dead (Masson, 1995). Experimenters have been able to induce depression in dogs and monkeys (Ibid). It is clear pain and emotion are not exclusive to humans, nor would we deny a human rights if they could not feel pain or emotion. It is therefore clear that claiming that animals do not suffer or have emotional lives cannot be used as a justification for nonhuman animal testing.

Often it is suggested that human language is a sufficient difference. Human language might seem a significant difference, but we do not deny rights to humans who cannot speak. Also, there is significant evidence to suggest that many animals not only communicate with each other, but are capable of learning human language. Chimpanzees, gorillas, orangutans and other primates have been able to not only learn to communicate with sign language, but also to understand human speech even though they cannot speak in the same manner (Wise, 2002). Some signing apes have even been observed teaching sign language to their children (Wise, 2000).

What we argue here is that humans and nonhuman animals be given equal consideration in deciding whether or not they deserve rights. Simply put, for whatever quality humans possess that they have rights, animals should be granted or denied rights based on whether or not they possess that quality. Having identified no quality that is exclusive to all humans and absent in all nonhuman animals that is a valid criteria for granting or denying rights, it is clear to us that rights cannot be exclusively held by only members of the species *Homo sapiens*.

4.2.3 Patriarchy and Speciesism

The abolition of animal testing is just one facet of a larger endeavor – to liberate animals from exploitation. Comparisons between the animal rights and women's rights movements have been made to show that these two movements are very similar. In our society, both animals and women have been made inferior as a result of patriarchy. The liberation of animals and the liberation of women are two intertwined struggles that are so closely related that one cannot be accomplished without the other. To completely abolish animal testing as a part of the liberation of animals, one must understand that the liberation of women must also be accomplished.

In today's modern society one may feel that the liberation of women, that feminism, is no longer necessary, that sexism no longer exists. After all, the United States Government has a couple of pieces of legislation protecting the welfare of women – the Nineteenth Amendment which gives women the right to vote (NARA, n.d.) and the Civil Rights Act of 1964 which outlawed the discrimination of people based on several factors including gender (CongressLink, 1964). Other smaller entities (schools, colleges, universities, workplaces, etc.) also have their own policies governing the intolerance of sexual discrimination. WPI, for example, has an anti-harassment policy that is supposed to ensure an environment free of discrimination which includes gender discrimination (WPI, 2006a). However, regardless of these laws and policies, sexism still exists in the United States and elsewhere. Patriarchy persists due to the strong correlation between the treatment of women and the treatment of animals.

The unfair treatment of animals and women in comparison to men has its deep roots in our society through Judeo-Christian tradition. The Hebrew Bible and the way the Church had interpreted the Bible to early Christians was one of the primary causes of how this unfair

treatment had been so deeply established. In the book of Genesis God created the universe, the earth, life on earth, and then:

> …God said, Let us make man…and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth (Genesis 1.26).

From this passage men assume that they have been given by God the right to have complete dominance over all living things, over all the animals on earth – animals are worth less than men because they were created for men. Further in the book of Genesis, God created woman:

> And the rib, which the LORD God had taken from man, made he a woman, and brought her unto the man (Genesis 2.22).

It was explained to women that because woman was taken from a *part* of man, that women are *less* than men, that women are *less* than human. The manner in which Genesis was written indicated the prejudice men have had over women, and the prejudice humans have had over animals. The Church explained to Christians that men have dominance over animals and women as described by the Bible. This prejudice has carried on up to this day where we call it sexism and speciesism.

Sexism and speciesism in our society is further reinforced by language usage. There are numerous examples in multiple languages in which women and animals are objectified by using labels for women and animals interchangeably. In Latin, the word for wolf is *lupa*. *Lupa* is a homophone, it is also the Latin word for whore (Antonio, 1995, p. 222). Similarly in Tagalog, *puta* is a homophone for bitch, whore, and a traditional Filipino dessert. Joan Dunayer further explains the transitive properties of language usage. For example calling an attractive woman a foxy lady: if *woman=fox* and *fox=prey* then *woman=prey* (Dunayer, 1996, p. 16). In these sets of transitive equations, the woman is transformed into a hunted animal and

the animal is given feminine qualities – this reestablishes the dominant relationship that men assume they have over women and animals. Similarly, if *woman=dessert* as well as *woman=meat(prey)* then women and animals are simply reduced to an object of consumption for the appetites of men. Some women may try to evade negative association with animals in relation to their gender by statements such as "I want to be treated with respect, not like some animal!" (Dunayer, 1995, p. 19) but such statements suggest that it is okay to treat animals negatively, as long as women are not victims of negative treatment. This approach as an attempt to level the grounds between men and women is an inappropriate one because as long as our society continues its Judeo-Christian traditions and colloquial language usage then women will always be associated with animals in a negative fashion. One can bring up that this case of animal labeling is not sexist. Men are sometimes given animal labels as well – *chauvinist pig* for example (Dunayer, 1995, p.18). This, however, does not detract from the fact that this sort of labeling is still speciesist; the connotation in which this animal label is used is a negative one. Though the negative use of animal labeling of men exists, it is far more prevalent in the labeling of women. Furthermore, when there *is* prevalent use of animal labeling of men, the labeling is used in a manner that boosts a man's image, esteem, and feeling of dominance. For example the phrases "hungry as a wolf" or "big as a bear" reinforces a male's sense of masculinity and dominance. The use of language reinforces sexism and speciesism by correlating words used for women and animals in a negative manner. This sort of language usage also contributes to objectification of women and animals.

Objectification is what Karl Marx calls *reification* and what Carol Adams calls *thingification* (Adams, 2003, p. 22). Adams more eloquently elaborates on *thingification* and calls it the "formula for the absent referent" (Adams, 2003, p. 23). The purpose of the formula

for the absent referent is to separate the living thing (the woman, the animal) from the object that it is commodified for the consumption of humans, and more specifically for the consumption of men. The formula for the absent referent is given by:

> nonhuman/or human substitute + butchering = "meat"/consumable flesh/mass term/destruction of subject status (Adams, 2003, p. 25)

In Adams' formula, "butchering" does not necessarily always have to mean the literal butchering of animals for meat. Butchering can refer to the way women are presented in the media, the way animals are "sacrificed" in science – butchering can refer to any action which transforms an abstract living being into a consumable object, or "consumable flesh" as it is in Adams' formula. As with the term "butchering," the term "consumable" that Adams uses does not mean literal consumption through the mouth into the gut, it also means any use of the objectified being.

An important constant in Adams' formula for the absent referent that aids in further describing the consumable flesh is the "mass term." A mass term is something that remains the same regardless of the quantity of it (Adams, 2003, p. 22). A simple example that demonstrates the meaning of mass term would be color: if one adds the color blue to the color blue, the end result is still blue. The quality of the mass does not change with respect to the quantity of the mass. Mass terms are what animals and women become after having gone through the process of butchering. Butchering (objectifying, *thingifying*, etc.) animals and women removes the unique traits and qualities that they once possessed. So with Adam's formula for the absent referent, *someone* (an animal, a woman) is transformed into *something* (a mass term, consumable flesh).

Women as a mass term can be observed in the media: the periodicals section of any store will have rows upon rows of many different magazines with covers that portray a

typical male's fantasy woman. She is likely to be blonde haired, tan skinned, and probably wearing a string bikini or lingerie. The individual unique qualities of each of the women in the magazines are not factors in the sum because these qualities were stripped from each woman when she became commodified into a consumable image.

Related to women in the media, women's fashion contributes to commodifying women into a mass term. There are seasonal fashion trends that the media persuade women to follow. Though the primary objective of the fashion industry is probably to make money off of people, a by-product of the industry is that it creates a homogenous image of women. This commodifies women into a mass term because their individual qualities are lost when they follow a homogenized fashion.

Similarly, animals as a mass term can be observed in several cases. Regarding the farming of livestock, as the quantity of livestock increases from rural family farming to factory farming, the quality of treatment of the animals does not proportionally increase with it. For example, a hen in a battery cage on a factory farm has about 67 square-inches of space (sharing a 20-inch by 20-inch cage with about five other hens) but she needs about 300 square-inches of space to be able to flap her wings (COK, n.d.). A wild hen or a hen on a family farm would have much more than 300 square-inches to walk around, peck, dust-bathe, and flap her wings. It is also notable that in factory farming is it very often the case that it is the female farm animal that is exploited: a hen and her chicks and eggs, a sow and her calves and milk, etc. but it is not often the case where a male animal is exploited (Davis, 1995, p.193).

Regarding the use of animals in science, though animals (some animals, not all animals) are protected in the Animal Welfare Act, the act does not regulate or mention the quantity of animals used (USDA, 2006). The quantities of animals are not important in cases

such as these because the animals are commodified into mass terms and then depersonalized when they become used for science, education, research, etc. There are other aspects in the scientific field that correlate animals and women.

In the 1800s feminists already saw the link between women and animals. As discussed in the earlier section "Experimentation on Animals Historically," many women in the 1800s were involved in anti-vivisection campaigns (Birke, 1995, p. 34). In recent history women have not made many more significant connections with animals. However, the discussion up to this point shows that there is a correlation among animals and women, so why have feminists not yet made a strong connection to animals?

If women create a closer relationship to animals, then the status of women would be degraded to the status of animals (Birke, 1995, p. 35) because, as discussed throughout this section, our culture has shaped the ranking of animals in a way that their status is less than the status of human beings. Those who justify using animals in science did so by creating a large gap of separation between humans and animals. For example, in certain scientific disciplines today, animal physiology *and* behavior are grouped in biological science. However, human physiology is grouped in biological science, but human behavior has its own science. This separation of behavioral and physiological sciences in animals and humans reflects Descartes' philosophy that animals lack souls (Birke, 1995, p. 39). Part of Descartes' philosophy maintains that humans and animals are significantly different, aside from general biological functions, for animals lack the souls that humans have, and it can be said that Descartes' philosophy is strongly influential on our culture today. Culturally, men have always felt as if they were the pinnacles of humanness. Historically, women in some cultures were not considered fully human – that is, their value was less than that of men. Qualities that men have used to define themselves as men – strength, intelligence, independence, etc.

– have been observed in women, so the definition of human shifts to be able to include women (although women have status as persons, in our current culture the status of women is still not on par with the status of men). Similarly in animals, things we have traditionally used to define ourselves as persons – using tools, language, mathematics, etc. – have been apparent in other non-human species (Birke, 1995, p. 38), so the boundary of the definition of what is human has to shift even more. Yet the boundary between animal and human still exists, most likely due to human stubbornness and anthropocentrism. If feminists seek equality with men as human beings then the correlation between animals and women cannot be strongly maintained for the reasons discussed above.

Another aspect in biological science that overlaps with the treatment of women is bondage. One may wonder how bondage plays a common role in both the treatment of animals in biology and the treatment of women. Regarding the treatment of women, bondage obviously occurs in a pornographic setting. In pornography, "[w]hen women are shown in positions of bondage…the message to men is powerfully clear: submission…[is] acceptable;…women are inferior to men; animal-like" (Adams, 2003, p. 67). Regarding the treatment of animals in biology, the bondage occurs on the dissection table. On the dissection table, the position of animals in bondage demonstrates the same implications as women in pornography; it demonstrates the "analogy between the image of the dog strapped down for vivisection and images of the bondage of women in pornography" (Scholtmeijer, 1995, p. 232). Historically, the settings of pornography and dissection were established and controlled by men, and currently men still generally control these settings. Scholtmeijer also notes that "[t]he injustices suffered by women…are arguably an extension of the more easily identified abuse of animals." For example, animals used in science were not given a voice – their cries were not given legitimacy – and relatively recently, in 1920, the voices of women

were finally given legitimacy with the right to vote. Other examples have been described throughout this section.

As mentioned earlier, men formally established and controlled science. The methodology used by men in science – the style of scientific writing and scientific words – contributes to the gap between humans and animals. Scientists tend to use the passive voice in scientific writing. In scientific writing dealing with the use of animals, the function of the passive voice is to transform the life of the animals into data (Birke, 1995, p. 43). Also in scientific writing, the scientist and other humans are removed from the report; pronouns such as *I* and *we* are almost never used in scientific writing. By removing humans from the writing and avoiding the use of pronouns, the writer of the report is able to reduce the emotional impacts of human/animal interactions in the scientific experiment. Although it is encouraged that scientists include any information and all the data in their reports, they are discouraged from mentioning or acknowledging in their reports any emotions, feeling, or cognizance they witness in their animal subjects (Birke, 1995, p. 44).

The words used in scientific writing, in combination with the style of scientific writing, also contribute to maintaining the gap between animals and humans. The use of animals in science is termed *sacrifice*. In scientific writing, sacrifice acts as a euphemism for dissection, vivisection, experimentation, etc. on animals (Birke, 1995, p. 45). Another word used in scientific writing is *culling*. Culling refers to the killing of a large amount of the laboratory animal population in order to control the amount of animals in the laboratory holding facilities (Ibid). By using these words scientists are able to alleviate the emotional impact of the harm done to the animals used and they are also able to maintain the gap between animals and humans. The words sacrifice and culling as applied to animals used in science would analogously be called murder/torture and genocide when applied to humans –

this demonstrates the extreme bias humans have over animal life in the circumstance of animals used in science.

Sexism and speciesism have had and continue to have their roots intertwined deep in the soils of religion, language, consumption, and science. These prejudices have their roots in other areas as well (such as domestic violence against animals and women, sports, etc.), but the subjects described above are the most prevalent and noticeable in our society today. As argued throughout this section, sexism and speciesism are powerfully related. Today, progressive humans are striving for a culture devoid of the *–isms* between human beings (sexism, racism, etc.). In order to accomplish a future without a prejudice such as sexism then in addition the elimination of speciesism is necessary.

4.2.4 The Rights View

In addition to Singer's utilitarian approach to animal rights there is also Tom Regan's rights-based approach. While Peter Singer argues that we should consider the relative suffering that beings endure, Regan feels that we should look at what beings have inherent rights and those beings should be respected based on the rights that they possess. Regan and Singer might differ on the reasons for attributing a moral status to animals, but many of the implications of their beliefs are the same. Both philosophers feel that everyone should adopt a vegan diet and immediately stop testing on animals.

Tom Regan shares the spotlight with Peter Singer as one of the most prominent animal rights philosophers. Their works have been the basis of over thirty years of activism. As such, their arguments have been subjected to many years of close examination and criticism. In later revisions of their books, they have come to deftly counter many of the arguments that have arisen. Over time, people have come to prefer certain approaches to this problem. Regan specifically decided that the utilitarian philosophy was susceptible to certain shortcomings. He believes that the utilitarian approach was "argumentative" and felt that it was possible to justify "morally callous" actions that might still bring a positive outcome to certain parties (Regan, 2000). Utilitarianism is often criticized for creating slippery slope arguments. For example, under Singer's philosophy any cruel action (to either humans or other animals) can be justified as long as a large enough group of people derive happiness from it. Regan argues more for solid rights.

Integral to Tom Regan's philosophy is his concept of a 'subject-of-a-life'. This concept outlines what is needed to be considered a moral being. Regan figures that before we can discuss the rights of anyone we need to define precisely criteria for determining subjectivity. He specifies in detail that

> …individuals are subjects of a life if they are able to perceive and remember; if they have beliefs, desires, and preferences; if they are able to act intentionally in the pursuit of their own desires or goals; if they are sentient and have an emotional life; if they have a sense of the future, including a sense of their own future; if they have a psychophysical identity over time; and if they have an individual experiential welfare that is logically independent of their utility for, and the interests of others (Regan, 1983, p. 264).

This definition most certainly covers adult humans; but it fails in cases which Singer refers to as the "marginal cases", to infant humans, severely handicapped humans and some nonhuman animals. It is impossible to conclusively know exactly how any other animal (other humans included) think, each person's experience of world is exclusively his or hers. However, we can reasonably deduce that other animals possess any subset of these qualities and therefore are some sort of "subject-of-a-life".

Regan then assigns these previously determined subjects as having an inherent value, notably different than intrinsic value. To Regan there is an essential and undeniable part of each being that is valuable by his or her very nature, not simply by his or her experience. This value is a function of these beings qualifying as being a subject-of-a-life. Regan states that each animal-being is thoughtful and cares for his or her own life, but that his or her value exists regardless. Regan believes that this value is not dependent upon the animal's actions or experiences, that it is inherent. With these values it is difficult to argue that there may be any notion of degrees. To Regan there is no gray area, beings cannot care halfway about their existence; they either do so fully or not at all (Regan, 1983, p. 235).

These rights that both humans and other animals inherently posses come into play when Regan introduces a basic moral principle. This is called the respect principle, a Kantian, duty-based principle. It is with this principle that Regan states that if we possess an inherent value then we are obligated to give equal respect "to those individuals who have equal inherent value" (Regan, 1983, p. 264). Some view this principle as a way in which Regan's philosophy is superior to the utilitarian philosophy. A utilitarian would only be

concerned with ensuring that the net interests are positive and would not be concerned with the interests of the individual. With Regan, each individual's rights are recognized and respected (Regan, 2000).

For the previously mentioned principle to be of any good, it needs to be regarded as valid by certain subjects of a life. We can certainly see that not all subjects-of-a-life are able to understand the implications of such a moral contract. For example: "Joe's cat" can certainly understand that he is hungry and would like food so that he can stay alive, but "Joe's cat" does not have the ability to understand a complex moral contract between two beings. Regan provides for this situation by creating two tiers of moral beings. The first type is called moral agents and the second type is called moral patients. Agents are individuals who have the ability to take moral principles and make decisions based upon these principles. Moral agents are considered to have advanced faculties that suit them for these situations. These agents are also accountable for their actions. Moral patients on the other hand are not accountable for their moral actions because they do not possess the more advanced reasoning abilities that moral agents do. Patients lack "the ability to formulate, let alone bring to bear, moral principles" (Regan, 1983, p. 152). This dichotomy creates a set of morally responsible individuals and a second set of persons who are not responsible for their actions yet have rights that can be negatively impacted. Anecdotally, "Joe's infant niece" might fall into the category of moral patients. She cannot understand right and wrong, and as such "Joe" does not fault her when she decides that his hand is a great chew toy. "Joe's cat" is a moral patient as well, since he too cannot understand Regan's principles, but he is just as much a subject-of-a-life as "Joe's niece." Hence "Joe's cat" is entitled to the same treatment as his niece.

4.2.5 Conclusion – Where We Stand

We believe that the complete abolition of animal exploitation is a moral imperative. Animals are thoughtful beings that deserve equal moral consideration. We greatly value Singer's critique of speciesism; we find speciesism to be as unfounded as sexism or racism. In order to further progress towards equality, we need to reject the anthropocentric world-view. Although we have some minor disagreements with Singer's overall utilitarian philosophy, our personal philosophies on animal rights have been greatly influenced by his ideas. At times utilitarianism, especially act utilitarianism, can become a slippery slope argument. Singer has been lambasted in the media for defending bestiality and infanticide. Unfortunately this has been used as an ad hominem attack against Singer, in an effort to discredit his other ideas. Some animal rights activists have even criticized Singer for not being strict enough in his adherence to vegetarianism. Under Singer's ideology if a specific action does not create any additional suffering, it is acceptable. Singer is consistent with his utilitarian ethics, but may appear to others to be contradicting himself. For this reason we agree more with Regan's principled approach because his rationale appears more consistent. Although no additional suffering may be created, we feel that Regan's principled approach is more easily defended. There is also value to creating a positive alternative to animal exploitation. For example: a student opposed to animal exploitation was taking a class that involved dissection. If the student took Singer's approach, he or she might simply watch another student dissect, since that would cause no additional suffering. However, if the student instead took Regan's position, then the student would refuse to participate on principle and request a completely alternative assignment. Doing so helps creates a positive alternative to animal exploitation.

Our support for these philosophical concepts obligates us to take some type of

action. Our group has concluded that Stephen Wise's practical approach is one that is most effective. Wise argues that we should work towards legal rights for animals because laws can best prevent animal suffering. He recommends starting with "higher" animals, such as nonhuman primates, since the case for their rights is most clear. Once this initial case has been made we can begin to work on giving rights to creatures with fewer cognitive abilities, who still possess some type of mental presence. Before we can begin to create a society in which animals are respected we need to encourage acceptance of the idea that animals are not simply property but persons that possess a valuable life. Once these animals are considered to be legal persons, existing laws can be applied for their protection.

Furthermore, we believe that the problem of animal exploitation persists because it is also a cultural problem. Adams makes the point that the subjugation of nonhuman animals and subjugation of women is normalized in our culture by speciesist and sexist language. Gendered pronouns are rarely used when referring to nonhuman animals; animals are often referred to as "it" instead of "he" or "she". When animals are exploited they are transferred from subjects to objects by the use of the "absent referent". Animals killed for food are transformed into "meat" and animals killed for science are transformed into "data". In scientific culture, animals are not "subjects" they are "models". Since the problem is cultural, we need a cultural solution. We need to use language that treats animals as living beings instead of as property. When writing about animals we need to choose words like "who" instead of "which", use gendered pronouns, and avoid speciesist phrases that imply animal inferiority, such as "eat like pig", "fat as a cow", "insignificant as an ant", and "dumb as an ox". Changing the way we currently use language regarding animals and women will shape the way we relate to one-another. Language shapes the way we understand the world; if we change our language and culture, the way men treat women and the way humans treat

animals will also change. In this report and in our everyday speech we have begun changing the way we talk about animals. We encourage others to do the same.

It is our belief that the animal rights movement needs to take a multi-faceted approach to achieving animal equality. Both cultural change and legal reforms are necessary for lasting social change. Although the ultimate goal is the complete abolition of animal exploitation, abolition need not be a sudden act. Changing our language and culture, while simultaneously dismantling the institutions that perpetuate animal exploitation, is a realistic and sustainable approach that will achieve the same goals as immediate abolition.

4.3 Our Vision

4.3.1 Plan for WPI

WPI is an excellent place to learn because the students take great pride in making a difference in the world. Understanding that "every aspect of life is affected by the social, political and physical consequences of science, engineering, and technology," (WPI, 2006b) WPI has made a goal of producing "Technical Humanists," (WPI, 2005) and fostering a keen awareness of the "moral, political, historical, and aesthetic effects of their actions" (WPI, 2006b). In keeping with this tradition of striving for excellence, we have a number of recommendations to help WPI further achieve its goal. It is our recommendation that WPI:

1. **Continue to follow the "three R's" –** It should be well noted that WPI has made a commendable effort to maintain and follow the "three R's," which are "Reduction, Refinement, and Replacement.." The "three R's" call for the reduction of the number of nonhuman animals used in experiments, the refinement of experiment techniques in order to minimize the suffering of nonhuman animals, and to replace nonhuman animals in experiments wherever possible (IACUC, 1996).
2. **Become a pioneer in developing alternatives to animal research for both moral and scientific purposes –** By setting a goal to work towards developing technology that will one day eliminate animal testing all-together, we are setting a standard for ourselves as moral pioneers in science. Alternatives to animal testing also have scientific value as one has greater control over their testing environment. By pioneering in this field we will establish a firm place in the future of technology.
3. **Establish a WPI lending library to provide educational resources for local High Schools and other Colleges –** By providing educational alternatives to other schools, WPI will become a leader in responsible education and research as well as community outreach. We believe this will reflect very highly upon WPI and has the potential to bring in grant money.

In keeping with the "Three R's" we should be seeking to reduce and ultimately eliminate our reliance on animal testing in science:

1. **Continue to refrain from nonhuman primate testing –** As the strongest case for animal rights lies with our evolutionary cousins, we should refrain from conducting tests on them.
2. **Phase out Nonhuman Mammalian research by 2012.**
3. **Phase out Nonhuman Vertebrate research by 2020.**
4. **Phase out all testing on nonhuman animals with nervous systems by 2025.**
5. **Phase out remaining animal testing as new technology becomes available or new information comes to light suggesting a moral imperative to refrain from testing on them –** Through the course of our study we have seen the moral imperative to refrain from testing on animals that can feel pain and suffer.
6. **Establish and implement a framework for Informed, Safe, and Consensual Human testing wherever a living subject is needed.**

Bring moral and ethical considerations of animal testing to the forefront at WPI:

1. **Hold and encourage campus-wide debates on the issue.** Through the commendable efforts of a number of professors, these have been ongoing on a small scale within biology and philosophy courses. It is our recommendation that these be taken to the next level allowing for campus wide debate and consideration.
2. **Institute a mandatory bioethics course for biology related majors**. This would be able to be taken en lieu of a single humanities or social science requirement. We feel it is incredibly important and in keeping with WPI's goals that students be given an opportunity to consider the ethical and moral implications of their work before they set ever set foot in a laboratory. A student should have considered all the issues significantly long before they are asked to participate in an animal experiment.
3. **Enact a student choice policy to allow students the freedom to decide for themselves where they stand on the issue.** In order for students to be able to decide where they stand on animal testing it is very important that they be allowed to make the decision without having to jeopardize their education. By respecting one another, we foster an environment where one can fully consider all sides of the issue, and better consider their future.
4. **Increase transparency between WPI IACUC and the campus community and consider incorporating student representation**. This would serve to ease tensions

between the public and research community as well as foster greater student involvement with the workings of the campus community.

5. **Encourage other schools to follow our example, show the educational and scientific communities that it is possible to foster scientific discovery while maintaining the utmost in moral and ethical responsibility.**

4.3.2 Future IQPs, MQPs, & Sufficiencies

The completion of this IQP and this report in no way indicates the end of this issue at WPI. In response to our info sessions, survey, and other actions in campus, we have received emails from concerned WPI members who wish to see further participation on campus regarding the use of animals. Some students have even asked about working on projects as a continuation of our project. This idea of future projects stemming from our project motivated us to create a list of recommended project topics.

Future IQP topic suggestions:

- **Implementing Educational Alternatives to Existing Laboratory Modules** – students will test out all possible alternatives from the Science Bank to determine which are the most appropriate for the laboratories in the Biology & Biotechnology Department
- **Establishing a Lending Library** – once alternatives are established at WPI, a lending library (similar to the Science Bank) will be established for use by the schools and colleges in the Worcester community. This will make alternatives easier for the schools in our community to obtain for it will be local, and it will establish WPI as a pioneer in the Worcester community as a technical and humane leader
- **Establishing a Framework for Human Testing** – the purpose of most anatomy courses is to learn human anatomy, and WPI has many pre-medical students so studying human anatomy is important. For this project, students will try to establish a framework for laboratories where a human model would be ideal. This framework will ensure that human models are informed, safe, and consenting. In the case of a cadaver, the framework will ensure that the body was donated willingly by the owner of the body.
- **Fostering Debate at WPI regarding Animal Testing** – there have been ongoing ethical discussions, between a research assistant professor in the Biology Department and a philosophy professor, hosted by one of the faculty members in the Biomedical Department. Generally, the audience for

these discussions has been relatively small and limited to the students of these professors. This project will broaden these discussions to be open to a campus-wide audience and transform the discussion into more of a debate.

