
THE ANIMAL RESEARCH CONTROVERSY

PROTEST, PROCESS & PUBLIC POLICY

- AN ANALYSIS OF STRATEGIC ISSUES -

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However, we take sole responsibility for the ideas and conclusions in this report.

A.N.R. and F.M.L.

Cover photo of protest outside American Museum of Natural History in 1976 taken by Dan Brinzac. Permission to use the photo was granted through the courtesy of Henry Spira.

CONTENTS

EXECUTIVE SUMMARY		i
CHAPTER I.	Introduction	1
CHAPTER II.	History of animal research and related legislation	3
CHAPTER III.	Current status	11
	A. Public attitudes to animal research	
	B. Research animal use - numbers and percentages	
	C. Trends in animal use	
	D. Animal user category	
	E. Statistics on pain and distress	
	F. Regulatory structures	
CHAPTER IV.	Major philosophical positions	31
	A. Introduction	
	B. Consequentialist arguments	
	C. Rights-based arguments	
CHAPTER V.	Evaluating animal research	37
	A. Valuing animal research	
	B. Criticisms animal research	
	C. Cost-benefit balance	
CHAPTER VI.	Are there alternatives?	59
	A. Definitions	
	B. Some examples of available alternatives	
	C. Interest in alternatives	
	D. Trends and solutions	
CHAPTER VII.	The question of animal pain and distress	73
	A. Introduction	
	B. Definitions	
	C. Can invertebrates perceive pain	
	D. Guidelines	
CHAPTER VIII.	Animals in Education	87

CONTENTS

CHAPTER IX.	The testing issue	97
	A. Introduction	
	B. Consumer concerns	
	C. Recent changes	
	D. Test methods	
	E. Alternatives	
 CHAPTER X.	 The form of the public debate	 117
	A. Introduction	
	B. Ad hominem attacks	
	C. Intimidation and violence	
	D. Tactics and Strategies	
	E. Role of the media	
	F. Sharing common goals	
 CHAPTER XI	 Policy Proposals	 155
 REFERENCES		 159
 APPENDICES		 179
	Appendix I. Organizations and Resources	
	Appendix II. History of the Animal Protection Movement	
 INDEX		 207

INSERTED COMMENTARIES

There are inserted quotes and comments (boxed items) throughout the text. Most of the boxed items do not refer directly to material in the body of the text but are included because they add color and depth to the analysis. The major commentaries are listed below.

A.	Public attitudes and animal research: Baby Fae and head trauma cases	22
B.	The John Orem case	39
C..	Chronology of Alternatives	70
D.	Thalidomide, penicillin and extrapolation; cautionary tales	114
E.	American Museum of Natural History case	123
F.	Key print media stories	134

1. HISTORY

The animal research controversy has a long history and it seems to follow a 50-year cycle of waxing and waning. From 1850 to 1900, the controversy grew and required the serious attention of leaders of society toward the end of the century. From 1900 to 1950, the issue gradually disappeared from view as a significant societal problem. Then, from 1950 onward, it began to develop again and by the 1980s demanded the attention of politicians, scientists and the public. It is not clear whether the issue will begin to fade away again in the 21st century or if its new intellectual underpinnings will sustain it. However, the issues and arguments put forward in the 19th century are, with one exception, exactly the same as those we are dealing with today and they still remain largely unresolved. The one exception is the question of alternatives to animal use, which holds out the promise, in the view of its proponents, of having the fruits of research without having to bear the costs in animal pain, distress and death.

2. ANIMAL NUMBERS

The statistics on laboratory animal numbers in the United States are crude and relatively unreliable. In Europe, Britain has kept figures on laboratory animal use for over one hundred years and most countries in the European Union are now required to collect and report accurate statistics on animal use. These figures indicate that animal use has been falling in Europe since the late 1970s and early 1980s. For some countries, such as Switzerland and Great Britain, animal use has fallen by 50% from 1980 and 1975 respectively (to around one million animals in Switzerland and three million animals in Great Britain in 1992). For other countries, laboratory animal use has fallen by 20-40%.

In the U.S., the data on laboratory animal numbers are not as reliable. However, annual surveys were conducted in the 1960s by the National Academy of Science's Institute for Laboratory Animal Resources (ILAR) up to 1971. From 1972, the U.S. Department of Agriculture (USDA) has kept statistics on dogs, cats, primates, rabbits, hamsters and guinea pigs. It is possible to track

the number of these six species used annually from around 1960 (one has to subtract the use by federal laboratories because of gaps and problems with the USDA annual reports). The data shows that of the six species, numbers peaked in the late sixties (at 2,063,846 average in 1968-9), and fell rapidly in the early seventies (1972-5 average was 1,581,983), then remained stable for the next fifteen years and began to fall again around 1990 (the 1990-93 average was 1,228,419).

Since 1968, the decline in the use of the six species has been around 40%. However, rats and mice are not included and they usually account for 80-85% of the laboratory animal total. The ILAR/USDA data do not reflect trends in mouse and rat numbers (ILAR did record mouse and rat use but the data only exist for the 1960s, 1971 and 1978 - a 40% decline was recorded between 1968 and 1978). Other more recent data, from the Department of Defense (DoD) and corporate laboratory records indicate that DoD mouse and rat use fell around 35% from 1983 to 1991 while corporate use fell by as much as 70% (Hoffman-La Roche) during the 1980s.

3. HOW MUCH ANIMAL PAIN & DISTRESS?

Public opinion polls and reaction to media stories indicate that when the public becomes concerned, it is primarily concerned with laboratory animal pain and distress. Even the painless killing of laboratory animals is perceived to carry a cost (particularly by those who work in research laboratories). However, we have very little data on the extent of animal pain and distress in research. The USDA requires registered laboratories to report their animal use (not including rats and mice) in three categories - research causing no pain/distress (category C), research causing pain/distress which is relieved by drugs (category D), and research causing pain and distress that is not relieved by drugs (category E). However, the USDA has never provided guidelines to help institutions decide how to classify their research (for example, if drugs are given to relieve pain for some, but not all of the time, should it be placed in category D or E?).

Nevertheless, the USDA returns indicate that 5-6% of all animal research is placed in category E, but there are very large differences among institutions and states. For example, Kansas reports that over 40% of its animals are used in category E research while many other states that use large numbers of animals report less than 1% of all their research in category E. Some corporations that do toxicity testing (where pain-relieving drugs are usually not used) report no animal use in category E. Many non-profit institutions are very reluctant to place animal research in category E because they believe they will be targeted by animal activists if they do. Thus, it is very probable that the USDA statistics under-report laboratory animal pain and distress, however mild some of it may be.

The only country that has collected systematic data on animal pain and distress is the Netherlands. Their 1990 Annual Report on animal experimentation notes that 53% of the animals experienced minor discomfort, 23% moderate discomfort, and 24% severe discomfort. About one fifth of the animals in this last category were given medication to alleviate pain. Examples of procedures that would place animals in the "severe" category are prolonged deprivation of food or water, some experimental infections, tumor research and LD50 testing.

Laboratory animal research causes less pain and distress than implied by animal protection literature but more animal pain and distress than claimed by research advocates.

4. REGULATORY STRUCTURES

Prior to 1970, animal research was largely unregulated in the United States. In 1966, the Laboratory Animal Welfare Act was passed to regulate dog and cat dealers but research institutions were not included. In theory at least, many institutions had animal care committees on their books at this time, but, if they functioned at all, they were mainly concerned with allocating space for research animals and setting the rates for maintaining animals in the facilities.

In 1970, the Laboratory Animal Welfare Act became the Animal Welfare Act and all institutions registered under the Act were required to follow regulations that governed the care of dogs, cats, primates, rabbits, hamsters and guinea pigs but how those animals were actually used remained outside the scope of the Act. Nonetheless, in response to rising public criticism, institutions began to address the question of how research animals should be used in experiments in addition to the routine care and housing they should receive. In 1981, the University of Southern California reworked its animal care committee and started to oversee how animals were used at the university. They even appointed a local animal activist to sit on the committee. Other institutions began to follow their lead.

In 1985, the Public Health Service (PHS) revised its animal use policy and required all institutions receiving its funds (mainly from the NIH) to establish animal care and use committees to review and approve animal research protocols. The new policy was based on the model of the Institutional review boards established in the 1970s to review research using human subjects. The new animal research committees began to grapple more and more with how animals should be used. Then, at the end of 1985, major amendments to the Animal Welfare Act were passed that required all registered research institutions (not just those receiving PHS funding) to establish Institutional Animal Care and Use Committees (IACUCs). The IACUC was required to review and approve animal research protocols prior to any animal research being conducted and to pay particular attention to reducing research animal pain and distress. In addition, the amendments required institutions to address the psychological well-being of primates and the exercise and socialization needs of laboratory dogs.

Today, those using laboratory animals in the United States have to conform to a wide range of housing and care standards and also have to address a variety of issues dealing with how the animals are used. In particular, if the animals are likely to experience pain and distress (even if alleviated by anesthetics or analgesics) the investigator has to demonstrate that he or she has looked for alternatives. IACUCs also pay much greater attention to the

need to prevent pain and distress. However, there are still tensions about any interference with how animals are used and the boundaries of IACUC power to prevent particular research projects.

5. JUSTIFYING ANIMAL RESEARCH

Animal research is almost always justified in terms of its great utility in improving human and animal health, while the costs of such research in terms of animal harm and distress are considered to be small by comparison. Sometimes, it is also argued that animal research has played an important role in the development of basic knowledge about biology.

Although some critics argue that animal research has played no role in the advance of medical knowledge, such arguments are plainly wrong. There are many examples where animal research and testing have played an important part in the development of new knowledge or insights that have led to improvements in medical therapy. Some animal research projects have proved to be more important than others, but experience indicates that it is not possible to predict which research is likely to be more important than other research in building our understanding of human and animal biology and disease.

In the past ten to fifteen years, research advocates have begun to draw on more emotional arguments to prove that animal research is necessary, rather than simply listing the medical advances that are based on animal research. Patients who have benefited from modern medical technology have come forward as spokespersons to endorse the importance of animal research. This approach has been developed to counter the strong emotional arguments of the critics of animal research.

6. CRITICIZING ANIMAL RESEARCH

The critics of animal research have always employed emotion-laden images to protest the use of laboratory animals but, in the past twenty years, they have also developed a range of reason-based arguments that are grounded either in moral philosophy or

that employ methods of argument and citation used in scientific discourse. By adopting a scientific style of argument, animal research critics are tapping into the authority and credibility that science enjoys in modern society. (However, simply adding references to an argument does not make it scientific, though it does allow greater scrutiny of the argument.)

Animal research is criticized on moral grounds either because animals are argued to have inherent moral rights that would prevent their use in research (rights-based arguments) or because animal research causes more animal harm and distress than benefits for humans and animals (utilitarian or consequentialist argument). The rights-based arguments do not necessarily hold that animals and humans have the same rights. The utilitarian argument is very similar to that used to justify animal research. The difference between the research advocates and the utilitarian critics is that the critics argue that animal research causes considerable animal pain and distress for little or no real benefit for the most part.

The critics have also put forward a range of technical arguments claiming that animal research is either not necessary or not as important as implied by the research advocates. These arguments may be summarized as:

- i) better use of preventive medicine will eliminate the health problems that require animal research;
- ii) public health and epidemiological research is far more important than animal research in improving public health;
- iii) clinical research (i.e., human) has provided the key insights in advances in medical treatment and animal research has merely been employed to dramatize clinical findings; and
- iv) the development of alternatives eliminates the need to use animals.

The importance of preventive medicine and of public health, epidemiological and clinical research is not in question in this debate. However, research advocates do not accept that the above

approaches are either being ignored or that they obviate the need for animal-based research. In addition, alternatives have not advanced to the point where they could replace all animal use.

There is plenty of room for legitimate and even interesting and constructive argument in debating the relative importance of animal research and its cost-benefit characteristics. Unfortunately, arguments are usually presented in relatively absolute terms and the research establishment has shown little interest in debating the technical merits of animal research with their critics for fear that it may give the critics what is perceived to be undeserved legitimacy.

7. ANIMAL TESTING

Laboratory animal use in testing is different from animal research because the main aim of testing is either to establish whether a product is safe for use (e.g. vaccines and biologicals) or to determine the level and type of toxicity associated with a new product (e.g. new drug testing). No hypothesis is being developed or tested in routine animal testing.

Animal testing accounts for between 10 and 20% of all laboratory animal use. Most test regimens for the toxicity or hazard (identifying safety) estimates of a chemical or product employ animals at some point. Such tests have been developed over the past sixty years because of a perceived public health need and because common laboratory animals are mammals, like humans, and are viewed as being sufficiently like humans to provide useful conclusions about human exposure.

In the past twenty years, criticisms of such tests have grown and have stimulated a widespread re-evaluation of the need for and role of animal testing. In addition, animal protection criticism and the rapid advance of biological technology have spurred interest in toxicity testing that does not use whole animals. Animal organs, animal or human cells, and computer modeling are some of the possible alternatives that are being explored.

In Europe, Japan and the United States, there are numerous projects to develop and validate alternatives for animal testing. Regulatory authorities are working to harmonize testing requirements and support the validation of alternatives. Industrial and academic toxicologists have largely accepted the need to develop, validate and implement alternatives. However, establishing hazard or safety is not easy and data from a laboratory mammal still provide a level of regulatory history and confidence that is not yet seen with the new alternative tests. As experience with the new alternative tests grows and as knowledge about toxic mechanisms continues to increase rapidly, so the need to perform animal tests will decline. However, animal testing will not disappear in the foreseeable future.

8. ANIMAL USE IN EDUCATION

Animals have traditionally been used in educational exercises to teach manual skills or to demonstrate known principles of biology or methods of research. Animal protection advocates oppose most use of animals in education because, they argue, the skills, principles and methods can now be taught just as effectively using models, computers or some other teaching aids. Research advocates resist this criticism because they see educational exercises using live and dead animals as essential in stimulating interest in biology, teaching the importance of biology and medical research and expanding biological literacy in general.

Currently, the debate over animal use in schools focuses on dissection and a student's right to opt out of the laboratory without penalty. Several states have passed laws that specifically permit a student the right to choose. Research advocates are concerned about this because they perceive that if students are allowed to opt out of dissection, it challenges the school's authority to teach what it considers necessary and how it should be taught and it also might lead to declining standards of biological literacy.

Ironically, both the country's medical and veterinary schools are now allowing their students to opt out of animal laboratories if they so choose. Thirty-four of the 126 medical schools have no

animal laboratories and 61 of the remainder allow students to opt out of animal laboratories. More and more veterinary schools are allowing students to opt out of the surgery laboratory on purchased laboratory dogs and are teaching surgery skills via other means (e.g. student spay/neuter clinics on animals from a local humane society).

There is very little empirical data that either support or refute the contentions of either side. This is an issue where the firmness of the conclusion is inversely proportional to the amount of hard evidence supporting it. The evidence that is available supports the contention that factual (declarative) knowledge can be learned just as effectively from books, lectures and videotapes but that problem-solving skills (procedural knowledge) is much more effectively learned by performing laboratory exercises. In addition, unpublished research suggests that factual knowledge and values formation are unrelated.

9. ALTERNATIVES

The concept of alternatives developed from a 1959 book that suggested that researchers should seek to Replace animal use where possible, Reduce animal use where possible, and Refine animal research techniques so as to reduce animal pain and distress as much as possible. These "Three R's" now constitute what most people identify as "alternatives" although there is a tendency for both sides to focus on Replacement and ignore Reduction and Refinement.

As mentioned above, animal use has dropped by up to 50% in the past twenty years and it is generally considered that part (nobody knows how much) resulted from the promotion and adoption of the idea of alternatives. In addition, more attention is being given to reducing animal pain and distress in research.

In the United States, there is a certain amount of schizophrenia about the concept of alternatives. While corporate toxicologists and regulatory scientists have mostly accepted the term and are comfortable working to develop and implement alternatives,

academic scientists and their main funding source, the National Institutes of Health (NIH), and many research advocacy organizations reject the use of the term "alternatives" preferring to use such terms as "adjunct" and "complementary methods." However, the Office for Protection from Research risks, which enforces PHS policy on animal research, does require attention to the three R's (alternatives). Those who reject the term "alternatives" tend to see it as a Trojan horse planted by the animal protection movement that will lead to great harm for medical research if allowed to gain a foothold.

It appears as though most of the public who pay attention to this issue use the term "alternatives" and so do legislative bodies. The U.S. Congress recently mandated the NIH to develop a plan for promoting and implementing alternatives but, to date, only the National Institute of Environmental Health Sciences (which happens to be heavily involved in developing new toxicity-testing methods) has publicly embraced the term.

10. ROLE OF THE MEDIA

Scientific organizations have often suggested that animal activists have skillfully manipulated the media (thereby gaining an unfair advantage) because of the images of animals under experimentation that they have provided or because animal activists have particular public relations skills. It is true that animal images have a particular pull on the public (equal to human infants) but there is no evidence that animal protection organizations have any greater public relations skills than the scientific organizations who defend the use of animals.

Throughout the 1970s and the early 1980s, the general media's coverage of animal protection issues was largely favorable to the animal groups. However, this began to change around 1985/86. One began to see more articles critical of the tactics and claims of the animal groups. The change was not the result of a reappraisal by journalists but by more proactive and aggressive tactics by research advocates who decided that the animal rights threat warranted significant attention. Once they set their mind to

it, the scientific organizations and specialized groups formed to defend animal research could call on significant resources, including funding, sophisticated public relations skills and experience, many excellent contacts with the media, and high profile and respected spokespersons. The animal protection community is currently holding its own in the media battles but is having to work harder to do so.

It has sometimes been argued that the media converted the animal research controversy from a non-issue into a major story. However, it is not clear that the media have such power. In the 1930s and 1940s, the powerful Hearst newspaper chain adopted the antivivisection cause and yet, after two decades of campaigning against animal research, the public still favored animal research by an overwhelming margin. The media does not convert non-issues into major stories. Instead, skilled journalists have sensitive "news antennae" that sense the moods and concerns of the public before others do and develop stories that address those concerns. Thus, journalists do not make a public issue so much as articulate it when public concerns reach a certain level.

11. TACTICS AND STRATEGIES

A. Animal Protection

The animal protection groups have traditionally relied on "public education" and new legislation to change animal research practices. Public education initiatives were designed to inform the public about the "horrors" of animal research. Legislative initiatives would then be introduced to eliminate the problems and to regulate any remaining use of animals. With the growth of the movement, other tactics were developed and implemented.

High-profile campaigns succeeded against narrowly defined targets that were chosen to provide maximum advantage for the critics (e.g. cat sex experiments at the American Museum of Natural History, pig "torture" experiments sponsored by Amnesty International, and eye irritancy and lethal-dose testing by the cosmetic industry). Campaigns with more diffuse goals (e.g.

the national ProPets campaign against the laboratory use of unclaimed pound dogs and cats) generally did not have the same success.

People for the Ethical Treatment of Animals used undercover investigations and material stolen by the Animal Liberation Front (ALF) to expose research practices. They were particularly successful with two early cases - the exposés of the Institute for Behavioral Research (the Silver Spring Monkey saga) involving an undercover investigation (or infiltration depending on one's point of view) and the University of Pennsylvania head-trauma laboratory, involving videotapes of the experiments on baboons stolen by the ALF and later edited into a half-hour exposé.

The use of stockholder resolutions as a way of bargaining with public corporations began in the 1980s and is now a common tactic.

Animal protection organizations composed of and aimed at specific professions were established (e.g. Physicians Committee for Responsible of Medicine, Association of Veterinarians for Animal Rights, and Psychologists for the Ethical Treatment of Animals). These groups provided a source of expertise and credibility to the animal movement and also served as something of a counterbalance to the existing professional societies that supported animal research, though their membership is much smaller.

The animal protection "movement" also continued its legislative lobbying and public education but, with even more members and more money, was able to do both more effectively. Many of the organizations hired Washington lobbyists to represent their interests and the fund raising and public education mailings were distributed to a million or more constituents as opposed to a hundred thousand. Both of these actions increased the political impact of the animal protection groups on Capitol Hill.

While the initial undercover investigations and break-ins by the ALF were aimed specifically at exposing conditions in

animal research laboratories (i.e. the liberation of information), there were also cases of vandalism (up to and including arson) and anonymous threats were issued against research scientists and their families. These tactics of intimidation led some research advocates to categorize animal rights (and some animal welfare) organizations as violent, anti-science groups and even as supporting terrorism. Such categorization began to have an impact, and many of the establishment animal protection groups publically criticized acts of vandalism and intimidation as being counter to animal rights philosophy (i.e. no harm to any sentient being, including humans). The boundaries of legitimate protest and civil disobedience in animal protection campaigns remain to be defined and articulated.

B. Research Advocates

Research advocacy and professional scientific and health organizations tended to ignore the animal protection movement until the early 1980s. A new research advocacy organization, the (now National) Association for Biomedical Research, was started in 1979 because existing organizations were perceived to be unable to deal with the expanding animal protection movement. In July of 1985, Margaret Heckler, Secretary of the Department of Health and Human Services, suspended a grant to the University of Pennsylvania head-trauma laboratory because of violations of animal care and use policies. This was a wake-up call for the research community which began to develop programs to counter the animal rights movement.

The Association for Biomedical Research (which had many corporate members) and the National Society for Medical Research (which had many university and medical school members) combined forces to form the National Association for Biomedical Research. Many states either established state-based societies for medical research or revived organizations that were active in the early 1900s but had gradually fallen into a dormant state.

These groups developed a range of tactics and approaches. They monitored state and federal legislatures and lobbied against

animal protection legislative initiatives. In Congress, they introduced and eventually got passed and signed into law an act making theft and destruction of property at a research facility a federal crime and subject to FBI jurisdiction. They developed numerous brochures and other materials for the public, including a rather successful series of posters. They supported the development of patients' organizations to counter animal protection campaigns and emphasize the importance of animal research to the advance of medical knowledge. They also developed a variety of curricula and other materials aimed at school teachers and school children that are designed to confirm the importance of animal research and re-affirm how good laboratory animal housing and care are.

While research advocacy organizations like to argue that animal protection groups together have a very large annual budget to devote to campaigns against animal research, the playing field is more equal now than it was in the 1970s. While the national animal protection groups probably devote together around \$15 million annually to the animal research issue, they often do not work together or co-ordinate their activities.

The research advocacy groups together currently devote around \$5 million a year to support the need for animal research. However, these funds do not include the activities of the professional scientific and medical societies, of the National Institutes of Health or of the many corporations that are now actively engaged in the debate. Given the fact that the research establishment also has better access to the sources of power and the policy makers in America, the debate over animal research now would probably favor those who support the need to use animals in the laboratory.

It is likely that the balance of public opinion will begin to edge back towards greater support for the use of animals if current trends and tactics remain unchanged.

C. The "Troubled Middle"

Although it may appear from a quick survey of media

stories that the debate over animal research is hopelessly polarized, there are many scientists and interested members of the public who occupy what philosopher Strachan Donnelly has called the "troubled middle." In other words, they accept (with more or less reluctance) the need for animal research but they also acknowledge and worry about the moral challenges raised by the practice. This silent majority could be mobilized to participate in and support a constructive dialogue, leading to reasonable and effective public policy initiatives that would allow progress toward the elimination of animal pain and distress in research without placing unreasonable barriers in the quest for greater biological and medical understanding.

In England, Australia and a number of European countries a constructive dialogue has been developed around the "troubled middle" that involves both defenders and critics of animal research. In the U.S. such dialogue has been less visible but is nonetheless occurring. Representatives from pharmaceutical and household product companies have been working with representatives from some animal protection groups to support initiatives that would lead to the development and use of alternatives to some animal testing. Both defenders and critics of animal research have lobbied for more funding for enforcement of the Animal Welfare Act. In addition, as more people on each side develop a better understanding of the arguments of the other, chances for a meaningful and productive dialogue improve.

In the end, a credible public policy will have to be based on the meaningful inclusion of critics as well as defenders of animal research in policy formation and application.

12. PUBLIC POLICY SUGGESTIONS

- A). An officially sanctioned forum should be established with representatives from major organizations and some independent analysts to determine how much reasonable common ground exists and to address specific assertions and claims by either side.
- B). The USDA should develop a more extensive annual

report form so that those involved in making and influencing public policy can have reliable data to support or refute arguments. In Europe, where such data are now becoming available because of a European Union directive, it is possible to identify trends and problem areas with some reliability.

- C). Because of public concern about laboratory animal pain and distress, a more accurate assessment of the extent of animal pain and distress should be developed, and ways that such distress can be minimized should be systematically investigated. The development of accurate and trusted data would prevent exaggerated claims by both sides in the debate and would provide guidance in the areas where efforts to develop alternatives (to reduce animal pain and distress) would directly address an important public concern.
- D). The new Applied Toxicology program authorized under the 1993 NIH Revitalization Act should be funded and built into a program that addresses new method (i.e. alternative) development, validation and implementation.
- E). Scientific organizations should formally accept that the use of animals in research entails some costs in animal death and distress and should establish programs that specifically support efforts to minimize those costs. At the same time, animal protection groups should recognize that clinical (i.e. human), animal and non-animal research techniques have all played a significant role in the advance of biological knowledge and that removal of one of these three elements is likely to slow down the advance of biological knowledge.

CHAPTER I

INTRODUCTION

In a series of exploratory studies conducted by Takooshian (1988) between 1979 and 1982, it was found that positive or negative attitudes toward animal-based research were associated with attitudes toward animals in general and not with the respondent's attitudes toward the advancement of science. This was a surprising result to some observers because there has been a tendency to identify critics of animal research as anti-science. However, even more surprising, the Takooshian study did not find any significant differences between the attitudes of scientists and the attitudes of the general public toward the use of animals; both were found to have mixed feelings regarding animal research (Grotsky, 1983).

These "mixed feelings" reflect the central dilemma in biomedical research involving animals. How are the interests of the human species and the need for greater biological understanding balanced with the needs of other life forms and the human responsibility to protect animals from unnecessary suffering?

This conflict of interests has called into play the consideration of ethics and morality and raised questions as to whether ethics and morality vary in time and place or are fixed and absolute. While some continue to view human/animal relationships from an anthropocentric stance, believing that nonhuman animals exist for the use and possible exploitation of humans, others believe that the human race is accorded no higher moral status than any other species.

Such differences of opinion have been debated frequently over the past 100 years. Today's arguments about animal research have changed little from those heard in the late 1880s with the exception of the recent interest in the concept of "alternatives." Scientists still justify the use of animals in research on the basis of the potential or actual benefits in human knowledge and

health care. Opponents of animal research still use the same sorts of arguments against the practice such as:

- (i) animal research is immoral;
- (ii) animal research is unnecessary because we can achieve the same benefits by relying on public health, prevention or clinical research; or
- (iii) animal research produces considerable harm to animals and little or no benefit to humans.

The controversy today regarding the use of animals in research appears on the surface to be a strongly polarized struggle between the scientific community and the animal protection movement. However, there is a wide range of opinions and philosophies on both sides. Mistrust between the factions has blossomed while communication has withered. Through the 1960s, 1970s and early 1980s, the animal movement grew in numbers and financial resources, and developed much greater public recognition and political clout. The research community paid relatively little attention to the animal movement for much of this period but, alarmed by several public relations coups in the 1980s, it has become more vociferous and has shifted from a reactive defense to a proactive, aggressive offense.

The "battle" rages on with neither side considering a surrender or even a truce.

CHAPTER II

HISTORY OF ANIMAL RESEARCH AND RELATED LEGISLATION

The use of animals in the pursuit of knowledge dates back to the Ancient Greeks and Romans. In the second century, A.D., Galen made extensive use of animal experimentation but then scientific endeavour of all kinds gave way to the medieval "Dark Ages." In the late 16th and early 17th centuries the scientific revolution began. By the second half of the 17th century, animal experimentation had emerged as one approach to developing an understanding of the natural world. Early members of the Royal Society conducted and described experiments like Robert Boyle's air pump in which he removed the air from a glass container and showed that it led to the death of a mouse. Even then, there were some public concerns about the practice, and members of the Royal Society did touch on the ethical issues raised by their work with animals.

During the 18th and 19th centuries the use of animals in experimentation slowly progressed from a relatively uncommon practice into the scientific mainstream. In the mid-1800s, principles for regulating animal research were proposed in Great Britain (Rowan, 1984b), and, in the late 1800s, there was a surge in antivivisectionist sentiment and activity throughout Europe and in the U.S.

A variety of social forces influenced the growth of this sentiment (French, 1975; Rupke, 1987; Turner, 1980). These included Jeremy Bentham's late 18th century utilitarian arguments about the moral importance of animal pain and distress and the impact of Charles Darwin's *The Origin of Species* on prevailing attitudes regarding the status of humans and animals. Darwin's theory challenged the anthropocentric view of nature that placed human beings at the teleological center of the universe (Sperlinger, 1981, p. 87-88). The social elite began to question how animals were treated and should be treated, especially in research laboratories. It is still not entirely clear why animal research should have

"One would think ... that the conversing with dead and stinking carcasses (that are not only hideous objects in themselves, but made more ghastly by putting us in mind that ourselves must be such) should be not only a very melancholy, but a very hated employment. And yet ... there are anatomists, who dote upon it; and I confess its instructiveness hath not only so reconciled me to it, but so enamoured me of it, that I have often spent hours much less delightfully, not only in courts, but even in libraries, than in tracing in those forsaken mansions, the inimitable workmanship of the omniscient Architect." (Robert Boyle, 1627-1691)
(cited in Oster, 1989)

"The science of life ... is a superb and dazzlingly lighted hall which may be reached only by passing through a long and ghastly kitchen."
(Claude Bernard, 1813-1878)
(Bernard, 1865)

touched such a raw nerve among the public.

Darwin's work also created a problem for those opposing animal experimentation because they sometimes argued (and still do) that animals were so unlike humans that they could not serve as experimental models of human physiology and biology. Of course, this leads to the discomfiting corollary that, if animals are that dissimilar, then perhaps the moral questions are relatively minor. On the other side, scientists argued that the theory of evolution implied that animal biology would be sufficiently similar to human biology to render animals useful as research models, at least in some instances. Yet if animals are that similar, then does it not raise serious moral questions about their use? This paradox seems to be especially severe for those interested in human psychology and cognition because of the moral weight usually accorded to cognitive abilities like rationality, speech, abstract thought and the like.

"I have all my life been a strong advocate for humanity to animals, and have done what I could in my writings to enforce this duty.... I know that physiology cannot progress except by means of experiments on living animals, and I feel the deepest conviction that he who retards the progress of physiology commits a crime against mankind."
(Charles Darwin, 1892)

Although animal research was not as common in the U. S. as in Europe at this time, the same social forces were at work and the practice of animal research began to grow. American research laboratories grew steadily in number through the 1880s and 1890s (Rowan, 1984b), particularly following the establishment of the research-based land-grant universities in each state. Not surprisingly, opposition to the practice also grew. In 1883, the American AntiVivisection Society was founded in Philadelphia, followed in 1895 by the formation of the New England AntiVivisection Society. Henry Bergh, the founder of the American Society for the Prevention of Cruelty to Animals (ASPCA), America's first animal protection organization, established in 1866 in New York City, also campaigned actively against animal research until his death at the end of the century.

Not unexpectedly, there were attempts in the U.S. to pass legislation to control animal research similar to that passed in 1876 in Great Britain. Throughout the 1890s, bills were introduced in the U.S. Congress to

regulate the use of animals in research in the District of Columbia (then a hub of medical research in America). One of these bills, the Gallinger Bill, was even endorsed by six Supreme Court justices and many other eminent professionals in Washington.

In 1892, Henry Salt, a close friend of George Bernard Shaw, produced a book titled *Animals' Rights*. While this was not the first use of the term "animal rights," it was one of the more important arguments supporting the idea. However, despite appearing shortly after the passage of major animal protection legislation and apart from its impact on GBS, the book apparently had little success and sank into obscurity. It is interesting to contrast the fate of Salt's book, which appeared in print at the end of a period of concern with animals, and Singer's 1975 *Animal Liberation*, which appeared at the beginning of a period of concern for animals. Singer's book is widely known as the bible of the modern animal rights movement.

All of the bills were defeated and it has been suggested that the successful introduction of an antitoxin in 1894 as a therapy for diphtheria had a major impact on the fate of these bills. The discovery of the antitoxin was the first major therapy that could be irrefutably demonstrated to be based on experiments on living animals (earlier discoveries, such as asepsis and anesthesia could be argued to have originated in the clinic or had not produced a particularly successful medical therapy). Nevertheless, opposition to animal research continued to enjoy considerable public support up until 1916 when two of the leading figures in the animal movement, Albert Leffingwell and Caroline E. White, died and America entered the First World War.

By the end of the First World War, animal protection issues were claiming much less public attention, and the movement entered its second phase, when most humane organizations were content simply to promote humane education programs and enforce animal cruelty laws. The ASPCA withdrew its opposition to animal

"Mortality from diphtheria, the dread scourge of infancy had hovered for years around forty percent. The use of antitoxin immediately slashed it to ten percent. Not only did animal experimentation play a crucial role in the development of antitoxin itself; the theoretical framework that made it possible to conceive of such a thing and promise more discoveries like it - had been forged in the 'torture chambers of science.' The public impact was profound."
(Turner, 1981)

research and passed what amounted to a vote of confidence in the medical profession's concern for animals. The only organization with a national following to be founded during this period was the National Antivivisection Society in 1929.

The third phase of opposition to animal research began in 1950 and continues unabated to the present. Organizations like the Animal Welfare Institute (1951)

U.S. Laboratory Animal Legislation

1960-66	Numerous efforts to pass bills based on British 1876 Act.
1966	<i>Life Magazine</i> exposé
1966	Laboratory Animal Welfare Act passed
1970	Laboratory Animal Welfare Act (LAWA) amended, becomes "Animal Welfare Act" (AWA)
1976	AWA amended - Federal agencies required to report <u>animal use</u>
1981	Silver Spring Monkey Case
1984	Pennsylvania Head Trauma Laboratory Case
1985	AWA Amended - Emphasized reducing animal pain and suffering

and the Humane Society of the U.S. (1954) were founded and started to devote considerable time to the animal research issue. For the most part, these groups focused on the care of laboratory animals and paid less attention to their use. Early in the 1960s, legislation began to be introduced into the U.S. Congress to regulate animal research, but it was not until 1966 and a *Life Magazine* exposé of the deplorable conditions in the compound of a dog dealer that the U.S. Congress took action and passed the Laboratory Animal Welfare Act. While this original legislation regulated only the acquisition and handling of animals by the dealers, it was amended in 1970 (and the name changed to the Animal Welfare Act) to include the care of research animals in research institutions. However, rats and mice, which account for about 85% of all laboratory animals, were excluded from regulatory oversight by order of the Secretary of Agriculture.

In 1975, the publication of Peter Singer's book, *Animal Liberation*, was another major landmark in the growth of the animal movement. The book empowered animal protectionists*, providing them, finally, with clear logical arguments to support their emotional com-

*Interestingly, there exists no single book of comparable influence on the "pro-research side."

mitment to the cause and helped to launch the modern "animal rights" movement. Approximately thirty "national" animal organizations were founded in the U. S. between 1950 and 1992, most of which made the animal research issue a major part of their agenda.

Pressure continued to be applied on both federal and state legislatures to tighten the laws controlling animal research. Several states either repealed laws permitting the release of pound animals to research institutions or abolished the practice altogether. At the federal level, two more scandals about animal research in 1981 and 1984 led to a public clamor for more regulation, and new legislation was passed by the U.S. Congress in 1985. One of the bills required the National Institutes of Health (NIH) to upgrade its requirements for animal research oversight and the other amended the Animal Welfare Act to require more attention to protocol review and the reduction of animal pain and distress in laboratories.

Legislative battles continue into the 1990s over pound "seizure," product-safety testing, protection of research facilities against break-ins and vandalism, the treatment of nonhuman primates, whether or not research should be covered under state animal cruelty laws, the right of private citizens to sue for enforcement of the Animal Welfare Act, and student rights regarding dissection and animal experimentation. Since 1987, approximately one fourth of the states have seen the introduction of bills to end the use of animals for educational purposes.

Since 1985, legislation has been repeatedly introduced regarding consumer product-safety testing and the need to implement alternative testing. Supporters of animal research complain that the huge number of animal-related bills (one of the top three mail-generating issues in Congress) introduced by animal groups are deceptively packaged to appear to protect animals when their real purpose is to curb and eventually eliminate

"Finally, even if the Court were to accept the Secretary's [of the USDA] construction of the statute and find that the Secretary does have discretion to determine what animals are covered under the Act, the Secretary's exclusion of birds, rats and mice would be arbitrary and capricious." (Charles R. Richey, U.S. District Court for the District of Columbia, January 8, 1992, ruling on Civil Action No. 90-1872.)

any use of animals in research. Animal rights groups claim the legislation they support is aimed at enforcing United States Department of Agriculture (USDA) regulations in laboratories where they are not now being enforced, increasing the use of alternatives, and protecting the rights of animals (Foundation for Biomedical Research, 1990). So far, no laws that would significantly affect the practice of animal research have been passed since the 1985 Animal Welfare Act amendments.

In January of 1992, it was decided in a U.S. District Court that the USDA's exclusion of rats, mice and birds from coverage under the Animal Welfare Act was in violation of the law. The main impact of this new ruling would be increased responsibilities for the USDA inspectors. Institutions and universities that use only rats and mice and, therefore, may choose not to be federally inspected, would have to register with the USDA and establish animal care and use committees.

On May 20, 1994, a three-judge panel of the U.S. Court of Appeals for the District of Columbia Circuit reversed the 1992 decision on the grounds that the plaintiffs (the Animal Legal Defense Fund, the Humane Society of the U.S. and two individuals) lacked "standing" to sue and the right to judicial review under the Administrative Procedures Act. "Standing" is a complex issue rooted in constitutional law that requires that individuals and institutions who petition the courts for relief should demonstrate that they are being harmed by the enforcement (or lack of enforcement) of a particular law. One of the three-member panel argued that one of the individuals (a former researcher) did have standing to sue but the other two disagreed so the majority prevailed.

In February of 1993, a federal judge determined that the regulations developed to implement the psychological well-being of primates and dog exercise were inadequate because regulated institutions were directed to develop their own standards. The judge ordered the

USDA to redo the regulations. While there is little disagreement that the USDA should cover rats and mice (NIH guidelines and American Association for the Accreditation of Laboratory Animal Care [AAALAC] standards both cover rats and mice), the judge's decision on the regulations for primates and dogs was much more contentious.

Originally, the USDA developed what are known as engineering standards for primates and dogs (featuring mandated minimum cage sizes) that would have entailed significant expense to acquire new cages or retrofit existing housing. After considerable discussion between USDA and NIH officials, the USDA regulations emphasized performance-based rather than engineering standards. Nonetheless, these performance-based standards stimulated considerable research into environmental enrichment for primates and dogs that have improved housing conditions for the animals.

The USDA appealed the judge's ruling and was supported by an amicus brief filed by numerous universities and research associations. Again, the U.S. Court of Appeals for the District of Columbia, reversed the decision on the grounds that the plaintiffs did not have "standing" to sue for "regulatory relief". In the last five to ten years, federal courts have narrowed interpretations on "standing" and it now appears as though animal protection organizations have very limited access to sue for injunctive relief under the Animal Welfare Act. Any attempts to challenge USDA regulations on animal research will now have to be taken directly to the U.S. Congress.

CHAPTER III

CURRENT STATUS

A. PUBLIC ATTITUDES TO ANIMAL RESEARCH

Just after the Second World War, there was an active protest against animal research in the city of Chicago led by the locally based National AntiVivisection Society and the local Hearst newspaper (William Randolph Hearst had established an antivivisectionist stance as an editorial policy for the newspapers in his chain). A group of research scientists decided to establish the National Society for Medical Research to combat this threat and to ensure an adequate supply of animals (especially dogs) for the expanding national biomedical research effort. One of their early actions was to commission a poll of public attitudes on research. They found that the public was very supportive of animal research - 85% approved of the use of animals in research and only 8% disapproved (National Society for Medical Research, 1949). Recent surveys indicate that public attitudes toward animal research have changed substantially since 1949.

Public Attitudes to Animal Research: 1949
(NSMR, 1949)

Favor Animal Research	85%
Oppose Animal Research	8%
Member of Animal Group	1%
Sent Funds to Animal Group	4%
Consistent Support for All Animal Research	47%
Object to Use of Certain Animals	28%
Object to Certain Uses of Animals	19%
Object to All Use of Animals	3%

In 1985, the National Science Board (NSB) added a question on animal research to its regular survey of public attitudes to science. The public were asked if they agreed or disagreed with the statement: "Scientists should be allowed to do research that causes pain and injury to animals like dogs and chimpanzees if it produces new information about health problems."

This is a deliberately loaded question in that the animal species cited are high status but the research is proposed to provide new information relevant to health care. Other polls have indicated that the public is more opposed to the use of dogs and chimpanzees than rats,

but the research is identified as being useful. The results for the U.S. and the UK (1988) are given in Table 3-1.

American attitudes toward animal research appear to be growing less favorable but the last few years have seen the research community fight back much more aggressively. If the next survey shows any reversal of the above trends, then it will indicate that the research community is regaining lost ground. The UK figures demonstrate the standard dogma - namely, that the British public is much more negative about animal use.

	<u>USA</u>				<u>UK</u>	
	1985	1988	1990	1993	1988	1992
Agree	63	53	50	53	36	40
Disagree	30	42	45	42	53	56
Don't Know	7	5	5	4	2	4
Neither (UK option for 1988 only)	-	-	-	-	9	-

Many other surveys of American attitudes to animal research have been commissioned with the following composite results. About 75% of the public accept the use of animals in research while about 65% actually support the practice. Support for the use of animals changes according to the type of animal used and area of research. For example, in a 1985 poll, 88% would accept the use of rats but only 55% would accept the use of dogs. In the same poll, only 12% oppose the use of animals in medical research on cancer or diabetes, but 27% oppose the use of animals in allergy testing (Foundation for Biomedical Research, 1985). In another poll, 60% opposed the use of animals to test cosmetics, but only 20% of the same sample opposed the use of

animals to test medical products (Ward, 1990). The public is also concerned about the treatment of research animals, and a majority support a strengthening of federal regulations and the development and promotion of alternatives.

B. RESEARCH ANIMAL USE

As a result of the activities of the animal protection movement, new regulatory hurdles, and the rising cost of procuring and maintaining laboratory animals, animal use continues to decline while interest in non-animal testing approaches is growing. Millions of research animals are still used annually in the U.S. although no accurate and comprehensive figures of how many and for what purpose are available.

The most comprehensive independent source of information on animal use in research and testing facilities is the *USDA Annual Report*. However, for the following reasons, this information is unreliable and is an underestimate of the actual numbers (Welsh, 1991).

* Research facilities are not required to disclose their use of rats, mice, birds, amphibians and reptiles and national-use figures can only be estimated. These groups of animals account for an estimated 80 to 90% of all animal use.

* The USDA classifications in the standard form

Numbers ('000s) of animals reported in "wild animal," "farm animal" and "other" categories. (In 1990, the "wild animal" category was dropped and the other two added.)

	<u>Wild</u>	<u>Farm</u>	<u>Other</u>
1985	284	n.a.	n.a.
1986	144	n.a.	n.a.
1987	168	n.a.	n.a.
1988	178	n.a.	n.a.
1989	154	n.a.	n.a.
1990	n.a.	54	236
1991	n.a.	200	315
1992	n.a.	211	529
1993	n.a.	365	678

"Other" is increasing because more institutions are voluntarily reporting rat and mouse use and these data are included in the "other" category.

are unclear and the criteria that should be used to classify research as "non-painful," "painful but alleviated by drugs," or "painful without pain-relieving drugs" are not clearly spelled out.

* Individual reports to the USDA vary in their thoroughness and accuracy, and some institutions may not be included in the annual compilation simply because their reports were turned in late.

* Laboratories owned by federal agencies appear to report animal use in a relatively haphazard manner and are not required to report their numbers although most do.

Over 2.3 million animals were reported to the USDA as having been used in research and testing in the U.S. from October 1992 to September 1993 (United States Department of Agriculture, 1994). (A relatively small number of rats and mice were included in the category "other animals" - see Table 3-2.) The Office of Technology Assessment (OTA) previously estimated that between 17 and 22 million animals were used in 1984 in biomedical research of which 85 to 90% were rats and mice (Foundation for Biomedical Research, 1990). If these proportions still hold true, then somewhere between 14 and 21 million animals were used in 1992. Other estimates of laboratory animal use range as high as 70 to 100 million but the available data do not support such high estimates. (It is possible that 50 million or more animals were used annually around 1970.) In the absence of reliable survey data or comprehensive statistics, it is not possible to tell whose estimates are correct although the OTA statistics are probably closest to the mark.

The 1993 USDA annual report on Animal Welfare Act enforcement reported that 1,331 institutional registrants used 2,369,439 animals (see Table 3-2). This

is a higher total than reported in the mid to late eighties (when the annual average use was around 1.8 million), but it should be noted that the farm animal category is new (since 1990) and numbers reported in the category of "other animals" (also added in 1990) have increased dramatically from around 50,000 wild animals used annually in 1981 to over 675,000 today. (Some institutions voluntarily report rat and mouse numbers and these are included in the "other animal" category.)

C. TRENDS IN ANIMAL USE

The Institute for Laboratory Animal Resources (ILAR) reported a 40% decrease in the number of animals used in the U.S. in the ten years between 1968 and 1978, based on the 1968 and 1978 national surveys conducted by ILAR (NIH, 1980). The largest declines occurred in the use of rats and mice. It is not clear how much confidence can be placed in the surveys' methodology or results. For example, ILAR conducted annual surveys from 1965 to 1971 with total animal numbers varying from 39 million in 1965 to a high of 55 million in 1969 (total numbers fell slightly to 49 million in 1971). However, the ILAR 1967 survey, conducted for NIH and using slightly different methodology from the other surveys in the 1960s, reported a total of 33 million laboratory animals used in that year, well below the annual average recorded in other ILAR surveys in the 1960s. In addition, there is an unexplained discrepancy for dogs, cats, primates, rabbits, hamsters and guinea pigs (the only animals enumerated ev-

Table 3-2 **1993 use of laboratory animals (USDA)**

<u>Species</u>	<u>Numbers used</u>
	<u>1993</u>
Guinea pigs	392,138
Rabbits	426,501
Hamster	318,268
Dogs	106,191
Primates	49,561
Cats	33,991
Farm animals*	365,233
Other animals*	677,556
	TOTAL 2,369,439

Rats and mice 11-19 million (rough estimate)

*Some birds, fish, frogs and some rats and mice are included in the category of "other animals".

Table 3-3 Annual average use of six species of laboratory animals for specific time periods (not including use by Federal laboratories)

Time Period	Annual Total	% of '72-'75	% of 1967	% of 1968/9
1967(ILAR)	1,652,500		100	
1968/9(ILAR)	2,063,846*			100
1972-75(aver.)	1,587,083	100	96	77
1976-82(aver.)	1,533,206	97	93	74
1983-88(aver.)	1,485,070	94	90	72
1990-93(aver.)	1,228,419	77	74	60

(*Non-federal use estimated from actual average total of 2,900,000 for 1968/69; in 1967 non-federal animal use was 71.15% of total.)

ery year from 1972 by the Animal and Plant Health Inspection Service [APHIS]) and the ILAR survey for 1978. ILAR recorded 1,504,000 of the six species used that year compared to the APHIS annual report total of 1,628,000.

The data from the ILAR surveys and from the APHIS annual reports under the Animal Welfare Act are not strictly comparable but presumably the animals recorded in the 1965-1971 ILAR surveys are not totally fictional and so these numbers provide an upper boundary of some sorts (around 50 million animals used annually in the late 1960s, with a possible maximum of around 3,000,000 being dogs, cats, primates, hamsters, guinea pigs and rabbits (the APHIS six species). During the period 1990 to 1993, APHIS reported an average of 1,309,598 of the six species used annually. However, because of the uncertainties with the data, it may be prudent to underestimate the decline in animal use.

Some of the problems in attempting to elucidate animal use trends from the ILAR surveys and the APHIS annual reports include the following. First, from 1972 to 1975, the APHIS reports do not include animal use by the federal laboratories. Second, the data from any

facility filing late in any particular year are not included in the annual reports and no correction is made for late or non-filing institutions. Third, there are many recording and tabulation errors in the APHIS reports. For example, the summary data for the federal laboratories given in the FY 1988 report are exactly the same as those for the FY 1989 report (presumably 1988 figures were incorrectly used for 1989). Fourth, the numbers for the FY 1984, 1985 and 1987 reports are substantially higher than in previous and succeeding years. Inspection of the reports reveals that in these years, the number of animals reported being used in federal laboratories is at least three times (at an average of 400,000) greater than the figures given for other years (which average around 120-130,000). Finally, APHIS changed the categories of animals recorded in 1990. From 1972 to 1989, they recorded numbers of the regulated six species as well as "wild animals." In 1990, they eliminated the category "wild animals" and added two new categories, "farm" and "other" animals. Now, if any institution voluntarily reports rat and mouse numbers (as more and more are doing), these data are tabulated in the "other" category. As a result, animal use has apparently "increased" in the 1990s.