- **Assessing the Efficacy of current Government Regulations and Requirements** – students will investigate all the laws, regulations, etc. with regards to animal testing and drug production. Students will assess the efficacy, flaws, etc. of these laws and regulations and provide a criticism of what these laws are lacking, avoiding, etc. and then the student may choose to make recommendations to strengthen these laws to further benefit the animals without any detriment to humans
- **Changing the Medical Paradigm from Cure-oriented to Preventative Medicine** – students will investigate our society's tendency toward reactive, cure-oriented solutions (in medicine and in other major aspects in society) by evaluating this tendency historically and presently. An investigation and comparison will be made with preventative solutions, illustrating how preventative solutions are more beneficial to personal health and overall societal health.

Future MQP topic suggestions:

- **Developing *in vitro* systems simulating *in vivo* systems for use in research, laboratory, and classroom** – students will explore different tests performed *in vivo* that can be replaced by *in vitro* testing, then students will develop *in vitro* systems to simulate the *in vivo* systems
- **Developing *in silico* systems simulating *in vivo* and *in vitro* systems for use in research, laboratory, and classroom** – students will create *in silico* systems (computer modeled systems) that will replace both *in vivo* and *in vitro* testing.
- **Developing and improving artificial surgery models** – students will create and perfect physical models mimicking surgery done on humans and/or small animals for students studying surgery
- **Developing and improving college level education models suitable for replacement in laboratories and classrooms** – students will work on developing or improving any of the types of models discussed above

Future Sufficiency topic suggestions:

- **Animal Rights and Animal Liberation** – a look into the writing of Tom Regan, Peter Singer, and other animal rights authors

All the projects listed above are simply suggestions, the topics are flexible and they can be altered, abridged or built upon. Students who wish to continue projects related to our project can use the suggested projects above as a guide or a stepping-stone. Ideally, each year students will participate in at least one project relevant to reducing animal testing at WPI and WPI affiliated locations (such as Gateway Park) in order to meet our future goals as outlined in "Plan for WPI."

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Appendices

Appendix A: Lists

Available Alternatives at the College/University Level

Cat Alternatives

Cat Dissection Laboratory	http://animalearn.org/view_sciencebank_item.php?id=2
CatLab	http://animalearn.org/view_sciencebank_item.php?id=3
Concise Dissection Chart: Cat	http://animalearn.org/view_sciencebank_item.php?id=5
Critical Car Fluffy	http://animalearn.org/view_sciencebank_item.php?id=124
Dissection Video Series: Cat	http://animalearn.org/view_sciencebank_item.php?id=6
Genetics CatLab	http://animalearn.org/view_sciencebank_item.php?id=123
Pregnant Cat Model	http://animalearn.org/view_sciencebank_item.php?id=7

Dog Alternatives

Canine Osteology	http://animalearn.org/view_sciencebank_item.php?id=96
Critical Care Jerry	http://animalearn.org/view_sciencebank_item.php?id=125
Female K-9 Urinary Catheter Mannikin	http://animalearn.org/view_sciencebank_item.php?id=126
K-9 IV Trainer	http://animalearn.org/view_sciencebank_item.php?id=128

Drosophilia Alternatives

Drosophilia Genetics	http://animalearn.org/view_sciencebank_item.php?id=122

Earthworm Alternatives

Concise Dissection Chart: Earthworm	http://animalearn.org/view_sciencebank_item.php?id=20
Dissection Video Series: Earthworm	http://animalearn.org/view_sciencebank_item.php?id=21
DryLab Plus: Earthworm	http://animalearn.org/view_sciencebank_item.php?id=25
Earthworm Dissection Laboratory	http://animalearn.org/view_sciencebank_item.php?id=27
Earthworm Model	http://animalearn.org/view_sciencebank_item.php?id=28
Lab Dissection Video Series: Earthworm	http://animalearn.org/view_sciencebank_item.php?id=29

Frog Alternatives

Concise Dissection Chart: Frog	http://animalearn.org/view_sciencebank_item.php?id=40
Digital Frog 2	http://animalearn.org/view_sciencebank_item.php?id=41
Dissection Video Series: Frog	http://animalearn.org/view_sciencebank_item.php?id=43
DryLab Plus: Frog	http://animalearn.org/view_sciencebank_item.php?id=46
FrogLab	http://animalearn.org/view_sciencebank_item.php?id=47
Lab Dissection Video Series: Frog	http://animalearn.org/view_sciencebank_item.php?id=50
Muscle Physiology	http://animalearn.org/view_sciencebank_item.php?id=56
SimMuscle	http://animalearn.org/view_sciencebank_item.php?id=57
SimNerv	http://animalearn.org/view_sciencebank_item.php?id=55
The Frog: Vertebrate Dissection Guide	http://animalearn.org/view_sciencebank_item.php?id=48
Vertebrate Dissection Guide: Frog	http://animalearn.org/view_sciencebank_item.php?id=54

Human Alternatives

A.D.A.M. Anatomy Practice	http://animalearn.org/view_sciencebank_item.php?id=106
A.D.A.M. Interactive Anatomy	http://animalearn.org/view_sciencebank_item.php?id=108
A.D.A.M. The Inside Story	http://animalearn.org/view_sciencebank_item.php?id=107
AnatLab	http://animalearn.org/view_sciencebank_item.php?id=109
Anatomy Revealed: The Face	http://animalearn.org/view_sciencebank_item.php?id=110
Exploring the Heart: A 3D Anatomy & Pathology	http://animalearn.org/view_sciencebank_item.php?id=114
Human Anatomy Lab	http://animalearn.org/view_sciencebank_item.php?id=116
Human Heart in Depth	http://animalearn.org/view_sciencebank_item.php?id=117
Labeled Visible Human	http://animalearn.org/view_sciencebank_item.php?id=119
The Dissectable Human	http://animalearn.org/view_sciencebank_item.php?id=112

The Dynamic Human	http://animalearn.org/view_sciencebank_item.php?id=113
Virtual Heart	http://animalearn.org/view_sciencebank_item.php?id=120

Aquatic Life Alternatives

Clam

Concise Dissection Chart: Clam	http://animalearn.org/view_sciencebank_item.php?id=9
Lab Dissection Video Series: Clam	http://animalearn.org/view_sciencebank_item.php?id=10

Crayfish

Concise Dissection Chart: Crayfish	http://animalearn.org/view_sciencebank_item.php?id=12
Dissection Video Series: Crayfish	http://animalearn.org/view_sciencebank_item.php?id=15
DryLab Plus: Crayfish	http://animalearn.org/view_sciencebank_item.php?id=18

Fish

BioLab Fish	http://animalearn.org/view_sciencebank_item.php?id=61
Concise Dissection Chart: Perch	http://animalearn.org/view_sciencebank_item.php?id=62
DryLab Plus: Perch	http://animalearn.org/view_sciencebank_item.php?id=66
Laboratory Dissection Video Series: Perch	http://animalearn.org/view_sciencebank_item.php?id=67
Perch Model	http://animalearn.org/view_sciencebank_item.php?id=69

Shark

BioLab Fish	http://animalearn.org/view_sciencebank_item.php?id=61
Marine Life Series: Anatomy of the Shark	http://animalearn.org/view_sciencebank_item.php?id=82
Pregnant Shark Model	http://animalearn.org/view_sciencebank_item.php?id=83
The Dogfish: Vertebrate Dissection Guide	http://animalearn.org/view_sciencebank_item.php?id=81

Starfish

Concise Dissection Chart: Starfish	http://animalearn.org/view_sciencebank_item.php?id=86
Dissection Video Series: Starfish	http://animalearn.org/view_sciencebank_item.php?id=88

Squid

Concise Dissection Chart: Squid	http://animalearn.org/view_sciencebank_item.php?id=90

Pig Alternatives

Concise Dissection Chart: Pig Heart	http://animalearn.org/view_sciencebank_item.php?id=90
Dissection Video Series: Fetal Pig	http://animalearn.org/view_sciencebank_item.php?id=33
DryLab Plus: Fetal Pig	http://animalearn.org/view_sciencebank_item.php?id=35
Fetal Pig Model	http://animalearn.org/view_sciencebank_item.php?id=36
Lab Dissection Video Series: Fetal Pig	http://animalearn.org/view_sciencebank_item.php?id=37

Rat Alternatives

Concise Dissection Chart: Rat	http://animalearn.org/view_sciencebank_item.php?id=72
DryLab Plus: Rat	http://animalearn.org/view_sciencebank_item.php?id=74
Koken Rat	http://animalearn.org/view_sciencebank_item.php?id=127
Practice Rat	http://animalearn.org/view_sciencebank_item.php?id=129
PVC Rat	http://animalearn.org/view_sciencebank_item.php?id=130
Realistic Rat Model	http://animalearn.org/view_sciencebank_item.php?id=77
SimVessel	http://animalearn.org/view_sciencebank_item.php?id=79
Sniffy the Rat: Pro Version	http://animalearn.org/view_sciencebank_item.php?id=133
The Rat: A Functional Anatomy	http://animalearn.org/view_sciencebank_item.php?id=75
Vertebrate Dissection Guide: Rat	http://animalearn.org/view_sciencebank_item.php?id=78

Miscellaneous/Other Alternatives

Concise Dissection Chart: Sheep Brain	http://animalearn.org/view_sciencebank_item.php?id=90
Concise Dissection Chart: Grasshopper	http://animalearn.org/view_sciencebank_item.php?id=58
CyberEd Dissection Series	http://animalearn.org/view_sciencebank_item.php?id=102
DryLab Suite	http://animalearn.org/view_sciencebank_item.php?id=104

Equine Osteology	http://animalearn.org/view_sciencebank_item.php?id=97
Laboratory Dissection Video Series: Grasshopper	http://animalearn.org/view_sciencebank_item.php?id=60
SimHeart	http://animalearn.org/view_sciencebank_item.php?id=95
SimPatch	http://animalearn.org/view_sciencebank_item.php?id=98
Suture Arm	http://animalearn.org/view_sciencebank_item.php?id=131
The Cell is a City 3D	http://animalearn.org/view_sciencebank_item.php?id=132
The Pigeon: Vertebrate Dissection Guide	http://animalearn.org/view_sciencebank_item.php?id=70

Colleges and Universities with Student Choice Policies
As of May 2007

Barry University Miami Shores, Florida
Brigham Young University Provo, Utah
Bryn Mawr College Bryn Mawr, Pennsylvania
California State University at Bakersfield Bakersfield, California
Cornell University Ithaca, New York
Georgia Military College Milledgeville, GA
Hofstra University Hempstead, New York
Lehigh University Bethlehem, Pennsylvania
Loyola Marymount University Los Angeles, California
Marist College Poughkeepsie, New York
Oberlin College Oberlin, Ohio
Oregon State University Corvallis, Oregon
Portland Community College Portland, Oregon
Quinnipiac University Hamden, Connecticut
Radford University Radford, Virginia
Sarah Lawrence College Bronxville, New York
State University of New York at Albany Albany, New York
Texas Woman's University Denton, Texas
The College of William and Mary Williamsburg, Virginia
University of Houston Houston, Texas
University of Illinois Urbana, Illinois
University of New Mexico Albuquerque, New Mexico
University of Pennsylvania Philadelphia, Pennsylvania
University of San Francisco San Francisco, California
University of Texas- Health and Science Center at Houston Houston, Texas
Virginia Commonwealth University Richmond, Virginia
Virginia Tech College Blacksburg, Virginia
Wright State University Dayton, Ohio

U.S. Veterinary Medical Schools Offering Alternatives
As of May 2007

Auburn University Auburn, AL
Colorado State University Fort Collins, CO
Florida State University Tallahassee, FL
Iowa State University Ames, IA
Kansas State University Manhattan, KS
Louisiana State University Baton Rouge, LA
Michigan State University East Lansing, MI
Mississippi State University Mississippi State, MI
North Carolina State University Greensboro, NC
Ohio State University Columbus, OH
Oregon State University Corvallis, OR
Purdue University West Lafayette, IN
Texas A&M College of Veterinary Medicine College Station, TX
Tufts University School of Veterinary Medicine Boston, MA
University of California-Davis Davis, CA
University of Georgia Athens, GA
University of Illinois Champaign, IL
University of Pennsylvania Philadelphia, PA
University of Wisconsin Madison, WI
Washington State University Pullman, WA
Western University of Health Sciences Pomona, CA

Appendix B: Letters

Letter to the SGA, 13 March 2007

IQP: Exploring Ethical Issues in Animal Research

March 13, 2007

Christian James Bryan
Adam Faulkner
Allison Vasallo
Andrew Wilson
(iqp@wpi.edu)

Student Government Association
Worcester Polytechnic Institute
100 Institute Road
Worcester, MA 01609

To The Student Government Association:

We are working on an IQP that explores the ethical issues raised in animal research, testing, and dissection. A part of our project is establishing a dissection choice policy for students. We have been working with students, members of the SGA, and faculty members and as a result of working with them we have gained their support for this policy.

Enclosed is our draft for a campus-wide student choice policy pertaining to animal testing and dissection. The student choice policy is derived from and influenced by the policies of other universities, colleges, states, etc.

The following pages contain:

- The policy
- A list the schools and states that aided in our draft of the policy
- A list of faculty that have verbalized support for our policy
- Letters of recommendation
- A summary of student support
- Upcoming events

Animal Testing/Dissection Choice Policy
At WPI

1. Alternatives to any class exercises, labs, or demonstrations that involve the use of animals must be available in all classes for students who choose not to participate for moral and/or religious reasons.

2. The alternative assignment shall require a level of time and effort by the student that is comparable to but not greater than the level of time and effort required by those students participating in the exercise involving animals. The responsibility for creating an alternative lies with the instructor, not the student.

3. Requiring the student to watch others participate is not an alternative; the student must be allowed to leave the room while the exercise is taking place.

4. Students will not be penalized or ostracized in any way for choosing the alternative exercise. Nor should students be rewarded for participating in assignments involving animals.

5. A student's choice to participate or not to participate in assignments involving animals shall be respected by all school faculty, and the student shall be treated in a nonjudgmental manner. A student must feel free to choose the alternative without fear of being singled out or pressured.

6. All students must be informed in writing of their option to choose not to participate in assignments involving animals. References to this policy shall be made on the biology department website.

7. Those instructors who still use animals in their classes must verbally announce the policy to all students on the first day of the academic term and on the day of the assignment involving animals.

8. Those instructors who still use animals in their classes must include a copy of this policy in the course syllabus.

9. All classes that involve animals shall mention that they use animals in the Course Catalog. This policy shall appear in its entirety in the Course Catalog.

Colleges and Universities with Student Choice Policies

[List is given in Appendix A]

Universities researching alternatives to animal testing:

[List is given in Appendix A]

States with Choice-in-dissection Laws for Public High Schools:

[List is given in Appendix A]

We have sought the input of key faculty members including:

Dr. John Orr
Professor Dollenmayer
Professor Rolfs
Professor Dominko
Professor Gottlieb
Professor Sanbonmatsu
BME Dept. Head Professor Gaudette
IACUC Chair Michael Buckholt

Letters of Recommendation:

The following letters are from Dr. John Orr and Professor John Sanbonmatsu. Professor Rolfs, Michael Buckholt, and other professors have also voiced interest in drafting letters of support.

> Hello Drew, Allison, CJ, Adam,
>
> Silicon Valley is great and the projects are going very well. I'll be leaving Sunday night to come back to WPI. Congratulations on all the work on the animal dissection policy!
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> I support the adoption of a WPI policy that addresses student concerns regarding their personal dissection or other use of animals, whether live or not, and that seeks to provide alternatives to such use wherever educationally and scientifically feasible. I also support humane treatment by WPI of all animals involved in teaching and/or research.
>
> It is great that Biology faculty support this initiative because they are the people who need to address the educational aspects.
>
> John Orr

Student Support

Facebook Group: 207 members

Petition: 120 signatures

Info Sessions: Every two weeks we hold info sessions and open discussions. At each of these info sessions we have gained support from all of the attending students, as well as helpful input from these students. The majority of these students are Biotech and Biomed majors.

Clubs in Support: Justice and GAEA both support this policy.

Upcoming Events

March 16, 2007 – Info Session and Open Discussion about the Policy
5PM-6PM, Morgan Room in the Campus Center

March 19, 2007 – Presentation by AnimaLearn representative on dissection alternatives
Afternoon, Salisbury [exact time and place TBA]

March 30, 2007 – Info Session and Open Discussion about the Policy
5PM-6PM, Morgan Room in the Campus Center

April 13, 2007 – Info Session and Open Discussion about the Policy
5PM-6PM, Morgan Room in the Campus Center

April 27, 2007 – Info Session and Open Discussion about the Policy
5PM-6PM, Morgan Room in the Campus Center

SGA Resolution drafted by Alison LeFlore

Student Government Association
c/o Student Activities Office
100 Institute Road
Worcester, MA 01609-2280, USA
508-831-5565, Fax 508-831-5014
sga.wpi.edu sga@wpi.edu

Worcester Polytechnic Institute

Student Government Association

RESOLUTION: Animal Dissection-Optional Policy

Intention:

WHEREAS, The Worcester Polytechnic Institute Student Government Association exists to represent the concerns of the undergraduate student body; and,

WHEREAS, Undergraduate students have expressed an interest in having an animal dissection-optional policy; and,

WHEREAS, there are many alternatives to animal dissection that offer the same educational value.

Resolution:

RESOLVED, That the Student Government Association concurs with the student body's desire to have an animal dissection-optional policy; and be it further

RESOLVED, That the Student Government Association kindly requests that the Faculty Committee on Academic Policy works to create a policy to allow Undergraduate students dissection-free options in laboratories that include animal dissection.

Resolution passed on the thirteenth day of March in the year Two Thousand and Seven by the Seventeenth Session of the Worcester Polytechnic Institute Student Government Senate

_____

Charles A. Gammal III
President, WPI Student Government Association

Letter to the CAP 6 April 2007

IQP: Exploring Ethical Issues in Animal Research

April 6, 2007

Christian James Bryan
Adam Faulkner
Allison Vasallo
Andrew Wilson
(iqp@wpi.edu)

Committee on Academic Policy
Worcester Polytechnic Institute
100 Institute Road
Worcester, MA 01609

To The Committee on Academic Policy:

We are working on an IQP that explores the ethical issues raised in animal research, testing, and dissection. A part of our project is establishing a dissection choice policy for students. We have been working with students, members of the SGA, and faculty members. As a result of working with them we have gained valuable input for this policy.

Enclosed is our draft for a campus-wide student choice policy pertaining to animal testing and dissection. The student choice policy is derived from and influenced by the policies of other universities, colleges, states, etc.

The following pages contain:

- The policy
- A list the schools and states that aided in our draft of the policy
- A list of faculty that contributed to the project
- Letters of recommendation
- A summary of student support
- Upcoming events

Animal Testing/Dissection Choice Policy
At WPI

Preamble

Throughout our meetings with faculty and discussions with students we discovered that this is an important and personal issue for everyone. We found that everyone involved generally agrees upon the spirit of this policy. However, as with any policy, there are some minor disagreements on the specific wording. The sample policy below is open to change in wording and other minor changes as long as the general spirit of the policy remains intact.

There are core principles that should be included the policy to ensure that the spirit of the policy remains intact. These principles ensure that all students should:

- be well informed of their right to choose an alternative
- be entitled to an alternative assignment that does not involve the use of animals, regardless of religious/moral views
- not feel forced to complete any assignment that involves animals
- not feel intimidated to request an alternative
- not be punished for choosing an alternative assignment, nor should students be rewarded for choosing the assignment that uses animals

Policy

1. No student shall be forced to participate in any animal experiment that they feel conflicts with their religious/moral beliefs.
2. Alternatives to any class exercises, labs, or demonstrations that involve the use of animals must be available in all classes for students who choose not to participate for moral and/or religious reasons.
3. The alternative assignment shall require a level of time and effort by the student that is comparable to but not greater than the level of time and effort required by those students participating in the exercise involving animals. The responsibility for creating an alternative does not lie with the student.
4. Requiring the student to watch others participate is not an alternative; the student must be allowed to leave the room while the exercise is taking place.
5. Students will not be penalized or ostracized in any way for choosing the alternative exercise. Nor should students be rewarded for participating in assignments involving animals.
6. A student's choice to participate or not to participate in assignments involving animals shall be respected by all school faculty, and the student shall be treated in a nonjudgmental manner. A student must feel free to choose the alternative without fear of being singled out or pressured.
7. All students must be informed in writing of their option to choose not to participate in assignments involving animals. For example, references to this policy shall be made on the biology and biomedical engineering departments' websites.
8. Those instructors who use animals in their classes must verbally announce the policy to all students on the first day of the academic term and on the day of the assignment involving animals.
9. Those instructors who use animals in their classes must include a copy of this policy in the course syllabus.
10. All classes that involve animals shall mention that they use animals in the Course Catalog. This policy shall appear in its entirety in the Course Catalog.

Colleges and Universities with Student Choice Policies

[List is given in Appendix A]

Veterinary Medical Schools Offering Alternatives

[List is given in Appendix A]

Universities researching alternatives to animal testing:

[List is given in Appendix A]

States with Choice-in-dissection Laws for Public High Schools:

[List is given in Appendix A]

We have sought the input of key faculty members including:

Dr. John Orr
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Professor Rulfs
Professor Dominko
Professor Gottlieb
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IACUC Chair Michael Buckholt

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The following letters are from Dr. John Orr and Professor John Sanbonmatsu. Professor Rolfs, Michael Buckholt, and other professors have also voiced interest in drafting letters of support.

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>
> It is great that Biology faculty support this initiative because they are the people who need to address the educational aspects.
>
> John Orr

Dear Jeremy and other members of SGA:

I am writing to express my enthusiastic support for the proposal by Andrew Wilson, Allison Vasallo, Adam Faulkner, and CJ to institute a student choice policy in the matter of animal vivisection on campus. Their proposal is excellent; such a proposal is long overdue (other campuses already have such policies--we're taking up the rear); and it has the support of the key administrators and biology faculty on our campus, including Prof. John Orr and Prof. Jill Rulfs (Head of Biology).

Why do we need such a policy? Several years ago, I found myself talking with a WPI student I didn't know about her "poster" session for her MQP in bioengineering or biology. As part of her research, she was told she had to experiment on pregnant rats, which she then was forced to kill. "I used to go home every night and cry," she said. "I majored in bioengineering/biology because I want to be a veterinarian. I love animals. But I will never do this again." I have heard similar stories from other WPI students.

There is no reason why students who are ethically opposed to experimenting on and killing defenseless animals should be penalized for requesting that alternatives be provided in the classroom or lab. Other institutions have such policies, and it has done them no harm. Not only will having a student choice policy in place ensure that the no WPI student, in future, will be forced to engage in an action they see to be morally wrong; it will also enliven discussion on our campus about ethical norms and the best way to conduct scientific research.

I therefore give my fullest support to these students, and I hope SGA will take leadership on this important, and just, proposal.

Sincerely,

John Sanbonmatsu, Ph.D.
Assistant Professor of Philosophy
Department of Humanities and Arts
Worcester Polytechnic Institute
(508) 831-5226
js@wpi.edu

Student Support

Facebook Group: 207 members

Petition: 120 signatures

Info Sessions: Every two weeks we hold info sessions and open discussions. At each of these info sessions we have gained support from all of the attending students, as well as helpful input from these students. The majority of these students are Biotech and Biomed majors.

Clubs in Support: Justice and GAEA both support this policy.

Upcoming Events

April 13, 2007 – Info Session and Open Discussion about the Policy
5PM-6PM, Morgan Room in the Campus Center

April 27, 2007 – Info Session and Open Discussion about the Policy
5PM-6PM, Morgan Room in the Campus Center

MathWorks E-mails: e-mails with employees at The MathWorks

From: Allison Vasallo
To: Mike Kissinger
Date: May 11, 2007 4:33 PM
Subject: animal alternatives

Hi Mike,

I remember a while ago at the end of a Step-it-Up meeting you talked about working on a simulation for MatLab (right?) as an alternative to some animal testing. Could you tell me a little more about that? Like what would it replace, what it simulates, etc. and if there's a website about it already, that'd be awesome too!

You probably already know about the IQP I'm working on with Drew Wilson about Animal Testing at WPI, and our goals to reduce it. Any help you can give would be very appreciated by us.

Thanks a bunch!

-Allison Vasallo

From: Mike Kissinger
To: Allison Vasallo
Date: May 11, 2007 7:06 PM
Subject: Re: animal alternatives

Hi Allison -

I just emailed the CEO of MathWorks to see if he can give me some info. I will get back to you!

Cheers!

Mike

From: Mike Kissinger
To: Jack Little
Date: May 11, 2007 7:06 PM
Subject: Regarding MATLAB and animal testing

Hi Jack –

A few months ago at my BPO you mentioned that you saw potential for MATLAB to be used in lieu of or as a supplement to animal testing. Some of my friends who are still in school are working on a project to provide alternatives to animal testing in the classroom, and I was wondering if you had any ideas about this or could point me to people or documents with this sort of information. I'm very interested in this personally and I'd like to help them out as well.

Thanks very much!

Mike Kissinger

From: Jack Little
To: Mike Kissinger
Date: May 12, 2007 8:56 AM
Subject: RE: Regarding MATLAB and animal testing

Hi Mike,

This is a long term quest right now, at least at the cellular level. To the extent that your friends are interested in computer modeling, well, that's what Simulink does. Pax, are there any examples to point him to?

Regards, Jack

From: Pax Paxson
To: Mike Kissinger
Date: May 14, 2007 10:53 AM
Subject: RE: Regarding MATLAB and animal testing

Hi Mike,

As Jack points out this is a long term vision. It is starting to show early signs of progress mostly in biotech companies. The modeling approach is making it possible to weed out toxic drugs from the pipeline before they get to animal testing.

While there isn't much published about the reduced animal testing right now, there are many papers that discuss strategies in drug development that make drug target identification more accurate and require less testing. I have attached one paper, but have many so let me know if you want more.

It is also worth mentioning that the FDA is beginning to require more analytical evidence for the "mechanism of action" for a drug. This is pushing Pharmas and biotechs to include models in their documentation for drug approval. This is early stage still but pointing towards less animal testing in the future.

Cheers,

-pax

From: Mike Kissinger
To: Allison Vasallo
Date: May 14, 2007 11:18 AM
Subject: RE: Regarding MATLAB and animal testing

Hi Allison –

Here is some stuff from people at my company. It looks like for night now there's nothing for dissection, but there are alternatives to clinical drug trials in the works. See the attached paper.

Cheers,

Mike

E-mail from Professors

From: [censored for anonymity]
To: Andrew Wilson
Date: Apr 27, 2007 8:59 AM
Subject: "You Are What You Grow"

I think your IQP is the best kind, i.e., has the potential to spark a real debate and maybe change policy on campus.

Let we know where I can access it when you're finished.

[censored for anonymity]

Appendix C: Other Schools' Policies
Sarah Lawrence College Policy

SARAH LAWRENCE COLLEGE
Bronxville, NY

The policy below, adopted 1994, is printed in the college's registration packet for all prospective and returning students.