Despite these problems, it appears as though animal use (or at least the use of the six species primarily counted by the USDA) has declined by at least 23% and maybe as much as 40% since 1967 (see Table 3-3). The ILAR 1967 and 1978 surveys indicate that rat and mouse use declined by about 40% during the decade up to 1978.

Other evidence also indicates that the trend of animal use (including rats and mice) in the U.S. is down,

Animal Research Numbers in DoD Laboratories

<u>Year</u>	<u>Numbers</u>	<u>% of '83</u>
1983	412,000	100
1986	352,000	85
1991	267,000	65
1993	ca. 200,000	49

(Data for 1983-1991 from Weichbrod, 1993; for 1993 from DoD *Report to Congress*, April, 1994.)

especially from 1980 onwards. Various large companies (e.g., Hoffman-La Roche and Ciba Geigy) have reported substantial declines in animal use since 1980. For example, Hoffman-La Roche reported that its use of animals dropped from around one million a year to 300,000 during the 1980s even though the number of new drug entities under investigation remained about the same (*The Alternatives Report*, 1990).

A recent Ph.D. thesis by Weichbrod (Walden University Institute for Advanced Studies, 1993) reports that Department of Defense laboratories reduced their intramural use of laboratory animals (the numbers included rats and mice) from 412,000 in 1983 (from OTA, 1985) to 352,000 in 1986 to 267,000 in 1991 (a 35% decline in nine years). The National Cancer Institute reported that it had eliminated the annual use of several million mice by switching from the standard mouse model in looking for anti-cancer drugs to a battery of human tumor cell lines (Rowan, 1989b). Conversations with those involved in laboratory animal supply companies indicate that the unit volume is down although dollar income is not because the average price per animal has increased substantially. All over the world, reports are coming in that annual animal use has declined by up to 50% over the past ten to fifteen years.

The most comprehensive figures on trends in animal use are those available from Great Britain which show a steady increase in animal use after the Second World War until the numbers peaked in 1975 at around 5.5 million animal experiments performed (note: one "experiment" is approximately equivalent to the use of one animal [Andrutis and Rowan, 1990]). There has been a steady decline in animal use ever since to just under 3 million animal procedures. (In 1987, the definition of "animal experiment" was changed and the term "procedure" was used. The change led to an increase in the number of "procedures" compared to the number of "experiments" in 1986, but the trend line remained the same.) While other countries do not show exactly the

same rate of increase and decline over the past fifty years as Great Britain, there is plenty of evidence to indicate that the same general trends are occurring in Europe, the U.S. and Japan.

D. ANIMAL USER CATEGORIES

According to the USDA statistics, animal use is split almost evenly between commercial and non-commercial users (Welsh, 1991; Newman, 1989) although these analyses omit the federal laboratories which account for somewhere between 15-20% of national laboratory animal use. It seems as though the ratio between commercial, non-commercial and government laboratories in the U.S. may be around 45:40:15. In Great Britain, commercial laboratories have always accounted for around two thirds of the animal use with educational institutions and government laboratories splitting the remainder.

Much attention has been focused on the use of animals in the testing of personal care and household products although such use probably accounts for much less than 1% of the national demand for laboratory animals. In Great Britain, the testing of personal care and household products accounted for less than 5,000 animal procedures in 1992, or around 0.15% of total animal use. Among commercial organizations, the vast majority of animal use is involved in the discovery, development and testing of new medicines and therapeutics.

Overall, laboratory animal use can be divided into the categories of education, drug discovery and

	<u>Total</u>	<u>ToxTests</u>	<u>Cosmetics & Household Products</u>
1987	3,631	570	21.4 (0.6%)
1988	3,480	589	24.5 (0.7%)
1989	3,315	544	16.1 (0.5%)
1990	3,207	558	5.9 (0.2%)
1991	3,242	523	5.9 (0.2%)
1992	2,928	538	4.2 (0.1%)

toxicity testing, the development and toxicity testing of other products, the testing of biological agents, diagnosis, and other research (covering, for example, immunology, microbiology, oncology, physiology, zoology, ethology, ecology and a host of other disciplines and sub-disciplines). No statistics are sufficiently detailed to provide an accurate estimate of animal use in the above categories. However, diagnosis and education probably account for less than 5% of the total each. Toxicity testing of other products will account for around 10% of the total (with more such testing involved in drug discovery and biologicals production). Drug discovery and biologicals production may account for between 30-40% of all animal use with other research accounting for the remainder.

"[The USDA-APHIS Reports do] not provide APHIS with information sufficient to demonstrate that researchers have used pain-relieving drugs appropriately in accordance with 'professionally accepted standards.'"
(Solomon and Lovenheim, 1982)

E. STATISTICS ON PAIN AND DISTRESS

According to USDA statistics, 6.6% of the animals used in research experience pain or distress that is not alleviated by painkillers and are placed in Category E on the annual reports submitted by institutions (Newman, 1989).

However, it is well-known that there is tremendous variation in the way different institutions report their use of animals by pain category. Some organizations go so far as to state on their reports that the USDA pain classifications are so unclear that they have simply put all their animal use into Category C, the non-painful category.

Category D is for animals that experience pain and distress alleviated by drugs but there is some question as to whether all distress is alleviated. An animal that undergoes surgery under anesthesia but is then allowed to recover and experience some discomfort would still be placed in Category D, and there is some direct evidence that actual use of post-operative pain relief is lower than stated (Phillips, 1993). Approxi-

mately 36% of animals used in 1992 were placed in category D. Animals used in infectious disease work, antibody production, cancer research and toxicology testing are commonly placed in Category C (no more than minor and momentary pain or distress) even if the disease or toxic agent will eventually cause considerable pain or distress.

An analysis of the 1992 USDA statistics on animal use reveals enormous variation from state to state in the reporting of animals used in painful procedures without the administration of pain-relieving drugs. In 1992, the average for all institutions was a reported 5.63% of

laboratory animals used in such projects. However, Kansas (45.5%), Washington (30.4%) and Colorado (26.0%) reported that more than a quarter of their animal research involved unrelieved pain while some relatively big users like Arkansas (0.03%), Delaware (0.65%), Florida (0.70%), Maryland (0.82%), Massachusetts (0.98%), Nebraska (0.13%) and Texas (0.70%) reported less than 1% of animal research in the unrelieved pain category. While there are some differences in the types of research performed from state to state (two Kansas institutions perform a lot of vaccine challenge tests, for example), the variations are much more likely to be due to differences in the way the USDA forms are interpreted. Both theoretical issues and practical experience

<u>Anesthesia Use In Great Britain</u>			
<u>% of Procedures/Experiments Using:</u>			
	<u>No Anesthesia</u>	<u>Anesthesia for Part</u>	<u>Anesthesia for All</u>
1982	80	16	4
1983	79	17	4
1984	79	17	4
1985	77	17	6
1986	73	19	8
1987	70	20	10
1987*	66	18	16
1988*	64	17	19
1989*	63	20	18
1990*	69	17	15
1991*	69	17	14
1992*	67	20	13

* Procedures (Experiments from 1982 to 1987)

THE MORAL OF BABY FAE AND HEAD TRAUMA CASES

The question of pain and distress experienced by research animals is of more than academic interest. The following two case studies illustrate these influences rather dramatically.

1. Baby Fae

On October 26, 1984, a twelve-day-old infant with hypoplastic left heart syndrome, who came to be known to the world as "Baby Fae," received a baboon heart transplant at Loma Linda University Medical Center. Three weeks later, she died of kidney failure. The operation unleashed a storm of debate and criticism. While it was generally accepted that Baby Fae was unlikely to survive for many weeks without some intervention (and even then her chances of long-term survival were slim), questions were raised about the fact that the hospital personnel had made little attempt to search for a heart from a human infant (although such hearts are rare) and about the lack of details on the informed consent process. Spokespersons for Loma Linda argued that the procedure was experimental therapy and that it offered Baby Fae her only chance at "long-term" survival. But the available data indicated that her chances of surviving for more than six months with the baboon heart were not good and several newspaper cartoons picked up on the notion that Baby Fae was just another experimental animal. There are indications that public opinion about animal research is strongly influenced by the extent of pain and distress perceived to be experienced by the animals. The other important influence on public attitudes is the perceived importance (human utility) of the research.

Although most of the bioethical discussion centered on whether or not Baby Fae was inappropriately used in a clinical experiment (as opposed to being provided with experimental therapy), some animal activists took the opportunity of all the media attention to criticize the use of the baboon as a donor and argued that the animal was needlessly killed. This argument was not received with much sympathy by either the media or the public. The *Boston Herald* captured the public rejection of the animal rights argument with an editorial cartoon which featured Baby Fae on one side and a group of animal rights activists on the other. The captions for the two sides read, "Born with half a heart" and "Born with half a brain," respectively.

2. Head Trauma Laboratory

Over Memorial Day weekend in 1984, five people from the Animal Liberation Front (ALF) broke into a laboratory at the University of Pennsylvania Medical School that conducted head injury research. They vandalized equipment and removed sixty hours of videotapes of the activities in the laboratory filmed by the research personnel (Fox, 1984). The laboratory used the baboons in experiments designed to produce non-impact (e.g. whiplash) damage to the brain and spinal chord. The animals were then studied to determine the type and extent of damage produced and the effect of the damage on the animals' subsequent behavior. The stolen items were delivered to People for the Ethical Treatment of Animals (PETA) who condensed the 60 hours down into a

25 minute videotape that raised a host of questions about surgical and animal care standards in the laboratory. Questions were also raised about the utility of the research.

The PETA videotape was widely distributed to the media and was discussed on a variety of popular television programs. However, the official investigation by the National Institutes of Health (NIH), who had funded the research, was delayed for almost six months as NIH personnel negotiated with PETA to obtain copies of the stolen videotapes. As a result, the NIH investigation of the incident took over twelve months to complete. Animal activists grew impatient at the delay and staged a "sit-in" at NIH during July, 1985. The NIH interim report was released at about the same time and concluded that the laboratory had failed to comply with animal care standards. Margaret Heckler, Secretary of the Department of Health and Human Services, did not wait for the final report. She immediately suspended the research.

During this period, perhaps as a result of the "sit-in," media interest in the story grew again and both the *Washington Post* and the *New York Times* ran very critical editorials. The *Washington Post*, which is not known for its interest in, or support of animal protection issues, went so far as to title its editorial "Animal Torture" while the *New York Times* was more subdued, titling its editorial "Animal Abuse." Criticism of the research was not confined to the liberal wing of the media and a number of conservative commentators (e.g., Paul Harvey) also condemned the research in no uncertain terms. Harvey also encouraged his listeners to send donations to PETA.

These two cases - Baby Fae and the Head Trauma laboratory - are very useful contrasts in the public reaction to animal research issues. When animal activists criticized the killing of the baboon in the ultimately futile attempt to treat Baby Fae's heart problem, the public and the media regarded the criticism as at best, unfounded and misplaced. By contrast, the condemnation of the head trauma experiments by animal activists was echoed and reinforced by the media. The critical differences between these two cases that explain the different public and media reactions are, it is suggested, perceived differences in human utility and animal suffering.

In the first place, the suffering of the baboon used as a heart donor for Baby Fae was perceived to be minimal or non-existent while the baboons used in the head trauma research were perceived to be experiencing great suffering, via the videotape shot by the researchers themselves. In the second place, there was a very direct exchange of the baboon's life so that Baby Fae could live (no matter that the attempt failed) while the head trauma research promised only some vaguely identified possible benefit sometime in the future. Thus, in the overall cost-benefit equation, the baboon in the Baby Fae case experienced no suffering and its death resulted in Baby Fae being able to live. In the head trauma research, the cost in animal suffering was perceived to be very high with only some vague and ephemeral promise of benefit in the future.

These two cases provide a very graphic contrast of the role played by public perception of the cost/benefit weighing of research. In the same vein, animal testing of new cosmetics is opposed by a majority of the public while only about 15% oppose the use of animals to test new drugs, especially drugs for cancer.

indicate that the APHIS pain classification scheme provides no real information on the extent of animal pain and distress.

"Over and over researchers assured me that in their laboratories, animals were never hurt ... Scientists could tell me these things with apparent conviction because they defined pain and suffering very narrowly. 'Pain' meant the acute pain of surgery on conscious animals, and almost nothing else. [W]hen I went beyond the issue of physical pain to ask about psychological or emotional suffering, many researchers were at a loss to answer.

Researchers believe that all animals are capable of feeling pain, but what they actually see when they look at lab animals is a scientific objective, not the animal's subjective experience. The result is that it rarely occurs to them to consider whether an animal is in pain, is suffering - or whether it is feeling anything at all, outside the boundaries of the research protocol."
(Phillips, 1993)

The category D statistics also vary over a considerable range from state to state but it is not clear why. Ultimately, the USDA statistics cannot be used as a reliable assessment of research animal pain and distress. Nonetheless, this should not be read as concluding that a majority of research animals necessarily experience considerable distress.

In Great Britain, the only indication of pain control that is available is the recording of anesthesia use. In 1978, 3% of the 5.2 million procedures involved anesthesia for the whole procedure (they were terminal) and 14% involved anesthesia for only part of the procedure. In 1988, 19% of the 3.5 million procedures involved anesthesia for the whole procedure and 17% involved anesthesia for only part of the procedure. It is not clear why anesthesia use doubled from 1978 to 1988 although the 1986 Act that revised British controls over animal experimentation placed greater emphasis on the control of pain and distress (*The Alternatives Report*, 1990).

The Netherlands has made a concerted attempt to classify its research animal use by pain category. The 1990 *Annual Report* on animal experimentation notes that 53% of the animals experienced minor discomfort, 23% were likely to experience moderate discomfort and 24% were likely to experience severe discomfort. About one fifth of the animals in this last category were given medication to alleviate pain. Examples of procedures that would place animals in the "severe" category are prolonged deprivation of food or water, some experimental infections, tumor induction, LD50 testing and immunization in the foot pad or with complete Freund's adjuvant (*The Alterna-*

tives Report, 1992a).

The problem of animal pain, distress and “suffering” in the laboratory is very complicated and no adequate data are available. A discussion of some of the conceptual and categorization problems are provided later (see VII).

F. REGULATORY STRUCTURES

1. THE U.S.

For almost thirty years the U.S. government has required its grantees to comply with certain standards of humane animal experimentation. The two main mechanisms for setting standards have been Public Health Service initiatives (mainly through the NIH) and the Animal Welfare Act enforced by the U.S. Department of Agriculture (through APHIS - the Animal and Plant Health Inspection Service).

The Animal Welfare Act, originally enacted in 1966 and amended several times since, was passed to ensure “the humane care and treatment of laboratory animals, and the prevention of pet theft for sale to research facilities” (Morrison, 1984). The 1966 Act was very limited. It applied mainly to the acquisition, handling and sale of dogs and cats to research institutions and had relatively little impact on the care or use of animals in research laboratories. The Act’s reach was extended in the 1970 amendments to include other groups of animals (but the Secretary of Agriculture excluded rats and mice - an action that has now been found by a federal court to contravene the Act), and their care in the laboratory housing. In addition, animals had to be given adequate anesthesia and analgesia unless such use would compromise the research. Decisions about how animals were to be used still remained largely up to individual investigators.

In 1985, the new amendments to the Animal

“... the standards promulgated thus far under the Animal Welfare Act have had a very positive effect - beneficial to good science, to animals and to scientists.”

(J.R. Lindsey, 1980)

Welfare Act extended its reach still further and required all registered institutions to establish Institutional Animal Care and Use Committees (IACUCs) that would not only oversee animal care but that would also, for the first time in the U.S., begin to examine laboratory animal use. As the Act is now being enforced, the IACUC must pay particular attention to the question of whether or not alternatives might be available for those protocols that have the potential to cause animal pain and distress, even if the pain and distress are alleviated by drugs. Thus, the availability of possible alternatives should be considered in about 42% of the research animal use reported to the USDA (the percentages may be lower for research involving rats and mice).

The 1985 Amendments also added several phrases that have caused considerable difficulty but have begun to change housing standards for laboratory animals. Institutions were required to provide exercise for dogs and develop facilities that would promote the "psychological well-being of primates." Over the past five years, considerable effort has been expended to determine what is meant by "psychological well-being" and how changes in housing and care standards might encourage it. For example, research facilities are increasingly keeping primates in groups, providing "toys" and encouraging the animals to "forage" for food. These ideas are beginning to percolate down to affect ideas about housing for and care of the commoner laboratory species like rabbits and even rats and mice.

The National Institutes of Health (NIH), part of the Public Health Service (PHS), is the major U.S. government agency funding laboratory animal research. It has traditionally been the lead federal agency for the establishment of policies on animal experimentation. These policies originally dealt mainly with the care and maintenance of laboratory animals and not with the experimental methods themselves. This changed with revisions to PHS policies in 1985 in the wake of several incidents involving laboratory animals that were widely

publicized by animal activists.

The PHS turned to its oversight of human research for a model that could be applied to animal research. Thus, all institutions receiving NIH funds had to file an assurance statement with NIH and had to either revamp existing animal care committees or establish such committees where they did not exist, to review protocols and apply the revised PHS policies. The NIH also conducted spot checks to ensure that their standards were being maintained. At least one major research institution had its NIH funding suspended when NIH determined that its facilities and program were not up to standard.

"[T]he ... analysis leading to the main conclusion that there is an institutional responsibility for review of scientific merit [of research involving animals] is incorrect ..."

(Black et al, 1993)

"According to the PHS Policy, the institution through its IACUC has a legal obligation to assess the experimental design of a research project in order to assure its soundness ... [and] may, indeed alter the proposed research after appropriate consultation with the investigator."

(Prentice et al, 1993)

The National Science Foundation (NSF), an agency of the federal government outside the PHS, also requires its grantees to comply with standards set by the NIH/PHS. However, the NIH policy deals only with laboratory animals and up to one quarter of NSF's research involves field studies of free-living wild animals. In 1988, working under an NSF grant, the Scientists Center for Animal Welfare developed guidelines for field research in cooperation with the major specialty zoological societies (Scientists Center for Animal Welfare, 1988). Other disciplinary groups (e.g. the Society for Neuroscience, the Association for Research on Vision and Ophthalmology, the International Association for the Study of Pain) have produced guidelines on animals used in particular areas of research. The American Veterinary Medical Association has developed (and periodically revises) euthanasia guidelines that have now become virtual government regulations.

The application of the new institutional animal care and use committee structure has substantially changed the oversight and approval of animal research

"The animal rights movement therefore faces a dilemma. Either it engages in negotiation and compromise ... or it seeks to retain moral purity and concentrates on public campaigning to persuade public opinion to move sufficiently towards its position, thus forcing government to respond. This dilemma does not affect animal welfare groups since they are already working in the mainstream and so are likely to be consulted by government in any case. What is more, they find no problem in entering into a dialogue."

(Garner, 1993)

projects. However, the system is relatively new and the participants are still negotiating their way through the regulatory structure.

For example, there is a considerable range of opinion over the role the local committees should play in addressing the scientific merit of proposed projects. Some argue that the committees have to become involved in the planning of the scientific research because bad science is a waste

of animal resources (and hence bad for the animals). Others hold that the Animal Welfare Act forbids interference in the actual conduct of research and, hence, the committees are not permitted to question the science. A recent exchange of letters in the newsletter of the Institute for Laboratory Animal Sciences provides a window into this debate (Black et al, 1993).

2. OUTSIDE THE U.S.

Nearly all the other industrialized countries (31 members of the Organization for Economic Cooperation and Development [OECD]) have established laws and regulations regarding the use of animals in research. Canada does not have statutory oversight but relies on a "voluntary" system administered by the Canadian Council on Animal Care (CCAC). The CCAC, on which sit representatives of major interest groups including animal protection organizations, establishes national standards and guidelines and conducts inspections. Even before U.S. institutions re-invented the animal care committee, the CCAC had suggested that all institutions set up animal care committees and so their oversight structure has the same feel as the U.S. system.

Britain does not rely on local institutional committees but rather on a system of personal and project licenses that is overseen by a Home Office Inspectorate.

Britain is also part of the European Community (EC) and must therefore meet the minimum standards established by the EC 1986 Directive on animal research. This Directive requires that member countries collect comprehensive statistics on animal research activities, promote alternatives, establish standards to minimize pain and suffering and establish standards for adequate care and housing.

In Australia, there is a national Code of Practice, an Australian Council on the Care of Animals in Research and Teaching and different state laws dealing with animal research. The Code of Practice requires that all experiments be approved by an institutional Animal Experimentation Ethics Committee which consists of several members, one of which must be an independent person not involved in animal experimentation in any way (Singer, 1990).

While there are many differences from country to country in the oversight of animal research, they tend to rely either on local institutional committees, or on an inspectorate, or a mixture of both approaches to oversee animal research. Many OECD countries have established formal government or government-supported forums of some sort where opposing views can be heard and weighed. Nearly all the OECD countries encourage the development, promotion and implementation of alternatives. For example, the British Home Office's Animal Procedures Committee (APC) contains representatives from both research and animal protection as does the Canadian Council on Animal Care. The APC has been involved in dealing with several "incidents" in Britain and helped to resolve them in a constructive fashion. There are still dissatisfied groups in Britain (including an active Animal Liberation Front) but it is likely that, without the APC and its role in promoting constructive discussion across the "divide," the situation would be much worse. Australia, Canada, the Netherlands and Sweden also have some formal consultative mechanisms.

CHAPTER IV

MAJOR PHILOSOPHICAL ARGUMENTS

A. INTRODUCTION

A wide variety of philosophies have been held by people arguing for and against the use of animals in biomedical research. Until recently, however, it was rare for these philosophies to be developed into sophisticated and coherent arguments but this has changed dramatically. More has been written in the past twenty years on the moral status of animals than in the previous two thousand years. Research scientists usually argue in favor of animal research by appealing to its utility. Opponents of animal research can be divided into two broad philosophical traditions - utilitarian (consequentialist) and rights-based (deontological).

B. UTILITARIANISM

Utilitarianism weighs the consequences of all those affected by a particular action and recommends those choices which best satisfy the preferences of those affected and has the least harmful effect upon them (the greatest good for the greatest number). One weighs the merits of a particular action by its consequences so utilitarianism is a consequentialist approach.

Research scientists argue that animal research produces considerable human and animal benefit at a relatively modest cost in animal pain and distress. Thus, one finds many justifications that point to the triumphs of the discovery of insulin, the development of the polio vaccine (or, in the case of, say dogs, the distemper vaccine) and the development of modern surgery and organ transplantation. At the same time, the research community is at pains to point out that anesthesia and analgesia are used wherever possible and that research animals experience relatively little pain or distress.

"The day may come, when the rest of the animal creation may acquire those rights which never could have been withholden from them but by the hand of tyranny ... It may come one day to be recognized, that the number of legs, the villosity of the skin, or the termination of the os sacrum, are reasons ... insufficient for abandoning a sensitive being ... What else is it that should trace insuperable line? Is it the faculty of reason, or perhaps the faculty of discourse? But a full grown horse or dog is beyond comparison a more rational, as well as a more conversable animal, than an infant of a day, or a week, or even a month old. But suppose the case were otherwise, what would it avail? The question is not Can they reason? Nor Can they talk? but Can they suffer?"
(Jeremy Bentham, 1748-1831)
(Bentham reprint, 1962)

By contrast, one of the intellectual founders of the modern animal movement, philosopher Peter Singer, employs utilitarian arguments to condemn most animal research because he perceives it as producing great animal suffering for relatively trivial human and animal benefit. When Singer extends utilitarianism to animals, he is placing great weight on the idea that animals experience suffering that is very similar to human suffering and so should be given equal weight in the moral calculus. (It is important to note that Singer is not arguing that animals and humans should be accorded equal treatment, just that their interests [where they are the same] should be given equal consideration.)

There are direct conflicts between the utilitarian arguments of the scientists and those of Peter Singer. For example, are the benefits of animal research trivial or considerable? Do animals suffer considerable pain and distress in research? These conflicts have never been adequately addressed. It has proved much easier for both sides to develop caricatures of their opponents and their opponents' arguments and then to refute those "straw men." For example, most scientific responses to Singer have been intent on proving that he promotes animal rights and that he harbors a "hidden agenda" of wanting to eliminate all animal research. As a utilitarian, Singer is opposed to "rights" language and he has to be open to the possibility that some animal research may produce more benefit than harm.

"I am not the kind of moral absolutist who holds that the end can never justify the means. Nor have I said that no animal experimentation is ever of use to humans (though I do think that much of it is of minimal or zero value) or that all animal experimentation involves suffering." (emphasis in the original, Singer, 1990)

It should be possible to generate a more productive discussion of the differences between the "permissive" and "restrictive" utilitarian views of research scientists and Singer and his supporters, and, perhaps, even develop some constructive middle ground that could serve as the basis for reasonable public policy initiatives.