Choice Policy Regarding Dissection in Biology Courses

Sarah Lawrence College does not require students with ethical objections to participate in dissection. Students who choose to refrain from such activities will be given alternatives that will provide similar experiences. Those who choose such alternatives will not be penalized, although they will be responsible for the material presented in these exercises. If appropriate, separate evaluation of their learning experiences may be designed. In courses where dissection is considered to be fundamental and therefore mandatory, students should be informed of this during registration.
Students who feel that undue pressure to dissect has been placed upon them, or question the designation of a course as requiring mandatory dissection, may file a complaint with the Dean of the College.
Proposed Student Choice Dissection Policy
This policy is to affirm the rights of students who conscientiously object to participating in the dissection of animals, and to underscore the responsibility of school officials to provide these students with appropriate learning opportunities. Students may request alternatives to dissection if they are opposed to dissection because of religious or ethical reasons. Students requesting an alternative lesson plan should be granted their request without any pressure to do otherwise. Student values or beliefs regarding dissection must be respected.
In order to provide a truly fair student choice policy for classroom animal dissection the following provisions should be implemented:

1. All biology instructors should be informed of this policy through a written memo.
2. At the beginning of the semester, biology instructors should inform students of the option to choose an alternative, both orally and in writing. This policy should be included in the curriculum guide and the Timetable of Classes, and it should also be posted in all biology classrooms.
3. A student's grade would not in any way be affected by the choice of an alternative lesson plan, and a student should not be discriminated against based upon his or her decision to exercise the right of choice.
4. Testing and evaluation should be designed to measure the student's knowledge of the course objectives rather than the process of dissection itself, and should not include use of specimens.
5. Alternative education projects should be available in all biology classes for students who wish to refrain from the participation in, or observation of, a dissection. The project should require a comparable time and effort investment by the student. It should not, as a means of penalizing the student, be more arduous than the original dissection project.

6. The responsibility should not be on the student to determine an alternative course of study, as requiring the student to create his or her own course of study unfairly burdens the student.
7. Teacher guidance and assistance should be available for all students who choose alternatives.
8. As soon as possible, the department should create separate labs that do not use any animals in classes where the number of enrolled students permits. It is the department's responsibility to indicate in the Timetable of Classes and through other means that these new labs are available.

University of Illinois
Urbana-Champaign Senate
Senate Committee on Educational Policy
(Final; Action)
EP.03.35 Report to the Senate on Alternatives to Dissection in Undergraduate Courses

Introduction

Last September, the Illinois Student Government unanimously passed Assembly Resolution 02-08-06, "ISG Support for Alternatives to Dissection." In part, the resolution asserts that "there is a portion of the student body whose deeply held religious or ethical objections requires them not to dissect or vivisect" and asks that instructors "provide alternatives to students whose religious or ethical beliefs directly conflict with the act of dissection." The Senate Committee on Educational Policy has welcomed the opportunity to work with students and faculty members to address concerns about the instructional use of animals in undergraduate courses.

The aim of this report is to describe an approach to harmonizing two important institutional values: respect for students' beliefs (religious and otherwise) and excellence in undergraduate education-specifically education that investigates the nature of vertebrate life. It is the role of the Senate to guide departmental and school policymaking by explicating the norms of campus culture relevant to the matter at hand. To the extent possible, then, the recommendations presented herein recognize that

- the use of animals in course work for undergraduate programs of study is best decided at the departmental or school level; and
- for a policy on alternatives to instructional dissection to be fully meaningful, it should be interpreted within the context of whatever regular relationship students have with academic advisors in their department.

At the same time, these recommendations acknowledge that

- long-standing initiatives to diversify the campus' undergraduate population are increasing the number of students whose religious beliefs compel them to request alternatives to dissection assignments;
- students have valid personal reasons apart from religious beliefs for wanting to avoid animal dissection.

The Senate Committee on Educational Policy urges the Senate to adopt this report, thereby establishing a framework within which schools and departments may continue their efforts to foster teaching and learning of the highest caliber while according full value to the myriad cultural traditions and beliefs evident in the student body today. (In the next sections, the

committee's policy recommendations appear in boldface type. Note that these recommendations do not apply to courses offered in the College of Veterinary Medicine. Note, too, that throughout this document, dissection refers to the dissection of vertebrate animals.)

Policy Recommendations

Notification

Recommendation 1: If a class on the Urbana-Champaign campus is to involve students in the dissection of vertebrate animals, the following information shall be readily accessible to students at the time of priority registration: (a) whether alternative assignments will be made available to students who request accommodations; (b) when and how such accommodations must be requested; (c) how the denial of accommodations may be appealed; (d) how to inquire about the unavailability of accommodations.

Availability of Alternatives

Recommendation 2: In General Education courses that require students to engage in animal dissection, alternatives to dissection must be made available to all students who request them. A course that requires dissection without alternative is not a General Education course, but rather a specialty course.

Recommendation 3: In all other courses that require students to engage in dissection activities, alternatives shall be made readily available to students who request accommodation, but only if the offering department deems it academically appropriate and economically feasible to do so. In upper-level classes where dissection is required, and no suitable non-animal alternatives can be found, departments and faculty are strongly encouraged to locate sources of animals that are not harvested for the express purpose of dissection. If a repository of such animals can be identified that does not represent an undue financial burden, departments are urged to procure these animals should students request alternatives to traditional dissection. such dissection protocols continue to be subject to IACUC approval. IACUC approval does not, however, preclude the use of alternatives to dissection as long as it is understood that alternatives must not be fully educationally equivalent to an IACUC-approved dissection exercise.
As it stands, the instructional use of animals must be approved by the Institutional Animal Care and Use Committee (IACUC), which requires instructors to provide, among other things, a detailed rationale for using animal subjects, and to consider non-animal alternatives and explain why such non-animal models are not adequate substitutes for the use of animals. If practical, in courses in which alternatives are likely to be requested, instructors are encouraged to develop alternatives that are most beneficial educationally so that they will be ready for delivery upon request. Sources of funding for such course development are discussed below.

Recommendation 4: The availability of alternatives to dissection shall be announced in the *Timetable* and its successor under SCT Banner. Suggested notifications are: (1) DISSECTION REQUIRED: ALTERNATIVES AVAILABLE FOR ALL ASSIGNMENTS; (2) DISSECTION REQUIRED: ALTERNATIVES AVAILABLE FOR SOME ASSIGNMENTS; (3) DISSECTION REQUIRED: ALTERNATIVES NOT

AVAILABLE. Departments are encouraged to augment these notifications so as to convey the best possible sense of how dissection will figure in students' course work.

Requests for Accommodation

Recommendation 5: Students should ask their instructors for alternatives to dissection between the time of registration and no later than the end of the first week they attend class. Requests should be made in writing. In responding to requests, instructors should be mindful that the campus *Statement on Individual Rights* stipulates that "information about student views, beliefs, and political associations that instructors acquire in the course of their work as instructors, advisers, and counselors should be considered confidential" (§2.C). Particulars about how and when to request alternatives should appear conspicuously on a department's or school's webpage.

Recommendation 6: Students whose requests for alternatives to dissection are denied may appeal the denial to the appropriate Unit Executive Officer (e.g., Chair, Head, or Director). Concerns about the availability of alternatives should also be directed to that person. Students whose requests grow out of religious convictions (see *Statement on Individual Rights*, §7) may appeal the denial or unavailability of accommodations by following the process defined in the *Code of Policies and Regulations Applying to All Students*, Rule 24, "Grievance Procedures in Matters of Religious Beliefs, Observances, and Practices." The process for appealing the provision of an inadequate alternative assignment is described in the *Code*, Rule 26, "Procedures for Review of Alleged Capricious Grading-All Students."

Advising Recommendation

Nothing in the policy recommendations above is intended to alter the pathways students currently follow toward completion of majors in the life sciences. Instead, the recommendations seek to map these pathways more clearly for the benefit of students who have objections to dissection. It is likely that, as is now the case, some pathways within majors will require students to dissect vertebrate animals without the choice to do otherwise. But along other pathways, dissection may not be required.

Recommendation 7: In the *Programs of Study* document, departments and schools in the life sciences shall identify pathways toward undergraduate degrees according to whether or not students are required to engage in the dissection of vertebrate animals without alternative. Such departments and schools should provide academic advising that helps students reconcile their degree goals and career aspirations with their beliefs about animal life.

Curriculum Development

The development of alternatives to dissection assignments is not without cost. To underwrite expenditures for faculty time and material acquisitions, departments and instructors should make full use of internal sources of support for instructional development and the acquisition of information resources (e.g., the Teaching Advancement Board, CITES Educational Technologies, college Teaching Academies, the University Library, and the Office of Instructional Resources), as well as extramural sources (e.g., Mellon Foundation Program in Teaching and Technology).

Review

Recommendation 8: In Fall 2004, the Senate Committee on Educational Policy shall undertake a review of school and departmental policies governing the instructional use of

animals in the undergraduate curriculum and at that time shall submit its findings in a Report of Information to the Senate.

Virginia Commonwealth University Policy

Bill in Support of the Conscientious Maintenance of Non-Dissection Degree Paths for Virginia Commonwealth University Monroe Park Campus Undergraduate Students

Passed by the Virginia Commonwealth University Student Senate on February 21, 2005 with 0 abstaining, 34 in favor, 1 against, and signed thereafter by Student Body President, Zmarak Khan.

WHEREAS, it has always been a Virginia Commonwealth University (hereby referred to as VCU) policy that students should not be obliged nor coerced to participate in activities they find ethically or religiously objectionable; and

WHEREAS, VCU seeks to respect the ethical and religious beliefs of all students while striving to provide the highest level of educational quality and the greatest breadth of educational opportunities possible; and

WHEREAS, some students find it ethically or religiously objectionable to participate in acts including, but not limited to, dissecting dead animals, conducting invasive experiments on live animals, and/or carrying out any other harmful procedure on animals for educational purposes (with all these examples hereinafter included in the term dissection); and

WHEREAS, such students pursuing a bachelor of arts and/or taking general education (non-science major) biology courses at VCU are officially and publicly offered penalty-free alternatives to dissection (which do not and shall not include watching another student perform dissections, taking a lower grade or dropping the class); and

WHEREAS, students who find it ethically or religiously objectionable to participate in dissection may desire to earn a bachelor of science degree with a major or minor in biology or other science, or to pursue another academic path that may require core biology (science major) courses; and

WHEREAS, VCU does not intend to discourage such students from entering professions in the sciences, or any other field, by requiring them to violate their ethical or religious beliefs; and

WHEREAS, VCU recognizes that such students, if permitted to pursue a bachelor of arts or a bachelor of science degree, with any major or minor, without ethical or religious compromise, can find a career in the sciences, or any other field, which does not require their participation in practices they find objectionable; and

WHEREAS, the fundamental core biology major lab class, currently known as BIOZ 152L, (the only dissection class of the five-class group which serves as a block prerequisite for all other VCU biology major courses, and the only dissection class required for a bachelor of science degree, with any major or minor), as of the spring 2005 semester, now officially and publicly offers students with ethical or religious objections penalty-free alternatives to

dissection (which do not and shall not include watching another student perform dissections, taking a lower grade or dropping the class); and

WHEREAS, based on the above stated development, dissection is no longer required at VCU in order to earn a bachelor of arts or a bachelor of science degree, with any major or minor;

THEREFORE, LET IT BE RESOLVED that students of VCU with ethical or religious objections to dissection shall always be afforded the opportunity, without prejudice, harassment, coercion or penalty, to obtain a bachelor of arts or a bachelor of science degree, with any major or minor, without participating in dissection; and

THEREFORE, LET IT BE FURTHER RESOLVED that any changes to the biology curriculum and / or the core requirements for earning a bachelor of arts or a bachelor of science degree, with any major or minor, will continue to provide unobstructed paths for students to earn such a degree without participating in dissection, specifically that, any class which involves dissection and is required for a bachelor of arts or a bachelor of science degree, with any major or minor, will officially and publicly offer penalty-free alternatives to dissection (which shall not include watching another student perform the dissection, taking a lower grade or dropping the class); and

THEREFORE, LET IT BE FURTHER RESOLVED that any changes to the biology curriculum and / or the core requirements for earning a bachelor of arts or bachelor of science degree, with any major or minor, will continue to provide a wide variety of lecture and/or laboratory classes which do not involve dissection; and

THEREFORE, LET IT BE FURTHER RESOLVED that VCU Department of Biology will actively strive to investigate and invest in new technologies and educational models which will achieve pedagogical objectives without requiring dissection, and that these investments will be offered as supplements to existing dissection exercises in addition to serving as alternatives for students with ethical or religious objections to dissection; and

THEREFORE, LET IT BE FURTHER RESOLVED that no references appear on the transcripts or in the permanent records of students pursuing a non-dissection bachelor of arts or bachelor of science degree, with any major or minor, that would distinguish them in any way from their fellow students; and

THEREFORE, LET IT BE FINALLY RESOLVED that every reasonable effort be made by the administration to ensure that all students are aware that non-dissection paths exist for a bachelor of arts and a bachelor of science degree, with any major or minor, including:

- Continuing to include a statement on the BIOZ 101L and BIOZ 152L class syllabi (or any class involving dissection that is required for a bachelor of arts or a bachelor of science degree, with any major or minor) that alternatives to dissection are available to students with ethical or religious objections to dissection,

- Continuing to require instructors of the BIOZ 101L and BIOZ 152L classes (or any class involving dissection that is required for a bachelor of arts or a bachelor of science degree, with any major or minor) to make a verbal announcement to the class at the commencement of each semester that alternatives to dissection are available to students with ethical or religious objections to dissection,

- Elucidating the existence of non-dissection paths to a bachelor of arts and a bachelor of science degree, with any major or minor, in the Department of Biology section of the 2006 and all subsequent VCU Undergraduate Bulletins, in the biology course section of the 2006 and all subsequent VCU Schedule of Classes, and on the VCU Department of Biology website.

Appendix D: WPI's Policy, the ATCP

Three of our drafts of the policy for WPI are shown below. Though only three drafts are shown, we have made many more drafts throughout the project terms. Only three drafts are shown because changes between every single draft are minor, and because showing any more than three drafts would be a waste of space and paper.

Proposed Student Choice Policy at WPI
As of January 9, 2007

1. Alternatives to any class exercises, labs, or demonstrations that involve the use of animals must be available in all classes for students who choose not to participate for moral and/or religious reasons.
2. The responsibility for creating an alternative lies with the instructor, not the student. The alternative assignment shall require a level of time and effort by the student that is comparable to but not greater than the level of time and effort required by those students participating in the exercise involving animals.
3. Requiring the student to watch others participate is not an alternative; the student must be allowed to leave the room while the exercise is taking place.
4. Students will not be penalized or ostracized in any way for choosing the alternative exercise. Nor should students be rewarded for participating in assignments involving animals.
5. A student's choice to participate or not to participate in assignments involving animals shall be respected by all school faculty, and the student shall be treated in a nonjudgmental manner. A student must feel free to choose the alternative without fear of being singled out or pressured.
6. All students must be informed in writing of their option to choose not to participate in assignments involving animals. This must happen at the beginning of each academic term during which the assignment is scheduled, a minimum of three weeks prior to the assignment.
7. Those instructors who still use animals in their classes must verbally announce the policy to all students on the first day of the academic term and on the day of the assignment involving animals.
8. Those instructors who still use animals in their classes must include a copy of this policy in the course syllabus.
9. All classes that involve animals shall mention that they use animals in the Course Catalogue.

Animal Testing/Dissection Choice Policy (ATCP) at WPI
As of March 9, 2007

1. Alternatives to any class exercises, labs, or demonstrations that involve the use of animals must be available in all classes for students who choose not to participate for moral and/or religious reasons.
2. The alternative assignment shall require a level of time and effort by the student that is comparable to but not greater than the level of time and effort required by those students participating in the exercise involving animals. The responsibility for creating an alternative lies with the instructor, not the student.
3. Requiring the student to watch others participate is not an alternative; the student must be allowed to leave the room while the exercise is taking place.
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5. A student's choice to participate or not to participate in assignments involving animals shall be respected by all school faculty, and the student shall be treated in a nonjudgmental manner. A student must feel free to choose the alternative without fear of being singled out or pressured.
6. All students must be informed in writing of their option to choose not to participate in assignments involving animals. References to this policy shall be made on the biology department website.
7. Those instructors who still use animals in their classes must verbally announce the policy to all students on the first day of the academic term and on the day of the assignment involving animals.
8. Those instructors who still use animals in their classes must include a copy of this policy in the course syllabus.
9. All classes that involve animals shall mention that they use animals in the Course Catalog. This policy shall appear in its entirety in the Course Catalog.

Animal Testing/Dissection Choice Policy (ATCP) at WPI
As of April 6, 2007

Preamble

Throughout our meetings with faculty and discussions with students we discovered that this is an important and personal issue for everyone. We found that everyone involved generally agrees upon the spirit of this policy. However, as with any policy, there are some minor disagreements on the specific wording. The sample policy below is open to change in wording and other minor changes as long as the general spirit of the policy remains intact.

There are core principals that should be included the policy to ensure that the spirit of the policy remains intact. These principles ensure that all students should:

- be well informed of their right to choose an alternative
- be entitled to an alternative assignment that does not involve the use of animals, regardless of religious/moral views
- not feel forced to complete any assignment that involves animals
- not feel intimidated to request an alternative
- not be punished for choosing an alternative assignment, nor should students be rewarded for choosing the assignment that uses animals

Policy

- No student shall be forced to participate in any animal experiment that they feel conflicts with their religious/moral beliefs.
- Alternatives to any class exercises, labs, or demonstrations that involve the use of animals must be available in all classes for students who choose not to participate for moral and/or religious reasons.
- The alternative assignment shall require a level of time and effort by the student that is comparable to but not greater than the level of time and effort required by those students participating in the exercise involving animals. The responsibility for creating an alternative does not lie with the student.
- Requiring the student to watch others participate is not an alternative; the student must be allowed to leave the room while the exercise is taking place.
- Students will not be penalized or ostracized in any way for choosing the alternative exercise. Nor should students be rewarded for participating in assignments involving animals.
- A student's choice to participate or not to participate in assignments involving animals shall be respected by all school faculty, and the student shall be treated in a nonjudgmental manner. A student must feel free to choose the alternative without fear of being singled out or pressured.
- All students must be informed in writing of their option to choose not to participate in assignments involving animals. For example, references to this policy shall be made on the biology and biomedical engineering departments' websites.
- Those instructors who use animals in their classes must verbally announce the policy to all students on the first day of the academic term and on the day of the assignment involving animals.
- Those instructors who use animals in their classes must include a copy of this policy in the course syllabus.
- All classes that involve animals shall mention that they use animals in the Course Catalog. This policy shall appear in its entirety in the Course Catalog.

Appendix E: Survey

Survey Questions and Possible Answers

- I am a(n):
    - Undergraduate student
    - Graduate student
    - Faculty
    - Staff
    - Other [text box]

- Major:
    - [drop down menu]

- Graduating year:
    - [drop down menu]

- Gender:
    - Male
    - Female
    - I'd rather not say

- Age:
    - [text box]

- Do you have a pet?
    - Yes
    - No

Questions:

1. Are you aware that animals are used in experiments and killed at WPI?
    a. Yes
    b. No

2. If yes, which animals do you know are used in experiments (both research and education) at WPI? [select all that apply] CHECK BOXES
    a. Cats
    b. Mice
    c. insects
    d. Rabbits
    e. Frogs
    f. Pigs
    g. Fish
    h. Horseshoe crabs
    i. Rats
    j. Dogs
    k. Non-human primates

3. Have you ever participated in live animal testing or dissection on campus?
    a. Yes
    b. No
    c. I'd rather not say

4. In general, how do you feel about animal testing? [select all that apply] CHECK BOXES
    a. I do not support it – it is against my religious beliefs
    b. I do not support it – it is against my moral beliefs
    c. I do not support it – it is a poor scientific methodology
    d. I do not support it – other reasons [text box]
    e. I do support it – humans were given dominion over animals
    f. I do support it – animals don't have feelings
    g. I do support it – it helps us advance in science
    h. I do support it – other reasons [text box]
    i. I don't care

5. There is some disagreement among scientists about whether animal testing has a medical benefit to humans <link>. Suppose that animal testing does have a medical benefit to humans – how would you feel about that?
    a. I would not support it
    b. I would support it
    c. I wouldn't care

6. How do you feel about the use of animals when testing cosmetics and other household products?
    a. I do not support it
    b. I do support it
    c. I don't care

7. How do you feel about cases where animals are killed for dissection or used solely as an educational tool?
    a. I do not support it
    b. I do support it
    c. I don't care

8. In animal testing and dissection, does it matter how the animals are treated?
    a. Yes – if I am convinced that animals are treated well, I am okay with it
    b. No – it doesn't matter, I'll support it either way
    c. Animals should not be tested on in the first place

9. Should students have the right to choose in their class/labs whether they want to participate in animal experimentation/dissection?
    a. Yes
    b. No – it is ultimately the professor's decision

10. For Biology/Biotechnology and Biomedical students: the Biology department is considering purchasing alternatives to animal experiments in classes/labs – would you use them?
    a. Yes
    b. No

11. If you support animal testing what makes it acceptable to test on animals? Specifically, what makes non-human animals sufficiently different from human animals to justify testing on them, while at the same time sufficiently similar to yield relevant data?
    a. [text box]

12. If you do not support animal testing, what led you to that belief?
    a. [text box]

Answers to Survey Question #11 (response number precedes the answer)
If you support animal testing what makes it acceptable to test on animals? Specifically, what makes non-human animals sufficiently different from human animals to justify testing on them, while at the same time sufficiently similar to yield relevant data?

1. don't care

3. I believe that animal testing and dissection is a necessary part of any biologist's education. The internal organs and layout of these animals is similar to that found in humans, and especially for those individuals looking towards a career in medicine I feel that they need to experience that first hand. I would not like to have a surgeon operate on me, who has only had the minimal experience found in medical school using cadavers.

6. By testing on animals, and through dissection, humans have found cures to diseases, side affects of potentially harmful materials and overall, have increased their knowledge of the human genome and function. The reason between supporting the testing on non-humans is due to knowledge levels. Other animals do not have the knowledge to supplement cures for diseases, some humans do. I guess you can say it is a case of superiority in intellect.

14. As a bioligist I support animal testing, as many animal models give results that could overall cure a human or help a human with a disease, etc. So I think medical testing is beneficial and justified. It is also humane. Animals in labs are treated very well and when killed, killed in the fastest manner so as to avoid causing the animal to suffer. I have also done many dissections to help explore the body and see anatomy first hand, and I have no problem with it. As humans we grow to learn more everyday, and it is not simply killing animals for no reason, but for expanding our knowledge to better understand ourselves and our diseases, etc.

15. It is not that I support animal testing. My future is to be a veterinarian. As so, I need to actually understand the workings of the animals if I ever hope to help them. For this reason, and only because suitable fakes are not accessible, I partake only in dissection but never animal testing.

16. Practically speaking, it is easier to use an animal model because data can be replicated, many times. Though it is unfortunate that testing often leads to death, and I don't think humans have dominion over animals to use them, but I do think that it is a matter of knowledge and survival. Because we have that option, we can gain a better understanding of life and the biology of ANY organism. As humans, it is natural that we have a selfish desire to elongate our own life or better our quality of life. I would rather watch my child with leukemia gain treatment which has been proven for its efficiency and safety with the testing of many rats or mice, than watch her slowly and painfully die. The main reason non-human animals are used is because we are able to do so without taking any human lives (which in our society naturally has a larger significance), we can reproduce our data (and it is very relevant) with ease, explore various issues in a variety of ways and learn more and more each day. For medical students...I think it is several times preferable that they have an idea of what they will be looking into before they perform their first surgery. Imagine if every surgeon had never seen the organs or touched them or fully understood the pathways by visualization...and did so for the first time on his/her first patient? For me, that is a terrifying thought. My research involves animals, and I take care of them with the utmost care and respect. I make sure they are in no pain, and in as little discomfort as possible. I don't rejoice at the thought of removing their brains for analysis, I often feel sad. But I refuse to say that this is done in vain and it is just cruelty with no use. There are millions and millions of people--mine own--whose lives would be much different and much more miserable if animal testing was not allowed.

17. Certain animals are very similar to humans, whether anatomically or physiologically. Though I feel for animals and do not like the excess of use of animal experimentation, there are cases in which humane animal testing have helped scientists to better understand the human body and how it functions. These breakthroughs have helped modern medicine to develop and fine cures/vaccines for many debilitating diseases/disorders. I believe that in the cases where animal testing is deemed necessary and the benefits are potentially great, then animal testing should be carried out in the most humane process as possible. There are rules and regulations to ensure that this happens.

19. Just about everyone, with few exceptions, eats meat, milk & eggs (cows and chickens live horrible lives to produce milk & eggs) and fish. Just about everyone wears leather. Those uses of animals are similar to the

natural order of the world since time began. Using animals for experimentation, done humanely and without excess, is an outgrowth of that.

20. Virtually all humans in the western world have benefited directly, have a family member who has benefited directly or have a close acquaintance who has directly benefited from the medical breakthroughs that have resulted from using animals in research.

22. I believe that there is a very clear difference between humans and animals - in ALL cases. As someone who believes that humans were created in the image of God, I believe that we have been set above all animals and that it is OK to use animals to further the human cause. That is not to say that I think it is OK to abuse animals and kill them for no reason.

24. In my class, we dissected fetal pigs. I was okay with it because i knew the pigs were never alive. These pigs were gathered from slaughter houses. If they were not used for educational purposes, they would have been disposed of anyways. Sorry that does not answer your question.

26. I think it is only acceptable to test on animals if you are willing (assuming the test is successful) to carry out the same test on humans. Animals and humans share a significant amount of the same genetic make-up, which means that our bodies will react similarly to the same treatment. Animals should not be subjected to treating or treatment that the scientist him/herself wouldn't be willing to go through to find the same result.

28. when there are no known models or similitudes; there are certain applications that require in vivo data. Your questions do not allow for "depends on the situation" as an alternative to all questions, suggesting a biased questionnaire. The short answer is that many of the physiological processes and responses are the same. Some medical findings from veterinary science have become medical treatments or physiological understanding.

33. I think that in many cases, animal testing is a necessary step in the development of new treatments. When new vaccines, antibodies, chemicals, etc. are discovered and researched, we must have some way to validate the new treatments before use in humans. Some people get upset about the use of animals, but in many cases, they are close enough for us to gauge if a product is going to have some horrible side effects, and we need to have a way to determine that before we get to humans. There just isn't a better way right now, than to start with smaller organisms such as mice, and work our way up to humans.

35. Humans get tested too, ever heard of clinical trials? While it may not be to the same degree, the research done when testing on animals often leads to greater scientific discoveries. I love animals but I'm not going to say they shouldn't be tested on when it could ultimately save lives.