C. A QUESTION OF "RIGHTS"

One of the most frequently debated issues re-

garding research animals is the concept of “animal rights.” Can nonhuman animals have inherent rights? Carl Cohen (1986), who defends the use of animals in research, states that a right, including a moral right, is a claim or potential claim that one party may exercise against another. He argues that rights entail obligations, and it is assumed that the holders of rights have the capacity to comprehend the obligations and rules that come with rights.

His analysis concludes that animals cannot have rights because they do not possess the capacity for moral judgement or having duties and obligations, cannot comprehend the rules that accompany rights, and therefore are incapable of exercising or responding to moral claims. However, his approach runs into problems with so-called marginal humans such as infants, the senile, comatose, and the mentally retarded who are granted rights even though they are also, like animals, unable to comprehend rules and obligations. Cohen merely asserts, without argument, that all humans should be accorded the same rights.

The assertion that animals should also be accorded rights, or at least the right not to be used merely as a means to an end, is another major thread in criticism of animal research by animal rights activists. The leading exposition of this position is by philosopher Tom Regan. According to Regan, any animal that is capable of having beliefs and desires (Regan considers all adult mammals as having this capacity) should be accorded the right not to be used as a means to an end. The critical point about rights-based arguments is that, while rights can be over-ridden by weightier rights, they cannot be abrogated merely because it would be useful to do so. There are weak points in Regan’s arguments (see Donnelly and Nolan, 1990) but public discussion of animal rights rarely reaches the level of sophistication necessary to address those weaknesses.

In fact, the term “animal rights” is much abused

and misused in the debate over animal research and animal use. In general, rights terminology is found in four different arenas of public discourse; common parlance, the political arena, the legal arena and in philosophical argument. The different nuances of meaning and varied uses of the term "animal rights" cause much confusion.

In common parlance, it is clear that the public uses the claim that animals have "rights" simply to mean that humans have some duty to consider animal welfare. In a 1989 survey, 80% of a sampling of the American public agreed that animals have rights. However, 85% of the same sample agreed that animals may be killed and eaten by humans. Clearly, the public view of the "rights" that animals have do not protect animals from being killed for food.

In the political arena, "rights" terminology has a powerful resonance in American society. "Rights" claims are advanced by many groups who see themselves or their clients as disenfranchised. The animal groups have adopted "rights" language in part because it is such an important political catch phrase. In this area, a campaign for animal "rights" may mean as little as a campaign for better regulation of animal research to reduce animal pain. Conversely, it may also include a call for the total abolition of all uses of animals.

Philosophically, "rights" terminology has a very particular meaning. A claim that animals have rights in philosophical terms means that animals have some inherent worth independent of the value we humans place on them (Tannenbaum, 1989, p. 105). Regan argues that animals have the right to be left alone by humans and should not be used for food or research. However, one can hold that animals have some (lesser) rights that can be over-ridden by some (greater) human rights without endorsing Regan's very restrictive view. The debate over animal rights has now become a confusing mix of misunderstood concepts and caricatured

arguments. It will not be possible to regain a constructive public policy until advocates are forced to define their terms and to be more precise with their arguments.

In the legal arena, animals may be considered to have some "rights" that are protected by law (e.g. protection from cruel treatment and in some states, neglect). However, for the most part animals are considered to be property and, therefore, would not have any rights. Their owners would have their property rights in the animal protected.

CHAPTER V

EVALUATING ANIMAL RESEARCH

A. THE VALUE OF ANIMAL RESEARCH

For much of the last thirty years of debate over the use of laboratory animals, the scientific community* has kept a low profile, appearing to hope that the protests against animal research were just a passing fad. Mark Hatfield, Executive Director of the Research Defence Society in England, commented on this approach, stating that:

The ignorance of the public on scientific and medical matters is indeed abysmal and a large chunk of the blame must surely go to the scientists themselves for failing to communicate their subject in an intelligible and balanced manner (Mittwoch, 1990).

Since 1985, (in the wake of the head trauma laboratory case at the University of Pennsylvania and then-Secretary of Health Margaret Heckler's concessions to animal activists) the scientific community has begun to develop a much more active and public profile supporting the use of animals in research. For example, public interest advertisements have been developed and widely distributed, high-profile spokespersons (e.g. former Secretary of Health Dr. Louis Sullivan and former Surgeon-General, Dr. C. Everett Koop) have been recruited to present the message that animal research is necessary, justified and beneficial to both humans and other animals, and speakers who are more knowledgeable in the issues and arguments have appeared. Some of the arguments put forward to support the use of laboratory animals are summarized below.

* "Scientific community," like "humane movement," implies a uniformity of opinions and tactics that neither of these categorizations really reflects. The terms are used here only as convenient approximations.

1. HUMAN BENEFIT

"There can be no doubt that the use of animals in medical research in the past has proved worthwhile for human purposes, ... [These past benefits] do not mean that the continued and unquestioning use of animals in biomedical research today is therefore also morally justified. In deciding what uses of animals in research might and might not be justified, there is thus a need to argue for, rather than to assume, the potential and likely benefits of the research."

(Smith and Boyd, 1991)

Spokespersons for the scientific community assert that the majority of medical advances leading to the cure and treatment of disease are based directly or indirectly on animal research. It has been argued that 90% of the medical knowledge developed in the past 100 years can be traced directly to research involving the use of animals (Hamm, 1985). This implication that nearly all knowledge is derived from animal research is, however, an exaggeration that the critics have no difficulty in undermining.

Sir William Paton (1993) is not as all-encompassing in his claims for animal research and he recognizes the important role played by other investigative approaches. However, he does argue that no area of biological or medical knowledge would be unaffected if animal research had been forbidden. This claim (of the indirect and direct influence of animal research) is not as easy to undermine. In fact, in general terms, the real influence of animal research on medical and biological knowledge is very difficult to quantify. Most advocates and critics rely mainly on specific examples that focus on a tiny element of scientific knowledge for a finite time, not infrequently based on a selective use of source material.

The influence of animal research extends into the development of knowledge of infections and their control, of anesthesia and its refinement, of disturbances in nutrition and dietary deficiencies, and in the development of new drugs and their continued refinement (Paton, 1993). The Foundation for Biomedical Research in their *Portraits* (1990) booklet states (with little fear of effective contradiction) that "these discoveries and treatments touch every human life in some way from the moment of birth."

THE JOHN OREM STORY

On July 4, 1988, the laboratory of Dr. John Orem, a professor of physiology at Texas Tech University, was broken into and vandalized. Seventy thousand dollars of damage was done and research animals as well as documents were stolen. The day following the break-in, People for the Ethical Treatment of Animals (PETA) distributed a news release announcing the break-in and two days later held a news conference accusing Orem of "cruelty, incompetence, and greed" in his research and in his treatment of his laboratory animals. PETA and the Animal Liberation Front (ALF), who claimed responsibility for the break-in, objected to Orem's treatment of his laboratory cats who were surgically prepared so that electrodes could be inserted into their brains to monitor neural activity.

The target of these attacks, John Orem, had been supported for twelve years by the National Institutes of Health (NIH) and had recently received a five-year grant from NIH to continue research into the neurophysiology of the control of breathing and the alterations in these controls during sleep. Clinically, it appears that these alterations induced during sleep in normal people cause no problems but patients with certain types of lung disease and infants are another matter. Sudden Infant Death Syndrome (SIDS), the most common cause of death in infants, is now thought to be due to problems in breathing control during sleep.

Following the break-in and charges by PETA, the press took up the story and state-wide demonstrations occurred along with a massive write-in campaign to the NIH. The result was an investigation of Orem's activities by both the Office for the Protection from Research Risks (OPRR) and the National Heart, Lung and Blood Institute (NHLBI) of the NIH. However, following investigation, both OPRR and the NHLBI reported that they found the charges unfounded.

The most interesting aspect of this case is how both animal activists and research advocacy groups have presented their arguments about the worth of Dr. Orem's work to the press. Following the break-in, spokespersons for biomedical research argued that Orem's research was leading to a better understanding of the causes of SIDS (and sleep apnea) and they claimed that the attack on Orem's laboratory could seriously set back the development of a cure for SIDS. However, animal activists rebutted this claim and noted that, of the twenty-one articles by Orem, only two mention SIDS while a review of a 1988 volume that is devoted entirely to SIDS and that includes over 1,000 references cites Orem only once (Kaufman, 1991).

Orem responded to the third-party defenses of his research in an interesting way. In 1990, in a commentary published in the *Chronicle of Higher Education* (Orem, 1990), he noted that he found himself almost as upset by those defending his research as by the vandalizing of his research laboratory. After careful self-examination, he decided that he was particularly disturbed that research advocates seemed to find it necessary to emphasize the potential "usefulness" of his work. Although people constantly wanted to know about the potential application of his research, he stated that he was simply trying to generate a better understanding of the sleep control center in the mammalian brain and he specifically denied trying to develop therapy for AIDS. While applied research could be judged by its utility, he argued that basic research should be judged simply on whether or not it produces new knowledge based on creative science, rigorous testing, and self-critical interpretation of data.

Despite Orem's own personal disavowal of the immediate utility of his research and his call for more support for basic research, the debate over the "Orem Incident" still features supporters referring to AIDS and critics pointing out the lack of relevance of Orem's research to AIDS (Kaufman, 1991).

Orem's statements about basic research lead to some very important and complex questions. Are the levels of scientific creativity, rigor and interpretation sufficient criteria to determine the value of the knowledge being sought? Why does some knowledge seem more valuable than other knowledge? How can valuable knowledge be distinguished from useless knowledge? How does one provide an appropriate public endorsement that the knowledge being sought is indeed valuable? Should basic research that causes moderate to severe animal suffering be permitted and, if so, should the public demand a higher standard of justification for the data retrieved from basic research that involves moderate to severe animal suffering than from research, basic or applied, that causes little or no animal suffering?

There are no easy answers to the above questions which may explain why there has been so little serious attention given to them in the debate over animal research.

The role of animals in the discovery, production and testing of insulin is one specific example of a narrative that “proves” how important animal research is and it has been widely used by supporters of the standard approach to biomedical research. In 1889, Minkowski and von Mering demonstrated that a pancreatectomized dog developed diabetes. This led to a flurry of activity to isolate the active principle in the pancreas but the results were, at best, inconsistent. The development of better techniques for measuring blood glucose after the First World War then led to the successful isolation of insulin from the pancreas of dogs in 1921. This discovery by Banting and Best is the event that is usually cited as proof of the importance of animal research (although Bliss [1982] questions its actual importance in his masterful history of the discovery and development of insulin therapy).

Procedures then had to be worked out for the purification of insulin from pork and beef pancreases (animal assays played a vital role in tracking insulin activity in the purification fractions). When large-scale purification was in place, each new batch of “purified” insulin then had to be standardized and once again animal assays were crucial.

Collip (one of the four Toronto scientists involved in the discovery) developed a rabbit hypoglycemic convulsion test to track and measure insulin activity (later mice were used). This use of animals in the bioassay of insulin is usually not cited as evidence of the importance of animals in research but it is arguably just as, if not more, important than Banting and Best’s work with dogs. Over the years, the need to use mice in the bioassay has declined dramatically due to technical improvements (Trethewey, 1989). Today, in addition to pork and beef insulin, human insulin is also available thanks to the new biotechnology techniques applied to bacteria.

Millions of dogs, rabbits, rats and other species have been and continue to be used in research on diabetes that is aimed at improving therapy, understanding more about diabetes as a disease, and eventually the development of an artificial pancreas that will eliminate further need for insulin injections. Dogs are used to study the problems associated with pancreatic transplants and the ocular and vascular complications associated with diabetes. Charles Best (cited by Rowan, 1984b, p.182), one of the original discoverers of insulin, estimated that by 1934, 130 million diabetics had had their lives prolonged due to insulin.

2. ANIMAL BENEFIT

The scientific community argues that human beings are not the only group benefitting from animal research. Many of the procedures performed on lab animals have led, directly or indirectly, to clinical applications that have proved helpful in the treatment of animals, especially companion animals. New chemotherapies were developed for humans but proved to be equally effective on animal diseases, and improvements in surgery, imaging and treatment of animals have come to veterinary clinics from research to improve human medicine via human hospitals (Loew, 1988; Foundation for Biomedical Research, 1993).

A recent example of the benefits that some animals derive from increased biomedical knowledge is the rapid development of a vaccine for parvovirus after the virus suddenly appeared in 1978, killing tens of thousands of dogs (Pollock, 1982).

3. KNOWLEDGE

The examples of medical advances mentioned above are largely the result of applied research that is directed toward a specific objective, such as the development of a new drug, therapy or surgical procedure. Such research involves building on existing knowl-

edge, some of which is gained through basic research on a specific biomedical problem (American Medical Association, 1989). For example, the study of retroviruses was begun well before HIV appeared because it was an interesting research problem. How did the retrovirus replicate itself and produce daughter viruses? By the time AIDS was identified as being caused by a retrovirus, there was already substantial knowledge about the basic biology of such entities and scientists were able to make relatively rapid advances in approaching specific therapeutic options.

The value of knowledge has proved to be difficult to assess prospectively. If a particular set of data can be generalized to other situations, then it tends to be more valuable than narrowly applicable data, but it is difficult to say more than this. Perhaps, as a result, biomedical researchers have always had some difficulty persuading the public to support “basic” research and thus tend to focus on specific medical advances instead (see for example, the Orem case, page 35).

However, one famous study conducted by Comroe and Dripps (1976) attempted to identify the relative importance of basic research in the overall process of advancing health care. They evaluated the knowledge required to lead to the top ten developments in cardiovascular and pulmonary medicine at the time and found that approximately 41% of the key publications (as determined by polling a large group of experts in the field) could be classified as basic (as opposed to therapy-oriented) research. On the basis of this study, they argued that society should continue to support basic research. Their study was a retrospective look at the field and nobody has yet performed a prospective analysis because of the obvious difficulties. In general, it is neither possible to predict how, nor if, a particular basic research project will provide a significant contribution to medical advancement.

According to NIH analyses of their granting

patterns, about 35-40% of research funding is allocated to studies using animals, ranging from studies that simply require blood or tissues to conducting brain surgery. Some portion of those studies will fall into the basic research category as opposed to research with a specific applied goal in mind. Therefore, animal research has played a role in developing our current body of scientific knowledge. While there are those who claim that it is wrong to use animals in research with no specific health-therapy objective, the scientific community argues that basic knowledge should be pursued.

B. CRITICISMS OF ANIMAL RESEARCH

1. IT IS IMMORAL

The moral arguments against the use of animals in all or some research are complex and detailed. One needs to understand the philosophical arguments and themes, at least in outline, and recognize the differences between the utilitarian and rights-based approaches at a minimum.

Many of those who oppose animal research believe that animals, in and of themselves, have inherent moral value and should not be used as a mere means to human ends. They argue that treating animals as disposable tools because they are animals and not humans is a form of prejudice that they label "speciesism" and that it is as morally reprehensible as using, say, women or Jews* for experimental purposes. "Speciesism is a prejudice or attitude of bias in favor of the interests of members of one's own species and against those of members of other species" (Singer, 1990).

Singer's basic approach is utilitarian and he does not argue that all humans are equal to each other nor that animals are necessarily equal to humans. However,

*Though women or Jews, in this example, are not a separate biological species.

he places great weight on the capacity to suffer and holds that animals and humans share similar capacities to suffer. He then argues that most animal research causes great suffering for relatively trivial benefit and hence is not morally justified. (Note: Singer is not arguing that animals and humans are the same or deserve the same consideration in toto. Only where they share the same morally significant characteristics would they deserve the same consideration.)

Regan takes another approach, arguing that certain animals that have beliefs and desires are "subjects of a life" and have inherent rights that would proscribe their being used as a means to a human end. Thus, according to Regan, mammals (and perhaps birds and other vertebrates) should not be used in research, even if it were to produce useful results. Other philosophers who espouse rights for animals may use different grounds for their argument and may not demand the complete abolition of animal research that Regan does. However, all rights-based philosophies require that those who justify the use of animals in research do so by reference to some greater "right" that overrides the rights of the animals, rather than by pointing to the research's utility.

Opponents of animal research do not restrict themselves to philosophical arguments. They have also criticized animal research on technical grounds as well. This criticism is relatively new and was not a major feature of the 19th century debate against animal research. In the late 20th century, the authority of science in modern industrial societies is considerable. Therefore, it is not surprising that critics of animal research should have turned to scientific themes to support their arguments. However, scientific authority is based on more than the mere listing of a series of academic citations at the end of a paper, a point that is not always remembered by either side in this contentious debate.

The various technical criticisms of animal re-

search may be classified into the following two broad themes: first, the practice is unnecessary and second, the practice produces too little benefit to balance the harm done to the animals.

2. ANIMAL RESEARCH IS UNNECESSARY

Some critics of animal research argue that animal research is not necessary because:

- a. better use of preventive medicine will eliminate the diseases that require animal research;
- b. greater use of and reliance on public health measures will eliminate the need for animal research;
- c. clinical approaches provide all the clues we need while animal research merely dramatizes clinical discoveries; and
- d. the development of alternatives eliminates the need to use animals.

Prevention and public health

Opponents of animal experimentation propose that the prevention of disease is the only truly effective way to insure universally good health. Sharpe (1988, p.49) states that since, “. . . treatment has little impact and often comes too late, real improvements can only come by preventing the disease in the first place.” But a healthful diet, regular exercise, and avoidance of harmful substances is not always sufficient to keep people free of disease nor even alive in the modern world. Risk of injury and disease cannot be eliminated and life involves making constant compromises between conflicting risks.

The first two approaches to avoiding animal research (preventive strategies and public health initia-

tives) tend to overlap and are vulnerable to the same general rebuttal - namely, that both are heavily influenced by the growth of knowledge (our ideas about infectious disease are, for better or worse, very different today than they were 100 years ago), a considerable amount of which is generated via the use of animals.

Thus, it is true that the prevalence of many of the major diseases was declining steadily before the advent of antibiotics, vaccines and other drugs (McKeown, 1979) but the development of clean water supplies, better hygiene, improved food supply and nutrition and other measures that have been identified as contributing substantially to the decline in infectious-disease mortality occurred as the germ theory was being confirmed, as our knowledge of pathogenic organisms exploded and as other advances in biomedical knowledge were being made. It would be very surprising if one could isolate such advances from changing societal attitudes about hygiene and disease.

The history of medicine is full of examples of clever detective stories suggesting potentially important therapies that were not aggressively applied (or were even ignored or suppressed - e.g. the story of Semmelweiss and puerperal sepsis) until the mechanism of the disease was more thoroughly understood. The connection between lung cancer and cigarettes is a more recent example of the linked role of epidemiology, pathology and laboratory research in supporting (all too little and too late) appropriate public health measures. (It is also an example of how powerful interests can use research data and "scientific" authority - whether derived from animal studies or other approaches - to their own advantage.)

McKeown (1976) demonstrates quite convincingly that antibiotics and other landmark medical therapies derived from the research enterprise made only a small contribution to the decline in overall mortality due to infectious diseases during the period from the

1850s to 1970. However, his analysis does not take into account the effect of the new medicines on morbidity. A case of non-fatal pneumonia in the early 1900s would have caused several weeks of high anxiety among all family members, several weeks of severe illness in the patient, and many weeks of recuperation. In the late 1900s, pneumonia causes little anxiety and little more distress than a cold thanks to antibiotics.

There are numerous other similar examples. For example, while tuberculosis (TB) mortality rates had declined very significantly before the advent of antibiotics, there were still a substantial number of cases of the disease when isoniazid and streptomycin became available to treat TB (e.g. there were 50,000 people in the United Kingdom with the disease) and no significant mention is made by McKeown or those who cite him of the effect of the antibiotics on morbidity. As Paton (1993) reports, these two drugs produced a marked improvement in the outcomes of those with TB.

In addition, the sense of control over disease that modern advances in health care have provided is not accommodated by McKeown's analysis at all, but such feelings of control are likely to be very important when measuring quality of life.

Thus, one can make some important arguments about the importance of prevention and public health initiatives in human health and even grant the argument that modern medical research has contributed only a small part directly to extending life expectancy. But one cannot infer that these measures were not influenced by knowledge derived from animal research nor that prevention and public health by themselves are responsible for the considerable ability we now have to control morbidity and suffering. An example is the relief from suffering provided by medications for fever, muscle ache, allergy or of the remarkable achievements of modern dentistry.

At least one critic of animal research argues that he is not advocating that preventive measures replace animal research (Barnard - personal communication, 1993). Instead, he views animal research as not morally justifiable and, in looking for another approach that might be able to pick up the slack if animal research were abolished, he suggests that we can employ preventive and public health approaches instead with little or no loss in health benefits.

"... in no case are animal studies the foundation for progress."
(Neal Barnard, 1989)
(cited by Hey, 1989)

For example, he suggests that high intakes of saturated fat are positively correlated with increased rates of breast cancer and heart disease, based on human epidemiological data. However, the link between saturated fat and breast cancer is not as obvious as he implies and there are other plausible explanations including the suggestion that estrogenic chemicals in the environment may be causing the increase in breast cancer rates (Colborn et al, 1993). The critic could no doubt suggest that we should merely reduce both saturated fat intake and the burden of estrogenic chemicals in the environment without trying to decide which is more important but, without good strong evidence, such sweeping public health measures are unlikely to be enacted (viz. cigarette smoking or alcohol consumption).

Clinical studies

The third claim in this category implies that animal research is unnecessary because we can achieve the same or better results by relying on clinical (i.e. human) research. In the United States, a considerable proportion of federal biomedical research funding (around one third) does support clinical research while approximately 40% supports animal research. Thus, the call to support clinical studies is already being addressed. The question is whether the clinic can completely supplant all animal studies. Reines has argued this issue most forcefully, drawing on examples like the discovery of some psychoactive drugs via clinical observation (Reines, 1990) and other case studies. In addition,

Kaufman et al (1989) have produced a critique of animal models which argues that animal models are rarely cited in the clinical literature and are, therefore, not useful in terms of actual clinical medicine.

The case studies cited by Reines draw on instances where astute clinicians (following William Osler's advice) use interesting cases and clues from the clinic to make conceptual or therapeutic leaps into new areas. For example, important psychoactive drugs (e.g. chlorpromazine) were discovered in this way (Reines, 1990). However, this clinical insight then led to a whole range of additional research questions about the mode of action of such drugs and the possibility of developing other drugs with different (improved?) properties that could not all be answered by clinical observation or human experimentation. (Reines does not use "discovery" in its colloquial sense. For him, "discovery" appears to refer to the creative insight. The subsequent research to test the insight appears to be categorized, at least in part, as "dramatization.") In addition, as with public health investigations and conclusions, the clinical insights occur in the context of the then current knowledge base which relies on data from all sorts of laboratory, epidemiological and clinical research

In the critique of animal models, Kaufman et al (1989) analyze citations to ten randomly chosen models from the animal model files at the Armed Forces Institute of Pathology. Of 693 citations to the 21 core papers describing the animal models, 78 (11.3%) were judged to be clinical with most of these citations (61) referring to only three of the models. The authors note many of these citations appeared to be clinically unimportant and they conclude by questioning the usefulness of these models in understanding and treating human disease.

This study represents an interesting (and to this date the most sophisticated) attempt to undertake an objective analysis of the utility of animal models. However, it is not without significant problems. Citation

analysis has developed into a complex science with many potential pitfalls. For example, it is well known that older papers rapidly disappear from the literature and become subsumed by more recent reviews. Thus, their simple citation analysis tracked the influence of the original papers that first described the animal model but not the influence of the model itself. In addition, errors in citation are fairly frequent and one has to be careful to examine potential variants. Such variants can account for a significant proportion of the total citation record.

There are other problems aside from the technical difficulties of citation analysis. It is not clear how clinical "value" was judged nor how the citing literature was divided into clinical papers and other types of research. The scientific literature is also notoriously neutral in assigning value to prior literature (e.g. one paper may have been far more influential than others in the bibliography, yet is "counted" as equal to the others in impact) and it is likely to be very difficult to determine how much impact an earlier paper has had on an investigator merely by reading a journal report. The study also does not provide any control comparisons, such as a citation analysis of the clinical studies of the same human diseases which the animals were supposed to be modeling. It may be that the clinical studies appear similarly unimpressive in influencing the later literature.