36. Genetically speaking, humans are close enough to a lot of mammals that testing on them will yield information that will be similar to the results of testing on humans. Morally, I feel that we should test HUMANS for human advancement. However, most people believe non-human animals are somehow lesser beings and therefore religious majorities have made it the social norm to allow non-human animals be the subjects of tests and torture that would get any human who executed them a swift end. Also, there is a social stigmatism against performing any tests that could be harmful (or even good in many cases) on humans... Therefore, if non-humans animals are considered socially acceptable to glean information from for medical advancement it seems the only available course. Additionally, if the test subjects are well cared for and do not suffer considerable pain and agony I am more FOR the advancements of medicines than for forcing lab subjects to be euthanized because they cannot be reintroduced to a normal population of their species. I repeat, however, tests for human advancement should be performed on humans to get the best results no matter what the test.

40. The cougars are going eat our children. If you were trying to cross the road and you had to kill a cougar to get a new heart wouldn't you do it? I sure as hell would.

43. The are significant benefits from animal testing for humans. Tests that are not ready to be conducted on humans can be done on animals first.

53. If I am speaking from a purely biological perspective, then its only right that we should have the ability to further our own species through the exploitation of other animals (lower or higher in function, though there really is no way to truly discern that). Morally, however, I believe in the phrase "the ends justifies the means." If causing animals some discomfort and shortening their lifespan means that humans as a whole benefits, then it is more then justified to do as such, it is an obligation. What I am against is the purely unnecessary cruelty animals are exposed to in certain environments. Some people are so miserly and lazy that they cannot provide a comfortable living condition for these animals even before they are subjected to tests or killed. All in all, I take a callous approach to it. I more or less don't care what people are doing as long as I'm not participating in cruel actions. Death is not cruel, only suffering is. To kill a rabbit or a pig or anything for the purpose of science is no different (better even!) than taking a pet home and putting it in a cage for the rest of its life.

55. Most of the time, larger animals used for dissection are not raised specifically for the purpose of their dissection, for example, fetal pigs are taken from animals that were used in the food industry, and cats are taken from animal shelters where they were euthanized. In terms of animals that are bred solely for the purpose of testing, it is alright if they are small animals that have a very high reproductive rate, such as mice. These types of animals dont have any higher thinking capabilities, and they are overpopulated anyway, so it wouldn't make sense to release them into the wild after they were used. Animal testing is ok with me as long as it is appropriately useful in furthering science, as opposed to just for cruel and torturous experiments. Dissecting animals that were dead to begin with is a great educational experience, especially for pre-health students, and as long as animals aren't being harmed in the process, medical education using as realistic models as possible is the best way to go.

59. All other sources of experimentation should be exhausted before testing on humans. For example, cell cultures can be used for a lot but not everything. I do support it because animal testing is a critical step in testing products. I mean, we could jump right to human testing; I've got no qualms with that so the people who are against animal testing under any circumstances can volunteer if they wish. Also, testing on animals for cosmetics is just pointless and unnecessary. Scientific research and medical research are the only acceptable forms of animal testing to me, and only if it is necessary. Dissecting something just to dissect it for a 2000 level lab is pointless and students should have the opportunity to do something else.

60. Animal testing is essential to the development of new medications and improving the quality of life. Of course, the utmost care must be taken to assure proper animal welfare. Animals need to be taken care of in all ways possible. Animals should be put down before they experience too much pain and all efforts need to be made for their comfort. These steps are taken at most if not all animal testing facilities. I can understand how some uninformed people can be disturbed by the process. It is important to note that pre-clinical (animal) test are required by the FDA prior to clinical (human)testing and that many different life saving drugs have been developed and tested through animal models. Also in almost all cases the animals are bred specifically for the testing. If people feel very strongly about the issue they should not take and medication, you cant have it both ways. Animals are very different from humans, this is true. But as you know the if the right animal model is selected for the research valuable results can and often are obtained. As I mentioned earlier, the animals in most if not all testing facilities are taken care of in the best manor possible and every effort is made for their comfort. If this were not the case I would not support animal testing.

61. test on criminals

67. Exactly that. Non-human animals are sufficiently different from humans to justify testing on them, while at the same time sufficiently similar to yield relevant data. The data are not exactly relevant to humans, but close enough to gain insight. I'd rather test on an animal, even my pets, than my children. And I would do so if I could improve on the health of my children. I only support animal testing where it is justified (well designed experiments, other options have already been used (e.g., cell culture), but when it is justified it is important. Simply stated, I value my children's lives more than any animal's.

68. Animals are not conscience, they do react to external stimuli via there instincts. - I like to think of animals as 'blacked-out drunk' people - you see a blacked out drunk person - they talk to people, react and engage with others, and have thoughts and make decisions - in the morning its like nothing happened - animals don't have to wait until the next morning - just the next moment - for another argument - I do value a single human life over the collective lives of every animal - if an entire species had to be wiped out and/or tortured to save the

life of a family member I would have no qualms about that wisdom only comes through suffering - why not move this suffering unto beings who have no 'knowledge' that they are suffering

69. There are many studies that do tests on humans as well, so it's not only animals being tested on.

72. Animals, although they feel fear and pain, are less aware and not in our biological imperative to protect. Non-human animals when treated as reasonably humanly as possible can advance science- there would be no way to discover things like new treatments for diseases. Although the extended lifespan of human beings over the past decades has been mostly due to better nutrition and cleanliness, the quality of life of people who have diseases has drastically improved.

73. If done correctly, it has the potential of saving human lives.

74. They are a better model system then doing tests on human subjects.

77. I always come down to the 'grandma test'. If grandma needs a new surgery, do you want the first one ever to be done on her, or would you rather it was tried on an animal first? Similar questions arise with new drugs. Should we test them first on people, with no animal testing at all? Computer models are OK as far as they go, but how do you imagine we got the data to make them realistic in the first place? If a program must use dissection in the classroom to be accredited, it is not possible to allow students an alternative, and still grant them a degree in the subject. If you are going to major in a biological science, I believe it is important at some point to work with living organisms.

78. If animal testing can be used to speed medical treatments to common usage, that may be life saving or greatly improve the quality of life of humans (from a medical stand point such as a drug for asthmatics that requires less us of a rescue inhaler or a safer anti inflammatory for arthritics) The I believe it acceptable. I support testing on animals that do not display obvious cognitive functions such as great apes. Over all I don't care for animal testing, but I have seen first hand the differences in speed using in-vivo models can have on getting useful drugs to a clinical testing level, and the accuracy with which the effects most drugs will have when they reach clinical trials. While other methods are becoming available, they are still in development and require more time before they can replace in-vivo testing completely. I do not support unnecessary testing or unnecessary cruelty.

81. For the record, this survey is very slanted. The questions clearly indicate to me that the group is opposed to animal testing. In the future, when preparing surveys, it would be good to work on non-leading questions that do not give away your position. Now, to answer the question you asked, I do believe that research on animals has led to discoveries that are beneficial to humans in terms of battling chronic diseases. As someone who suffers a chronic disease, I must support research that might someday provide me with a cure. No doubt that sounds selfish, but I do believe that the health and welfare of millions of people trump the rights of the laboratory animals. I do not condone animal testing on products for cosmetic or household use, as that is not a life-saving situation.

82. The animals used for testing are bread for that reason. They should be treated humanely in laboratories. To a certain extent testing and educational demonstrations are done with humans and cadavers as well, however terminal experiments are not done on humans because they are not bread for this reason.

84. A value can be placed on the life of any living thing, some greater than others. Given the choice between saving the life of a family member and a complete stranger, most people would choose to save the family member. Given the option of testing on animals with a significant probability of curing a disease, I would choose to test. While I consider the value of the life of an animal to be great enough not to use it for food, I still place a higher value on human life. However, testing should only be done when it is established beyond a reasonable doubt that the desired results cannot be achieved using non-animal methods. The process by which I assign value to a life is an emotional one rather than a rational one. I place more value on those which I interact with directly and provide me some benefit (such as family, friends, and pets) and which more closely mimic my behavior (primates, dogs, cats) than those who don't (strangers, rats, mice, insects).

89. i do believe in animal testing as long as animals are treated relatively humanely and it is helping us find cures for diseases for humans and animals. Testing a lot of things on humans doesn't make sense just due to the huge amount of time it would take. By using test subjects whose reproduction is faster and life span shorter means we can get answers faster. As for dissection I also agree with it because by allowing us to learn about animals, especially for people like me who are pre-vet, it is allowing us to give more aid to animals in the future.

92. For medical purposes, I think animal testing can be useful. For education, it is also a useful tool for getting students used to being up close and personal with a biological system. I think animals go through much worse in the food industry such as in meat processing plants. Also, that happens on a much much larger scale. Is it unpleasant? Yes. I think food factories could do their stuff a lot more humanely. On the other hand, people have been killing animals for thousands of years in this great natural biological struggle. Our modern conditions shield many of us from the messy nature of meat-eating and so some people choose to be vegetarian. Just as students have the choice of what to eat (DAKA serves vegetarian options) based on their feelings about animals , so should students have the choice of what to experiment on and dissect. I am not opposed to animal testing, but I support the optional policy.

94. Non-human animals are not sentient and have been used by humans for millennia for purposes other than testing. If scientific tests need to be done on a living subject, I would prefer that animals are tested on before humans, because if there is a dangerous side effect to the test, at least a human was not killed for it. When it comes right down to it, humans are more important than animals any day.

96. I am ambivalent about this issue. I believe alternatives can work just as well, and should be used as much as feasible.

99. I believe that before a treatment for a disease can be used in humans, it needs to be tested for lethality and possible side effects. Many times this is possible to do in a cell culture, but most of the time using a whole biological system is much more helpful. While it is true that animals don't have to be an accurate model of a human disease, sometimes it's the best alternative. Apes are usually very accurate models for studying human diseases, and also genetic modifications can be introduced in lower mammals to make them better models for certain human aliments. However, I only support animal testing for the purposes of advancing research on prevalent, dangerous diseases that plague the humankind (cancer, AIDS, Alzheimer's, etc.) and I categorically do not support testing cosmetics and household chemicals on them. I am also against dissection for educational purposes, unless it involves already dead animals used for this purpose (human and non-human alike).

103. I don't necessarily support animal testing, but I think a comment here will be appropriate. There are hundreds of millions of animals killed each year for food, where more efficient/better alternatives are available. The number of animals killed in labs, although still high, is not comparable with the number of animals 'processed' by the meat industry. I believe in the possibility that animals could be used for research, as there is potential to make the lives of both people, and other animals better, as a result of that. I might have a different opinion on the subject if animals were not killed for any other reason -- then the issue of animal testing would carry more weight.

110. I just feel like it's silly for people who want to be doctors and veterinarians to not want to dissect animals. I love animals, but I realize that this is one of the only ways right now to have a REALISTIC idea of what the inside of living things look like. People who are not premed though, should be able to choose if they want to participate in these dissections.

116. i am alive because of drugs tested on animals. i like being alive. i develop drugs and prototypes for humans based on concepts and theories that can not be predicted when placed into the body, so for safety's sake, there is a need which is fulfilled by animal testing. if students would rather learn by using alternatives, as long as the learning is taking place, it shouldn't make a difference. However, in the development of consumer products, it is absolutely necessary.

117. Mice for example are incredibly close to humans genetically- they make good model organisms. IT is helpful scientifically to test on animals since they are good representations of humans. CJ- What's up buddy!

118. Millions of lives have been saved through animal testing. Many physiological mechanisms are the same in humans and animals, while some mechanisms (including protective mechanisms) are found in animals and not humans. Thus, animals play a critical role in the development of a therapeutic agent or device. Unfortunately, I have seen what diseases such as cancer can do to a little child. I have also been fortunate to see modern medicine, which has been advanced through animal testing, save multiple young lives. I choose to save human lives.

121. certain genes and pathways are conserved in many animal species, so the data are relevant. For example: innate immunity.

122. certain genes and pathways are conserved in many animal species, so the data are relevant. For example: innate immunity.

126. for the last question I believe that the best egicational tool should be used

155. One difference I see is in lifespan - people live to 80, 90, or 100, while most medically useful animals have much shorter lives. We aren't abbreviating their existences by more than a few years. Anyhow, I leave it to scientists to decide which animals are useful and similar enough to humans. Is it necessary to see if a chimpanzee can solve puzzles? Maybe - treat the animals well. Is it necessary to conduct cancer experiments on small animals like mice? Most certainly. Etc.

156. i support it because it is a great way to learn. Plastic models are great and all, but it is no substitute for the real thing. If people are too grossed out be dissecting real creatures, maybe they are in the wrong line of work. I have no problem with practicing on human corpse either as long as the person donated his body to science. How do you think doctors learn how to perform procedures. I think all these Nazi-animal right activists need to get a life.

169. I'm a vegitarian so this is a hard topic, but if ethical testing on animals could save human lives I support it. There's no higher power saying human are above animals, but you'd step on a bug before you shot a deer. I think a similar logic applies.

170. i don't really care, if animals are killed for the better of man kind, then I have no opposition, but if they are mistreated then i do not support it, because only assholes would mistreat animals. But just think about it, which would you prefer, testing happening on humans, or animals? Also i do support all testing done on rats, because it gives them a purpose in life.

173. Computer models show specimens all identical and idealized. In order to get the best idea of anatomy and how it relates to physiology, students must experience a real specimen. Additionally, students at WPI are not required to take courses involving dissection. There are four 2000-level labs, one of which involves dissection, and students are only required to take three.

174. It depends on the situation. Sometimes it is necessary for medial testing to make sure that drugs are safe for human use. I do not think that animals should be tested for cosmetic products if it can possibly cause any harm to them.

175. its fine

178. I believe it is only acceptable if a real benefit can be gained. If there is the possibility to save many human - or animal- lives by research using animal testing, it is justified.

183. If it's to figure out methods to cure currently uncurable diseases, or to find better cures (that work faster and with less side effects), I think the possible benefits outweigh the bad.

186. I don't think non-human animals are completely different; many products, drugs, etc are tested on humans as well. I would support alternatives to animal testing if they are available, but in many cases they are not, and I believe the benefits outweigh the costs.

187. it's mostly common sense.

188. The animals must be treated correctly and humanely, during life, sacrificing, and death. They must be treated with respect. The animals should only be used in order to teach or develop scientific improvements. Animals have organs and systems that can be used to sufficiently educate other people or develop scientific research.

193. There are circumstances under which I believe animal testing is beneficial to a greater whole. The suffering/death of a limited number of animals might be outweighed by the loss of thousands of (human) lives, the safety of ecosystems, etc. I do not, however, support it for cosmetic research or anything frivolous of that nature. Perhaps I should add that I also support the dissection of human beings for research purposes, and if there were shown to be sufficient benefit, the testing of humans (in extreme cases). When at all possible, I think live testing ought to be avoided altogether, but as long as models (both physical and virtual) are conceived by humans, there is a margin of error, which in some cases may be unacceptable, and necessitates experimentation on actual living subjects.

195. Following federal guidelines is critical

196. If sacrificing a few hundred animals, whether they are humanely sacrificed first or used for live studies then euthanized, could potentially save millions of human lives, I am certainly for it. I believe that the animals should not have to endure unnecessary suffering, meaning their accommodations should be "comfortable," but in general you need to sacrifice to make progress.

200. Well first off it seems as if your questions are slanted towards one direction, and so you guys should take a look at that. Now for why I believe it is acceptable to test on animals, because it is the nature of this world, that one animal uses another to survive. Testing in not done only on non-human animals, humans are tested as well, maybe not to the same extent or type, but take a look at a lot of biological/medical tests and plenty are taken out on humans. As far as dissection, most animals are not killed for the purpose of dissections, they have already been dead and if not dissected then they are essentially compost, why not use them. Medical students dissect dead humans, there is no difference.

204. Animals are much the same in that they all have the same basic organs and functions and needs. They don't have the ability to reason, which is quite obvious. Humans are the dominate species without a doubt, and we should use whatever God has given us to further our education and as an end result treat and protect those with medical need.

205. I do not fully support animal testing, however I believe that it does give a hands on teaching experience to the students. I do not think that animals should be killed soley for the purpose of dissection but rather use animals who have died of natural causes or were sick and were suffering for learning purposes.

206. It can offer advances in science, biologically and medically.

208. 1. animals lack cognizant thought. 2. If the animals could do testing on us they would. 3. Animals are killed constantly for the betterment of other animals (AKA, predators eat pray), the only different between testing and eating is that one is popular to protest. 4. Without animal testing, human drug trials will be more dangerous.

217. Animals that were raised for scientific uses only, and that are treated respectfully.

221. Humans are fundamentally different from other animals in that we do not act solely based on a combination of environmental and instinctual factors. We also posses the ability to reason objectively and a moral conscience, which form what is commonly called the "soul". No other animal possesses these, so while animal cruelty is unfortunate and should be stopped, it is an entirely different ballpark from murder and other human to human crimes.

222. I do own a pet, it is a pug. And if something goes wrong with it, I take it to a veterinarian. I would not want to take him to a vet that has only seen plasticated models but not an actual inside of an animal (having

worked in a (human) hospital myself I am FIRMLY of the belief that computer models/plasticated models/VR are good for theory, but THEY ARE NOT PRACTICE THAT LABS ARE SUPPOSED TO BE). I realize that the natural response to this is: "If they want to be a vet/MD/someone else in a similar field, their training for that field will provide that experience". That may be true, however, many graduate medical/vet. schools already expect certain amount of PRACTICAL experience. And all these toys (VR, CAD models etc.) are NOT practical experience. It does not say on your transcript: "Did not actually get practical experience in this" next to your Lab Bio class number and the grade - so I think providing this choice will screw those people who DO have the experience - because the grad schools' admissions offices, when looking at WPI, will have to keep in mind that "Lab Course ####" on a transcript is not actually necessarily practical experience. Lack of language (not the same thing as "means of communications" - consult a linguistics book for definition of "language") and also well-defined and well-developed thought process is what I feel makes non-human animals sufficiently different from humans from an ethical point of view. As to yielding data - I am not a biologist and not an expert on this. However, I feel a simple statement that is impossible to refute is this: there is a reason colleges all over the world use animals for a variety of RESEARCH AND WORK-related applications. And if they do so, the undergraduate education HAS to provide SKILLS for working with these animals. Toys like VR, CAD-models or drawings are NOT practical experience.

226. I am a licensed pesticide applicator and so I know the LD50 values are found with mice and other animals. They do have a purpose here, as acute effects can be calculated fairly well. I am aware that humans can have different structures and reactions, but for the most they are very similar. I do not support a lot of the chronic testing of chemicals on animals such as mice because of there short life spans and some chemicals take years to take effect. If the test is for generational effects, human testing would take close to 100 years to start showing signs, and thus it is not feasible. Animal testing has its place for life threatening or health threatening chemicals. I do not believe in testing for cosmetic reasons because I don't value a persons mental happiness as highly as I do their actual breathing life.

227. Animals are not the same as humans. I worked in a veterinary clinic for a couple years and I understand the difference between humans and animals even though I came in contact with hundreds. They have very different purposes in life.

231. If it can be beneficial to the human race than animals should be tested on so that we can have advances to save human lives.

235. It is acceptable to test on animals if it leads to curing diseases affecting animals as well as humans.

239. Many animals have biological and physiological characteristics similar to humans and thus can be an important learning tool as well as test subject. However, they are sufficiently different because they lack self-awareness.

240. While I believe it is wrong to harm animals (for the sake of enjoyment, such as pleasure hunting), I feel its Okay to harm animals if there is a legitimate reason (such as research for medicine and products). However, it is very tough to decide on a limit (is the killing of animals really necessary for developing lipstick? Lipstick is a luxury item!).

241. For education purposes, it seems likely that real life dissections are much more realistic and accurate than 'computer programs'. Specifically, I would hope my surgeon has practiced dissecting before he goes and cures me.

242. I support animal testing as long as it is beneficial for human health discoveries.

246. Animals (there may be exceptions for primates) are not sentient beings with the volition. They do not choose their course in life like humans do but rather rely on instincts and do what is necessary to feed themselves. The animal testing "problem" only occurs because of human emotions towards it after anthropomorphizing them. Granted that the animal body does not behave exactly the same way as humans but they do have many many similarities and i would rather have my shampoo tested on pigs than myself.

248. Science must advance. Anything less is foolish and the result of do-nothings who spend too much time worrying about the world around them. This is not to say that nature is not important - we do have to maintain a healthy environment. But we can not allow the well being of common animals such as mere rabbits or mice over the possible advancement of human knowledge.

249. The morality that humans have and animals don't. We know that it is bad, and for medical research I support testing on animals, but for cosmetic and other stupid reasons I do not support it.

259. With animal testing there is variability within each animal. By implacing this variability within the subjects, we are better able to predict how it would react within the human system. Also, model are difficult to produce long term symptoms of testing. Also, since there are no comments section. Some questions seemed biased to either produce questioning within "your subjects" or to alter their answering of the question. For example: ordering of selections in question about how you feel about animal testing. the question above this one - I would use the models in addition to the animal dissection. and the most obvious, there is no need to phrase a question starting with the idea that not all testing is medically benifical. that had nothing to do with the question. the school should have the models; however the models should not be open to everyone in replacement of the class (religion and strong beliefs can be an exception). a large part of classes where animal testing occurs is the involvement with the animal. And the most obvious question, why is someone against animal testing want/need credit in an animal testing class? there are better classes not revolved around animals. I just saw some oddities in your survey. nothing personal, i do believe the school should have the models.

260. I find the sources lacking...but I do believe that animal testing has resulted in an improved quality of life amongst humans. I'm sensing some biasing in these optional questions.. Not being able to test on us seems just a good reason as any.

261. I believe that only medicines should be tested on animals and other information regarding dosages of medicines. I don't agree with testing on certain animals. I am only for testing on animals that we would normally kill for other reasons anyways. For example, we kill mice and rats that are in our house, so why not test on them. We kill pigs and cows to eat, so why not test on them if it will help us discover new cures to diseases.

266. Products for animals should be tested on animals. i.e. dog shampoo

269. Question: "...what do you believe makes it acceptable to test on animals?" Are you kidding? Without animal testing all medical and pharmisudical research either stops or moves immediately to human testing. Neither of those sound like very good options to me. Also, this bull concerning plastic models is sickening. Seems to me like an attempt to sell a bunch of cheap plastic anatomy models at an outrageous cost. (So far as I am aware, the fetal pigs used in biology labs come from butchers: pregnant pigs are killed for meat and the fetuses are sold off to labs) Does it really make sense to try to learn biology by looking at plastic models? That's like trying to learn to fly the space shuttle by playing space invaders! And guess what? You DO have a choice. If you don't want to experiment with animals, DON'T MAJOR IN BIOLOGICAL SCIENCES. DON'T REGISTER FOR THE COURSE! Again I draw a parallel: I came to study Aerospace Engineering so that I can work on real spacecraft, not a plastic model of the millennium falcon. And another thing. Next time you are injured or sick and see a doctor, ask yourself if you would be ok if the doctor had never cut open an animal or human cadaver, and had spent his/her medical school training with plastic toys instead. Would you let him/her take a scalpel to you? Would you be ok running human trials on a drug that had never been tested on rats? What if 50% of those people got cancer from the test? Would you sleep well at night knowing you spared a bunch of lab rats at the expense of human subjects? An moral argument against testing on animals is likewise obscenely ignorant. It is immoral not to test on them, for the sake of victims of injury, disease, cancers, birth defects... the list goes on. And one final thought... Why should the tuition of sensible science students be squandered on useless toy models? Question: "Specifically, what makes non-human animals sufficiently different from humans to justify testing on them, while at the same time sufficiently similar to yield relevant data?" This is a loaded question. It assumes that the respondant cites human/animal differences as a reason for justification of testing. It also seems to suggest that the animals are harmed in some way (which is not necessarily the case), and that a respondant should feel morally responsible for harming animals. In short, this question shows incompetence on the part of the researchers.

272. I don't know exactly what makes some animals similar enough that testing on them yields relevant data, however if it does yield relevant data, if you can test on/kill a few animals to save a lot more humans, then I think that's fine. Hell, I'd even be fine with human testing if it could save many more. I think we should do tests on criminals with life or death sentences. It would clear up some room in prisons and give us more relevant data.

273. This question assumes that the person answering it unequivocally does not support any testing on humans, but supports testing on animals and has not considered the conflict therein. Clearly, there are differences between humans and animals, and to deny that would be asinine; however, it is also clear that there are biological similarities in certain regards which make animals a sufficiently suitable subject for testing of certain things. To act as though animals are equal to humans with regard to life and death situations is absurd, as I highly doubt anyone who is concerned with the effects of animal testing has ever gone to the same extent in mourning the loss of an animal as they did a human. The reality of the situation is that it is not as cut-and-dry as you may like to believe. You may choose to take for granted advances in science due to "animal testing," or potentially even to ignore that they exist, but the fact of the matter is that they are real. Additionally, there are sufficient differences in types of animal testing which are undertaken, which are begin ignored in this study. The dissection of fetal pigs or worms, for example, is a topic which I would find difficulty disagree with, as in both cases the "cruelty" is difficult to discern. Fetal pigs, by nature, are already dead, and the death of worms (or frogs, etc) does not largely concern me else I would refuse to travel in a vehicle during or after any period of rain; I believe that the same is true for the majority (or all) of the population. The situation, thus, is that there is a gamut of types of animal testing, and ignoring this and simply posing biased questions provides one with an ability to sway the results of a survey in the direction that they wish. A counter-survey similar to this one could easily be devised in which the questions were worded in a way which led the majority of participants to answer that they supported animal testing. However, regardless of this, I suspect that the "unbiased" statistical results of this survey will be used as supporting evidence for a politically-motivated forcing on your moral beliefs on others. As Disreali said, there are three kinds of lies: lies, damned lies, and statistics.

275. it helps us cure diseases. I support animal testing only if it directly benefits human health. Ideally, we would replace live animals with cadavers.

276. There lack of consciousness

280. If they're already dead, their bodies may as well be put to good use. I feel the same way about humans. Now if you're referring to animals being specifically grown for the purpose of killing and dissecting them... that's different.

283. Animal testing has many different degrees of harshness and variety. For example, I've done animal testing on rats before seeing if they are attracted to white or black walls more. Behavioral testing is what I've done mostly when I first planned to become a Bio major before I switched (no relation to the animal testing issue) to IMGD. I think that treating animals detrimentally and harshly is unacceptable, but I am not against testing in general. Also, looking at animals for dissection purposes, for example, gives people a better idea of the makeup of the animals, which can actually help in saving alive animals like it. This is like looking at a dead body and do an autopsy to find out why the person died. This is to get more information.

289. I believe that as animals, both human and non-human, there are sufficient commonalities in our biology such that research on both types of animals can yield benefits to both groups. I tend however to reserve this category for significant issues, such as research into disease. Cosmetic testing on animals is not something I support because the end result cannot be mutually beneficial. I also believe humans should be used as test subjects wherever possible.

292. Because they reproduce more rapidly and take less time to develop. Plus their overall lifespan is significantly less than that of a human so they won't be living long anyways.

294. All of the most important medical advances of the past century have been discovered or validated through the use of animal models. Animal testing clearly yields relevant data and the suggestion that they are not sufficiently different that humans to justify testing is an outrageous over simplification of a very complex issue.

Where one person draws the line of propriety for which animals are worth assigning rights to and which are not is entirely subjective.

297. Mmmmm.... steak.... Animals are here for us to eat. End of story.

307. I'm a pre-vet major, so I support animal testing if it will further my education and help many animals in the future but only if the animals that are being used are treated very well during the testing.

311. I don't support it on the basis of feelings that humans are "superior". If another animal advanced itself to be able to perform on humans Id support that testing too. I believe that there are differences in testings done on animals (cosmetic, research and psychological). Psychological testing on animals proves no immediate life saving advances to science. However, testing biomedical devices on animals is no different than the FDA clinical human testing that is required for all medical devices before they are approved by the FDA.

318. Fuck everyone who makes my tuition go up because they are such stuck up arrogant hippie cunts that they can't understand the importance of dissection. If you don't want to do what it takes for science get out of the field and go make me a sandwich. I think a Nobel Prize winner said that. Ultimately, the world comes down to them or us. I'd kill 100 children to cure cancer if I had to. Or 1000. As a scientist it is always my job to strive for the greater good, however narrow that margin may be at times. The split hairs come with the territory and shouldn't be negotiable. Ask Congress why animals are different. I'd love to see us do testing on death row prisoners instead of chimps or rats. We'd get better results in a lot of cases. Unfortunately the ethics of those who make the decisions to decide how things they don't understand should proceed don't agree. Science is the backbone of civilization, and it requires sacrifices, and that's that.

323. Animals that are used for educational purpose are of kind that is quickly regenerating and reprodusing. I believe that students who are studying medicine should have sense of how a real organism functions in order to realize the significance of life and how to save it and cure other live creature such as human.

325. I personally believe that if someone is opposed to humane animal testing, he or she should seriously reconsider his or her career choices. The biological/biomedical/bioengineering industries rely heavily upon experimentation involving animals. Where does one draw the line? What if a student is morally opposed to hurting plants? Or single-celled organisms? I know this example is extreme, but is it reasonable for someone with such firm beliefs to seek a career in a field when they are morally opposed to the majority of the research that happens within it? For example, if someone is morally opposed to typing on a keyboard, then should they seek a career in Computer Science?

327. A lot of good comes from animal experimentation in curing human diseases and if it saves human lives I think that they are more important than animal lives because I am human. If I was dieing from a disease and a cure was found through animal testing I would be fine with that.

334. not all animal models yield similar results to humans. nonetheless, it is extremely important to test on animals prior to testing on humans. the process is multi-staged: theoretical/modeling, lab bench, animals, humans. I think it's a well developed process and in the majority of cases the animal testing stage is necessary and can not be bypassed. difference between animas and humans is in the intelligence level.

335. if there is a product or medicine that could potentially hurt a human being I would prefer it tested on an animal first so there is more information before giving it to humans

336. I believe that the use of animals for testing is a good educational tool. On that note, I believe that it is inhumane to mistreat these animals. I believe that it is important to anesthetize them before any testing is done. I also believe that the use of animals for testing should have more than one benefit; for example, the BME dept utilizes the tails of the rats that were used for testing in other classes/labs. Rather than using the rat for one purpose and killing another, we are utilizing many parts of the rat for the advancement of science.

337. it allows us to see how life reacts to chemical compounds...and to learn about body parts like muscles and tendons which are not different in animals....they, depending on the animal used, reproduce much quicker than humans so testing has little impact on their population and does not alter directly human society, unlike testing

on a man who might work in a power plant, his loss of life may directly effect the lifes of those who rely on his skills in his work...therefore directly effecting human society

339. that is a ridiculous question. the point of working on animals, no matter what type, is because they have similarities with respect to their system (be it circulatory, musculoskeletal, etc) and it is a scientific advantage that we can use them as models, and take advantage of what we can learn from them.

341. To make some advancements tests are needed. If we do not test on humans we need another source.

350. I agree with animal testing as long as the animals are treated well, and they are not killed. Certain things I think are very important to test on animals, especially if it will help with cancer research for humans, or attempts to cure other widespread diseases.

354. People learn best through experimentation. If I was going into surgery I would want a doctor that has dissected animals. That way I would know at least he or she has had real life experience. Using computer models and other means is not sufficient enough. Anyone who is in a position where they need to dissect animals needs to realize that these dissection pertain to their field and that they be dissecting more than animals for their careers. So the bottom line is that if someone finds themselves in a position where they need to dissect something for their major and are uncomfortable doing it, they need to re-evaluate if this is the position they want to go in with their career. In terms of justification I believe that animals are more humane and viable to dissect than humans. Human corpses aren't nearly as readily available and I feel that dissecting human corpses would have even more of a uproar than dissecting animals.

357. biased question but: It is for the betterment of humanity. The presupposition that the illusion of soul or whatever is a purely human-invented concept. They are a tool for us to use. Why is it ok for an owl to swoop down and eat a mouse, but we cannot use them for scientific purposes?

361. Humans conduct testing on Humans as well, maybe not on the same scale or in the same ways but it happens.

363. The fact that humans have the ability to choose between testing and not testing on other animals makes humans different from other animals. As this has nothing to do with the biological composition of humans and other animals, the relevancy of the data has nothing to do with this difference. I don't have sufficient background in biology or animal testing to make claims either way for biological similarities.

365. Animals are not sentient beings like humans, but possess many physiological similarities, which makes testing/dissection on them possibly useful. When no good alternative exists, animal testing could be key to testing potentially lifesaving treatments for humans. However more mundane items like cosmetics and household products should have a higher standard set for animal testing.

366. If you're going to sign up for a class that involves dissection, you have to deal with the consequences.

367. If you are going to look at the use of animals for dissections, perhaps you should also look at how the animals we eat are treated before slaughter and become a vegetarian. We could always test new medical products on humans...

369. This is very difficult to answer adequately. I have a greyhound and she's more important to me than almost any human. I would not want anything ever to happen to her and I would protest anything where any dog was being tested unless it was absolutely necessary to try to cure something like cancer. I don't mind if people dissect frogs for science (although I refuse to dissect anything because that makes me ill). I envision some companies probably breed frogs or rabbits for use in testing or dissection. That is ok with me. I guess I draw the line at dogs. I'm not a fan of testing cosmetics on animals, but I try to be realistic about how society works at the same time.

374. I understand that some kinds of medical testing can not feasibly be conducted in non-animal models.

375. I believe that if the animals have certain compounds inside them that we cannot easily manufacture ourselves and the animals are nowhere near being endangered, then animal testing on those animals would be okay.

376. Animal models are incredibly useful. I'd say that humans have sentience, and that's what separates us, but sentience is what we define it to be. Mostly, the types of animals that are tested on have more offspring per parent than humans do. I believe that it is our responsibility to see that animals are kept as comfortable as possible during testing. Animals that are on the verge of extinction must be restored if at all possible. All species are too interconnected to be callous. However, at the end of the day, given the choice between killing a human and killing an animal, I will kill the animal.

377. For some areas of research even the thought of testing on humans is considered to be taboo, leaving no way for science to advance to help both humans and animals. By allowing animal testing, when warranted, it allows for science to advance and for humans and animals down the road to benefit greatly.

384. I don't think stupid things like cosmetics should be tested on animals, but things that could save lives should be tested on animals, specifically practicing procedures for operations. I don't think that young animals should be killed for that specific reason though, especially animals that could be pets.

386. It's hard to say. We're eating meal every day. But few people care about it. At least we can treat them well and do it as little as possible.

392. We need to find the data, Id rather deal with a dead animal than an actual human. Not using real animals (virtual reality) would def. slow research down.

393. I don't think there is really a difference between animals and humans, however I think we need to look at the big picture. If testing on a small number of animals would help a large number of humans, I can support it. I think the emotional aspect needs to be set aside to look at the large scale benefits. Although this may seem cruel, I believe this is how nature handles things, and I see this as the most efficient way to test things.

395. Free from human control or not, most animals will have pain in their lives anyway. As humans, we are capable of the moral responsibility to cause as little suffering as possible. Given an animal test that I truly believe to be helpful to society, the testing is acceptable (cruelty never is). The situation becomes amoral. The other reason is that animals, for the most part, do not contribute to society as a man/woman can. Granted that there is the Singer problem, that the boundaries are gray and hazy (some people fall into animal categories and vice versa), the "testability" of an animal should be determined by their worth, or lack thereof. An animal or human can have value as a worker, and can have sentimental value (ie domesticated animals). This is why it all depends: the acceptability of the tests is arbitrary.

400. They are animals for God's sake. If we had to kill a million cute little bunny rabbits to learn even the smallest amount about a disease I would support it.

407. Animals do feel pain, both higher and lower paints compared to humans. But for the sake of scientific advancement, until there's a better way, animals need to be used. Plus as a job seeking biologist, I need to conform to the standard practices of the industry if I want good pay. It's really hard to become a doctor with a fear of blood.

411. Nothing. Just because they don't know if they want to help the advancement of science doesn't mean that we shouldn't use them. They may have feelings and all that jazz, but they cannot CHOOSE to say no, their natural instinct, which tells them to live no matter what, doesn't count. They could save COUNTLESS lives for a few cats, dogs, monkeys, or cows dying. The lives could be animals' lives too.

415. 1) Medical benefits. 2) Animals are not sentient beings (with the exception of dolphins and lab mice, who are both more intelligent than humans).

416. I believe that it is the lesser of some evils. We could test on humans, but that would never be allowed.

421. They are animals, human life and comfort are more important.

423. Although it is true that animal testing is not always as effective as some people want it to seem, it still is an important step in the development of our science. If some new drugs have to be tested, I would be much more willing to risk a life of an animal, than health of a human being. God made us supreme over animals, so we can use them as we wish, for a value of an animal is not much greater than a value of non-living objects. Talking about students - if you are considering to work in a certain field, you should be ready to face the "uncomfortable" parts of your job. Medical practice can sometimes involve operating on dead bodies, which although might seem immoral, was one of the greatest steps in the development of medicine, and was done by the most gifted and intellegent people in human history, including Leonardo Da Vinci and Michlangello Buanarotti. I most firmly support animal testing and am not afraid to say it out loud.

426. I do not consider it animal testing. I would call it using an animal as a model system. Animals are used to test various components of the body in order to improve medical devices, procedures, treatments, etc. so humans are not exposed to unnecessary harms. If we have the means available to prevent human from suffering, then they should be used. The rapid advancement of medicine and technology have brought forth a demand for control and regulation. I support the use of animals as models for educational and experimental purposes when they are used for good reason and purpose.

427. It can have its reasons. As far as I am aware mice react similarly to medications as humans do, but since they have a shorter life span it is easier to recognize potential reactions. Many of these will eventually be tested on humans as well. Additionally every thing has a life span, and if the animal died of natural causes (including humans) and are them used for research purposes after I don't see that being so wrong. Lastly many people have pets (such as snakes, or some fish) that are feed live animals (mice, or other fish, etc.) are we to say that this should not be allowed as well?

428. I believe it's acceptable to test on animals because ultimately a lot of the testing that is done is to benefit the human race. There are numerous agencies/boards (like IRB) that are there to make sure the animals are treated in a humane way. Ultimately a lot of the testing that is done on animals first is then done on humans. The reason we choose the animals we do to test on isn't because they are sufficiently different from humans but because they are very similar to humans, making them the perfect first step in the testing process.

431. In my opinion, any person who is taking a biology class for the credit, animal testing is up to their own personal moral choices. I fully support it for when the person is going to be doing it as their carreer, especially as a vetrinarian or medical doctor, when the skills they learn in dissections and vivisections will carry directly over to their field and will be unreplaceable by virtual means.

436. I just think if any useful data at all can be found, it is worth it. Animals are animals, and although it is sad when they die, it is worse when a human dies. SO if animal testing can prevent such deaths or help humans, I am for it. Then again, I am biased, because I am human.

439. its the only way to make advances in science if we don't start somewhere things wont get done. as long as things are done in a fairly humane way I find no problem with it and i think that people who do are overreacting because its nearly impossible to not use any products that have been tested on animals previously.

441. This question was worded to sway people's answered. Reword it please with a more unbiased approach. Thanks. :)

447. I believe that for many fields of study, animal dissection is the only way to achieve proficiency. Models are definitely of use, but a student should be required to dissect an animal at least once if the material being learned is sufficiently relevant. I recall dissecting a pig in high school; it was a disgusting experience, but extremely educational. I've also visited the Body Worlds exhibit that tours museums and found it to be extremely educational (if you don't know what it is, google it). I do not believe that humans and animals are very different at all. There is a continuum of sentience with bacteria at one end and humans at the other. Most animal rights activists would have us believe that "animals are people too", however, I prefer the opposite view: humans are animals. We are barely evolved enough to consider ourselves the top of the chain. Animals use each other, for

food, or various symbiotic relationships. Using animals for testing furthers humans' goals, and should be done whenever the expected benefits outweigh our desire not to inflict harm/pain.

448. Without animal testing, medical research will be handicapped. A lot of human lives are at stake.

451. Unless there are other methods to do tests in the interest of medical sciences or sciences in general which yield the same or better results, I believe testing on animals is the best practical solution as of the present.

458. we breed them to kill them

464. Humans play an important role in this planet as "custodians." Meaning that as the most sophisticated life on this planet, we have the obligation to help maintain it. Sometimes, this means using the resources at hand to find a cure, or a solution to a problem. At WPI we are the future heads of our fields, and it is crucial that we not hold anything back. Someday it may be that experience that leads to an important discovery. If you do not wish to perform any of these experiments then don't take that lab. If you cant get a degree in that field without taking that class, then maybe you are in the wrong major. Potential employers expect a person with a degree in Biology from WPI to have fulfilled all of the criteria of that major, not just the criteria that they choose.

471. What do you believe makes it acceptable to test on animals? - If it'll result in finding a cure for a disease or sickness then it makes it acceptable.

474. The answer to the question of what makes animal testing right really depends on the case. Lower mammals (non-primates), such as mice and rats, form an excellent basis for testing. They have enough biological similarity to provide generally accurate information and trends for research. They do not, however, seem to possess mental capacity anywhere near that of humans. This is not to say that they do not experience feeling or pain; it is likely that they do to some extent. I don't believe that torturing animals or purposely hurting them is right; it isn't. However, I believe that it is a case of looking at the benefits of this research to humans. Although animals may need to be killed or experimented with, this type of research can and HAS resulted in information that results in the saving of human lives, and a greater understanding of important concepts in biology and medicine. Much of the early research involving genetics, pathogens, and anatomy occurred with animals; the information needed to be gathered, and it certainly couldn't be done on humans. The same applies now. There are many ideas and products that need to be tested somehow, lest they may never become useful. Animals are the way to do this, especially in research or clinical trial situations. This does become a grey area to me when it involves primates or higher mammals. These animals are very clearly human-like in almost all respects, and quite clearly display intelligence. In this case, testing which will result in the death of the animal should be avoided unless necessary for something very important.

481. In my opinion, (because it is the only practical way), animals may be used to test the possible side-effects of specific cures that may eventually save thousands of people, before this cure is tested on humans. Also, unfortunately, various types of animals in different parts of the world are being treated in really bad ways. Consequently, I believe that using animals for ACTUAL good purposes (excluding cosmetics, etc. which are not very necessary) such as curing diseases, etc. becomes doing a bad thing for a good cause.

493. Regarding whether students should be able to opt out of animal experimentation and dissection, i think that it should be an option for students only when another option of not only equal work but equal educational value can be provided. If the educational goals of the class hinge on dissection, it would be dishonest to give credit for the class if the student did not participate in that core activity.

494. In the simplest terms, animals cannot speak, so there should be not provision for animal rights beyond what negatively affects humans. Any "inhumane" procedures done on animals that benefits human biological or medical science is 100% worthwhile. It is obviously morally incorrect to test on other humans; however, animals kill each other all the time, sometimes for no reason, so if humanity can benefit from harming animals, than I agree with it.

495. First, I would like to say that I am disappointed with this survey. Having been required to write a survey myself, I find this very slanted and that the available answers attack those who feel it is ok to do animal testing. Also students DO have a choice about participating in dissection labs. A degree in biology, BME or other field

can be completed without ever taking a dissection lab - if you don't like it, don't sign up. If animals are killed humanly - quickly and as painlessly as possible (which is taught and practiced in labs if you've ever bothered to take one). I think anyone would agree that they'd rather test the new miracle cancer drug on several mice than just letting their grandmother take it and end up with sores and possibly having to be euthanized because of it.

498. It's not the difference between animals and humans that makes the difference. It really depends on the situation; in some cases I'd support testing on humans as well, and in other cases I wouldn't support animal testing at all. For testing purposes, the advantage to animals (especially small animals, such as mice) is that a larger sample size can be tested much more efficiently and effectively, provided that the animal is a good model. But as I mentioned, it really does depend on the individual case.

499. Though I don't have much knowledge about animal testing and how the results relate to humans, but assuming that animal testing is beneficial to the human race, I feel that results from animal testing has led to various drugs and vaccination. So there is a trade off where one can avoid animal testing and let humans suffer for a longer time before alternative methods are available to do the testing and validation. The only reason animals are used in testing because the laws are made by humans and not by GOD or a special power so they are bound to favour humans. Another reason is animal life is not regarded as much as a human due to various reasons, so they are tested upon with all the new "stuff". I believe someday there would some new equipment where everything could be done on software like in mechanical engineering. So, till then animals will remain the primary subjects to test new drugs, etc. Also, even if this is accomplished, it is human nature to venture into new fields so animals would be used there instead of there, because the results would be more accurate than what a computer could give, like in outer space, it was a dog, chimp etc, sent to space first and then man went there. A computer can not be sent there and do an accurate analysis of the environment or something abstract which only animals and humans have in common, so animals are necessary in medicine till some breakthrough is available. I hope I have given you bastards enough stuff to copy and then paste in your useless report. An answer which so obvious even a donkey would know.

501. I only support animal testing when it is for medical research on deadly or permanently disabilitating human diseases, and then only if they attempt to experiment on the least amount of animals possible.

505. Animals do not have the same rights as humans, for example, the right to not be eaten. People are more important than animals and when the choice comes down to experiments and procedures that could help humans, I am in favor. But animals must be treated with respect and not allowed to suffer undue harm or pain.

507. when you get to age 50 and half your friends have a life threatening disease such as ALS, MS, terminal brain tumors, autism, etc you will realize that we need to test whatever we can to solve the mysteries of these diseases so that PEOPLE can live longer. Most of these rodents which is what I've been told are the main animal used on campus are raised and alive now only to be used as experimental beings. And if you use a cat or a dog - well, it was probably abandanoned in the first place. Someone's pet is usually well cared for and at home with them. These are animals that would have died anyway. I was raised on a mini farm - you learn animals are animals - you befriend them and then later you eat them - they were raised to be eaten. Animals are completely different from Humans and yes, we deserve to use them to test things that will prolong our lives.

517. My belief is that testing on animals in the name of science - meaining trying to find cures for diseases etc. is an important part of research. I do hope that they are treated in a humane way - I would not support any kind of abuse for animal testing - We have enough ways today to make any living thing not feel pain.

519. I think that it is okay to do tests on animals for medical research. For example, before a medication is approved, it must be tested on rats to find out what types of side effects it could have on humans. Also, I feel that animal testing is crucial in discovering new genes and their functions (e.g. for diabetes or obeseity)in order to prevent diseases. Non-human animals are different from humans in that they reproduce faster and have a shorter turn around time for results. It is not ideal to test on humans because every person has a function in society and is probably needed to do a job. Though, I do feel that some human testing is fine as long as it is okay with the person being tested on and they are given all the information pertaining to the tests. I feel that as long as animals arent being tortured, animal testing is an important part of scientific research.

521. If the animal is subject to the same illness/condition as humans, and the testing could potentially benefit both species.

523. I am only in agreement with the testing on animals if it was to benefit mankind by finding cures for diseases that affect our lives or medications that could ultimately save our lives.

528. There are number of chemicals which we do not yet understand how they react in humans. Though someone might disagree that what works in those animals-even the one perceived as being close to human-might not work in humans, the relative success achieved in those testings helps to understand what to look out for in human testing (when these chemicals are introduced especially for the first time)

531. I accept the need to test on animals for the benefit of humans. Would you suggest warning labels on a package stating X number of animals died in the testing of this product?

532. I would rather disect a human body than an animal if i'm studying human anatomy. If it is animal anatomy, then use an animal.

536. It is human nature to value a human's life over, say, a mouse's. A mouse does not develop relationships; it does not have a family that will grieve over it's loss. As long as the animal feels no pain in disection cases, I feel it is an extremely valuable learning tool that will allow people to decide if the biology or medical field is right for them. Again, in the case of primates, it is human nature to place higher value on a human life. Since primates cannot contribute to our society as humans can, I believe using them for medical research is acceptable. These animals are similar enough to humans to yield relevant data, and the medical research conducted with their testing could save the lives of many people.

537. I suppose when it comes down to it, I do not value an animal's life as much as I do a human's life.

539. In many cases the biological and physiological response of animals is sufficiently close to human response that knowledge can be gained without putting human lives at risk. Animals used for experimentation should be treated with compassion.

540. It's the scientific progress that makes it acceptable to me. Maybe computer simulations will be able to take over some day, but for now it is my understanding that testing via animal testing is the one best way to establish definitive results. Now I will add that, just as there are rules governing human testing, there ought to be rules that make animal testing as humane as possible. I am aware that there are situations when animals are not treated as humanely as they could be, and I would agree that such situation should be subject to scrutiny and regulation.

543. The entire argument about whether it is "right or wrong" to use animals in medical and scientific testing is an extension of the human tendency to anthropomorphise. I do not advocate unnecessary testing or cruel treatment, however, the reality is that without animal testing many of the medical treatments such as vaccines would not be around. We cannot limit our research because we have become squeamish or have just watch too many Porky-Pig cartoons.

550. If you are in a major/field where specific and valuable knowledge and experience comes from animal testing/dissection that will ultimately help you to become a specialist in your field then I agree with it. For example, I wouldn't want a doctor to perform surgery on me who was not without practice. I have a rather utilitarian stance on the matter- what benefits the majority is how I base my beliefs. It's not always easy to define majority however in this case I feel human lives are more important than those of animals. My grandfather, many years ago, had a life threatening heart condition and the physicians inserted part of a pig (I believe a major artery) and he lived for many years without problems. This may very well be responsible for my thoughts on the topic.

552. My sister is a licensed veterinarian and while she was in vet school she had to perform dissections and experiments on animals that would not be woken up from the euthanasia. If she did not have this option, she would be learning to deal with a beating blood system in the real world on people's precious pets. I will never allow any pet of mine to be worked on by any graduate from Tuffs University for this very reason. They do not

learn surgery on live animals. They are learning on your pet. Animals should not be treated as humans as they do not share the same soul characteristics as humans. They can feel pain as a sensory aspect, so if possible treatment with respect and gentleness should be a priority. It is specifically stated that humans have dominion over animals and in order to preserve the life of others (including humans) some animals will have to be sacrificed. I am aware of a study that was done on a special mix breed of dog that could aid in the knowledge and cures of glaucoma (only this breed developed glaucoma identical to humans). These dogs had to be sacrificed in order to achieve the needed research. What's worse: killing one dog or one human?

555. I am against unwarranted testing. But support testing that will ultimately better science and medical technology. Without this testing we would not be able to advance certain medications and treatments in a timely manner.

558. I am torn on this subject. I know that animal testing helps human advancement in the medical field. But it does seem like a cruel way to treat animals and a cruel way to help humans.

559. Non-human animals are a part of humans diet, which makes them sufficiently different from humans! that can be easily justified because it is a part of food chain essential for ecological balance. Again, we use their products like leather etc for our comfort! I don't know if it will justify testing on them, but if the testing is unavoidable, and for a good cause to humanity, i guess we can support it!

561. humans are the dominant species, and we should stop human suffering before stopping animal suffering. If testing animals allows us to do that, I have no problems with it. Humans can interact with each other socially to a far greater extent than animals can. We should uphold HUMAN rights, not organism rights, there is no other organism on earth that has developed language, writing, civilizations or conscience thought as extensively as humans have. That is why we are the dominant species. Humans share a significantly large portion of our genome with many different species, so if we can cure disease, or find some revelation in some other species, it may carry over, or lead to a human cure.

565. I do believe that in order for us to advance there is sometimes a need to use animals for testing and educational purposes. I know this year my daughter's group at high school is dissecting a Pig. I feel it is no different that sending it to the slaughter house to be put into the food chain. I do NOT believe in being cruel to animals for any reason.

566. Animals are not my parents, cousins, children. Testing on animals allows advances in medical science that have helped cure my mother, treat my father and gave both better health.

567. I believe that when the animal testing is done for medical purposes such as cancer treatment and the treatment of other deadly diseases it is acceptable, provided that it is believed that animal testing is beneficial to developing a cure. Situations like cosmetic testing are not acceptable. These products do not prevent humans from dying, but a purely superficial.

570. Good job not having the Fire Protection Department as an option. If you are going to include graduate students, shouldn't you make sure you have all the departments listed. Just a thought. Thanks.

575. Like the meat we eat, many of these animals would not be alive were it not for their ultimate destiny. Were I to denounce animal testing entirely, I would need to become a vegetarian. I do not support animal testing, like certain cosmetic tests, where there is needless suffering. I do support research to provide alternatives. However, for many new drugs, in particular, I am unaware that other alternatives exist.

576. You're missing the point. It's not what makes non-human animals different, it's what makes them similar. For many diseases, animals remain the best models. Having worked in and around animal research for 17 years (not at WPI), I can tell you of the countless diseases, and discoveries that were advanced because of animal testing. One researcher I worked with cured one form of blindness, largely as a result of his work with non-human primates. In 99% of the cases, the animals were treated humanely. Try not to have an agenda next time you try to elicit responses from the WPI (or any academic community) community.

577. The animals used in animal testing are close enough to humans in physical structure to gather data as to how the human body will likely react to something. There are many types of testing (cosmetic, L.D. 50,neurological, etc) that are inhumane. I would support mostly surgical procedure to treat life-threatening conditions. As such, I am not naive enough to believe I would rather have a dangerous surgical procedure testing on a relative than a pig or cow. If a relative were to volunteer, however, I would feel better about it. Perhaps a compromise might be to require a certain time in which the researcher must try and find human volunteers.

582. I believe that some medications and medical procidures do require animal testing. As far as dissection goes, if the animal is uthanized appropriatly there is educational benifit to using a live specimen. Models will not have the same educational effect.

586. I also believe in human testing to an extent. Being apart of a life science, especially a pre-medical track, one must learn the full extent of what is going on inside of various living organisms. I see this the same way as if you were going to a mechanic that spent 4 years learning to fix cars and engines on a simulator. Having the real experience is essential to education. Would you trust a doctor to operate on you if he/she had never had any experience with a living organism?

587. I do not believe humans to be above animals, make no mistake about that, but unfortunately not everything can be replicated ex vivo and sometimes it is far too dangerous to perform the experiments in humans.

589. I think that animal testing for educational and scientific purposes is okay. It's not a question of morals, but of what we want to accomplish as a species. Yes, animal testing has a bad reputation, and many of us have seen the horrible consequences of cosmetic testing gone bad, but animal testing is a way to help human need. It's not the human need is better, and natural selection has taken a blow since humans evolved, but using animals for our own survival is sort of like a new kind of natural selection, one that lets us further our species, not with who/what can kill the other, but who/what can last the longest on this earth.