Alternatives

The best available statistics indicate that the use of laboratory animals worldwide has fallen by 30-50% after peaking between 1975 and 1980. Several reasons have been put forward to explain this decline. First, it is argued that laboratory animals and their care have become increasingly expensive leading to an economic disincentive to use research animals. This is true but there is no data showing that animal research costs have risen

Number of mice used in insulin assay per million units of insulin sold

<u>Year</u>	<u>Number</u>
1970	19.3
1975	4.6
1980	2.4
1985	0.7

(From graph in Trethewey, 1989)

any faster than general research costs. In other words, have cost pressures really influenced investigators to switch from animals to cell cultures when the costs of cell culture research have also increased? Second, animal care and breeding standards have improved substantially over the past twenty years and, as a result, investigators can obtain better data from fewer animals.

Third, it has been suggested that animal use has fallen because of economic uncertainty and recessions. During the last fifteen years there have been two recessions and one boom period but animal use fell steadily throughout this period with no evidence that the economic boom had any impact on the rate of decline. For example, Hoffman-La Roche reported that it cut its animal use from 1 million to around 300,000 per annum over ten years but throughout this period it maintained the same number of Investigational New Drugs under study and therefore did not diminish its overall research effort (*The Alternatives Report*, 1991).

Fourth, it is argued that alternatives have played a major role. This is most likely true but it is not clear how much of the fall has been due to the specific search for and use of alternatives and how much has been due to the development of more efficient and powerful research techniques that also happen to reduce animal use. Thus, cell-culture technology has improved considerably in the last fifteen years as has our knowledge of basic biological mechanisms. Partly as a result, the National Cancer Institute has replaced its use of the mouse cancer model for screening for new chemotherapeutic agents with cultures of human cancer cells at a savings of around 3-4 million mice per annum (Rowan, 1989b). The pharmaceutical industry has also made very good use of new techniques to reduce animal use in screening for potential new drugs.

Even given the progress made in reducing animal use (and in reducing animal distress in research) over the past fifteen years, it is difficult to see how

research animals could be eliminated now or in the foreseeable future. By combining clinical, public health, cell culture and other approaches to research, it may well be possible to reduce animal use still further (perhaps substantially), but it is not realistic to expect to eliminate all animal use in the laboratories of the OECD countries and also argue that progress in biological and medical knowledge would be unaffected.

In determining whether or not animal research is beneficial, Smith and Boyd (1991) recommended that the following steps be followed:

1. Judgements about the benefits should be made by scientists in dialogue with informed public opinion.
2. Scientists should not only seek to advance the public interest when performing animal research but should be seen to be doing so.
3. Any judgement that animal research is necessary should be regarded as subject to possible change as scientific technology advances.
4. The factors and interests taken into account when making such judgements should be well known and widely agreed upon by both scientists and the public.

3. ANIMAL RESEARCH CAUSES TOO MUCH SUFFERING FOR LITTLE OR NO BENEFIT

Another criticism of animal research addresses its utility for humankind. Some suggest that animal research produces a tremendous amount of suffering and little human benefit. For example, Singer (1990) states that he thinks that much animal research "...is of minimal or zero value" while it causes considerable suffering. Others suggest that no animal research is useful but it still causes considerable harm to animals. For example, the Australian Association for Humane Research (1988, p.1) states, "We know of no animal experiments, as such, which ever led to a cure of a human disease."

Finally, others argue that animal experiments are not only useless, but are actually misleading. Sharpe (1988, p.200) states that, "... the real choice is not between dogs and children, it is between good science and bad science; between methods that directly relate to humans and those that do not. By its very nature vivisection is bad science: it tells us about animals, usually under

artificial conditions, and not about people." All three criticisms are commonly found in the literature of animal protection groups, sometimes together and sometimes not. All three criticisms focus on refuting the research advocates' argument that animal studies have proved to be very useful at small or no cost in animal suffering.

We have relatively little data on animal suffering in research and testing and what we do have depends heavily on what is perceived to constitute suffering. The authorities in the Netherlands have collected data on the potential pain and suffering experienced by laboratory animals. Their 1990 Annual Report on animal experimentation notes that 53% of the animals experienced minor discomfort, 23% were likely to have experienced moderate discomfort and 24% were likely to have experienced severe discomfort. About one fifth of the animals in this last category were given medication to alleviate pain. Examples of procedures that would place animals in the "severe" category are prolonged deprivation of food or water, some experimental infections, tumor induction, LD50 testing, and immunization in the foot pad or with complete Freund's adjuvant (*The Alternatives Report*, 1992a). All of the animals are likely to be euthanized so they will also experience the harm of death.

In Great Britain, the only indication of pain and distress level in laboratory animals that is available is the recording of anesthesia use. In 1978, 3% of the 5.2 million procedures involved anesthesia for the whole procedure (they were terminal) and 14% involved anesthesia for only part of the procedure. In 1988, 19% of the 3.5 million procedures involved anesthesia for the whole procedure and 17% involved anesthesia for only part of the procedure. It is not clear why anesthesia use doubled from 1978 (at 17% of all animal experiments) to 1988 (at 36%) although the 1986 Act that revised British controls over animal experimentation placed considerable emphasis on the control of pain and distress (*The Alternatives Report*, 1990). However, it is also possible that

potential pain was being under-assessed prior to the debate over the new act in 1985 and 1986.

According to 1992 USDA statistics (excluding rats and mice), 5.63% of the animals used in research in the U.S. experience pain or distress that is not alleviated by painkillers. However, USDA statistics on pain and distress are not reliable indices of animal pain and distress. Those completing the annual report forms are provided with few guidelines on how to assess pain and distress and there is also direct evidence that the use of post-operative pain relief in the laboratory is lower than reported (Phillips, 1993).

States vary dramatically in the proportion of research that is reported to be painful (from 45% to less than 1%) and for which pain relief is not provided. Some corporations that do toxicity testing report no animals in the category of "pain and distress unrelieved by drugs" and many non-profit institutions are reluctant to report animals in this category for fear they will be targeted by animal activists (who have access to annual reports from institutions). It is very probable that the number of animals experiencing pain and distress in research and testing is under-reported. It is not possible to estimate the degree of under-reporting from current data.

Despite the problems of assessing animal pain and distress (see chapter VII for more discussion of this issue) and the questionable reliability of some of the numbers, the available evidence does not indicate that all, or even a majority of research animals experience severe and unrelieved suffering. Of course, how one judges the total extent of animal suffering (and whether it is excessive) is going to be heavily influenced by one's personal values and interpretation of the data, and by one's assessment of the level of harm caused by the killing of animals and by their housing in the laboratory. Differences in the assessment of the extent of laboratory animal distress accounts for some of the apparently

irreconcilable conflicts between animal research and animal protection advocates.

C. THE COST-BENEFIT BALANCE

An analysis of the literature defending or criticizing animal research proves to be relatively unhelpful in evaluating the cost-benefit balance of animal research. Two separate papers on Nobel Prize winners in medicine for this century come to very different conclusions about the role played by animals. Stephens (1986) argues that alternatives have been honored many times by the Nobel Committee while Leader and Stark (1987) extoll the value of animal models. What is especially interesting about these two papers is that they quite frequently cite the same award in support of their argument. Stephens (1986) is more rigorous in his analysis (he defines his selection criteria more carefully) but the two papers demonstrate that there is considerable room for disagreement on the role played by alternatives or animals in the development of a particular discovery.

Overall, a careful reading of the arguments leaves one with the impression that non-animal models can be more valuable and can reduce reliance on animals more than the animal research advocates care to admit. By the same token, however, animal studies have been more valuable and more productive than the animal research critics are willing to acknowledge. Ultimately, Sir Peter Medawar was probably correct when he stated that:

The use of animals in laboratories to enlarge our understanding of nature is part of a far wider exploratory process, and one cannot assay its value in isolation — as if it were an activity which, if prohibited, would deprive us only of the material benefits that grow directly out of its own use. Any such prohibition of learning or confinement of the understanding would have widespread and damaging consequences; but this does

not imply that we are forevermore, and in increasing numbers, to enlist animals in the scientific service of man. I think that the use of experimental animals on the present scale is a temporary episode in biological and medical history, and that its peak will be reached in ten years time, or perhaps even sooner. In the meantime, we must grapple with the paradox that nothing but research on animals will provide us with the knowledge that will make it possible for us, one day, to dispense with the use of them altogether. (Medawar, 1972)

"... nothing but research on animals will provide us with the knowledge that will make it possible for us, one day, to dispense with the use of them altogether."

(Medawar, 1972)

CHAPTER VI

ARE THERE ALTERNATIVES TO ANIMALS?

Very few, if any, scientists have argued that they would prefer to use animals even if they did not have to (Rowan, 1991, Silverman, 1993), and many of the companies using animals have contributed substantial time and money to the search for alternatives. This activity has been at least partly responsible for the dramatic decline in laboratory animal use over the past twenty years (see Chapter III). Some of the significant obstacles to the development and implementation of replacements are the inherent complexity of the mammalian system, the complex, overlapping web of federal regulations that mandate much of the testing, the lack of a defined validation process, and the inherent inertia of regulatory policy (Investor Responsibility Research Center, Inc., 1992). The most active targeted attempts to seek alternatives have occurred in toxicity testing in industrial laboratories, particularly in the search for new non-animal techniques to replace the Draize eye and skin irritancy and the LD50 tests (see section IX).

Nonetheless, a significant segment of American scientists are very uneasy about the term "alternative" (preferring to use adjectives like "adjunct" or "complementary") and have yet to embrace the concept of alternatives. In fact, important research institutions such as the National Institutes of Health (NIH) avoid use of the term "alternatives" whenever possible. For example, the 1985 Health Research Extension Act of 1985 required NIH to establish an alternatives program but it ended up with the awkward title "Biomedical Models and Materials Resources."

A few years later, a Public Health Service (PHS) draft document on animal welfare commented that "efforts have led to the discovery of research methods that are useful as 'adjuncts' to animal research in that they complement animal models but rarely replace them. Thus, these adjuncts are not true 'alternatives' -

"Nonetheless, a significant segment of American scientists are very uneasy about the term "alternative" [preferring to use adjectives like 'adjunct' or 'complementary'] and have yet to embrace the concept of alternatives."

even the use of this latter term can be misleading ..." (Public Health Service, 1989). Other biomedical research advocates have argued that use of the term "alternatives" implies that one needs to be apologetic about the use of animals in research and that this gives the public the wrong impression (Goodwin, 1992).

In the recently passed NIH Revitalization Act of 1993, the Director of NIH is required to develop a plan for the development and implementation of alternatives. A draft of this plan has been developed by representatives from the various institutes and sent to the Department of Health and Human Services for final approval before release. The term "alternatives" is hardly used in the document (it appears only where it occurs in reference to meeting or organization titles) indicating that the NIH aversion to the concept continues. Nevertheless, the NIH Office for the Protection from Research Risks enforces the requirement in PHS policy that researchers pay attention to and pursue the Three R's (or alternatives) and has no trouble accepting or dealing with the concept.

Biomedical research in the U.S. is, thus, decidedly schizophrenic on the subject of alternatives. There is a small but growing industry of *in vitro* toxicology companies that hope to service the alternatives market opening up among corporate laboratories but there is a tendency for academic research to deny any validity to the alternatives concept. Nonetheless, if one takes a broad view of the concept of alternatives, then, judging from the large decline in animal use numbers, many scientists are clearly using fewer animals with no noticeable impact on research activity or productivity.

A. DEFINITIONS

Although the word "alternatives" is used frequently, it does not always reflect identical intent by users. Some animal activists argue that all animal studies should be replaced by "alternatives" although

many experts on alternatives do not consider the total replacement of animals a possibility in the near future. Others who support the search for "alternatives" focus on reducing animal use (rather than eliminating it) or on reducing animal pain and distress.

Rowan (1984a) offers the following as the most widely accepted definition: "An alternative is any technique which could: (a) replace the use of animals altogether; (b) reduce the number of animals required; or (c) reduce the amount of stress suffered by the animal through suitable refinements in the techniques used."

These are the Three R's as originally set out by Russell and Burch (1959). Rowan also stresses that any valid alternative system must provide data which leads to the same conclusion with the same degree of confidence as that obtained from the system being replaced.

Replacement originally referred to the use of insentient material for conscious, living, higher animals so that a fully anesthetized animal that did not recover could be regarded as a replacement to a conscious animal. Today, the idea of replacement is more restrictive and usually refers to the use of either tissue culture or some other experimental system that does not require either killing or disturbing an animal. Thus, the use of the new pregnancy test kits instead of rabbits is considered to be a replacement (despite the fact that the antibodies in these kits were probably raised in living animals). In addition, the Limulus Amoeboid Lysate (LAL) test for pyrogenic endotoxins is considered a replacement alternative even though the invertebrate horseshoe crab (*Limulus*) is "bled" to provide a "blood" sample to manufacture the LAL reagent.

"The FDA did not release its final guideline on the LAL test ... until almost 20 years after the discovery that endotoxin caused coagulation ... Three different types of studies were done during this time to standardize and validate the LAL test. First, the sensitivity of the LAL test to the presence of lipopolysaccharide ... was established. Secondly, there was a major international effort comparing the LAL and the rabbit pyrogenicity test ... Thirdly, a standard endotoxin sample was developed as a positive control for the LAL test ..."
(Flint, 1994)

The question of what constitutes an animal is also an issue as exemplified by attitudes to *Limulus*. Generally, invertebrates are perceived to be replacements in the "alternatives" scheme. However, a few papers have

discussed the sentience of insects and, recently, the Home Office in Britain decided to add the octopus to the category of "protected research animal." For the most part, however, invertebrates are considered to be replacements.

Annual monkey use to grow polio virus in the Netherlands: Impact of new techniques

<u>Year</u>	<u>Techniques</u>	<u>Number</u>
1960		2,440
1965		4,570
1970	In situ Trypsinization	1,590
1975	Microcarrier Technol.	463
1980	Tertiary cell culture	47
1984		30

(Hendriksen, 1988)

Reduction refers to areas where the numbers of animals can be reduced. The numbers of animals used in testing new batches of insulin and producing polio vaccine lots have been reduced dramatically in the past twenty years as technical refinements improved the production procedures (Tretheway, 1989; Hendriksen, 1988). Similarly, the National Cancer Institute reduced its use of animals in screening for possible new anti-cancer drugs by several million a year when it replaced the mouse cancer system with human cell cultures as the

primary chemical screen. In fact, a great deal of the reduction of laboratory animal use has come about because of more sensitive and mechanistic screens in the search for new drugs. In addition, animal use has been reduced in diagnosis and is beginning to fall in acute toxicity testing.

Refinement refers to efforts to decrease the incidence or severity of painful or stressful procedures for animals which still have to be used in specific tests or research. For example, most research facilities have now instituted policies to restrict or eliminate the use of Complete Freund's Adjuvant (CFA) in immunization protocols. CFA causes an inflammatory reaction that can be very painful and, in the current climate, animal care and use committees are very focused on reducing or eliminating perceived animal pain and distress as much as possible.

It is also interesting to note that the use of anesthesia in animal research in Britain doubled from 1985 to

1990. This coincided with the debate over the new Scientific Procedures Act (1986) and its subsequent passage. The Act regulates animal use in research, education and testing and one of the major elements of this new legislation was its attention to animal pain and distress. Accordingly, it seems reasonable to assume that the increased use of anesthetics was prompted by the increasing attention to animal pain and distress prompted by the new legislation. No similar statistics are available in the U.S. but it should be recognized that one of the main preoccupations of the recently revamped Institutional Animal Care and Use Committees is the reduction of animal pain and distress.

B. SOME EXAMPLES OF AVAILABLE ALTERNATIVES

An alternative is little more than a new technique to investigate a research question that uses fewer animals or causes less animal distress. One of the features of biomedical and biological science is the increasing sophistication of research technology and the expanding ability to answer evermore complicated and detailed questions. Therefore, it is not particularly surprising that the on-going search for better research technology should be leading in many instances to a reduction in animal use and animal distress. Questioners often ask for more detail, however, and want to know, "Just what are the alternatives?" The following list provides some concrete examples of research technologies and approaches that have reduced animal use and animal distress but the reader should be aware that, given the broad definition of an alternative above, all scientists are, or could be, engaged in the search for alternatives whether they realize it or not.

1. AUDIOVISUAL GUIDES AND AIDS

Audiovisual guides and aids are usually promoted as alternatives to animals in the field of education. They offer the advantage of repeated and play-

back viewing, often allowing the viewer to study procedures on humans instead of animals, but there are limitations to teaching hands-on techniques in this way. There is some evidence that animal use has declined in teaching at all levels and it is likely that audiovisual materials and computer teaching have filled the gap.

2. BACTERIAL CULTURES AND PROTOZOAL STUDIES

Bacteria are already common laboratory subjects and most sides in the debate consider bacterial cultures as true replacements. For example, bacterial cultures were used to replace animals in vitamin bioassays but, for the most part, bacteria are being used in research for which animals were not particularly suitable. In the first half of the 1970s, the Ames Test burst on the scene and was quickly picked up and promoted as an alternative to animals by animal protection groups. While Bruce Ames argued that the use of salmonella to detect chemical mutagens was a useful screen for carcinogens and it is certainly expedient in that it is much quicker and costs a fraction of the animal bioassay, it has not proved to be as useful an alternative as some have hoped. In part, this is because the Ames Test detects agents that damage DNA and there are a significant number of carcinogens whose main mechanism of action does not involve DNA damage.

3. COMPUTER SIMULATIONS AND MODELS

Computers are now commonplace in the laboratory and are widely used to increase analytic power and to present increasingly sophisticated educational tools. In addition, computer modeling can be used to test different experimental scenarios and to increase the efficiency of animal research. For example, computers are now being used more and more in structure-activity studies to determine both the toxicity of chemicals and for the "rational" design of new drugs. But computer

models and techniques are limited to available human knowledge and are similarly limited in their potential to replace or reduce the use of laboratory animals. For the most part, computer technology makes research more efficient and helps to guide the type of questions asked. The one area where it has shown some real promise as a replacement is in educational programs.

<u>NIH Extramural Research - FY 1980</u>	
<u>Types of Research Systems Used in Funded Projects</u>	
<u>Experimental "System" Used</u>	<u>% of Total Funds</u>
Humans	23.6
Mammals	26.1
Humans & Mammals	11.8
Humans, Mammals & Others	1.2
Mammals & Other Vertebrates	2.0
Mammals & Invertebrates	0.8
Mammals & Vertebrates & Invertebrates	0.2
Non-mammalian Vertebrates	2.0
Non-mammalian Vertebrates & Invertebrates	0.2
Invertebrates	1.9
Non-animal	30.2

(From Anon, 1982a)

4. HUMAN STUDIES

As discussed above, clinical studies can provide considerable information on human biology and disease and it is possible that, despite the one third of the NIH budget that already goes to support human studies, more could be done using epidemiological, autopsy and other approaches. However, human research is more expensive than animal studies and the Helsinki Declaration on the use of human subjects in research specifically states that humans should not be used in research unless appropriate studies have already been conducted in animals. Given both the logistical and ethical problems involved in conducting human research, it is unlikely that it will expand much beyond its present, quite considerable extent.

5. PHYSICAL AND CHEMICAL TECHNIQUES

The development of physical and chemical techniques over the past fifty years has been nothing short of

spectacular. The new genetic engineering technologies in particular allow laboratories to do in a day what took a year or more only a few decades ago. In addition, the new imaging technology (e.g. ultrasound, nuclear magnetic resonance) allows research scientists to do more and more investigation without invading body cavities or killing animals. The much greater sensitivity of new laboratory technology, coupled with non-invasive imaging, has certainly played a major role in reducing the demand for laboratory animals over the past twenty years.

6. TISSUE CULTURE

Tissue cultures (cell and organ cultures, organ slices, etc.) are widely used in biomedical research. The use of tissue cultures grew rapidly after the Second World War when antibiotics could be used to control the contamination of tissue cultures by micro-organisms. In the last ten to twenty years, the use of *in vitro* (literally, in glass) systems has grown dramatically across all disciplines, even in those like physiology and toxicology where whole animal studies have been the mainstay of the discipline. There are numerous examples of tissue culture replacing animal use (e.g. vaccine testing, virology studies, monoclonal antibody production) but it should be recognized that many cell cultures still require human or animal serum to grow properly and that the cells are often obtained from an animal killed for the purpose. The future potential of various tissue culture approaches to reduce reliance on animal use is considerable, but it is not yet the "animal-free" system that some assume.

7. OTHER ISSUES

Attitude changes are also an issue in considering alternatives, and educational approaches play a big role in reinforcing or forming attitudes. Thus, it is not clear what such initiatives as the "student's rights" bill in California, that gives students in kindergarten through

Milestones in Tissue Culture

1907	Harrison keeps frog embryo pieces alive and growing
1912	Carrel solves problem of viability - feed the cultures
1929	Fell develops her organ culture systems
1947	Tissue Culture Conference at Hershey, PA, forms Tissue Culture Association
	Enders, Weller and Robbins use antibiotics to prevent bacterial contamination
	Furth and Sobel report growth of tumor cells with differentiated characteristics
1948	Sanford, Earle and Lively grow single cells into clones
1955	Eagle develops "defined" growth medium (includes serum)
1958	Harris introduces hybridization of cells on a wide scale

the twelfth grade the right to object to dissection, will have on later attitudes to animal research and alternatives. "Hot line" numbers are advertised, and support from legal defense projects are offered to students who chose to object.

At the university level, several cases involving college students refusing to engage in procedures using animals have been settled out of court. Medical and veterinary schools are now offering alternatives to animal teaching laboratories. A 1987 survey conducted by the American Medical Student Association and the Physicians Committee for Responsible Medicine (PCRM) found that 53% of the medical schools that responded used animals in physiology courses, 25% used animals in pharmacology labs and 19% used animals as part of their regular surgery courses. However, a later survey by the Association of American Medical Colleges found that one quarter of medical schools do not use any animals in their educational programs while another one half allow students to opt out of animal exercises if they so desire (see Chapter on Education for more details).

In the research arena, the 1985 Animal Welfare Act amendments are beginning to have an impact on

how much investigators think about and search for alternatives (whether replacements, reductions or refinements). For example, the inspectors at the U.S. Department of Agriculture who enforce the Animal Welfare Act are specifically looking for evidence on protocol review forms that investigators have justified their needs for a specific number of animals (encouraging reduction) and that they have documented some sort of literature search for alternatives. It is not difficult to meet these new requirements but it does require more effort and more attention to these issues which is bound to have an impact on attitudes.

C. INTEREST IN ALTERNATIVES

In the face of the continuing controversy over the use of the term "alternatives" and their potential utility, it may be useful to review highlights of the growing public and corporate acceptance of the idea (Table 6-1).

Since 1985, so much has happened that a chronological listing of important events is too overwhelming. For example many corporations have become active developers and promoters of alternatives (e.g. in addition to those mentioned above, Exxon, Hoffman-La Roche, L'Oreal, Procter and Gamble, Unilever and Zeneca have been major players). In 1993, the most recent calendar year, the first director for the European Centre for the Validation of Alternatives Methods (a new European Union unit) was hired, the first World Congress on Alternatives in Baltimore was held, and a U.S. government-sponsored international meeting to examine potential replacement methods for rabbit eye irritancy testing was organized. It is now very clear that "alternatives" is much more than a fringe issue.

D. TRENDS AND SOLUTIONS

The national trend is toward the reduced use of animals in biomedical research (Mann et al, 1991), but there is little chance of completely replacing animals.

Methods that would completely replace acute toxicity studies in animals (such as the LD50) are difficult to find as these tests measure how the entire body reacts to a substance (Investor Responsibility Research Center, 1992). In the immediate future, some public consensus needs to be developed and widely communicated on just what the potential for alternatives is and how far society should go in promoting the search for and use of alternatives.

Table 6-1: Chronology of alternatives development up to 1985

1959	Russell & Burch book published which first enunciated the Three R's.
1962	Lawson Tait Trust (UK) - first research fund to support scientific development of alternatives.
1965	Littlewood Committee Report (UK) - reported that little would be gained by paying special attention to alternatives.
1967	United Action for Animals (U.S.) - new animal group formed that campaigned specifically for replacement "alternatives."
1969	FRAME (UK) - new group to promote the idea of alternatives to the scientific community. Lord Dowding Fund (UK) - new fund established to support alternatives research.
1971	Council of Europe Resolution 621 - suggested that an "alternatives" data base be established. This was the first significant "government" initiative or recommendation on alternatives. Ames Test first described - this test came to be widely promoted as an alternative to the animal bioassay for carcinogens although it did not live up to the initial hype.
1972	Felix Wankel Prize for Animal Protection - up to DM 30,000 prize for alternatives research (Bruce Ames of Ames Test among the early recipients).
1973	<i>ATLA Abstracts</i> founded (FRAME, UK). It is now <i>ATLA</i> and is a journal in the true sense of the term. It is covered in <i>Current Contents</i> , the "Who's Who" of academic journals.
1975	National Academy of Sciences Meeting (U.S.) - first major scientific meeting on the idea of alternatives in the U.S.
1977	Netherlands Animal Protection Law included a specific section on alternatives that has now grown into a program where the government provides hundreds of thousands of dollars to support alternatives research.
1978	FRAME Meeting at the Royal Society on Alternatives in Drug Development and Testing, London - first big scientific meeting on alternatives in Europe. Smyth book examining alternatives published. Smyth was president of the UK Research Defence Society, established to support animal research.
1979	HR 4805 (U.S.): Research Modernization Act -

Table 6-1 (cont.)