590. I support animal testing only in those instances where there is a very strong medical benefit (providing information to help the welfare of both animals and humans), and where all possible efforts have been made to minimize any animal suffering, and to greatly minimize the number of animals used. And yes such medically beneficial situations actually do exist, in spite of your somewhat biased question above with the reference citations. As to what makes non-human animals sufficiently different from humans to justify this, my answer is not much, we are indeed very much alike.....I'm strongly in favor of HUMAN medical testing too, even when it helps our knowledge of animal diseases (thus benefiting animal welfare)!

591. I don't know what qualifies an animal to yield sufficiently similar results so as to be useful, but if the animal is being used for something that has the potential to better the lives of humans then I am for it.

592. If you've got a better idea, I'd like to hear it. This is reality, its in there and the only way to know about it is to rip it open and take a peek.

593. At some point testing is necessary, whether on humans or animals. My position depends on the circumstances / situation entirely.

594. this survey seems to have a very anti animal testing bias. I think it is much better to test on animals than it is to test on humans. I also think that testing on animals provides valuable data that can ultimately lead to increases in our understanding of medicine. For example, I know for a fact that several chemicals that are currently used in chemotheropy now, have been used in research on animals in the 80s and 70s. I don't have time or energy to look up the specifics, but I think any academic worth any kind research can look that basic fact up in the library. I think it is very much worth the trade off to test on animals back - and even (heaven forbid) kill some of the animals - in the research to find a cure for cancer. I think if you look at any person who is currently benefiting from those drugs - that were ultimatly researched and deemed safe - because some animals were put at risk - and other drugs that are not used - because the results killed animals - make us better off. Finally, I do not support any organization that is tied to PETA. This organization is not really at all about protecting animals, but is rather a screwed up radical political movement that is anti human. I don't know if I

can change the mind of the people that made up this survey - which in my opinion has been overly bias in animal protection - but I think you should look hard and long before taking a radical approach to WPI and the use of animals in the classroom.

596. I Love animals, but most human lives are worth more than most animal lives (although there are exceptions---I have known several people in my life who are not as valuable to the world as my dog, for example, in terms of the things that they contribute.) In certain situations, if I can save human lives by testing in rats, I have no problem with it, provided that the rats are treated humanely.

597. "what do you believe makes it acceptable to test on animals" Testing vetinary drugs on a small number of animals in order to save lives of a large number of animals is ethical. E.g. testing a cure for mad cow disease on cows in order to save lots of cows. "what makes non-human animals sufficiently different from humans to justify testing on them" This is an ill-formed question. Your survey is flawed by prejudicial / leading questions in a number of places.

598. I support the testing of animals that rapidly reproduce (rodents, insects). Animals that could be considered pets (cats, dogs) or be considered to have a "personality" should not be tested on.

599. Non-human animals, most that are often bred solely for the testing, should and are used to advance science. Just as human/embryonic stem cells should continue to be harvested and/or created and allowed to be used for testing and for medical purposes. Cloning humans for research in my mind does not differ from the breeding of animals for dissection, testing and research. It seems extreme, but I do not think humans are any different or better than any other living creature. I also believe that non human animals allow for a base of testing, which can them be used on humans through clinical trials. Mice, rats, cats, monkeys, sadly their lives are taken to improve medical care, but I think what most PETA and even non extreme animal rights activists don't consider, is the benefit to their own family's health and welfare, perhaps someday, to their own personal medical care. Will they refuse medical treatments that have been tested on animals if they are in a terminal situation? Humans are involved in clinical trials, most after a series of animal testing, and these people really are aware of the risks they are taking, and humans are no different than the non-human animals being used, except they are cognitively aware of the risks they take. You can certainly find instances of humans in recent years have died due to complications in clinical trials. Not that this is right, but humans make their own decisions to participate. We need to have the right to make this decision ourselves, as we should have the right to buy cosmetics or household cleaners that are from companies who do not practice animal testing. Science has progressed in many historical instances due to researchers using their own bodies for testing; however the recent case of researchers using "graduate students" or post docs for this type of research is terrible. Humans should make their own personal decisions on this without being pressured. I realize that animals cannot make their own decisions, but if testing done in a way without causing pain or suffering, I believe the potential benefits outweigh the sacrifice. I personally also feel that students certainly could use simulations in many cases in lieu of dissection and that this should be an option.

603. I thnk if it can advance science- make medical advances then it is justifiable. I am a pet owner so it a difficult thing to decide.

604. All animals "use" other animals. Humans do it the most. Raising animals for use in stringintly controlled experimentation is no different than raising them on farms to be food.

606. This survey was one of the more skewed ones I've ever taken. Almost every question was phrased for a particular answer. If your goal is to have to have a survey to use against the biology department then I guess you succeeded. Maybe you should do an IQP where your not going to be bias in the collection of data.

610. The fact that the great majority of scientific medical advances are due to the testing on animals. In addition, I do not see how if I am able to eat meat but complain at the same time for animals being killed for medical advancement, that I could not be a hippocrit. Both are important aspects of survival and in my eyes food and testing could not be morally different from each other.

612. Many people in this world believe that they are here for a reason. I would argue that this is the case for these experiment animals, bred specifically to aid in learning and education. I've seen first hand at numerous

private and public facilities and at educational facilities, that these animals are treated well, respected, and often referred to by a given name, as opposed to their assigned number. During experimentation, they are held to the same surgical standards has humans in terms of sterility, technique, and pain management. IACUC regulates procedures and minimized the number of animals used, therefore I'm not seeing abuse of the system. Finally, nothing compares to hands on experience with surgery, as life is very delicate...a model cannot mimic the balance between life and death, nor teach the respect for life, attention to detail, and the repercussions of not performing well during a surgical experiment.

618. Most animals used in testing (mice, rats) are bred specifically with that purpose in mind; they would not exist otherwise. Computer models/VR equipment can not adequately mimic the complexities of a living organism. I would prefer to place the risk on small animals, rather than have something experimental tried out someone's family member.

620. Animals do not have free will nor are they capable of reasoning. As long as they are treated humanely, i.e., not allowed to suffer, I believe animal testing is invaluable in the search for medical advances in treating humans. As for the question about testing cosmetics and household products, I would prefer that there was the option "I don't know" vs. "I don't care." I don't really know enough about it to have an opinion.

626. Animal testing for non life threatning products like makeup, household products etc should be banned! Test that stuff on yourself! However testing new life saving medications where there is currently no cure is acceptable provided that the animal is treated well. Plenty of people donate there body to science for dissection.

627. hunters rule of thumb If you kill it you must eat it, waste not want not

628. As cruel and harsh as the idea seems, we wouldn't have anywhere near the scientific knowledge that we do now. Were the news to be released that we had cured every form of cancer with animal testing, I believe it would be more widely accepted. It's not a practice that I happily view as part of life, but I believe it is neccesary none the less.

630. I feel that if the experimentation yields to results that could protect human life (medical and/or scientific) it is justified. However, with the rise of new technology, there may be equally beneficial ways to gain the educational value gained from dissection (anatomy, biology). I would support a shift to using that technology in this case.

631. This is not a yes or no decison. Almost nothing in life is black and white. See full answer in next box.

633. Non-human animals are necessary for the advancement of the medical field. Large numbers of test can be run in small areas, and the better test organisms, especially mice, are very similar genetically to humans. Performing tests in vitro is not enough for new treatments to be approved for human use. These treatments need to be tested in living systems to see how they will affect patients. Since it would be impractical to perform testing on humans for ethical and efficiency issues, testing must be done on animals. Also, I would like to note that there often are cases where animals scheduled for termination are used for teaching tools after death, like the cats in BB2903.

634. If you can save a human life by ending a few non human animal lives, I don't see what the problem is. Human life is far more valuable than animal life. As long as the animals are not being tortured, I do not see the problem in it. If you can save me or my family's life by killing 300 animals, I don't care, do it, save my family. And I know even the idiots that don't support animal testing would agree with me on that one.

640. I support animal testing for pharmaceutical research. The first phase of any drug development is testing the effects of the drug on animals. This is needed before the drug can be tested on any human because if the drug has any serious (and unknown) side effects, I'd rather that it be tested on animals first. Animals have similar enough characteristics for scientists to be able to tell that if the drug caused serious side affects in the particular animal, then it would do the same for humans. Computer modelling is a very useful tool that can maybe help reduce the number trails needed to be conducted on animals, but I do not think that in the field of pharmaceutical research it can or should completely replace animal testing.

642. I think in medical fields if the product were to help with serious human diseases, like cancer and parkinsons then there is a reason that we need to test the product. Also if the person is going to be a vetrinarian then it would be just like med students using cadavers. However, with general bio i dont think its necessary to use animals for testing "just to see what it is" for one section of the class, since that can easily be done in a text book or computer.

645. There are obvious limitations that should be placed on animal testing. Purposes for which serve NO MEDICAL relevance should not be done. I personally do not like the idea of testing animals, and I know that as a biologist I don't think I could ever work with or euthanize animals. However, I understand that this is a difficult concept for some non-biologists to understand a need for animal models in science. My answer to this question is that animals graciously permit us to find cures for diseases, to understand wound modeling to benefit burn patients, and to comprehend the inner complexity/workings of the human body, in addition to a multitude of other things. For instance, in the case of drugs, it is extraordinarily difficult as a scientist to move a drug from the lab to a patient. There is currently NO POSSIBLE WAY to foresee if a drug that appears to be promising in the lab using human cell lines will act the same way in the complexity of the human body. Animals permit us to try these drugs and to catch any problems before mass amounts of people are dying because of some complication. Medical & biological science would not even be close to where they are today if we weren't able to use animals. I personally could never use animals in my own career b/c it would bother me too much, but I do not refute their tremendous impact and significance on science. Human life has increase an estimated 25-30years because of animal testing. I find it hard to believe that there is much data out there to discredit the use of animals in science. Perhaps I could understand a reduction in the use of animals for dissections and learning. I don't necessarily agree with the deaths of animals for that sole purpose as it seems trivial. But who's also to say that a medical student who may be operating on you in 10 years time could be just as good by using plasticized models or computers vs the real thing. If enough valid, repetitive data were presented showing that animal testing truly does not benefit science, I would absolutely agree that animal should not be used for science. But until then, I feel that it has to be done to save human lives. Humans are given the capacity to experience free will, higher thinking, and a diverse range of complex emotions. It is obvious from our ability to develop the world that we are a higher organism compared to our mammal counterparts (although we do make mistakes at times and tragedy ensues). For our present time however, animals are necessary to furthering our medical advancements in treating humans. Furthermore, animals need to be treated with the highest regard and utmost respect. Despite the fact that we are a higher organism, they are the ones saving our lives and thus deserve that title. I think that humans need to be aware of the fact as well that as we cure more and more diseases, our life expectancy continues to grow, thus creating more pressure on nature and wildlife. There are too many facets here to discuss them all, but we need to be very conscientious of what we're currently doing and to be aware of repercussions.

649. I think that animal testing is a necessary evil. I am moved more by uman suffering and want to end it, even at the cost of the lives of some innocent animals.

650. It has been demonstrated time and again that using animals to test out new technology for humans yields beneficial results for humans. What makes humans more valuable (even from a purely secular point of view) is our ability to think and reason. Physically we share many characteristics with many different animals. But out of the millions of different species of animals on the planet only people have reason. If one disagrees that humans are of more worth because of our ability to reason and that people are no more valuable than any other animal, then what is the difference between the human species killing other animals for their benefit and other animals killing for their benefit (say lions for instance)? If humans and animals are on the same level, it can't be expected of humans to act any better.

655. the fact that they are non-humans makes them sufficiently different by definition.

656. I believe that God put animals on earth to help humans

658. Animals allow researchers to test their hypotheses on a living system before putting them into clinical trials on humans. This research allows them to change the product before it reaches humans if they find a problem with the product. Animals, especially mammals and rodents are ideal for this due to the close relationship genetically to humans, having many identical systems and biological pathways. If animals are treated properly according to the organizations that regular animal testing for both research and educational purposes, then it is

fine. I do believe that if there is an equally good model to test a hypothesis (i.e. cell culture model) that the alternative model should be used at least before the animal model to test the validity of the reserach on a living system. This could prevent unnecesary deaths of an animal for a research idea that may not even work in the first place.

659. Do you want your family members to take drugs that have not been tested in any living system other beforehand? They will most likely suffer very bad side effects, if not perish. The other thing you have to worry about is false hope. You tell a human patient with MS that this pill could cure them, and instead it had the exact opposite reaction or no reaction at all, you are left with a very tramuatized patient, who will probably not want to try a drug again even if you perfected it. A rat is not going have false hope. Using humans as the first line of testing of drugs and other clinical products is an utterly ridiculous concept. You HAVE to test on other living systems first, utlimately is is clearly better a mouse dies because the drug is flawed than a human die.

660. I've seen a good number of animal testing, both at WPI and in hospitals. For instance, in one of my summer jobs, rats were used to test medicines for diabetes- which meant that we had to cause diabetes in perfectly healthy animals. Those rats were better treated than most household pets, and given every possible comfort for a rat. For the more painful diseases, such as cancer, they were given anesthetics so they wouldn't feel the pain. When the animals aren't in pain and/or it doesn't effect their lives to the point where they can't play or can't live as they would normally (as a household pet), I don't see a problem with it. When vivisection occurs- painful procedures, or those that degrade the lifestyle of the animal to the point where it can no longer live a relatively normal or comfortable life, seem inhumane to me. Of course, genetics play a big deal in differentiating between humans and animals- for instance, Mice, who are so genetically similar yet assumed to be inferior because they are easily obtained and we can't prove that their intelligence is on the same level as ours. THough, I do often wonder if we had switched it- put humans in theirsituation (uneducated, out of communication with those beyond our circumstance, and under similar conditions) whether we would perform any better.

663. I would just like to say that it seems you are driving at attempting to remove animal disection from WPI labratorys. However, all animals which are dissected are killed in a manner which provides the least ammount of pain. Also computer simulations are no substitute for gaining a strong understanding of anatomy and physiology. Many of the students at WPI are pre-med and their animal dissections pave the way for understanding of the human body. How would you like to have a surgeon or even a doctor who's only understanding of your body stemmed from text books and computer simulations.

664. There are situations when a prospective treatment or product may be too hazardous for testing on humans, but at the same time it holds the promise to save many human lives. Let's assume a new type of stent used to avoid clogging of artheries.let's assume also that such a stent can be placed using new techniques, minimally invasive were catheters are not needed, only a small incision (port), but we are not sure how well the stent can be translated to the needed spot. I think its first use on pigs or primates and not on humans makes good sense. Unless we can get humans that willingly will volunteer. Will you?

665. I feel like this questionaire has a predisposition of opinions. I do not like the way it is set up and highly disagree with the responses that you have given the public to choose from. I do not think that this questionaire should be used for an IQP.

666. I believe that humans were given dominion by God over all the other animals (Genesis 1:26). Humans have souls and animals don't. I don't think it's right to be cruel to animals and intentionally inflict pain on them without purpose, but I do not think that animal testing necessarially falls under that category. For example, a disection is on an animal that is already dead. In some cases animals must be put through pain to test them, but if it's necessary in order to save human lives, I think that sacrificing a rat's well being is worth the price. As long as it's with good intention.

667. I did not answer several questions. the reason is you did not mention what kinds of animals are involved and whether they were bred for this specific purpose. I distinguish between animals who if not tested would never be borm or would be used fro food and those captured in the wild or bred as pets and then turned over to science for testing becasue they are unwanted. Yes, treatment matters. Cruelty is to be avoided, but a longer

life and a better one than a food animal can't be considered torture and the opportunity to breed is a benefit to an animal- as we all die in the end anyway, that is not to be scorned.

677. Why not test on humans, too, if absolutely necessary? :) Now just try to get the human to sign a consent form...

681. I place a greater value on human life than on non-human life. While human tests are the only method for conclusively determining the safety of a product, many unsafe products (such as potential medicines) can be weeded out without the loss of human life, through the use of animals for preliminary safety testing. While animals are not humans, and as such not physiologically identical to us, researchers generally select test animals that bear strong similarities to humans in the relevant systems. Also, smaller animals have shorter life cycles, allowing test results to be gleaned much more quickly than they would be through human testing. The simpler the life form, the less objectionable I find its usage - if a test can be accomplished with insects, using mammals is hardly reasonable, unless there is a considerable benefit to doing so.

689. It is better to test a new drug or treatment on an animal than it is on a human. It's better for an animal to die than for a human to die from side effects or complications.

690. The fact that the genetic links between Humans and other animals, allow for the use of animals to represent a more realistic test in leiu of a human being. Also "live" data can more accurately model the outcome of a test vs. a simulation.

693. I simply believe human lives are more important than animal lives. I think, though, that animal suffering should be minimized as much as possible. I do think dissection as a tool can be worthwhile. I doubt that computer simulations yield as good a picture as to what goes on inside animals as does opening them up.

695. I think some animal testing is OK. I have not thought of specific reasons why or why not.

696. Many animals, particularly insects, have naturally short life spans and much higher birth rates. You can get hundreds of fruit flies, for instance, in a few days, while you need to wait 9 months for a single human. It's a shame that animals have to die to bring us medical advancement, but I'd rather have those medical advancements than all the dogs (which were used to develop insulin treatments for diabetics) in the world. The truth is, we would not have a long a life span as we do now if we did not use animal testing to develop treatments like angioplasty, artificial joints, or the polio vaccine.

699. If I could I'd use prisoners, but since this is illegal we are forced to use animals. I love animals and have several pets myself, but unfortunatly there sacrifice is necessary for the advancment of science. People are as we are because we evolved as the most murderous mother fuckers in the jungle, we do what we must.

700. I am ok with animal testing only if it is absolutely necessary to advance our knowledge of medical science in that area, with the following conditions: only plentiful lower animals are used (mice, frogs, etc) they are treated and killed humanely it is an area of science that will benefit mankind in a significant way, like curing cancer or helping a paraplegic walk again (no testing of cosmetics or other frivolous products)

703. Testing animals in the hopes that the outcome will save other animals, including humans, is acceptable.

705. Lack of sentience makes it acceptable, especially in cases where human lives may be saved. Results from animals are useful because in general, mammals have very similar biology, even across species. In terms of educational purposes, it is an important part of education to understand how internals are laid out--for this reason, at this time dissection is important, but if a suitable artificial model could be developed, it would be preferable.

707. It is not our right to test on animals but a privilege that should not be abused - As far as the class I took went, we treated them as humanely as possible which is why I was able to do it. They were not ill-treated or disrespected in anyway - the professor made sure of that. Animals used for the class were those that were going to be put to sleep by various labs and had inherent problems/diseases. Also, it is important to study the

procedures in school on these animals rather than enter the industry without the proper knowledge of handling them.

708. Animals lack self awareness. Also they are delicious.

713. When it comes to animal testing, I generally support it if it can be shown that the results can be used to save human lives. An example I frequently think about is a viral epidemic, such as an outbreak of avian flu. If science can learn how the disease progresses and test possible vaccines, then the animal testing was justified. I feel morally comfortable in saying that I value the millions of human lives that could be saved by the development of an avian flu vaccine over the hundred of lab animals (mostly monkeys) that will be killed in the course of the experiments. In fact, experiments like these have already been carried out, with fruitful results. Researchers reconstructed a strain of the deadly 1918 influenza virus and infected 12 research monkeys to understand how the disease progressed and what made that particular strain so deadly. The researchers discovered that the virus triggers an improper overactive immune response which leads to death. I believe this knowledge gives scientists a very powerful tool for combating the similar H5N1 avian flu strain. The death of the 12 research monkeys is justified because the results of the experiment have the potential to save millions of lives. But what if the same experiment used 12 humans instead of 12 monkeys? Would I support the testing then? No. So what then makes the monkeys sufficiently different from humans to justify testing? In my opinion, the fact that they are not human is sufficient reason. My justification comes down to choosing oneself (or ones species) over another. Suppose you and a stranger are in a small plane whose engine has failed and is going to crash. There is only one parachute onboard and it is only capable of carrying one person safely to the ground. Are you morally required to give the parachute to the other person? I think not. It is certainly nice, kind, heroic etc, but not morally required. Therefore, when two sets of lives hang in the balance, it is not a moral violation to choose oneself over another. This balance is in effect anytime a cure for a deadly disease is being researched, only the balance is between human lives and animal lives. Just as it was morally permissible to choose oneself in the airplane, so it is permissible to choose human lives over animal lives. Either millions of humans die because of a flu out break, or hundreds of research monkeys die while studying the virus and developing a vaccine. But what about alternatives to animal testing? What if they can create a situation where there is no tradeoff of life? If such alternatives existed and were equally effective, then I believe we would be morally required to use them. However, the prospects of such alternatives seem slim. Can cell cultures and petri dishes ever capture the full complexity of a disease as it plays out in the body? While I have no knowledge of any potential alternatives, my hunch is that such alternatives will never fully capture the complexity of the immune response. Alternatives may minimize part of the animal testing process, but in the end they are no replacement. Until such time as scientists develop alternatives of equal value, animal testing will remain a morally permissible part of disease research.

715. As long as the animals used are domesticated or belong to species that have relatively healthy (or oversized) populations (i.e., are not endangered), it's fine. In fact, I see all living things as equal enough so as to make it alright for human testing to occur pepople so choose to go through it. It's the fact that we all are so biologically similar that makes testing tolerable.

716. Many animals share a vast number of similarities with all other animals, humans included. If the testing is not cruel then it is acceptable. Testing is justified because we attach more value to human health than animal health. BTW, this question feels biased against animal testing

717. I believe that testing on animals is essential to furthing science. There are agencies/councils in place at WPI, such as IACUC, that review animal testing protocols and protect animal welfare. Therefore, if the animals are not mistreated, cared for, and euthanized in a humane manner, animal testing is reasonable. Computer systems and simulators cannot give us the whole insite into what goes on in a animal system. I feel that simulators could suffice for smaller organ systems, but ultimately animals should be used to test for overall responses to medical devices.

718. The only factor that makes animal testing ethical, is that substantial knowledge can be gained from it and/or can be used to benefit humans and animals alike. For, example; pithing animals to harvest cells for cell culture/ IN VITRO research. Thus, in that circumstance, the poor fate of one animal can in effect benefit multiple animals and multitudes of humans. Another factor is that animals deserve the right to be treated well, while in captivity. Not only is it the ethical thing to do, but making the animals comfortable renders better and

more consistent results via many, many understood and still mysterious hormonal cascades. For example, the cortisol stress mechanism can throw off results very much, if left unchecked, which is just a factor of stress upon the animals. Finally, animals are close enough to humans to yield good data for scientific purposes. While they are slightly far enough apart from humans in terms of societal aspects that render their testing more ethical than human testing (Nuremburg trials, Japanese war crimes tribunals, the Hague etc.). With that in mind, I have dissected humans as a medical student, and animals in undergraduate studies. While there are differences in the solemnity of treatment to cadavers, there are many similarities, that should and are followed. For example, cadavers must be dissected, not mutilated, the must not be wantonly vandalized, music may not be played in a dissection lab, etc (read grant's dissector for a full array of cadaveric etiquette). Having dissected humans and animals, along with models, I can safely say there is nothing like the real thing...plastinated models are simply second rate. To achieve the level of understanding necessitated by physiology or research classes at any level, animal models should certainly be used. HOWEVER, they must be pithed ethically, students should be well prepared to acquire as much knowledge as possible as quickly as possible in order to off set the ethical cost of pithing an animal. Even looking at testing new surgical procedures or drug development in clinical (human) testing scenarios, double blind/blind/placebo studies present ethical questions that are never easily answered. For example, how can you ethically tell a man/woman/child you are rendering the best possible care in a clinical trial, and in fact, give a sugar pill. Keeping in mind all of the above, animals and humans have are very near each other in ethical earnst, and also scientific value. Which is why the debate that humans are treated better than animals is flawed. In fact, humans are treated just as poorly and are just as deceived for the sake of science, however, many IRBs have approved the studies. All tolled, animals do deserve and receive similar ethical treatment to humans, as they should. While one can never fully earn the taking of a life or a physical being, you need to do the best you can. I.E. prep well before a pithing, do significant research before testing, extensive IRB reviews and ethical captivity standards. Understand that the medical research community does very much research on cadavers and live humans alike. However, the only ethical difference between animals and humans is slim...an informed consent form signed by a patient or patient's family.

721. Anatomy and brain function are two distinct things. A frog's internal organs are very much like our own. There is a reason we do not dissect the frog brain, and that is because it has no relevance to the human brain. Since our species appreciates the value of the individual, as opposed to the group as a whole, our want for saving individual lives outweighs the lives of animals of lower intelligence. Other frogs don't feel anything when another one of the completely disappears. Humans do. I feel like I'm writing a paper.

725. Anatomy and brain function are two distinct things. A frog's internal organs are very much like our own. There is a reason we do not dissect the frog brain, and that is because it has no relevance to the human brain. Since our species appreciates the value of the individual, as opposed to the group as a whole, our want for saving individual lives outweighs the lives of animals of lower intelligence. Other frogs don't feel anything when another one of the completely disappears. Humans do. I feel like I'm writing a paper.

729. I feel that if testing on animals can help give us a better understanding of how things work, than we should be able to test on animals, especially if it will help find cures for both humans and pets.

732. The direct response to the 'how are they any different from humans' question is that physically we are very similar and have similar reactions. Animals can develop personalities and they have thought processes, so they could be related to humans that way too. They do not, however, have the same level of thought processes, they have not evolved to the same level that we have. We also kill animals to eat them in order to survive. When it comes to testing cures for diseases on animals, that's done to help humans survive too. Do I like that animal testing is done? Not really. Do I like that animals are born, bred, and killed simply for students to dissect? Again, not really. But I feel like it's a "necessary evil" when you look at the big picture.

734. Really don't like the tone of this question. Do not feel this survey is unbiased. I believe testing is necessary and educational -- and the basis for most medical advancements. I do not believe in cruelty, torture, poor living conditions, etc.

735. I support animal testing only if it will benefit either humans or any species of animals. By 'benefit' I don't mean what cosmetics cause allergic reactions...but to test medication to cure/delay the effects of cancer, aids, tuberculosis and other such illnesses. Or if the experimentation is to cure a specific illness in that species. I also

feel that any pre-med/vet student should not have any other option other than using real animals, since when they get out in to the field they will be working on live animals - not models.

736. I believe God created animlas to serve man. So if animlas must die in order for humans to make medical advancements which lead to their overall comfort in the future, then thats what must be done. I also think man has a responsibility to treat these animlas with kindness and respect seeing how they are dieing to serve man. The animlas should not be treated cruelly and should die the most painless way possible.

742. I suppose I validate it the same as I would validate eating animals. If you are killing an animal to use it for something then I don't see a problem with it.

750. Ultimately, such things as vaccines and other treatments for viruses must be tested on a living creature, and it is a lot easier to get a multitude of information if the testing can be done on, say, mice, as opposed to humans (think of the number of mice available for testing as opposed to the number of humans available). It may be cruel and I certainly couldn't give a mouse AIDs without guilt, but if in the long run people benefit from it, it at least makes it not in vain.

752. I believe that animals do in fact have feelings and do feel pain. I also believe there is a lot of human pain and suffering in the world. I feel that it is ok to harm and kill animals to further research in field that can help cure peoples illnesses. On the other hand, I feel it is unfair to hurt or kill animals where the porposes are cosmetic, household, or non-medical fields.

755. otherwise we'd kill humans in testing OR we would never develop new drugs because we'd be too afraid to test on humans. As far as dissection goes, nothing is better than the real thing and what happens when you have to do the real thing, but never actually saw it? Mechanical engineers break real machines to learn about them, why shouldn't bio students have to break real animals to learn. If they don't want to do that kind of thing maybe they should reconsider their major!

762. I believe that animal testing is important for the scientific community. Particularly when it comes to the effects foriengn substances have on biological systems and processes. I also think that from a purly scientific stance, animals that reproduce rapidly and have a realitvely short life-span can give a researcher a better insight into the long term effects vs. testing on humans, who reporduce fairly slowly and have a long life span. I value the lives of all animals but in the end if the research will in someway save human lives then those research animals lives are even more important and honorable. All this being said I do think that animal testing should be well regulated and that research animals must be treated in a humane manner and with respect.

765. Mammal physiology similar. Human life is "more important" than animal life.

766. Animals do not have the thinking, reasoning, compassion, etc. of humans. I do not minimize that our pets can be "smart," provide us companionship, and may show us certain human-like traits at some level, but they are not. Since the beginning of humans, animals have provided us food, clothing, and service. Toxicological data demonstrate that testing done on animals is indeed helpful in establishing data for humans - this should be used. As in all, we are obligated to treat these and all animals humanely and respectfully.

767. As long as there is a plethora of that species on our plant, we should be able to learn through experimentation and analysis for the advancement of our society and preservation of our planet earth. Educating the future leaders of our society at WPI is instrumental in laying that foundation. However, if alternative methods exist to convey the same lessons, then they should be utilized. It's about the education not the dissection.

775. If purpose bred animals are treated humanely the benefits of research outweigh the individual animals lives. Research not only benefits humans but other animals as well. The key is to reduce the suffering of the animals used. For dissections the animal must be humanely euthanized and in studies procedures/protocols must be in place to ensure suffering is minimized. Note: I have worked in the animal testing field for over 5 years.

784. This is simply the best way to actually see the effects that certain chemicals, drugs, and operations would have on a living creature. In the classroom it gives students necessary experience and labwork that they must become familiar with. The only type of bio student that would never do this are strict botanists, and if they have a complaint about this then they may wish to look into creating another set of courses that would cover equivalent material in their own field of study. Otherwise, students should have this experience. Looking at a computer screen about the ideal frog body is in no way the same to actually looking at a frog on the table and students do not learn as much from just a simulation.

785. Ideally human trials should be done wherever possible. There are too many examples of inability to extrapolate data from one living organism to another. If it came down to choosing between the life of a human and the life of an random animal, OK - I'll lean toward the human. There ought to be a damn good reason for it though. And if you're wearing a fur, you better have been in a position where you had to kill that animal with your bare hands and skin it yourself, otherwise there's no excuse.

786. I think animal testing is fine as long as they do not suffer during the experiment. Most of the animals used (that I am aware of) are animals like rats and mice. They are prevalent inthe world so we aren't endangering their species and we are learning about biological systems to aid our own, and other species.

789. I believe it should be avoided and any alternatives should be investigated and used. but ultimately, I've learned a lot in my own undergrad studies during animal tests and sometimes there is not a viable alternative. true medical testing (cancer, etc) is an ethical justification, I believe - testing cosmetics & cleaners is not.

791. Testing on humans or animals is fine with me. The only difference is that a human can give verbal consent to the test. Animal testing is no worse than killing an animal for food - we use the death (or discomfort) of the animal to benefit humans. I see no distinction between the two, especially if the tests being performed are for medical research purposes. If alternative methods are just as effective (such as computer models, etc.) then the act is senseless and purposeless. In such a case, I would oppose it.

794. Mainly the similarities between a monkey's adsorption and use of drugs and a human's in the treatment of difficult diseases. It's also difficult to find humans who want to test a drug and who fit particular criteria exactly. It's a lot easier to test on monkeys or mice or rats. It's disappointing that we test the smallest, nearly insignificant things on all animals. It's important to test only those are the most important, i.e. cancer drugs, etc, and in situations where human testing is not possible or probable.

798. I support it to some extents. Some experimentation is necessary when the end result can be a positive impact on man kind. We need to weigh the costs of animal testing with what gains)if any), and be conservative with our actions.

801. I honestly do not know a lot about animal testing. Nor do i think the general public does either. So it is hard for me to say one way or another if I agree or not. I do believe that animals are living creatures that have the right to a good life and should be treated well. However, I think that research, testing, and learning from animals may be able to help humans and society. Also, I think it depends on the animal. I'm don't care that much about rats as I do dogs. So that could play a part in my decision as well. My point being, i need more information about this subject.

802. Animal testing, especially small animal testing is not really used to analyze any reactions because of its similarity to humans. Rather the small animals used, mostly the mammals, are used to test general reactions such as reactions caused by the "mammalian body" not neccesarily the human body.

Answers to Survey Question #12 (response number precedes the answer)
If you do not support animal testing, what led you to that belief?

29. What gives humans the right to use other animals in testing? I only dissect animals that died of natural causes. I will not kill an animal and I will not test on any animal killed just for educational purposes. If products aren't safe to test on humans, alternatives need to be considered instead of testing on animals.

30. I do not believe in human superiority, and I believe in the ethical treatment of all animate beings. We are given the choice of whether or not to treat these animals this way, and I believe that the choice we make reflects upon us as a species.

31. Most of it is just wasting life, especially the testing for cosmetics and household stuff. How much of the medical testing is really necessary or results in treatments beneficial to humans??? A very small fraction, I would guess. Breeding animals for the sole purpose of experimentation is immoral, in my view.

34. I do not believe that animal testing is right. They are alive and have every right to live. It is crewl and inhumane. If the animal is already dead (natural causes), then I would not have a problem with it at all. Same thing with humans donating their body to science after they die. I am appauled to find out that WPI does live animal testing. If we can test on live, innocent animals, why don't we test on convicted killers? I have done a lot of research on animal crewelty and I feel that the humans are the the most in"human" of all.

36. I definately do NOT support the use of animals for dissection in any class below a college (within major) course. I feel that the use of animals for dissection/experimentation in an education setting is entirely wastful when used with students who have no interest in learning from the experience and will not go on to use that information in the future. I strongly believe that dissection should be eliminated from High Schools (and below) with the possible exception of AP Biology classes where the students are much more likely to be heading into a field where the use of dissection will be meaningful to them. Further, ther eis absoultely no sense in wasting a life for some engineering or music major to get science credit even in a college situation. Therefore, courses for students who need science credit but are not science majors should have non-dissection classes. I feel that most of these type of students take nothing from the activity and, in many cases are disrespectful of the life that was yielded so that they may observe...something. Even in upper level biology course students take dissections and animal experiments much more lightly than they should, in my opinion.

49. I have a pet Guinea Pig, She's the shit.

57. There's a word for a person who exploits those he considers to be weaker than himself for his own gain: Bully. ... that about sums up why I'm morally opposed to animal testing. Cosmetic testing in particular sickens me. It's really just inexcusable, torturing weaker creatures for the sake of human vanity. Scientifically speaking, animal testing isn't very useful. Even the animals most similar to humans are pretty different. Results from animal tests are at best only sort of applicable to human medicine. At worst, medical testing on animals is really dangerous if the animal differs from humans in some small but significant way. If we knew for certain that a particular animal could be used in place of humans to develop a reliable cure for a life threatening disease - HIV, for instance - and the animals were going to be treated ethically during their lives and euthanized as humanely as possible at the end, I'd be okay with letting the testing happen, but wouldn't be thrilled about it.

63. Perhaps we should test on humans to cure animal diseases?

66. I am a strong animal rights advocate and vegan. I do not believe that human beings have the right to do whatever they please to non-human beings simply because they have developed in a which makes the choice a possibility.

72. Animal testing must be done for a reason, and it must be done as humanly as possible. There are painless ways to gather data from animals that may be more expensive, and these methods should be used whenever possible. The use of Animals should definitely be a personal choice. No one should be forced to dissect or experiment on animals. Students should be aware, however, of the useful roles animals play in biological science and the current laws that force animal testing of new treatments before they make this choice.

73. I draw the line at frivolous experimentation

79. I do not agree to animal testing, dissection, etc., especially if it is used for pure educational tools, for entry level students. With that said, I understand that some students wish to pursue fields in the medical sciences, and veterinary sciences. The veterinarians would need to participate in animal dissection, since they are studying it. The med students too would need to, but I would prefer that they get cadavers rather than animals.

84. I've got a few comments on your survey: - Some of the questions and answer choices are worded such that they could introduce bias. For example, the answer "I don't care." has a negative tone to it (it implies apathy). A wording such as "Neither." may illicit more accurate responses. - The word "kill" evokes very strong emotional responses in may people, and may bias your survey. A word such as "terminated" may be more neutral. Good luck! You guys are doing some awesome work. The Student Choice policy is a great way to begin reducing the number of animals that are used in experiments at WPI. Hopefully it will spur a broader movement in the research labs.

104. I do not support purposeless animal testing. It is obvious to me that if you put toxins into an animals body they will suffer negative effects. Testing cosmetics is also a horrid idea. There are key and significant differences between the way that humans' bodies functions and animals'. Testing with bugs, showing how they respond to stimuli that do not hurt such as "Do these beetles prefer moist or dry ground" is an example of an acceptable experiment. I disagree completely with the bio labs dealing with neurobiology where frogs are basically tortured before they are killed. I love biology, but I am made sick by what is being done here and around the country. I may have to change my major if alternatives are not made available to these gruesome labs.

111. I don't support mostly all animal testing... I think that animals are not ours to hurt and exploit.. We should be working on prevention not cures... if prevention doesn't work, then animals should be used as a last resort... I think watching animals for scientific study in their environment is okay... I also do think that some animals, such as mice or rats, can be sacrificed for experimentation if the cause will greatly impact many human lives... but it really depends on the circumstances.. if thousands of mice will be sacrificed for thousands of humans then i dont think that the experiment is worthwhile... all in all, it's confusing and sad

121. Testing on animals with more developed nervous systems (many vertebrates) is overly cruel as they feel physical and psychological pain. Certain animals most likely do not suffer significantly in testing.

122. Testing on animals with more developed nervous systems (many vertebrates) is overly cruel as they feel physical and psychological pain. Certain animals most likely do not suffer significantly in testing.

167. It is so stupid and pointless. There are so many alternatives out there (many of them far more useful in a classroom environment) than to just kill an animal in the name of science.

183. I pretty much covered it up there, but testing on animals for the sake of testing on animals isn't right. If it's for a good cause that helps humanity as a whole, and not just someone's hair, it shouldn't be outlawed.

196. N/A

202. I take a somewhat utilitarian approach to animal testing. If a cure for cancer can be found by sacrificing some rats, go right ahead. Similarly, if behavioral testing on animals inflicts some mental anguish on the subjects but leads to increased understanding of animal cognition and therefore better rights/treatment of the species as a whole, I think it is a worthwhile trade. But whenever possible, scientists should avoid causing undue harm and anxiety on their animal subjects, and animals should never be viewed as mere objects which cannot feel pain.

205. As I said before, I believe that in certain circumstances animal testing can be humane such as if the animal died of natural causes or was suffering. But I would draw the line at raising animals just to be killed or tortured, which I do not agree with.

211. The belief that animals do not have feelings is rediculous and humans do not have the right to take their lives at a whim. I believe that human and animal lives should be held at an equal value. I am ok with it, however, if it is unavoidable and any alternative means of study is inaffective in a crucial situation.

216. One word: Karma

223. I do not see the difference between a human and an animal test subject. neither should be killed for sole scientific use, nor should either be made a holy institution in death unusable for disection purposes (as long as the subject wasn't killed for that purpose). also, animals can be helpful for human emulation for testing such products such as hair and beauty products (such a waste, in my opinion). if the animals are treated with due respect, I dont see this as a problem, but what about the percentage of our population that's homeless? I'm sure they'll jump at the possibility of getting a salon hairdo for a steady salary. things to ponder, as fashion people are crazy. (not exactly scientific, but very true) we have options. use them.

229. I fail to see where there is a distinction that justifies arbitrarily valuing human life over animal life (I am also a vegetarian).

233. Animals are living creatures, and deserve to be treated with respect. They aren't here for us to poke prod and kill. It's cruel.

242. I have been told that there are alternatives to animal dissection for educational purposes. I am completely against animal dissection if we have other tools to educate the students.

247. I have recently decided to not eat meat products anymore. Also, I believe there are other, better options that don't include killing an animal for our own gain

249. I believe it because it's how I've always felt. I draw the line on what the animal is being tested for. As I said before, for medical reasons testing on certain animals is ok, but not for cosmetic reasons.

257. There are many true necessities in life, human life and animal life. Using animals as test subjects for our cosmetics is unjustified. If it could be proved that animals don't feel pain the way we do, that they don't become unhappy when put in pain, than maybe there is something there. But it is not so and could not be absolutely proved. Animals feel just like us and we should be considerate of that. If one is willing to put animals in pain, then there is something psychologically wrong; we must be heading towards life that is too narcissistic. Besides, there is some connection with animal cruelty and delinquency, so there is some connection with our lives and how we treat animals. We should take this into consideration EVEN FOR OUR SAKE!

263. Non-human animal testing rarely considers the interests of the animal being tested and treats them as objects or scientific tools rather than living beings. A large portion of animal testing is done to satisfy regulations, even for products that are not essential for human health (cosmetics and household products). Animal testing can sometimes lead to valuable health and safety information, although these tests have been greatly abused.

290. I draw the line at the very beginning of the argument: whether or not it is acceptable for any reason. I believe it is not; I believe that it is a disgusting and disturbing act, and that using animals for the sake of testing is inherantly wrong. That said, I cannot dispute its results, and I have no place influencing what others do or believe. In short, if I was instructed to kill an animal for testing or to test an animal that was killed for the explicit purpose of my testing it, I would rather fail the assignment and the class, and I would promptly walk out of the classroom.

311. I do not support animal testing for psychological testing. There is no proven benefit to this testing. They will not benefit from testing (like an animal could benefit from testing an improved drug etc)

316. If the class is for people becoming vets and real animal disection would be helpful to train people to help save many animals in the long run ONLY if the animals being tested on or disected are going to be put down anyways.

321. I believe in animal testing to the point where it is an absolute necessity. If animals are being used to test cosmetics or something that is altogether unnecessary then I don't feel that the animal should be tested on.

322. I respect/appreciate/honor/like some animals more than many humans. The Singer argument applies too.

328. I believe that using animals purely for our own benefit, just as it is done in raising animals for food, is unethical. Whenever I think of raising animals purely for the purpose of later killing them, possibly after extended torture, I think of Singer's Animal Liberation and the example of Nazi's raising Jews to later kill them. The argument that we have dominion over animals is very weak, since that dominion was probably created by us alone. The question that always comes to mind is: Why don't we perform the same tests on humans?

334. testing on mice and rats is easier to accept that, for example, testing on primates. but i do still belive that even fatal testing on primates can be justified if performed in the most humane way possible.

338. Animals have been a huge part of my life as far back as I can remember. My family has always had pets which were treated like family (because they were family). When I was little I was the kid that was outside catching any critter I could find, however strict rules applied. My mom and dad insisted that the animals were treated gently and returned to the same location they were found within a short amount of time. Here at WPI I did both my sufficiency (animal testing) and my IQP (ethics surrounding companion animals) on animal ethics. I am completely unconvinced that product or medical testing on animals is ethical. Each day it seems that more research is coming out to support the fact that animals are capable of a higher level of thought that was previously considered to be only possible in humans. Realistically, change will be slow as far as animal rights are concerned. Our society relies too heavily on animal products and too many people choose to remain ignorant for change to happen quickly. I have participated in labs at WPI using animals including the dissection lab. It was far from my first choice and had an alternative been offered I would have jumped on it in a second! Good luck on your project!

344. we should not kill or harm animals for the purpose of proving a point ni a classroom or collecting data that applies to our lives only slightly. I only support animal testing if it is for the purpose of protecting humans, like for animal-testing medicines for diseases like cancer

348. Animals have feelings and feel pain. Should not harm other animals, unless necessary. Such as development for medicine/treatment for fatal diseases. Cancer, HIV, and such.

352. I figure that non-human animals are alive exactly as we are. We wouldn't want them testing on us, would we? I don't care if we're considered more intelligent. What if some extraterrestrial race came to Earth and tested on us, merely because they were more intelligent? If it would be considered inhumane to test on humans, then, no matter how they are treated, how could it not be considered inhumane to test on animals? Of course, it is better to treat animal test subjects well, but they should not be tested on in the first place. So that's where I draw the line, that it shouldn't ever be done. I admit that I'm guilty of it, though. In my bio lab this term we did tests on animals. However, we didn't subject them to much, and they're all being adopted out, so it wasn't so bad, but they were still bred for and used as test subjects. The experiment actually gave us really great data, and I understand that, even if we were to use a computer simulation or something instead, which could have given us similar data, we would never know how to create that alternate simulation if we hadn't done the tests on the animals in the first place. So some testing is necessary and has often been necessary in the past to gain new knowledge. Where I REALLY draw the line is with companies like Proctor & Gamble that use tons of animal testing to test their products (in horrible ways) when they could use alternate and even better methods as some other companies do. As for what led me to the belief...nothing in particular. It's just what I believe because it makes sense to me. (And, by the way, because this is closely related and will give a better sense of my beliefs, I feel, just because I believe that animals are not lesser than humans does not mean that I'm a vegan or that I actively fight for it. It is natural for humans to eat meat (and it is tasty), and I am merely against the cruel methods used. Even though I strongly am, I do nothing about it, and I feel that I would do nothing about animal testing in a lot of cases, too, just go along with it, even if I could not bring myself to do some of the testing personally and/or felt terrible about it the whole time.)

358. We're animals too...

362. Because animals are also living beings. In other words, they are our peers co-habiting on the earth.

371. I have always been an avid animal lover and a supporter that people should stick up for those who cannot speak for themselves. Using stray cats in our mechanical engineering department, for instance, for use in a biomechanics class really bothers me. A mechanical engineering major will NEVER have to actually touch a muscle, let alone disect an entire cat. They're not doctors, and even if a doctor was training to become a surgeon, we have humans who dedicate their bodies to science. It's ethically wrong to take the life of ANY animal because we feel we are higher up on the chain of life for any means of consumption. Animal testing to me shows a lack of a conscience and a disreguard for all creatures below us. Helpless creatures should not be used to test any type of product to be marketed. There are so many chemical differences between humans and different types of animals that the test results would be extremely skewed and somewhat estimated. Nowadays, we have all sorts of different means that will get us the same answers we could get from torturing a defenseless animal. Hopefully more people will wake up soon.

374. 1. The realization that animals are sentient. 2. My mounting conviction that human intelligence is not categorically different from that of other animals. 3. The belief that alternate testing methods are underfunded. 4. The realization of how gratuitous the use of animal testing can be for little obvious benefit. // I think that no restrictions should be put on testing on echinoderms or other animals with no neural ganglia. Beyond that, I don't know.

375. I do not find the dissection of animals as a necessary action; there are alternatives, although not cheap, but they will not kill animals merely to be studied when someone is not actually getting anything out of them other than knowledge of anatomy, which can easily be learned through the alternatives.

378. I think that it is fine for them to be tested as long as they aren't hurt. And i think its dumb to test cosmetic products on them but i dont care that much. And killing animals just to disect them shouldn't be allowed.

384. I support it to a degree. I think that procedures should be practiced because they can save lives. I don't think that things that can't save lives should be tested on animals and I don't support testing on live animals and they shouldnt be killed either.

388. I don't have time to explain it a lot, and maybe I have not really though deeply about that question, but I have

393. I can't say I support animal testing for comforts (cosmetics, etc.,), but I can draw the line at helping a significant number of people (i.e., cancer research). I think that there should be no testing if it is not clear that the tests will help at least that many people.

394. I have a remark. What about human babies? i have heard that in the past, people did not really care if they were actually feeling pain or suffering when treating them medically (or even by surgery), and that anesthaesia was not a major concern when dealing with babies. Obviously, this idea is just disgusting. It is not because a creature can not speak that it does not suffer. Maybe I have this kind of feeling, which makes me somewhat reluctant with animal testing.

395. Again, it's unacceptable if it causes great suffering or if it's for a lousy purpose.

414. I support animal testing, but I am not going to do it. It is like I eat meat, but I am not going to kill the animal. I dont know, but humans are selfish in some sense.

449. On the idea of where to draw the line: Why test on animals? Why not test directly on humans? If there is a chemical or pathogen whose toxicity would like to be known, why not run the bioassay on humans? If the answer is, "Because humans are more important, or better than animals," then I ask, "How?" One cannot simply argue, "Because we are humans," as that would be speciesism, an analog to racism or sexism. The most common and seemingly upstanding argument is that humans are more intelligent than animals, we are self conscious. Well, then where does one draw the line that separates human intelligence from animal intelligence? If one draws the line to include all human beings, then many animals (such as primates) are included, as their

intelligence is higher than some mentally handicapped humans. If one draws the line so that no animals other than humans are included, then it becomes justifiable to conduct dissections on severely handicapped humans.

459. In case of impostant diseses where experimentation cannot be carrie dout on humans, animal testing may be the only way t proceed for the time being; however care should be taken that they are treated properly nad if ultimately sacrificed then they have pianless death to the point possible. I so not support their use in labs just for the sake of learning, esp if the student is never going to pursue a career in that filed. Like animal surgery for biomedical engineers!!!!!

466. Would you give your son or daughter's life to science?? What about your neighbor's or friend's children?? How about an orphan?? As simple as that.

487. Animals have the right to be treated with respect and dignity.

509. I don't draw the line, it shouldn't be done. Animals cannot speak for themselves. They depend on humans to protect them, not kill them.

513. I've been vegan for four years and vegetarian for almost 20 - should explain everything! My entire life is about protecting the lives of animals who are being tortured and can't do/say anything about it. As far as where I draw the line, animals should never be in a lab (unless it's a companion that you're taking with you on a trip to the lab, for whatever reason!). Animals should never be poked or prodded with things, or wrongfully have their lives taken away just so we can be "hands on" and study their organs/tissues/etc. We're living in a world with so much technology that there is certainly alternatives that EVERYONE should be using - there shouldn't be any consideration. When it's available, and it's obvious funding isn't an option when the school makes $35k a head, there shouldn't be a consideration AT ALL when it comes to cruelty-free or horrible dissection.

514. I do not support animal testing in any way. In today's world, scientific models work just as well.

522. Even the way the animals are kept is inhumane and unnatural for the animal. I dont believe any animal should be kept in a small cage. Take for example rabbits, of which I have 3 as pets, they are very social animals and need lots of room to run, play and explore. In labs they are kept in small, confined spaces without the comfort of their own species or kind interaction with humans. I cannot imagine treating an animal this way. They are also very clean animals and subjecting them to makeup or whatever on their fur is torturous to them. This all comes before any painful procedures, which is beyond terrible. I am very disappointed to hear that WPI is participating in such archaic practices. As a technology advanced institution, I would have expected instructors to use alternative methods of teaching. I thought WPI was better than this.

541. Anything breathing should be respected. Not over the top like a plant. However, animals do not deserve to lose their life for science. Some people take it to far and it can lead to additional taking of lives.

545. I think most testing is unnecessary and does not provide adequate data relevant to humans or real-life environments. In addition, numerous testing lab facilities (both commercial and university) have been videotaped showing cruel and inhumane conditions and treatment for the animals. However, I would support limited testing under very humane conditions for the animals if there is proven relevance to certain (not all) human health and disease conditions. Regarding dissection, I also know we euthanize between 6 and 9 million (depending whose numbers you use) companion animals a year that are unwanted. I would not oppose using euthanized animals for educational dissection purposes. I would insist that the animals bodies be treated with respect and ultimately disposed of in a respectful manner (completely opposite the high school dissection experiences of which I have been part). I am a vegetarian also for ethical reasons. I do not believe we (humans) treat animals in a humane and compassionate way.

547. Personally it is just not something I can engage in and not have emotional feelings about. It's one thing to disect a dead bug (I hate bugs anyway) but to KILL a live animal - I just don't get that. That makes no sense to me. It's a touchy subject. I just don't like it because I personally can't do it. I cringe when I hit a squirrel with my car. That's just me and my own personal opinion.

553. It's fraudulent science! "The fact is that we already do test new drugs on people, but because animal tests are so unreliable, they make those human trials all the more risky. In August 2004, the Food and Drug Administration (FDA) noted that only 8 percent of all drugs that pass animal tests make it to the human market. This means that of all drugs that are found to be safe and effective in animals, a whopping 92 percent are found to be either unsafe or ineffective in humans. Vioxx, Phenactin, E-Ferol, Oraflex, Zomax, Suprol, and Selacryn are some of the drugs that had to be pulled from the market in recent years because they killed or seriously harmed thousands of people. Despite rigorous animal tests, prescription drugs kill 100,000 people each year, making them our nation's fourth-biggest killer." "Studies have found that chemicals that cause cancer in rats only caused cancer in mice 46 percent of the time—that's about the same as flipping a coin. If extrapolating from rats to mice is so problematic, how can we extrapolate results from mice, rats, guinea pigs, rabbits, cats, dogs, monkeys, and other animals to humans?" "If experimenting on one mentally retarded person could benefit 1,000 children, would we do it? Of course not! Ethics dictate that the value of each life in and of itself cannot be superseded by its potential value to anyone else. Experimenters claim a "right" to inflict pain on animals based on animals' supposed lack of reason. But if lack of reason truly justified animal experimentation, experimenting on human beings with "inferior" mental capabilities, such as infants and the mentally retarded, would also be acceptable. The argument also ignores the reasoning ability of many animals, including pigs, who demonstrate measurably sophisticated approaches to solving problems, and some primates, who not only use tools but also teach their offspring how to use them." -http://www.stopanimaltests.com/f-pointcounterpoint.asp

559. Sometimes, animal testing is done for really stupid reasons like in the case of cosmetics. I think, we should respect the fact that testing on animals is something like a huge advantage on our part, and use it wisely. There should be some law restricting the use of animals to unavoidable cases

574. Various things. First, I have great compassion for animals. Second, I think in many cases there is corruption/mishandling of animals. Third, I had to dissect animals in high school and learned absolutely nothing from it. Forth, I do think all results of testing on animals can be transfered to humans. Fifth, with all the new technology available, I don't think that dissection for education purposes is at all needed for the vast majority of students.