- introduced by UAA (see above) directing that 30-50% of animal research funding be reallocated for alternatives. Gained wide public support and forced Congress to start to take an interest in the subject.
Sweden established \$90,000 in government funding for alternatives.
- 1980** Spira launched Draize Campaign (U.S.) - this campaign against rabbit eye irritancy testing credited with initiating considerable corporate research on alternatives.
New England Antivivisection Society gives \$100,000 for alternatives research on tissue culture and second consortium provides \$176,000 for CAM test development.
- 1981** Johns Hopkins University Center for Alternatives to Animal Testing (CAAT) (U.S.) established with \$1 million fund from cosmetics industry (Avon, Bristol-Myers Squibb leading donors - result of Draize campaign).
Swiss animal legislation - specifically required consideration of alternatives.
Zbinden & Flury-Roversi paper criticizing the classical LD50 - stimulated widespread re-examination of animal tests for acute toxicity.
- 1982** Colgate Palmolive provides \$300,000 to investigate chick chorio-allantoic membrane (CAM) system (U.S.).
- 1983** Switzerland provides SFr 2 million over 2 years for alternatives research.
FDA formally announces that they no longer require classical LD50 data.
- 1984** FRAME (UK) receives £160,000 from Home Office. First UK government funding for alternatives research.
- 1985** U.S. - Health Research Extension Act is passed requiring NIH to develop a plan for alternatives.
U.S. - Animal Welfare Act amendments are passed that require greater attention to alternatives in research that causes pain and distress.
Index Medicus adds a subject heading - Alternatives to Animal Testing.
European Research Group on Alternatives to Toxicity Testing (ERGATT) is formed.

CHAPTER VII

THE QUESTION OF ANIMAL PAIN AND SUFFERING

A. INTRODUCTION

Estimates of the number of animals used in U.S. research each year run from 17 million to as high as 100 million. (Current data indicate that 100 million is far too high and that it is unlikely that more than 30 million animals are being used in the United States.) The main types of animals used in laboratory experimentation are rats, mice, hamsters, guinea pigs, frogs, pigs, rabbits, pigeons, chickens, dogs, cats, and primates. The animals are used in a variety of ways: in basic and applied research; in the diagnosis of disease; in school and university educational programs; in testing the toxicity of new chemicals and products ranging from medical devices and pesticides to cleansers and cosmetics; in the search for and development of new drugs; and in the production of antitoxins.

In the first half of the 20th century, the public, in general, felt that laboratory animals were being properly cared for and used only when necessary and therefore supported their use in biomedical research. Public awareness of animal research and concern for the animals involved have increased dramatically over the last thirty years.

Although it is recognized that procedures performed on the animals often result in death, for many people it is not the taking of life which concerns them. They believe that the majority of procedures are done for a worthy cause such as medical ad-

*"There is no objection to vivisection except the physical pain it inflicts."
(Henry Bigelow, 1818-1890)*

Public attitudes on laboratory animal care (from Anon., 1949 and FBR, 1985)

1949

Do medical schools take as good care of animals as individual owners would?

As good	77%
Not as good	11%
Can't compare	2%
Do not know	12%

1985

Research animals are treated in a considerate manner.

Very often	9%
Fairly often	31%
Not very often	14%
Not at all	10%
Do not know	34%

vancement. Rather, it is the perceived pain, distress and anxiety experienced by the animals during scientific research that is of concern to the public: did the animal suffer, did it experience pain?

In the mid-1970s a number of philosophers, including Peter Singer, Tom Regan and Bernard Rollin, began a carefully formulated enquiry into the way in which laboratory animals were used. "The debate on animal research has therefore entered a new phase, involving a reevaluation of the moral status of animals, a detailed examination of the biological and philosophical meaning of animal pain and suffering and a closer examination of the benefits of different types of knowledge" (Tannenbaum and Rowan, 1985).

Jeremy Bentham (in the late 1700s) and Peter Singer (two hundred years later) made the concept of sentience central to any discussion of the morality of animal research, asserting that the capacity for suffering is the vital characteristic that gives a being the right to equal consideration (Singer, 1990). The commonly accepted definition of sentience is the capacity to suffer and/or experience enjoyment. Beings with the capacity to suffer have interests, even if it is only an interest in not suffering. Singer asserts that we can only have duties toward beings with interests, and insentient beings do not have interests. Therefore, if an animal is insentient - not capable of suffering or enjoyment - we have less moral responsibility toward it. The question remains, which animals, if any, suffer?

B. DEFINITIONS

Any discussion concerning the use of animals in research invariably raises such concerns as whether and how much the animals experience pain, fear, anxiety, distress and suffering. This is another area in the debate where conceptual confusion leads to misunderstanding and an inability to deal effectively with important public concerns.

The states of pain, fear, anxiety, distress and suffering are often implied to be the same or so closely related that they cannot be separated from one another, but this is not the case. For example, pain may produce suffering, but not always. It is useful to understand how these states are separate and distinct from one another, and recognize that they include both physiochemical and psychological components. This makes it difficult to determine how much, or even whether, animals experience these states.

1. PAIN

The National Research Council (NRC), in a recent analysis of animal pain and distress, distinguishes among several features of pain, including both sensory (the wiring) and affective (the psychological) components of pain (National Research Council, 1992b). Thus, when humans perceive pain, the phenomenon is more than a direct effect of potential or actual tissue damage. DeGrazia and Rowan (1991) caution against an instrumental definition of pain, arguing that the concept of pain, an intrinsically unpleasant state, must be understood in phenomenological terms.

There is a physical component to pain in that the nerve impulses that signal pain must pass down the nerves, but, in order to perceive pain, there must be some processing of these signals in a central nervous system. For example, an individual with a high-level spinal injury will withdraw his foot from a stimulus that can cause tissue damage (e.g. a hot iron) but will not feel anything. The foot withdrawal is accomplished by a simple "nociceptive reflex loop" involving the spinal column but no higher cognitive functions.

An individual with a prefrontal lobotomy is a more complex example of the importance of the central processing of a pain phenomenon. For some reason, an individual with destroyed frontal lobes of the brain does not experience the agony of pain. If people are

pricked with a pin, they will jump (they retain the startle reflex) but if one slowly pushes a pin into their leg or arm with their consent they will merely watch in interest. When asked if it is painful, they will respond that the “little pain” is still present but that the “agony” is not. Somehow, the removal of the frontal lobes of the cortex removes the affective response to potentially painful stimuli.

Thus, in order to experience pain, humans, at least, need both the wiring (the nerves) and also the complex processing in the brain that underlies the affective or psychological component of pain. This psychological response and level of pain perceived and tolerated by an individual also varies according to context.

It is accepted by most people that mammals and birds are capable of experiencing pain because they have the nerves and centrally organized brain that appear to be necessary for an individual to experience pain. But how can we tell if an animal is really in pain, since they do not have the capability to verbally express themselves as we do? Pain is essentially a private matter and none of us can really tell what pain another is experiencing, even when they can describe it in words. Brain (1963) argued that, since human prefrontal lobotomy patients are not disturbed by pain, animals with smaller or virtually non-existent cerebral lobes will also not experience pain. This is not a popular position today and experimental evidence contradicts it.

Patrick Bateson (1992a), a professor of ethology at the University of Cambridge, suggests using observable signs associated with the subjective sense of pain in humans as criteria for assessment of pain in animals. He asserts that scientists should ask the following:

- a. Does the species of animal in question have anatomical, physiological, and biochemical mechanisms similar to those in a human being believed to be able to experience pain?

- b. Is the animal behaving in a similar way to a human believed to be in pain?

For example, it is possible to ask animals how much pain they will tolerate by setting up a system where they receive a reward every time they accept a painful stimulus. When the pain becomes too high (exceeds the pain-tolerance threshold) they will no longer trade off the stimulus for the reward. Humans will voluntarily accept similar painful stimuli up to a certain threshold. Such experimental set-ups indicate that mammals have a very similar pain tolerance threshold to humans. This type of evidence is usually sufficient to convince most people that mammals and perhaps birds do experience the same sort of pain phenomena.

In natural settings, one has to use other methods to determine what is and is not painful and here, behavior is usually the key to detecting an animal in pain. It is usually agreed that if an animal subjected to a potentially painful situation stops activities that it habitually performs, or learns to avoid such conditions, we need to worry that it might be feeling something. It is important to note, however, that animals experiencing pain do not always behave differently. A prey species (e.g. antelope, rabbit, etc.) in severe pain may continue to behave relatively normally because an overt display of pain may encourage a predator to choose it for its next meal. In these instances, evolutionary selection may diminish behavioral pain signals so that they are no longer detectable.

2. FEAR AND ANXIETY

It is sometimes argued that animals experience fear, but not a state of anxiety.

Cassano (1983), a psychiatrist, stated, "Fear is a primitive state of mind found throughout the animal kingdom, whereas anxiety is part of conscious experience and takes shape as a typically human function or

States of fear and anxiety are not usually considered to be painful but they should raise as many concerns regarding animal well-being as pain states.

Fear is a primitive state of mind found throughout the animal kingdom, whereas anxiety is part of conscious experience and takes shape as a typically human function or attitude. Thus, the age of anxiety could be said to begin with the emergence of Homo sapiens. In anxiety, unlike fear, there may be no threatening situation at all, or only a vague one.

attitude. Thus, the age of anxiety could be said to begin with the emergence of Homo sapiens. In anxiety, unlike fear, there may be no threatening situation at all, or only a vague one."

Thus, there is a tendency to deny that animals can experience anxiety, although it is accepted that animals experience fear. What is the difference between fear and anxiety? Most of those who address this point argue that fear has a tangible object whereas anxiety need not. What is the difference between the two? Erickson (cited in Rowan, 1988) argued that "anxieties are diffuse states of tension . . . which magnify and even cause the illusion of an outer danger, without pointing to appropriate avenues of defense or mastery" while "fears are states of apprehension which focus on isolated and recognizable dangers."

The following are some of the physical and behavioral signs of anxiety (Rowan, 1988). All of these states are observable in both humans and animals.

- a. Motor tension - shakiness, jumpiness
- b. Autonomic hyperactivity - sweating, pounding heart, increased pulse rate and respiration, frequent urination, diarrhea
- c. Apprehensive expectation - anticipation of trouble
- d. Vigilance and scanning - hyperattentiveness

Is it possible that animals experience the human emotion of anxiety and that the above are physical manifestations of such a state? At least some people answer in the negative but there is some experimental evidence that supports the argument that animals do experience anxiety. Gray (1982), a neuroscientist, has argued that an anxious state may have evolutionary benefits in that an animal that experiences anxiety will be cautious when venturing out into the open and in exploring novel stimuli. There are drugs (e.g. alcohol, barbiturates and benzodiazepines like valium and

"A third important assumption is that human anxiety, or something very like it, exists also in animals and responds in much the same way to anti-anxiety drugs. [M]any people will undoubtedly find this assumption hard to accept. It is commonly believed that anxiety is an almost uniquely human state, dependent on such complex cognitive capacities as the ability to foresee the future, to form a self-image, or to imagine one's own mortality."

(Gray, 1982)

librium) that make animals less cautious that also reduce anxiety in humans. There are other drugs that cause anxiety in humans and these, when administered to primates, caused piloerection and struggling in the restraint chair, increased blood pressure and pulse, increased cortisol and catecholamine release, and increased vocalization and urination (see states above).

States of fear and anxiety are not usually considered to be painful but they should raise as many concerns regarding animal well-being as pain states.

3. STRESS AND DISTRESS

Stress is a much used and abused concept. One of the main problems in discussing stress is that the term is sometimes used to describe the state experienced by the animal but at other times it is used to describe the stimulus. In this discussion, the stimuli will be identified as "stressors" while the term "stress" will describe the inner state of the animal. When the animal is no longer able to adapt comfortably to the level of stress, one can define the inner state as "distress."

Stress is part of life and we find that too few stressors (e.g. as happens in barren environments, "white room" torture) can cause just as much stress as too many stressors. Therefore, we need to talk of an optimum level of stressors in the environment and recognize that distress occurs when the animal or human has considerable trouble adapting to a particular environment. A post-mortem analysis performed on an animal that experienced a significant amount of distress will turn up physiological evidence such as enlarged adrenal glands, smaller than normal spleen and thymus gland and enlarged heart. There are a multitude of ways of measuring the level of stress and distress experienced by a living animal (Manser, 1992).

For example, one may observe a change in behavior such as posture, hiding, not eating or not inter-

acting with other animals. Behavior alone is not a sufficient sign of stress or distress, however. Physiological changes have also proved to be useful indices of a change in stress levels. Such changes include a rise in certain hormones, which indicates stress or any emotional arousal, and changes in immune system reactivity. However, the drawing of blood samples to look for changes in stress levels may itself cause physiological changes. Also, rewarding activities may cause changes in physiological parameters that are similar to those seen when an animal is experiencing distress. Assessing stress and distress is not an easy or simple task but its difficulty should not be an excuse to ignore the issue of distress.

Research animals face two hazards that may lead to stress. First, they are frequently kept in relatively barren cages in an environment that includes distractors, such as excessive noise or smell, and few opportunities to hide. Thus, Riley (1981) reports that he had to design special animal-housing facilities and procedures in order to study the effect of stressors on the animals because the background level of stress was too great in the normal animal housing. Second, the experiments themselves may cause distress.

4. SUFFERING

The bottom line for most of those involved in animal welfare is the reduction and elimination of animal suffering. The public appears to be much more concerned about experiments that cause suffering than those that require the killing of animals. However, given this interest in the concept, surprisingly little attention has been given to determining what suffering is and which animals, if any, are capable of experiencing such a state? The National Research Council decided not to address the concept of suffering, preferring to limit themselves to pain and distress (concepts that they felt able to define operationally - i.e. in ways that could be measured). Peter Singer (1990) defines suffering simply

as “the unpleasant emotional response to more than minimal pain and distress” but provides little other guidance.

Suffering, precisely because of its emotional rather than physical base, makes greater demands on meta-physical than physical analysis. It will always be very difficult to determine how much another human or animal is suffering, or even if animals are capable of suffering at all (we only know that other humans suffer via reasoning by analogy from our own inner states).

In any discussion of suffering, it is very important to note that the terms “pain” and “suffering,” although they are often used interchangeably, do not refer to equivalent states. One may have pain without suffering, as when one pinches oneself, or experiences severe muscle ache after strenuous but satisfying physical exercise. It is also possible to suffer without experiencing any pain, as do those rare individuals who are congenitally unable to experience pain (DeGrazia and Rowan, 1991). Most of these individuals do not live very long because they suffer severe injuries while growing up. One case subject reported that she was terrified of surgery, even though she was incapable of feeling pain.

Cassell (1982) argued that suffering occurs when the integrity of a person is compromised or threatened in some way. In this definition, personhood is defined in terms of an individual’s mental and psychological construct of herself, as distinct from the organic body (Rowan 1988). Cassell’s definition appears to require that suffering can only occur in a being that has a psychological sense of self.

This is interesting when applied to a discussion of animal suffering, since his definition would require that the animal have some form of personhood (mind) in order to be capable of experiencing suffering. “Therefore, if we are to discuss suffering in animals, we need to demonstrate that animals, or at least some animals, have

“Some witnesses said that they find it easy to detect pain ... in animals, others regarded it as very difficult to do so; some were of the opinion that “distress,” e.g., mal-aise, fear and frustration, are more easy to detect than physical pain whilst others took the opposite view. Since even the detection of suffering in an animal offers so much difficulty, the possibility of assessing the gravity of suffering is a fortiori still more open to doubt; ...”

(Littlewood Report, 1965)

the cognitive abilities that would make them vulnerable to the experience of suffering and distress and possess at least some of the qualities that are included in the definition of personhood" (DeGrazia and Rowan, 1991).

Cassell (1988) asserts that animals must possess the following to be capable of suffering:

- a. Concept of the self as an independent being
- b. Concept of time
- c. Concept of ideas
- d. Purposes

Most people are probably prepared to accept that primates and perhaps the family dog and cat (because of our familiarity with and anthropomorphizing of) meet the above requirements, but as one moves from mammals to birds to reptiles to fish, the willingness to accept that the creature suffers probably diminishes. Too little attention has been paid to the issue of suffering to proceed much further in this report, but it should be recognized that there are some challenging and thorny problems underlying the call to stop animal pain and suffering.

C. HOW DO WE KNOW IF INVERTEBRATES EXPERIENCE PAIN?

Recently the authorities in Great Britain have decided to add the octopus to the list of protected species under the legislation controlling animal experimentation. This is the first time that an invertebrate has been explicitly brought under the protection of an animal experimentation law and it raises some interesting questions about the status of invertebrates and their ability to experience pain and suffering. The octopus is as good a choice as any because it has a large central nervous system that is capable of learning complex tasks. In addition, it responds appropriately to some aversive stimuli. As a result, the British authorities decided to be safe but what of one of the largest groups

of invertebrates, the insects? Are they capable of experiencing pain and, if so, what is their pain like?

Before discussing pain in insects, it is necessary to take a few moments to talk about nociception. There are a group of nerve endings in mammals that are known as nociceptors. These are receptors that respond to stimuli (e.g. heat, pressure) that have the potential to damage tissue. When these nociceptors are stimulated, they send a signal down the nerve fibers which may or may not produce a response. The reflex withdrawal of the body from the source of injury, such as a hand from a flame (or a paraplegic's foot from a hot iron as mentioned above) is an example of a nociceptive reflex. If there are no further nerve signals sent to the central nervous system, then a nociceptive stimulus will not produce any pain perception even though it produces a behavioral withdrawal from a noxious stimulus.

The concept of nociception is particularly useful when examining the potential of insects and other similar invertebrates to feel pain. "Insects lack the extensive central nervous system processing mechanisms that appear necessary to feel pain, and their behavior, when faced with noxious stimuli, can be explained by a startle or nociceptive reflex, which must be distinguished from pain" (DeGrazia and Rowan, 1991). Therefore any reaction observed in an insect exposed to a situation that would be expected to cause pain in a vertebrate can also be explained as a simple startle reflex.

It is clearly not easy to distinguish between pain and nociception but several people have explored the question of pain in insects. The entomologists, Wigglesworth (1980), Eisemann et al (1984) and Fiorito (1986) have all, based on available evidence and the behavioral responses of insects, concluded that insects probably do not perceive pain.

Insects do display a "startle reflex" for some aversive stimuli but there is little additional behavioral

evidence that insects experience pain as opposed to

**Approval/Disapproval of Animal Testing
based on Braithwaite & Braithwait, 1982)**

	<u>Mice</u>	<u>Dogs</u>
Painless Test/Drug Testing	+43	-23
Painless Test/Nonmedical	-38	-102
Painful Test/Drug Testing	-68	-110
Painful Test/Nonmedical	-110	-151

(The scoring could range from +200 [all strongly approve] to -200 [all strongly disapprove].)

using a simple reflex loop. For example, locusts will put the same amount of weight on a crushed foot as a whole one. A locust will continue to feed quietly even while another locust is eating its way up its abdomen. In evolutionary terms, nociception is an adequate protective mechanism for a creature

with a relatively short life-span and only modest learning needs. Therefore, it is possible to argue that insects do not experience pain. This is a somewhat controversial position but, by making the claim, we hope it forces others to pay more attention to what they mean by pain and suffering.

D. PAIN GUIDELINES

According to various reviews (e.g. Bateson, 1992b), an animal is likely to experience pain and subsequent suffering if it meets the following criteria.

1. Its brain contains structures that have functions that are analogous to structures involved in pain sensation and perception in humans.
2. Its nervous system has peripheral and other receptors that are sensitive to damage.
3. There are receptors in the central nervous system that respond to opioids.
4. The animal responds to damaging or threatening stimuli with flight or escape and it learns to avoid such stimuli by associating them with accompanying events that do not, themselves, threaten damage or harm.

It is generally considered that most vertebrates meet these requirements, and guidelines have been developed to reduce laboratory animal exposure to pain. For example, in 1981, the Committee for Research and Ethical Issues of the International Association for the Study of Pain (*Scientists Center for Animal Welfare Newsletter*, 1981) published their conclusions on minimizing the pain and suffering of laboratory animals.

- a. The experiment should be subject to scrutiny by both laypersons and colleagues in the field to assure that any pain inflicted is necessary and that the experiment is potentially beneficial.
- b. The researcher must view the animal as a living, feeling organism rather than as an object to be manipulated.
- c. If possible, the researcher should try any non-invasive pain on herself prior to use on the animal.
- d. The animal should be allowed a way to escape the painful stimuli.
- e. The experiment should be kept as short as possible.

Categories of Discomfort/Distress and Listing of Examples (Anon, 1986)

Minor

Blood sampling; taking x-rays; terminal experiments under anesthesia; rectal examination

Moderate

Frequent blood sampling; insertion of indwelling catheters; immobilization; pyrogenicity testing immunization with incomplete adjuvants

Severe

Collection of ascitic fluid; production of genetic defects; prolonged deprivation; tumor induction; some experimental infections; lethal-dose testing

- f. Researchers should use species as low as possible in the phylogenetic order.
- g. The animal should be allowed to self-administer analgesic agents.

Not all of these guidelines have been followed but there is broad consensus that animal pain is a problem that needs to be more carefully addressed as evidenced by the various meetings that have been held and the reports that have been produced in the past five to ten years. Those doing pain research have developed careful guidelines for acute pain studies where the animal is usually either anesthetized or permitted to escape from the stimulus whenever it so desires. In chronic pain studies, it has not been possible to allow the animal to avoid the painful stimulus and here, attention has been paid to keeping the level of pain down to the minimum necessary.

Many other scientists who work with aversive stimuli (such as electric shock, aggression experiments, food and water deprivation, and fear studies) have also been examining ways in which the strength of the stimulus can be reduced and the animal pain and distress kept to a minimum. However, it is interesting to note that no attention has been paid to studies of anxiety and agents that reduce or increase anxiety. It seems that the view that animals do not experience anxiety still holds sway, even though mice and rats are paradoxically used in studies on anxiety. In addition, the development of long-acting analgesic compounds for laboratory animals is a very recent phenomenon. While mice and rats were used in tests of potential human analgesics, very little attention was given to developing analgesics for mice and rats until recently.

CHAPTER VIII

ANIMALS IN EDUCATION

A. INTRODUCTION

In the current debate over animal research, both animal protection groups and research advocates appear to have decided that education of the public must be a key element in their overall strategy to win lasting support, especially education of school children and university students. A second assumption, by the research advocacy groups, has been that, if only the general public were more "science literate," the public would be much more accepting of the use of animals in research and much less likely to believe the "propaganda" disseminated by animal protection organizations.

Of a thousand students entering the fifth grade, only 732 will graduate from high school, 285 will enter college, 220 will graduate and only 40 of those will obtain science degrees. (Tarp, 1978) (cited by Mayer, 1980)

For example, one research advocacy group points out with alarm that, in a study of science achievement in seventeen countries (completed in the late 1980s), the U.S. ranked last in a survey of student knowledge in basic biology (Massachusetts Society for Medical Research, 1992). (It should be noted that the survey methodology has been severely criticized because, in the U.S., all school-aged children are given the opportunity to attend school while this is not necessarily the case in some of the other countries included in the study.) They go on to state that the proliferation and growing appeal of animal rights organizations to students is a manifestation of this lack of science knowledge. Other groups have expressed a related concern that the increasing number of protests over dissection and animal research will lead (or have already led) to a decline in the biology literacy of the public.

Sometimes, it is suggested in support of this claim that there has been a reduction in the number of students choosing biological science majors during the

1970s and 1980s when the animal protection movement grew dramatically in size and political clout. However, a survey conducted by the Graduate School of Education at UCLA produced data revealing that the percentage of college freshmen electing biological sciences majors has consistently been rather low and has varied only slightly over the years. There appears to have been an increase in biology in the 1970s (at about the time that animal activism began to increase but no causal connection is being suggested), and then interest declined in the 1980s (see Table 8-1). In 1966, 3.7% of college freshman chose biology majors, exactly the same percentage as in 1990 (Dey, Astin and Korn, 1991).

Table 8-1 **Percentage of American college freshman planning majors in:**

	<u>Biology</u>	<u>Health Sciences</u>	<u>Business Professions</u>
1967-69	3.6%	5.3%	16.3%
1970-72	3.6%	8.9%	16.0%
1973-75	6.6%	8.4%	18.2%
1976-78	5.2%	8.8%	22.3%
1979-81	3.8%	9.0%	23.9%
1982-84	3.9%	9.8%	25.0%
1985-87	3.7%	8.0%	27.0%
1988-90	3.7%	9.3%	23.7%

(Dey, Astin and Korn, 1991)

B. ATTITUDES TO ANIMALS

There have been a number of opinion polls of public attitudes to animal research but only a few attempts at a detailed and scholarly assessment of public opinion. Takooshian (1988), after studying the results of two 1985 polls that focused on adult attitudes toward biomedical research (one done by the Associated Press, the other by the Foundation for Biomedical Research), completed his own study to assess attitudes toward animal research and animal welfare. Pilot surveys found

of research. In the detailed study, Takooshian (1988) reported that:

- 1) there was no discernible difference between the public and the scientific community's attitude toward animal research (vivisection was the term used in the survey) — both had equally mixed feelings; and
- 2) one's attitude towards animal research is correlated more with one's attitude toward animals than with one's faith in science. Those who were concerned about animals were more likely to be concerned about their use in research, regardless of their support for science and scientific research.

His data also indicated that people have consistent attitudes toward animals and that these attitudes probably develop fairly early in life.

Studies on attitudes toward wild animals conducted by Stephen Kellert and his associates in the 1970s and 1980s are also relevant to questions about animal use in education. His studies revealed that knowledge about animals varied significantly with age (for children), gender, ethnicity, and relative urban or rural nature of the person's residence (Kellert 1988).

Among children, knowledge scale differences between eighth and eleventh graders were greatest between the fifth and eighth grades and then leveled off between eighth and eleventh grades. Female children had lower knowledge scores than males and urban children had lower knowledge scores than suburban or rural children (who had the highest scores).

Kellert (1985) also found major differences in attitudes toward animals among children of different ages. He designated three stages in attitude develop-

... there was no discernible difference between the public and the scientific community's attitude toward animal research.

... one's attitude towards animal research is correlated more with one's attitude toward animals than with one's faith in science.

ment:

- 1) six to nine years when there are major changes in affective and emotional relationships with animals;
- 2) ten to thirteen years when there are major changes in cognitive, factual understanding and knowledge of animals; and
- 3) thirteen to sixteen years when there is a dramatic broadening of ethical concerns and a development of ecological and environmental appreciation.

He reported that children at the youngest ages had the least concern for animal well being and the most exploitative attitudes toward animals of the three groups. They also exhibited the least interest in animals. As children develop, they demonstrate a decrease in negativistic, utilitarianistic and dominionistic attitudes. (Baenninger [1991] suggests that kindness and empathy toward animals is learned, while violence, aggression and/or cruelty are the natural, unlearned responses for children.)

Kellert's studies also indicated the considerable diversity (and potential for public conflict) among adult attitudes toward animals. There was a lack of interest in and affection for animals among lesser-educated adults; significant differences in perceptions of animals and the natural world among socioeconomic groups; regional differences in attitudes (western U.S. respondents exhibited the strongest interest and concern while the southern respondents manifested the least); large attitude variations among ethnic groups; and an extremely limited knowledge of animals by the American public as a whole.

In addition, a study by Kellert and Berry (1987) indicate significant gender differences. Women generally expressed substantially greater affection for individual animals, were more concerned about animal exploitation, were more fearful of animals and were far

less likely to value animals for their practical attributes. Kellert's data also revealed that, among adults, there is strong affection for pets and large, attractive wild animals and that a substantial minority of adults were concerned about presumed maltreatment associated with various uses of animals. In addition, his data (collected mainly in the late 1970s) suggest that wildlife values were going through a period of confusion and transition. Kellert and Westervelt (1982) report that, from 1900 to 1975, the frequency of utilitarian attitudes in society declined, especially in the 1960s and 1970s, while the frequency of humanitarian attitudes increased.

C. HOW DOES EDUCATION AFFECT ATTITUDES?

Both animal protection organizations and research-defense groups have targeted their education programs toward pupils in elementary and secondary schools with relatively little attention being paid to college level students. Hundreds of thousands of dollars have been spent developing curricula and educational materials of varying sophistication that provide many "facts" about animal research, sometimes combined with values/ethics discussion elements. The aim, either explicit or implicit, of nearly all the curricula is to convince the student of the "correctness" of a particular view or argument. There has been very little evaluation of these curricula (although Ascione [1992] reported that a humane education curriculum developed by the National Association for the Advancement of Humane and Environmental Education did enhance caring attitudes and empathy towards animals in first-through fifth-grade children).

The lack of studies of how these curricula affect student attitudes and behavior is a serious problem. It means that we really do not know what affects attitudes and values among students. One unpublished study of student knowledge and attitudes toward marine mammals and how they are affected by a new curriculum was reported by John Lien of Memorial University in

Newfoundland at a workshop in 1993 (Lien, 1993). His data suggest that information content and attitude formation are relatively independent of each other and that the belief that merely presenting information will modify attitudes or develop new ones may be wrong.

Lien tested students in Newfoundland and other parts of Canada for knowledge of and attitudes to marine mammals before and after exposure to a curriculum on marine mammals that he had developed. Newfoundland children had lower knowledge scores and more utilitarian attitudes than children in cities such as Toronto. After exposure to the curriculum (which contained no elements designed specifically to discuss values), knowledge scores of all children had increased to the same level and the attitudes toward marine mammals had also changed. However, the original attitudes were simply reinforced. In other words, students who had humanitarian/protective attitudes became more protective while those who had utilitarian attitudes became more utilitarian - the curriculum had increased the polarization of values.

In other words, students who had humanitarian/protective attitudes became more protective while those who had utilitarian attitudes became more utilitarian - the curriculum had increased the polarization of values.

Lien suggests that "positive" attitude changes (in the direction the designer intended) in response to education programs do not appear to result from the materials themselves, but rather from the educator's or spokesperson's own attitude and prestige among those being taught. This is an important suggestion and raises questions about the use of authority figures (movie stars, high profile doctors) as spokespersons for particular value and attitude messages aimed at both students and the general public.

D. DISSECTION

In the secondary schools of America, the practice of dissection has become the focus of considerable debate and argument. In fact, dissection has replaced student use of animals in science projects as the "hot" issue of the moment. Students have sued schools over

JENNIFER GRAHAM AND DISSECTION

In the 1960s and 1970s, the battle over the use of animals by school children swirled around the annual science fair. Westinghouse, sponsors of one set of science fairs, bowed to public pressure and excluded projects that involved animals in invasive or aversive situations. The International Science and Engineering Fair organizers, however, only banned actual animals from the exhibits and tightened up the published rules for the use of animals. Then, the National Association of Biology Teachers published guidelines for animal use in the classroom that discouraged invasive use of animals and the Institute for Laboratory Animal Resources (of the National Research Council) endorsed the new guidelines. Although the question of animal use in science projects has surfaced from time to time since then, there have been no sustained campaigns or high-profile incidents.

Then in 1987, the Jennifer Graham case switched attention to the issue of dissection as a teaching tool. Jennifer Graham was a sophomore in a California high school when, citing her strong moral objections to killing animals, she refused to dissect a dead frog as part of her biology course. The teacher and school administration refused to allow her to do an alternative exercise that did not involve dissecting a dead animal and said that her grade would be affected if she did not complete the frog dissection. Jennifer received a D for the course and she took the school to court.

Eventually she won her case and it became the stimulus for a number of state laws (in California, Florida, Maine, New York and Pennsylvania) that guarantee students the right to "choose" whether or not to do animal projects. In addition, Pat Graham, Jennifer's mother, became the co-ordinator of a national "hot-line" run by the Animal Legal Defense Fund that offers advice to callers about their rights to opt out of animal exercises. As a final footnote, Apple Computer used Jennifer in an advertisement to promote their computers but pulled it very quickly when they became aware of the hornet's nest that they had disturbed!

The Jennifer Graham case propelled the dissection issue into the forefront of the debate over the use of animals in education. People for the Ethical Treatment of Animals (PETA) began a nationwide campaign to eliminate dissection (including setting up an ABC TV exposé of Carolina Biological's procedures for obtaining and embalming animals for the dissection market) and research advocates began to fight back as they became alarmed at the influence that the animal protection literature and message might have (see Leepson, 1991).

the right to opt out of dissection and use alternative methods, and several states have passed or are considering legislation that grants students the right to opt out of dissection and choose alternative projects.

The National Association of Biology Teachers (NABT) has struggled for a decade to come up with a dissection policy that will satisfy everyone. Since 1981, they have voted on three different policies on the subject

and members are still debating the current version. There are no reliable surveys of the attitudes of biology teachers, students, parents or school administration, let alone studies of the skills and knowledge of those students who have done dissection compared to those who have not. However, the NABT did a preliminary survey of its members (which produced a response from less than 10% of the members) that indicated that members are strongly divided on the issue. There is also anecdotal evidence that the animal rights debate has had little effect on the decision whether or not to offer dissection in the classroom. Most of those who know the high school biology classroom indicate that cost, lack of time, and lack of interest among teachers are the primary reasons why live and dead animal exercises are dropped from or not offered in biology classrooms.

"It is my belief that scientists need to vigorously and positively promote the value of dissection, as well as other human uses of animals. First, I do not believe that there is really any substitute for the multisensory learning which takes place in dissection. Second, I sense an anti-science, anti-rationalist undercurrent beneath much of the animal rights rhetoric, which I believe, if allowed to grow, will undermine support for every kind of scientific research."

"A large number of students have ethical objections to dissection ... it's hard enough as it is to get students to think critically about ethical issues ... it would be tragic to have educators 'correct' student ethical beliefs (and insist that dissection is the only alternative)."

(Differing views on dissection - two responses to NABT Survey)

(McWethy, 1993)

There are no studies on the overall effectiveness of animal rights or research-advocacy curricula or at different age levels. In the U.K., Lock and Millet (1991) report that British students have negative attitudes toward dissection and generally do not understand what they are supposed to learn. No recent data address student attitudes to animal use but one preliminary survey suggests that students who have been involved in animal laboratories in high school or college are more

likely to be opposed to animal research than students not exposed to such laboratories (Broida et al, 1993). This apparently contradictory finding might have a logical explanation. Some students undoubtedly are interested in dissection but many (as reported by Lock and Millet, 1991) are not. Those who find dissection unpleasant may well take strong negative feelings away from the laboratory. If this speculation is correct, then biology teachers would do well to allow students a choice rather than forcing them to endure a laboratory they find distasteful.

Concern over animal use in educational exercises has extended into the professional schools. A growing number of veterinary schools now offer the students the option of operating only on client-owned or shelter animals that are to be put up for adoption rather than laboratory animals that are purchased specifically for surgery education (Pavletic et al, 1994). Recently, the Association of American Medical Colleges surveyed all 126 medical schools and found that 34 (27%) of the 126 schools reported no current use of live animals in their regular medical curriculum (Kelly, 1991). Of the 92 schools that did use live animals, 61 offered alternative exercises for students who object to direct participation. In other words, 75% of the medical schools permit students to graduate if they have experienced no surgery or other laboratory exercises on living animals.

Kelly (1991) also reported that less than 10% of the students who had the opportunity to opt out actually chose the alternative exercises and that, in 22 schools, refusal to attend live animal sessions affects an individual's chances for admission or promotion through the school's program. Only four of the schools reporting no use of animals stated that pressure from students or animal rights activists influenced their thinking.

E. POLICY ISSUES

The main problem in relation to the use of live

We are outraged that young, impressionable children are being used like pawns against the same science that has led to their immunization, dental care and general well-being.

(Daniel Johnson, AMA Press Conference, April 2, 1991)
(cited by Leepson, 1991)

"I have not met a veterinary educator who is not dedicated to finding and using effective alternatives to the use of animals in teaching, and over the past few years many alternatives have been developed and implemented by veterinary educators."

(Kraus, 1994)

and dead animals in school and college classrooms is that there are very few data on the extent and manner of animal use in classrooms, on the educational effectiveness of such use and on student attitudes toward animal exercises. Clearly, research on these questions is necessary if we are to avoid the current debate where strong opinion is usually unsupported by anything more than anecdotes.

However, what little data are available indicate that heavy-handed mandates that either forbid or demand student use of or interaction with animals are unlikely to be particularly productive. Where animals are used, students should be encouraged to discuss their feelings and values. Their values can certainly be challenged in an appropriate discussion but should not be denigrated or dismissed. It is generally accepted that students learn most efficiently when they play a role in their own learning as opposed to being treated as passive receptacles into which facts and values are poured.

CHAPTER IX

THE TESTING ISSUE

A. INTRODUCTION

The safety testing of drugs and other chemicals is a relatively recent requirement in the modern world. While prominent people have employed food tasters at their side to protect them from being poisoned and miners in the 19th century used canaries to warn them of pockets of dangerous gases, widespread testing of drugs, chemicals, foods and consumer products has been going on for less than sixty years.

Initially, tests were developed to standardize new batches of powerful drugs like digitalis and insulin that were prepared from natural products and that varied in potency from batch to batch. Gradually the approaches used for biologicals and vaccines came to be applied to other chemicals and to products that had been implicated in cases of human poisoning. For example, in 1937, an antibacterial solution was mixed with the wrong solvent and more than 100 people died as a result. Shortly thereafter, Congress passed the Food, Drug and Cosmetic Act of 1938 requiring the safety testing of drugs. In 1962, following the thalidomide tragedy in which many infants were born with deformed or no arms and legs, Congress tightened standards again requiring that drugs should not only be safety tested but that the companies should also prove that the drugs did what they were claimed to do before being marketed (i.e., efficacy).

Today, somewhere between 10% and 20% of all

Toxicity Testing in Great Britain, 1992

<u>Type of Study</u>	<u>Number of Procedures ('000s)</u>
All uses	2,928
Drug efficacy testing	704
Toxicology tests (all)	538
Limit testing	99
Formal LD50	153
Acute/subacute non-lethal	112
Eye testing	3
Skin testing	21
Chronic testing	110
Teratogen/mutagen	40
Industrial substances	92
Agricultural substances	77
Household substances	2
Cosmetic substances	2

laboratory animals are used in a variety of tests for a wide range of agents and products including drugs, vaccines, cosmetics, household cleaners, pesticides, manufacturing chemicals, foodstuffs, packing materials and so on. The most thorough testing is reserved for products that will be used in or on foodstuffs and for drugs. For these agents, acute (lasting less than a month), subacute (lasting a month to three months) and chronic (lasting more than three months) tests are performed to determine general toxicity, eye and skin irritancy, the agent's potential to cause mutations, reproductive problems and fetal malformations, and the agent's carcinogenicity. The costs of a full-scale battery of tests run well over one million dollars and would take three to four years to complete. Other agents, such as cosmetics, are not subjected to the same in-depth testing but still require information on, for example, general oral toxicity, eye and skin irritancy, phototoxicity and, perhaps, mutagenicity.

Toxicity testing, hazard and risk evaluation

Toxicity testing, hazard assessment and risk evaluation are sometimes used as synonyms but they describe different processes and should not be equated. In toxicity testing, the aim is to dose animals to produce an effect and to determine what toxic reactions occur at what dose. Hazard assessment is similar but is not specifically concerned about determining what the toxic effects of the agent are, only whether it is safe to use as directed. In other words, if the animal test demonstrates little or no toxicity at the high dose, then there is no need to increase the dose because the test agent is likely to be safe for human use.

Risk evaluation involves use of toxic-effect data but also requires knowledge of the potential routes and levels of exposure to the test agent. For example, if public exposure to a very toxic substance is likely to be low, then the public risk will also probably be low, but the risk for workers who handle the material as part of their daily job may be very high. (To add to the terminological confusion, some people now use hazard testing in place of toxicity testing and safety assessment in place of hazard assessment.)

It is sometimes argued that toxicity testing on animals is useless because there are metabolic differences between humans and animals. However, toxicologists are well aware of the differences and attempt to guard against over-interpreting animal results. Regulatory scientists, on the other hand, prefer to err on the side of caution and will tend to be more conservative when interpreting animal data.

VALIDATION

The animal tests that are used today as the basis for hazard assessment and safety testing were developed and refined to address perceived problems. They have never been formally validated although some have been evaluated to determine how well they predict human hazard. In general, it is widely recognized that the animal tests we use today are not perfect predictors of human hazard although it is likely that they do identify the most toxic chemicals and products to humans with a high degree of reliability.

The imperfect equivalence between the results obtained in animals and the likely toxicity to humans creates considerable problems for those who develop new tests that they consider to be the equal of, or better than a particular animal test. Should the new test be validated against data from the animal test, or should good human data be obtained for validation purposes? Human data are a problem because they are usually not available in any quantity or reliability. In fact, even good quality animal data are difficult to obtain.

Finally, one has to overcome the problem of biological variability. The animal and the alternative test, being based on biological systems, are both likely to have built-in variability. In eye irritation testing it has been shown that animal test data have a relatively high coefficient of variation (around 0.5 where the range is from 0 to 1.0). The alternative cell culture-based test has a lower coefficient of variation (around 0.2 - this is an advantage of many alternative cell culture tests). If a comparison of a thousand test agents that are known to behave exactly the same in both the animal and the alternative test is plotted, the natural variance of the test systems will produce a graph of points that are widely scattered and that will appear as if the alternative test has only a 70-80% correlation with the animal test (even though we assumed that without the biological variation the two tests should have a 100% correlation).

Thus, no matter how hard one tries to develop a perfect replacement for an animal test, inherent biological variability will undermine the attempt. It is perhaps not surprising that most of the more promising alternative tests demonstrate about a 70% correlation with the existing animal tests.

The only way around this problem of biological variation and validation is to develop an understanding of basic toxic mechanisms and then develop alternative tests that are specifically based on that mechanism.

B. COSMETIC AND HOUSEHOLD PRODUCT TESTING

"The Swiss authorities would accept alternative methods, but the companies collect data by means of the specifically regulated animal experiments called for in other countries. Essentially, the methods would not have to be validated but accepted. The LD50 method was never validated in the current sense but simply accepted by most countries and incorporated without validation into their guidelines. Somewhere someone should have the courage to do the same with alternative methods."

(L. Pioda, 1994)

The use of animals to test drugs and other therapeutic agents does have the support of a majority of the public, but there is much less support for the animal testing of products that are deemed less essential, such as cosmetics or household cleaning products. For example, 60% of a sample of 1,000 American adults opposed the use of animals in cosmetics testing, compared to 43% and 20% opposing animal testing of over-the-counter medicines and prescription drugs respectively (Ward, 1990). About 90% of the sample said they would purchase cosmetics that had not been tested on animals. Because of this concern, the rest of this section will focus on cosmetic tests on animals and some of the issues involved in the debate.

The issue of animal testing on cosmetic and consumer products is not as simple as it may appear. There are specific regulations that require the animal testing of pesticides but not of cosmetics. To make matters worse, there are several federal agencies that have jurisdiction over the safety testing of different sets of products and chemicals and their regulatory requirements do not always agree. Even though there are no explicit animal testing requirements for cosmetics and personal care products (except in the case of certain coloring agents that are tested for carcinogenicity), the relevant regulatory agencies have historically used animal toxicity data as their gold standard. The federal agencies expect that appropriate safety data will be generated for not only finished products, but also their ingredients. Many companies have felt that the only way to obtain the necessary information to assure consumers of safety and satisfy regulatory expectations is through testing on animals.

"[W]hatever the motives of those who support 'cruelty-free' campaigns, their strategies do little to enhance human safety or to reduce animal suffering. Members of the general public are frequently being misled, either deliberately or inadvertently, into believing that they are buying truly 'cruelty-free' and 'not tested on animals' products, when this is not true according to any reasonable definition of these terms."

(M. Balls, 1991)

However, this is beginning to change. Several

years ago Avon and Revlon (among others) announced that they would no longer conduct animal testing and Mary Kay announced a temporary moratorium on animal testing. Recently, L'Oreal stated that it would not test finished cosmetic products on animals. However, this certainly does not mean that products from these companies will no longer be safety tested.

Avon and L'Oreal, to mention two examples, are actively developing alternative test techniques in their laboratories and have developed a range of *in vitro* systems to help them assess the safety of both products and ingredients. In addition, both companies have extensive historical databases on the ingredients they use and on their product lines that allow them to predict, with a high degree of confidence, how new products might behave when applied to human hair or skin. In addition, Avon further protects itself by only buying new chemical ingredients with which they are unfamiliar if the suppliers also provide an appropriate set of animal toxicity data. L'Oreal has taken a different approach and has not forsworn the testing of ingredients on animals when they consider such testing necessary to protect consumer safety. Finally, cosmetics companies routinely conduct tests of their products (which have very low toxicity as a result of 60 years of refinement) on human volunteers.

None of the large companies that have renounced animal testing in the past few years have made a big play of the fact in their marketing campaigns. This reflects a continuing uneasiness about the issue, and their trade association, the Cosmetic, Toiletry and Fragrance Association (CTFA) states that appropriate animal testing is still vital to ensure the safety of all the industry's products. By contrast, many small (and no longer so small) companies have used the fact that their products are not

Recommendations Regarding "Cruelty-free" Labelling of Consumer Products
(Balls, 1991)

1. The use of terms such as "cruelty-free," "without cruelty" and "not tested on animals," in relation to cosmetic products manufactured and/or marketed within the EEC, should be prohibited.
2. The concept of a **toxicity profile** (which is presently very dependent on animal test data) should be replaced by the concept of **safety assessment** (which may, but need not necessarily require animal testing).
3. All possible steps should be taken to encourage the development, validation and acceptance of non-animal toxicity tests and testing strategies to reduce and eventually eliminate animal testing altogether.

animal tested as an essential part of their marketing.

The Body Shop, which has grown tremendously in the past ten years, states that it is against animal testing. Tom's of Maine, which is still small but which has enjoyed good growth in the past decade, includes a "not tested on animals" statement on its product labels. There are also a number of large consumer product companies that still conduct animal testing but note that most of their cosmetic and other consumer products are developed and marketed without recourse to animal testing. Only in a few cases do they judge it necessary to conduct some animal tests.

Thus, the consumer is presented with a number of conflicting messages about the necessity of animal testing and they are not sure whom to believe - companies that argue that some animal testing is still necessary or animal activists who claim that there are plenty of adequate alternatives and that we do not need more lipsticks or dishwashing detergents anyway. As with many of the animal research and testing issues, the answers depend on context and the precise question being asked.

For example, it is clearly possible to produce many cosmetics without conducting animal tests. Some of the large companies have started to do so and many smaller companies have done so for some time. But there are legitimate differences of opinion about the wisdom of such a course of action. Fortunately, cosmetics tend to be very non-toxic so the risks of not testing on animals are less than those for companies that manufacture a wide range of chemicals or products that vary from non-toxic to very toxic. In addition, considerable progress in reducing animal testing has occurred throughout the industry in the past five to ten years.

As a result, some companies prefer to continue to leave open the option of testing chemicals or products on animals when they consider it necessary but, at the

same time, they put considerable resources into a continuing search for and implementation of alternatives. Some of the large household product companies like Procter and Gamble and Unilever fall into this category. While they still conduct some animal testing, they are actively seeking alternatives.

An examination of progress in two specific areas of testing illustrates some of the challenges faced by those who seek alternatives to animal testing.

C. THE DRAIZE AND LD50 TESTS

Two of the research procedures that animal rights activists have found most objectionable are the Draize test and the LD50 test, both of which have commonly been used in the testing of cosmetics and household products. Campaigns against these two tests have led to significant modifications in test protocols, considerable research in *in vitro* toxicology to find alternatives, and major changes in regulatory attitudes about animal tests and potential alternatives.

1. THE DRAIZE TEST

During the Second World War, animal eye irritancy test protocols were developed to determine the effects of chemical warfare agents. In 1944, John Draize and his colleagues developed a scoring system to grade eye damage in which damage to the cornea accounted for almost 80% of the maximal irritant score. Since the war, the Draize test (as it became known) became a standard test for determining the eye irritancy level of a wide variety of products, including shampoo, hair spray, deodorant, detergents, drugs and pesticides (see Frazier et al, 1987 for a comprehensive review).

The chemical or product was placed in one eye of a rabbit, usually without local anesthetic, while the other eye was used as a control. The irritation levels were observed over several days and the scores for

corneal opacity, conjunctivitis, iritis and discharge were recorded and combined into a single score. The maximum score possible is 110 and this would usually mean destruction of the eye. Albino rabbits were chosen for the test because they have large, unpigmented eyes in which it is relatively easy to observe inflammation and irritation. The test has a relatively low risk of giving false positive results since a rabbit's eye is generally more sensitive to irritating agents than a human's. This is a valuable feature from a regulatory perspective because the chances are very good that a substance with little or no effect on a rabbit will be safe for a human eye.