584. I didn't realize animals were killed at WPI until I got this survey. I'm a vegan, so I hold very strong beliefs about how we should relate to other creatures around us. Animals feel pain and suffer when they are subject to these tests. Just because we can inflict this type of pain on animals for dubious scientific results, does not mean we should do it. I don't equate an animal's life with a human's life, but I do believe these animals have traveled the same difficult evolutionary path as humans, and evolved into wondefully unique and special animals that at least deserve our respect and commitment not to harm them for silly reasons. They certainly deserve more than to be kept in cages and subjected to endless poking and prodding with the end result being an anonymous and pointless death.

585. It is important for people to have a healthy respect for all life, including animals. I understand that in some cases animal testing may be much safer than human testing, while yeilding results that are similar to human test results. I also understand that dissection is an important step in learning the anatomy of animals or humans. I do not agree with the way animals that are raised for these purposes are treated. Testing should be done on humans who volunteer for such testing, knowing the risks involved. I find cosmetic testing on animals deplorable. Animals should not have to die just so humans can look "pretty". In situations where animal testing is medically or educationally necessary, and the animals are repsected, I will support it.

590. I was not able to provide an answer to some of your questions above because my thoughts were not one of your options.

594. oh - come on - this is a very bias question

597. If you do not support animal testing, what led you to that belief? My humanistic sense of ethics. Where do you draw the line? Gratuitous pain / poor conditions / primates

614. At the core is a belief that not being human does not stop one from being a person. Language technology and culture do not make one species inherently worth more than another. No matter where you draw the line

you get the Singer problem which I'm sure you're familiar with. So why not do the rational thing and test on humans instead of other animals?

617. I do not believe that animals should be killed unless it is completely necessary - human survival is the only excuse I can come up with. If it is proven that using animal subjects for testing of things such as human-life saving medicine or surgery, I do support it, as I do vaule human life over aminal life. However, for things such as testing cosmetics and other really trivial things, it is torturous and unnecessary for the animal.

627. hunters rule of thumb If you kill it you must eat it, waste not want not

629. There are levels and levels and worlds within worlds. We are all just residents here. Everything has soul and a conscious and is on a progression. Many humans have lost sight & connection with the bigger picture and have moved out of alignment. A living body is a machine which can be tuned and aligned. Animals in the wild must keep their senses tuned in order to survive; many humnas have lost concept of this. If one stops for a moment and allows themselves to connect and feel their own vitality one can feel that they are a small component of a very big picture.

631. Actually it was the use of animals in my General Biology classes during my undergraduate years that caused me to switch from animals to plants. We had to pith a frog to do some muscle testing. I found the entire activity ethically problematic, and unnecessary for class. On the other hand, it is crucial that physicians and veterinarians have first hand experience with living subjects in order to obtain the hands-on skills required to effect good medical practice. I would not want my pets to be operated on by a vet who had only worked with simulators and I would not want me or my family members to be operated on by a phsician who had no hands on experience with surgery. This is just plain old common sense. Humans need to DO things to gain tactile experience. Furthermore, it is only ethically acceptable for drugs important for animal and human survival to be tested first on animals and then humans.
647. In nature, animals live in the equivalent of a human warzone on a daily basis. You see no old animals in the wild, no sick and none born with defects. They are brutally killed and usually eaten alive, by other animals. We have no responsibility to save these creatures, and if their suffering will save human lives, and countless examples of research are irreplacable by computer models, then there is no reason to extrapolate the human social contract to animals that are incapable of understanding and participating in it. If a really good alternative exists that shows 30% of the reality of dissection in a lab, then a perfect performance on the alternative should have the weighted grade of 30%. Advancing in a biology field requires you are familiar with the real workings of living creatures, and if your plans don't need dissection expertise, you shouldn't mind NRing the course. Where should the line be drawn? Until people stop dying, animals are a viable test subject. Until people stop buying and needing all the supurflous chemical products found in every single household, animals are a viable test subject. Ask a mother how important the safety information is on all the chemicals under her sink are. Ask a person who depends on tap water how important carcinogen information is. Then start at the bottom, asking any one person how much harder it is to be socially accepted with horrible skin problems, because they can't wash with the right chemicals or they're exposed to the wrong ones, and see if they'll support no further testing on animals because of an overabundance of misguided human sympathy. If you can convince them, then maybe you'll have a case when talking to a university that trains all the scientists, the ones who do petty cosmetic work testing on animals as well as the ones that are working to save human lives.

651. I think there is a certain degree of scientific dogma involved ("thats just how we do it"), and that information technology will largely replace the need to kill animals to learn.

663. If it leads to saving a life it is acceptable. Our understanding of many diseases has come from the use of animal models. Anyone who says otherwise is most likely not a scientist in the field. I would agree though that animal testing for the use of cosmetic and house hold products is absurd and unwarrented.

664. I love God's creatures, I want them protected and respected, I believe they have a soul. I am vegetarian. I do not want them tortured unless is an absolute must.

677. I believe that an animal's life has significant value to it, and that we should use them only with the deepest respect. If someone needs to kill an animal, I hope they had also evaluated other alternatives (such as models) first for suitability. Just like with your question above "Do you believe that students should be allowed to chose

[an alternative to dissection].", I support the course instructor in that they are the ones who should decide if it is worth the animals' lives versus using models. Models are never exact replicas of life, so they not give a 100% accurate experience to a student. --- whether this is worth it, depends on what the instructor is preparing the student for in their careers. Similarly, I do not mind hunting for food, but I would not go hunting for sport. (ie, eat the animal, don't just throw it away)

681. Frivolous and/or inhumane usage of animal subjects is what I object to. Given modern technology, I see no reason to continue dissecting live animals in classrooms (an animal that has died naturally is obviously more reasonable). I would like to point out, as a side note, that the tone of this survey seems highly biased, and even hostile at times towards those who do not agree with the views that you obviously hold.

689. I do however, draw the line at pointless testing, such as cosmetics. If they have reason to believe that a cosmetic is going to poison a human being, then they shouldn't be releasing it anyway.

694. This is a very complicated subject and I am torn between the two options. With the testing lives are often saved (as I understand it) and scientific progress can be made so that we can better lives of people. Additionally... the animals will most likely suffer in one way or another. I believe I draw the line somewhere according to the suffering of the animal (if that can be determined). Because I eat meat which is a betterment of my life which I could probably not give up I suppose I would support animal testing as long as the animals were given respect.

698. Animals should not be slaughtered for education. Animal slaughter is different than animal testing - though usually both are factored in an experiment. If animals can be tested on without being mistreated, then i'm okay with animal testing. However, if this is the case, then there is no reason to be testing on animals rather than humans. This is why i am against animal testing: we should just be testing on humans. This would generally provide more valid results as well. Note: the question "Do you believe that students should be allowed to choose whether they want to participate in animal experimentation/dissection, assuming that an alternative assignment of equal work is assigned in its place?" Needs clearer answer options - If its the professor's decision, he could decide to give you the choice. Also, does equal work equate to equal learning? Are these students training for jobs that would require them to cut open animals anyway, in which case they ought to fail the class if they ethically or morally disagree with the industry they are training to be a part of? Another note: you provided an "Alumnus" status, but didn't include any years that an alumni would have graduated in.

701. I was led to my opposition as a logical conclusion of my pacifism and my belief that humans have no moral privilege over other animals. However, I must admit that I haven't taken the equally logical and probably more significant step of becoming a vegetarian.

703. Animals should only be used where humans cannot.

711. When animals are treated with disrespect and are seen as nothing more than a tool for science it's wrong. When humans are tested for things we try to be as careful and openminded as possible to the condition and well being of the individual. Animals are the same. Someone who has a pet would understand that animals don't just cry or get angry because they don't know any better. It's because they actually have feelings and the only way to express those feelings is through their body language and body motions. If we are to have animal testing, the care and well being of the animal must be intact. The animal, when tested, should be no different than it was before testing occured, such as its health and appearance.

728. Do not see a direct correlation (especialy quantitatively) between animal responses and human response to exposure and dosages of chemicals, etc.

734. This is a general comment on the survey. I do not feel the two questions offering only 3 answers (support, non-support, don't care) accurately capture my response. There are other possibilities not reflected. I also find the Yes/No answer to student requirement to participate in animal experimentation/dissection too limiting. I would sinceley hope that my surgeon participated in these types of exercises prior to operating on humans. Also -- I find it interesting that there is not option for general comments (I pre-empted this question to give you some of mine...)

741. There doesn't seem to be enough local, governmental supervision. Lab techs may be doing doing procedures that are not proper, and who's watching them? Are there independent inspectors in place who come in and inspect the labs and animals in those labs? I would draw the line at experiments regarding "pain tolerance" in animals. I once saw on TV, an experiment where monkeys were strapped in car-like vehicles with little helmuts on, and then these little cars were slammed into walls. The helmuts really provided no protection as they looked like thin, leather football helmuts. There are plenty of body/head injuries in humans to yield plenty of data. I think testing should stick with mice and rats.

743. Animals are sentient beings and to test on them is immoral.

744. Animal testing should directly benefit humans in a medical way, and should be treated as well as is feasible.

745. To tell you the truth, I really dont like to think about it... ignorance is bliss

748. It's just plain cruel. I draw the line at the first step. It should never occur.

750. I draw the line at testing for cosmetics and other vanity purposed. Killing poor puppies and such for a new kind of eyeliner? :(

753. Killing something to teach some student something that is already known is wasteful, and being a bad steward of our greatest God given gifts, this planet. That being said, we do have dominion over them, but that does not mean we ought treat them like scrap paper. What leads me to this belife, my heart and God given conciences.

765. I draw the line at humane treatment of animals. Even test animals should be treated as gently as possible.

773. I am not sure what led to my belief against testing. It seems like part of the modern project that for hundreds of years has privileged humans over animals and the natural world. We are starting to understand the destructive consequences that this kind of attitude has on animals, the natural world, and increasingly other humans - as when certain ethnic groups come to be regarded as "animals" on whom experiments can be conducted. Frankly, I cannot think of any animal testing that I could accept.

776. As an educational tool, it is a waste. In specific cases that actually DO behave the same way in humans it might be appropriate. However, repeating an experiment "to verify it" is considered - particularly in the field- to be unnecessary cruelty and looked upon as very bad methodology. I would agree. In specific cases, perhaps. From what I have seen though, it goes far too far out of that realm and into the realm of cruelty. A quote from a biology professor at WPI(on an experiment that had already killed enough mice to be statistically significant): "I don't know why they didn't use any more mice. After all, they're just animals". For that attitude, I do not believe it is appropriate. Those extra points in statistical significance would not have made a difference to anyone apart from my professor's happiness. They made a difference to the mice that would have been killed for no good reason.

781. We are just stealing the life from other creatures. It's all we do. We can not justify their suffering with our health and longevity.

783. I don't think anyone or any living animal should be probed,picked,stabbed,caged in small areas without any quality of life. Maybe people should be patched tested, you cannot assumed just because it works on an animal that it will work on a human, I could think of a lot of human beings that would be a great candidate for some of these test.

785. It should only be done when absolutely necessary and at the highest levels of science - i.e. final testing for drugs or experimental procedures. Unfortunately I don't see the government going along with 100% animal free testing anytime soon, so even if a researcher doesn't want to test on animals, current regulations likely insist upon it. High school or even college projects are definitely not justified in killing innocent animals. No offense, but how often do any of those projects produce earth-shattering data? Even so, the results obtained are often not applicable to humans. Use of tissue and organ cultures should be further explored, and

redundancy of data should be minimized. It's pretty darn obvious which chemicals and products are toxic or damaging, so stop shoving them down animals' throats and dripping it into their eyes already. There are other means of testing available now. Get with the times.

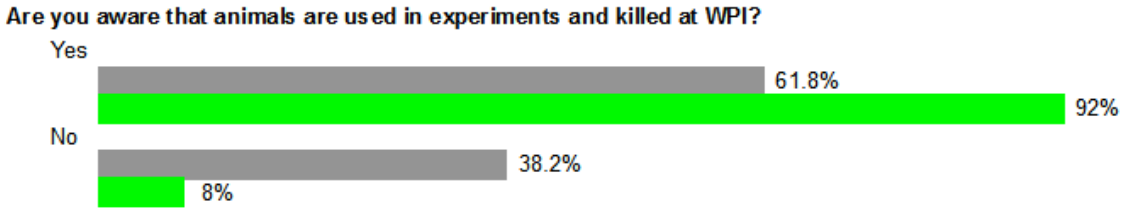
788. I do not support animal testing, but a recognize that it wont be going away any time soon. Another, easy alternative must be presented for the practice to be dismissed and for research to change its ways. A lot of different organizations would be impacted by removing animal testing. Therefore I think that we need to look at what we can do in this lifetime, rather than ask where do you draw the line, just whittle away over time until people began to accept that animals aren't that different and that we all came from the same god damned place. I do not support animal testing because I have always grown up an animal lover. I own lots of pets, who are all spoiled rotten, and I've seen the most colorful personalities in the most unusual creatures I cannot justify the torture, for science or food, of an organism which has earned its spot here just as much as we have. I understand that with food it is a neccesary in many places, but not for me. But for NO reason is vivisection neccesary. GOOD LUCK!

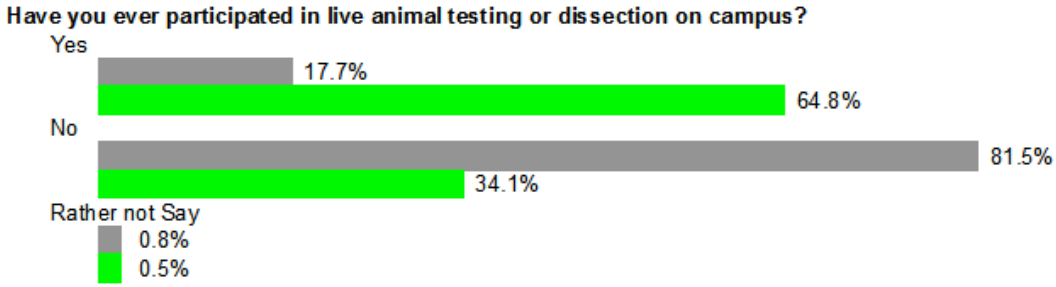
792. Killing or torturing any creature is inherently morally questionable. To me, any decision that affects a live subject necessitates a consideration of subjective reciprocity. That is, one must consider how the action affects that subject, from the subject's perspective. When dealing with human subjects, this kind of judgement is sometimes a simple matter of asking, "What if I was in the subject's position?" In these cases, it is reasonable to assume that the subject's perspective is very similar to one's own. In other cases, the reciprocity requires additional considerations, such as situation, history, disability, and other personal attributes. When dealing with a non-human subject, our understanding of the subject's perspective is much more limited, so a good deal of caution must be used in order to make respectful decisions.

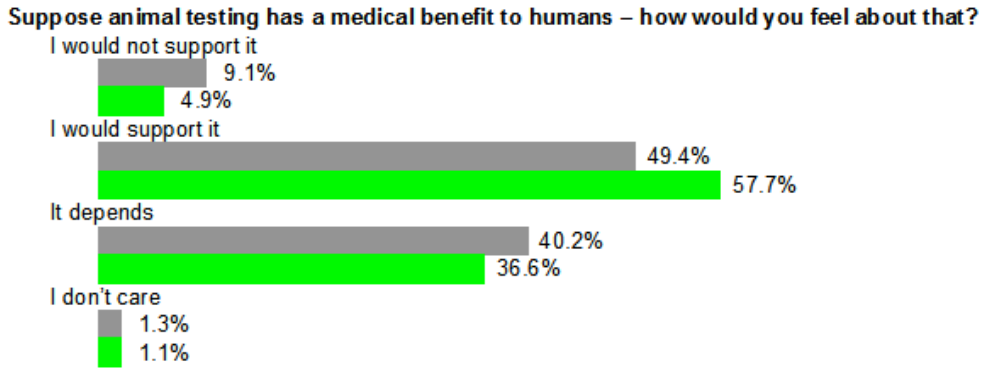
800. Why test on animals if not on humans? At the very least, humans can give consent. It may be impossible to avoid killing any organisms at all, but life is all about doing the best you can.

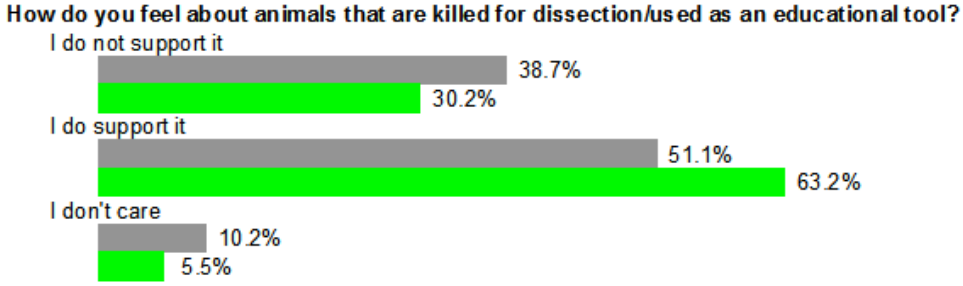
Graphical Representations of Answers to Selected Questions

Below are images of bar graphs, representing the percentages of people who chose the answers to selected questions. The gray bars represent the entire body of survey takers, and the green bars represent those in the biosciences.

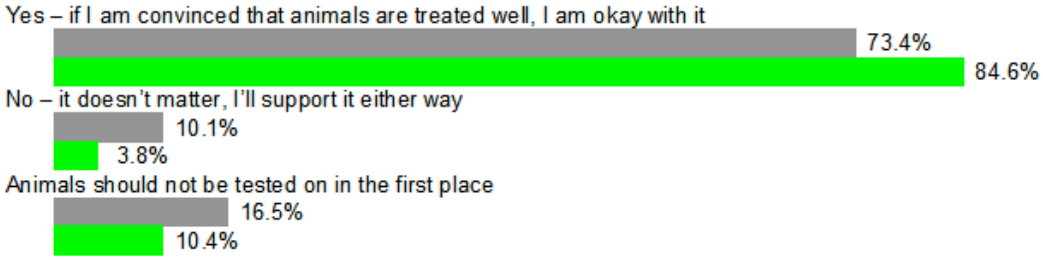




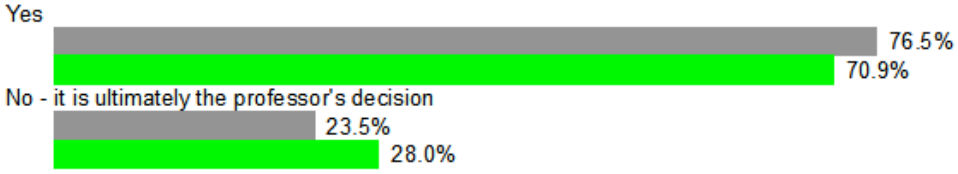




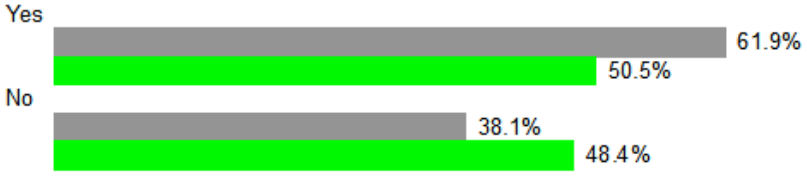
In animal testing and dissection, does it matter how the animals are treated?



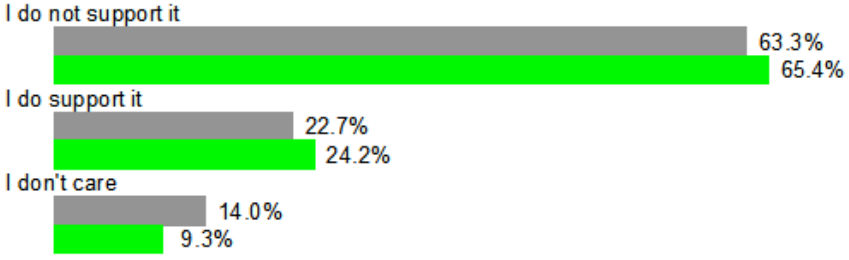
Should students have the right to choose if they want to participate in experimentation/dissection?

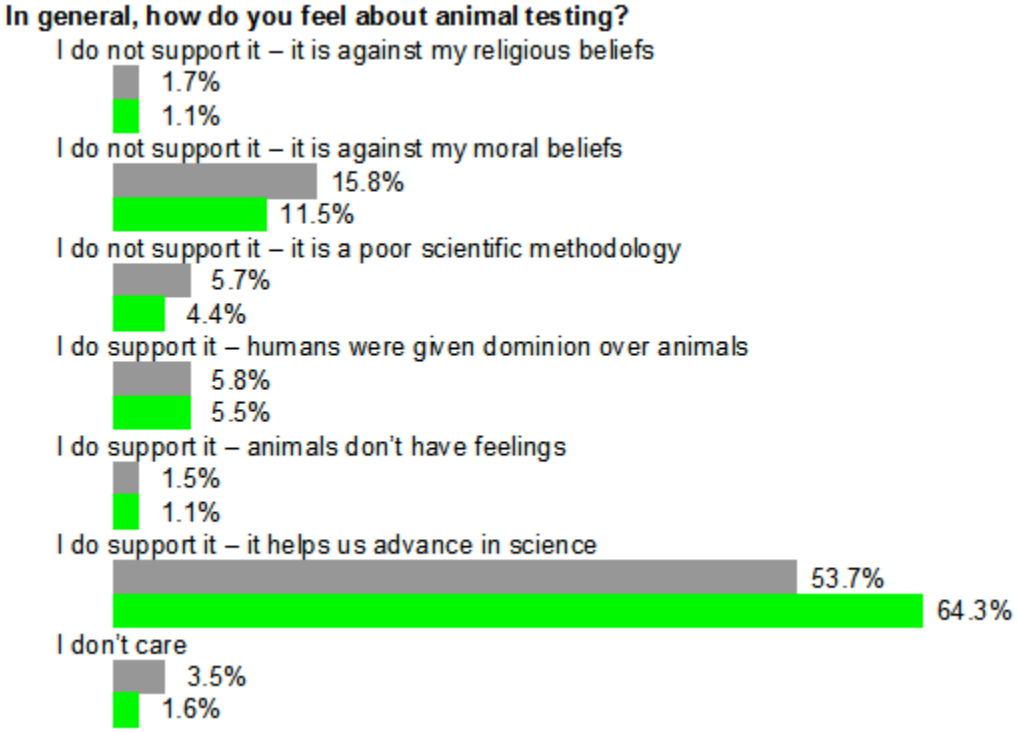


The Bio dept. is considering purchasing alternatives to animal experiments – would you use them?



How do you feel about using animals when testing cosmetics and other household products?




In general, how do you feel about animal testing?
I do not support it – it is against my religious beliefs
1.7%
1.1%
I do not support it – it is against my moral beliefs
15.8%
11.5%
I do not support it – it is a poor scientific methodology
5.7%
4.4%
I do support it – humans were given dominion over animals
5.8%
5.5%
I do support it – animals don't have feelings
1.5%
1.1%
I do support it – it helps us advance in science
53.7%
64.3%
I don't care
3.5%
1.6%

Appendix F: Miscellaneous

Selected pages from the ABET Criteria for Accrediting Engineering Programs

CRITERIA FOR ACCREDITING ENGINEERING PROGRAMS

Effective for Evaluations During the
2007-2008 Accreditation Cycle

Incorporates all changes
approved by the
ABET
Board of Directors
as of
October 28, 2006

Engineering Accreditation Commission

ABET, Inc.
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Website: www.abet.org

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Requests for further information about ABET, its accreditation process, or other activities may be
addressed to the Accreditation Director, ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD 21202

or to accreditation@abet.org

PROGRAM CRITERIA FOR BIOENGINEERING AND BIOMEDICAL ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Biomedical Engineering Society
Cooperating Societies: American Institute of Chemical Engineers, American Society of Agricultural and Biological Engineers, American Society of Mechanical Engineers, Institute of Electrical and Electronics Engineers, and National Institute of Ceramic Engineers

These program criteria apply to bioengineering and biomedical engineering programs with the exception of agriculturally-based engineering programs.

1. Curriculum

The structure of the curriculum must provide both breadth and depth across the range of engineering topics implied by the title of the program.

The program must demonstrate that graduates have: an understanding of biology and physiology, and the capability to apply advanced mathematics (including differential equations and statistics), science, and engineering to solve the problems at the interface of engineering and biology; the ability to make measurements on and interpret data from living systems, addressing the problems associated with the interaction between living and non-living materials and systems.

PROGRAM CRITERIA FOR BIOLOGICAL AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: American Society of Agricultural and Biological Engineers
Cooperating Societies: American Academy of Environmental Engineers, American Institute of Chemical Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers, Biomedical Engineering Society, CSAB, Institute of Electrical and Electronics Engineers, Institute of Industrial Engineers, Minerals, Metals, and Materials Society, National Institute of Ceramic Engineers

These program criteria apply to engineering programs including "biological," "biological systems," and similar modifiers in their titles with the exception of bioengineering and biomedical engineering programs.

1. Curriculum

Programs must demonstrate that graduates have proficiency in mathematics through differential equations, a thorough grounding in chemistry and biology and a working knowledge of advanced biological sciences consistent with the program educational objectives. Competence must be demonstrated in the application of engineering to biological systems.

Laura Ducceschi AnimaLearn PowerPoint Presentation

Benefits of The Science Bank

- Try the latest in biology teaching tools and dissection software without having to purchase them
- Cut down on budget expenditures for biology labs
- Utilize the most humane and cutting-edge method of anatomy, physiology, and genetics education

Benefits of The Science Bank

- Comply with Student Choice Policies without sacrificing educational efficacy
- Borrow multiple copies of technology for each student in class
- Continue Borrowing products as frequent and for as long as you choose

Regardless of Your Perspective…..

- **Ethics**
  Many biology educators and students are opting for alternatives to dissection because of concern for the source of animals
- **Efficacy**
  Majority of comparative studies in peer reviewed journals indicate equal or better learning quality with alternatives to dissection and vivisection

Comparative Studies of Student Performance

Almost all of 33 studies conducted until 2005 show that students using alternative methods perform as well or better than those using traditional dissection*

*Comparative Studies Document

Educators', Professors', and Physicians' Opinions

- "We need a radically different approach to the teaching of biology; One that focuses far more on life itself and on the wholeness of living organisms."

--George Russell, Professor of Biology at Adelphi University

Educators', Professors', and Physicians' Opinions

- "Computerized dissection alternatives have grown so sophisticated they now surpass traditional wet dissections in many ways.
  Numerous studies published in the literature of the education profession demonstrate same or better academic performance by students who study alternatives.
  Serious pre-meds and pre-vets can best master the dissection by repeatedly studying the superb images found on CD-ROMS."
- -- Nancy Harrison, MD
  Pathologist, San Diego, CA

Products in The Science Bank

- Recently released versions
- Compatible with PC and Mac
- Available in multiple quantities
- Superior Photography and 3D quality images
- Dissect and manipulate with computer mouse
- Available assessment tools

Quality of Technological Alternatives

- Students can visualize the dissection cuts made with computer mouse
- If cuts are made incorrectly, students are prompted to do it again, reducing waste
- Many of the CD-ROMS are animated to produce realistic imagery