Animal activists began to protest the use of animals for the safety testing of cosmetics and, in particular, the use of the eye irritancy and LD50 (see below) tests in the mid-1970s (see Rowan, 1984b for more details). However, these protests had relatively little impact. One official of the Cosmetics, Toiletries and Fragrances Association (CTFA) in Washington declined to explore any proactive initiatives to develop alternatives because the animal activists were not having much of an impact (one animal rights group had even protested outside the wrong address in Washington in their efforts to picket the CTFA!). However, in 1979, Henry Spira began to plan a campaign against the eye irritancy test and he organized almost 400 animal protection groups to join the Coalition Against Rabbit Blinding Tests.

Initially he approached Revlon, identified as one of the leading cosmetic companies, and asked them to devote 0.1% of their annual profits to the search for an alternative to the Draize test (approximately \$170,000 annually). Revlon rejected the suggestion and passed the matter on to the CTFA for their consideration. Spira then mounted a year-long campaign against Revlon which ended with the company announcing at the end of 1980 that it was setting up a research program at Rockefeller University to develop an alternative to the Draize test. The company, which had not welcomed the

attention it had received, also suggested that the rest of the industry might join in their initiative. The other cosmetics companies then banded together and established a one million dollar fund which was awarded to Johns Hopkins School of Hygiene and Public Health in 1981 to establish the Center for Alternatives to Animal Testing (CAAT).

"Elimination of the use of animals in toxicology testing is without question an honorable goal, and the majority of the population would not wish to continue to use animals in testing if equivalent, or better, information for the protection of human health was available from non-animal methods."

(D. Brusick, 1991)

When Revlon and the CTFA set up these alternatives research programs, there was very little research being done on potential alternatives to the Draize test. A pilot cell culture study had been conducted at Hazleton Laboratories in the UK and Procter and Gamble was attempting to gain approval for its low-volume eye test. (The standard Draize test required dosing the rabbit eye with 0.1 ml or 0.1 gm of test agent and Procter and Gamble had data indicating that the use of one tenth that amount gave results that correlated better with human data.) In addition, it was generally felt that both the Revlon and CTFA initiatives were mainly exercises in public relations and that the scientific rationale for starting the projects was very weak.

Just over ten years later, the situation has changed dramatically. The European Union (EU) has passed a directive requiring the testing of cosmetics on animals to be phased out by 1998. Most cosmetic and household product companies have active *in vitro* toxicology programs and all have made major modifications in the way they conduct their safety testing.

Corporate scientists who saw the initial research programs as little more than public relations exercises have become convinced of the scientific merit of pursuing alternative approaches. In addition, there is evidence that the use of animals in cosmetic testing has declined substantially. In Great Britain, the annual use of animals in the testing of cosmetics and toiletries has dropped from around 30,000 from 1978-1980 to 2,164 in

1992 (Anon, 1993). While the FDA and other regulatory authorities still accept the Draize test or a modified version as the final standard for eye irritancy, regulatory attitudes have changed considerably in the past few years and numerous modifications and potential replacement batteries are now under serious consideration (see section E for details).

2. THE LD50 TEST

The LD50 test (LD50 stands for "Lethal Dose - 50 percent") was originally developed to standardize batch preparations of powerful biological medications such as digitalis (Trevan, 1927). Each batch of the drug varied in potency and it was important to have a method to ensure that each new preparation was standardized before it was sold to pharmacists. Trevan demonstrated that the use of the LD50 allowed maximum accuracy with a minimum cost in animal life. Even so, this technique required the use of from 60 to 200 animals for each LD50 determination.

The LD50 value later became used as a baseline toxicological measure and would be one of the first toxicity tests done on any chemical or product. The oral LD50 is the dose required to kill half of a group of animals to which it is administered by mouth but dermal, inhalation and intravenous LD50 could also be and were determined. The test protocol for the classical LD50 requires establishing the approximate range of lethal toxicity and then administering several doses around that range to five groups each of males and females. The animals are observed for up to 14 days. Animals that die should be necropsied while those that survive are euthanized. The tissues of all the animals should be examined.

The LD50 test began to come under attack from animal activists in the 1970s using criticisms of the test published in the toxicological literature (e.g. Morrison et al, 1968). The test was initially criticized on moral

grounds (poisoning animals to death by force-feeding toxic substances did not sound at all pleasant) but the scientific criticisms added important weight to the campaigns by the animal activists.

For example, the LD50 value cannot be regarded as a biological constant because so many factors, including the animal species and strain, animal age, animal gender, diet, bedding, ambient temperature, caging conditions, and time of day can all affect the LD50 value obtained, sometimes by factors of up to one thousand. In 1981, Zbinden (a well-respected toxicologist) and Flury-Roversi published a review that concluded there was little justification for doing the classical LD50 test.

There were two main criticisms of the test. First, the classical LD50 test was criticized because it produced a statistically precise figure which had little actual meaning because of the influence of species and test conditions on the value. In other words, a test agent that had a rat LD50 of 100 mg/kg could cause human toxicity at a dose of from 1 to 10,000 mg/kg. There would be little point in determining that the rat LD50 had a standard deviation of 15 given the enormous uncertainties in extrapolating to other species. Thus, it would be quite sufficient to know that the lethal dose for a rat was approximately 100. The advantage of eliminating the demand for statistical precision is that one could reduce the number of animals required to determine lethal doses by 80% or more without compromising human safety standards at all.

Second, animal activists were concerned about the LD50 endpoint. It seemed undesirable to dose an animal and simply let it die from poisoning. Therefore, some effort has been devoted to developing an acute toxicity test in animals that specifically attempts to avoid simply letting animals die from the effects of the test agent. The animals are monitored closely and when they appear to be severely compromised,

*"It is the opinion of the National Society for Medical Research (NSMR) that the routine use of the quantitative LD50 test is not now scientifically justified."
(Anon., 1982b)*

they are euthanized. The disadvantage is that the animal might have recovered but there are also advantages since the quality of the tissues obtained from a euthanized animal is much better than those obtained from an animal that has died, perhaps as much as ten hours earlier.

The campaign against the LD50 has therefore focused on reducing the number of animals required and on looking for non-lethal endpoints. At one level, the campaign has been very successful in that few individuals or organizations still defend the need to perform a classical LD50. Nonetheless, the clamp of custom is hard to break and many classical LD50 determinations are still performed simply to complete product registration tables and satisfy the demands of regulatory authorities who have yet to hear that toxicologists still support the classical LD50 measure.

Indeed, toward the end of 1991, the first conference on international harmonization of testing guidelines for drugs, which included representatives from all the OECD countries (Organization for Economic Cooperation and Development), agreed to drop requirements for the classical LD50 (e.g. the OECD has agreed to accept data from the FDP test [see below], *Anon.*, 1992b). Nonetheless, in 1992, over one hundred and fifty thousand animals were used in Great Britain to determine classical LD50 values.

A number of efforts to develop adequate alternatives to the LD50 are underway. The British Toxicology Society concluded in 1984 that accurately determined LD50 values are rarely justified (Anon, 1984) and proposed an alternative test (the Fixed Dose Procedure [FDP] - van den Heuvel et al, 1987) which is more humane (morbidity not lethality is the major endpoint) and yet still provides the data needed for product labeling and classification. The alternative would lower the average numbers of animals used in the test to between 10 and 20 (van den Heuvel, 1990). In Germany, regula-

tors have also developed an alternative to the classical LD50 while the Americans are showing interest in yet another approach, both of which use fewer animals than the FDP but which still permit the death of some of the test animals.

The changes that have taken place in determining test agent lethal doses, and in attitudes to the classical LD50, are based on a mixture of public pressure, moral concern and sound scientific argument. While some activists would like to see faster progress and more total replacement of animals, the speed of change of both testing practice and toxicological attitudes over the past ten years is really quite surprising. It is unlikely that we will be able to totally replace acute oral toxicity testing in animals altogether in the foreseeable future but this has not stopped scientists from trying. Computer models have been developed to predict LD50 values, and cell culture systems are being investigated to determine if they have any utility in predicting acute toxicity, either alone or in conjunction with artificial intelligence systems.

D. ALTERNATIVES

Some animal activists claim that there are already adequate alternatives available that could replace all animal testing but this is, unfortunately, not the case. Nonetheless, considerable progress has been made and the area of eye irritancy testing can be used as an example to illustrate how a combination of common sense, small modifications and innovative new technology is revolutionizing our approach to toxicity testing and hazard assessment (see *Anon.*, 1991, for a summary).

When the search for alternatives to the rabbit eye irritancy began in earnest in 1981, the Draize test commonly employed from six to nine rabbits without anesthesia. While several laboratories began to investigate the usefulness of mammalian cell cultures and the chick

embryo's chorio-allantoic membrane (CAM) to screen for eye irritants, one of the first modifications to the rabbit test that was explored was the use of local anesthetics. After ten years of investigation, there are still many questions about the utility of local anesthetics to prevent short-term pain, and other modifications are steadily reducing the need for local anesthetics.

Over the past decade, the following modifications to the rabbit test have become sufficiently accepted to be endorsed by a wide variety of regulators and regulatory authorities (even if formal approval of the modifications has not always been implemented). It was well known that strongly acid and alkaline substances would cause irritant reactions. Now, companies routinely identify acids and alkalis as eye irritants without confirming the fact in an animal test. The use of bovine eyes from slaughter house material has also been shown to be very promising as a prescreen. If the test agent produces a positive reaction in the isolated bovine eye (or rabbit eye obtained from laboratory animals euthanized for other reasons), then it can be labeled as an eye irritant without further animal testing.

It has also been shown that it is possible to reduce the number of rabbits used in the test without compromising safety standards. Instead of using six animals, one can determine whether a test agent should be labeled as an eye irritant in three animals or fewer. The procedure involves dosing the eye of a single rabbit (perhaps using a local anesthetic to reduce the risk of a pain reaction) and evaluating the response. If a positive response is observed, then the agent could be labeled an irritant without further animal testing. However, if the response is negative, or confirmation of the positive response is required, then an additional two rabbits should be used. If a positive response is observed in two or more of the animals, the substance should be labeled an eye irritant. If only one animal gives a positive response, then the substance is labeled as a non-irritant. This approach was shown to provide almost exactly the

same classification as the use of six rabbits. Scientists from the Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA) reviewed individual rabbit data submitted to them and then conducted a statistical analysis of all possible groups of three animals (out of the six or nine tested for each agent) and found almost no difference in overall classification. As a result, regulators at the EPA and FDA were much more willing to adopt the three-rabbit protocol.

Finally, Procter and Gamble has been attempting to gain official approval of its low-volume eye test (LVET - using one tenth the standard dose in the eye) that, they argue, also produces less trauma in the rabbit eye and hence qualifies as a refinement alternative. To date, the LVET has proved to be difficult to sell although Procter and Gamble has found the test to be both effective and more humane.

While the above modifications were being explored, tested and argued, a wide range of new test systems has been developed and promoted. These include the following (see Frazier et al, 1987, for more details).

a) Several cell culture approaches including the widely used Neutral Red assay (measuring cell viability) developed by Borenfreund (Borenfreund and Puerner, 1985) as part of the Revlon-sponsored research at Rockefeller.

b) The CAM assay and its variants using the chorio-allantoic membrane of the developing chick embryo. The CAM is not supplied with nerves so is presumed not to produce a pain response although the chick embryo is killed in the assay.

c) The EYTEX series of assays. These assays rely on measuring a change in optical clarity of a proprietary mixture of proteins and other biological macromolecules when a test agent is added. The test is simple,

fast and relatively cheap and a number of companies and government laboratories claim to have produced very good results. However, other laboratories disagree and question how and why the test should work. Despite this controversy, an EYTEX derivative called Corrositex (designed to assess the corrosive potential of chemicals so that they can be correctly classified according to UN standards for transport) has been accepted by the Department of Transportation in the U.S. as an acceptable replacement to the animal test for a number of classes of chemicals.

d) A number of companies have developed what are known as artificial skin systems that can be packaged and used to test the irritant potential of test agents. These artificial skin products rely on seeding a basement membrane of some sort with skin fibroblasts and sometimes keratinocytes (the major skin cell type) to produce a product that simulates some aspects of human skin. Procter and Gamble has worked with one of these companies, Advanced Tissue Sciences, to produce a test protocol that can determine the irritant potential of solids and water-immiscible materials (which is not possible in the aqueous medium of a cell culture).

e) A test system called the Silicon Microphysiometer has been developed that records a very sensitive measure of the metabolic rate of a cell culture. Although it is an expensive piece of equipment, it has considerable potential in the laboratory and it can also be used to assess a cell culture's recovery from a test agent (hence simulating to some extent the recovery of the eye from an irritant reaction).

f) One computer modeling company has developed a program to predict eye irritancy but the current interest in computer technology is focused on the ability to combine structure-activity information on, the physical characteristics of, and the *in vitro* biological effects of the test agent in a way that improves the ability to predict irritancy and other toxic end points.

Several companies have stopped testing on animals (as mentioned above). They have taken this action because they now judge that they can rely on a safety-evaluation process that no longer requires testing by the company or a contract-testing organization on animals. A typical approach to safety assessment of a new product by such a company might involve use of the historical database on the corporation's product line, examination of what is known about the effect of physical characteristics and relevant structure-activity relationships for the product, available animal data on the ingredients in the product, data from a variety of *in vitro* tests (perhaps including a CAM-based test and isolated eyes from a slaughterhouse), and, finally, testing on human volunteers.

There are also some technical developments that were not mentioned in the above list because they have not been shown to be directly relevant to irritant testing (which was the basis of the discussion above). However, one potentially very exciting innovation involves the use of new genetic engineering technology.

It has been shown that several genes are switched on in response to damage or strain caused by certain toxic agents. One company (Xenometrix) has begun to exploit this by combining the genetic material that is responsible for switching on these genes with a gene that will produce a colored product when it is switched on. The resulting cell culture will change color when it starts to react to a particular type of toxic agent. Using this technology, one can produce a variety of cell cultures (including human cell cultures) that will respond to specific toxic insults. Eventually, it is hoped that the pattern of toxic insults to the different cell cultures might produce accurate predictions of what the agent might do in humans and also provide basic information on the possible mechanisms of toxicity.

It is clear that considerable progress has been made in developing and implementing alternatives to

ANIMAL TESTING, THALIDOMIDE, PENICILLIN AND EX-
TRAPOLATION: CAUTIONARY TALES

The debate over animal research and testing has spawned several "facts" that seem to have a life of their own and keep cropping up in the literature despite good evidence indicating that they are false. Some of these have to do with the use of animals in drug discovery and development process. One of the most common arguments against animal testing is the claim that thalidomide was thoroughly tested on animals before it was distributed for human use and yet its use resulted in the birth of thousands of babies with severe limb deformities. The actual facts are as follows.

Thalidomide was developed as a sedative and anti-nausea medication by a German firm, Chemie Grünenthal, in the 1950s. Unlike other sedatives in use at the time, it appeared to have very low toxicity and Chemie Grünenthal thought it would, therefore, be a very profitable drug. While they performed a variety of animal tests on the drug, there is no data to support the claim that it was tested as rigorously as any drug at the time (Ryder, 1975). There are indications that Chemie Grünenthal was not particularly anxious to follow up on the reports of problems with thalidomide (*Sunday Times Insight Team*, 1979). At any rate, thalidomide was apparently never tested for its effects on the reproductive function of animals prior to marketing. Such reproductive toxicity testing was not routinely performed in the late 1950s but it would, nevertheless, have been considered prudent even then to perform such tests on a drug that was specifically recommended for use by pregnant women - as was thalidomide.

During clinical trials and the marketing of thalidomide, both Chemie Grünenthal and Distillers (the British company licensed to distribute the drug in England and throughout the British Commonwealth) denied or downplayed any links between thalidomide use and adverse reactions. In 1961, both a German and an Australian physician separately suggested that thalidomide was the cause of the significant rise in fetal malformations that they were observing in their patients. McBride, the Australian, published a letter in *The Lancet* (December 16, 1961) reporting that women who took thalidomide had given birth to infants with deformed limbs. Somers, the Distillers pharmacologist, then conducted a number of animal studies and, in February of 1962, he produced similar limb deformities in the offspring of four rabbits. Somers sent a letter to *The Lancet* reporting his results that was published on April 28, 1962. That was the beginning of the end for thalidomide.

It is not unusual to find claims in the animal activist literature that animal tests of thalidomide, performed after the demonstration of the drug's teratogenic action in 1962, either do not produce deformities or show such large species variations that they prove the inadequacy of animal studies. It is true that humans are very sensitive to thalidomide's toxic effects but a wide variety of species in addition to rabbits have been shown to be affected by thalidomide. Even rats and mice (that are relatively resistant to thalidomide's teratogenic effects) were found by Somers to have reduced litter sizes at low doses. In other words, careful animal studies would have given some warning that thalidomide could cause problems.

Finally, if the thalidomide disaster really was such a powerful indictment of the inadequacies of animal testing, then the political fallout was totally irrational. Far from leading to a condemnation of animal tests, the tragedy led to an increased demand for animal testing (to demonstrate both the safety and also the efficacy of new drugs) as well as the development of a much greater appreciation of the difficulties of reproductive toxicity assessments.

Another common claim of the inadequacy of animal test data concerns penicillin. It has been argued that, if penicillin had been tested on guinea pigs, it might never have reached the market and we would have been denied the tremendous therapeutic benefits of this antibiotic. According to Botting (1991), the source of this claim is a 1966 review article which was just plain wrong. In a 1943 publication, Hamre et al not only reported the lethal results of tests of penicillin on guinea pigs but actually commented on what the results might mean for the drug's toxicity in humans. They noted that, at doses expected to be given to humans, the guinea pigs did not show any signs of toxicity.

Despite the thalidomide and penicillin cases, there is no question that animal testing will and does miss significant toxic effects and that no new drug, when given to human patients, can be guaranteed absolutely safe at the recommended doses. It is also unclear how much tragedy has been averted by animal testing (or how many potentially useful drugs have been rejected on the basis of unreliable animal test data). Nonetheless, industrial societies, via the regulatory bodies they have established as gatekeepers, have decided that animal testing is the best way to reduce (if not eliminate) the inevitable risks associated with the dispensing of any drugs. To date, the most influential societal criticisms of this reliance have focused on the problem of too little animal testing rather than too much.

animal tests. While total replacement for either irritancy testing or acute lethal-dose testing is not yet possible, the number of animals required in such testing has been reduced and could be further reduced. In addition, the animal distress caused by such testing has also been reduced by appropriate pre-screening programs. Much progress has been made in developing innovative new test methods and many companies are beginning to have enough confidence in these new methods to use them to make product-safety judgments. Regulatory authorities are also becoming more comfortable with some of the new non-whole animal tests.

*"The suggestion by the authors (Michigan State students criticizing the Draize test) of the viewpoint that cell cultures may have any utility in assessing the safety of chemicals in the human eye is without any redeeming merit. It clearly indicates the naivete of these students about matters biological."
(T.M. Brody, 1980)*

The extent of the commitment to the search for alternatives that now exists in corporations throughout the world is great enough that one can confidently predict that progress toward total replacement will continue although it is not possible to say when that goal will be reached or what animal tests will be replaced first. There are still, nevertheless, many political and scientific obstacles to be overcome in the development and implementation of alternatives.

CHAPTER X

THE PUBLIC DEBATE: DISCUSSION, PROTEST AND VIOLENCE

A. INTRODUCTION

For more than one hundred years the debate over the use of animals in research has involved considerable passion and, in general, more heat than light. Animal activists are outraged by the deliberate infliction of harm on sentient animals and the perceived lack of concern of scientists. Scientists, arguing that they are doing noble work that might someday benefit humankind, are equally outraged at being accused of callous indifference toward laboratory animal pain and distress and often consider animal activists to be misanthropic, antiscience fanatics.

Given the unflattering caricatures of their opponents in the controversy, it is perhaps not surprising that the debate over animal research is often so unproductive. In the previous nine chapters, various laboratory animal use issues were described and discussed. This chapter will examine how the controversy is waged and how the various elements attempt to influence public policy and popular support.

B. TACTICS AND STRATEGIES

1. THE ANIMAL PROTECTION MOVEMENT

In the past twenty years, the animal movement has benefited greatly from the influx of new employees and volunteers with a wide range of professional skills and ideas. For example, Peter Lovenheim, a young lawyer with an interest in animal issues, joined the Humane Society of the U. S. (HSUS) in the early 1980s as their contact with the regulatory agencies. After a few years at HSUS, he left to pursue other interests but remained interested in the animal cause. He started to explore the use of stockholder resolutions to pressure corporations to pay more attention to animal issues.

"Our antivivisection friends have now been at work in Europe some twenty years and in America some ten years. What have they accomplished? In Continental Europe there has been an enormous increase of vivisection, and, so far as we can learn, not a single case ever prevented. In America the same. In England, where some laws have been enacted, an enormous increase of vivisection ...

The world's history shows that very little can be gained by denouncing those who, without criminal intent, differ with us in view of right. Is there not a better way? We think there is. We believe there are lots of good and humane men in the medical profession who, if convinced, will go as far as anyone to prevent unnecessary cruelty."

(George Angell, 1891)

His first target was a Connecticut company that, among many other business interests, imported paté de foie gras into the United States. The company denied him access to their stockholders, arguing that their paté import business was such a minor part of their overall business activities that a stockholder resolution was inappropriate and outside SEC guidelines for such action. Lovenheim took the matter up with the SEC and eventually won his case. In the last few years, he has helped a variety of animal groups place stockholder resolutions on corporate annual meeting agendas.

In the legislative arena, animal groups have also developed a broad base of skilled and experienced lobbyists. In the 1960s, lobbying on behalf of animal causes was dominated by only a few individuals,

among whom Christine Stevens of the Animal Welfare Institute was clearly the major player. (She had and still has excellent political connections in Washington.) In the late 1970s and 1980s, more and more groups hired experienced lobbyists and there are now more than ten employed with various animal organizations in Washington. Similar developments are taking place at state legislative bodies. Animal organizations now also expect more legislative success. Twenty to thirty years ago, an animal group would claim victory if it managed merely to have legislation introduced into the federal legislature. Now animal activists only claim victory if they manage to pass an earmarked bill.

Similar changes and increases in effectiveness have occurred in public relations and in technical skills. One sign of their growing skills and clout is the growth in membership and funding. During the 1980s, People for the Ethical Treatment of Animals (PETA) used direct mail to grow from 25 individuals to an organization

boasting over 250,000 contributors and income of \$9 million in 1990 while the HSUS boosted its membership from 35,000 in 1978 to around 500,000 in 1992. Even specialty groups such as the Animal Legal Defense Fund and the Humane Farming Association have experienced dramatic growth in membership and income (Rowan, 1989a). However, one should also not exaggerate the skills and tactical sophistication of the animal movement.

In general, one can categorize movement tactics and strategies into the following broad arenas:

a) Legislative/Regulatory

- i) 1985 Animal Welfare Act Amendments
- ii) Helping to increase funding for the Biomedical Models and Materials Resources (BMMR) program at NIH

The 1985 Animal Welfare Act Amendments started with a bill developed by several animal advocates in Colorado and then introduced by Representative Patricia Schroeder (D-Colorado) in 1980. The bill went through a number of revisions following discussions with a wide variety of people, including many animal research interests and was finally passed right at the end of 1985 when Senator Dole, at the urging of Christine Stevens, added the bill's language onto a food bill. The language survived a conference committee and was signed into law by President Reagan.

The BMMR program at NIH funds a variety of programs and projects that can be loosely identified as alternatives. Members of the animal protection movement wished to support more BMMR activities so they cooperated with several other organizations (not all of whom were animal groups) to lobby successfully for increased BMMR funding. (A portion of the increased funds was awarded to the Johns Hopkins Center for Alternatives to Animal Testing.)

b) Public Education via Mailings and Publications

The animal protection movement has always relied heavily on its publications and other materials to increase public support for its programs. These materials range from campaign/fund-raising publications like the HSUS' *Close-Up Reports* to public service announcements and print advertisements, to periodicals like the quarterly magazine, *Animals*. The impact of these materials varies considerably. The HSUS *Close-Up Report* on the Draize eye irritancy test is now considered to be an important element in the success of the campaign (see Chapter IX) but much of the "campaign" literature serves primarily a fund-raising rather than campaign role (Anonymous, 1990b).

In addition, many of the animal groups run humane education programs for the elementary grades. These tend to concentrate on how to treat animals in general and how to take care of companion animals in particular. There is little evidence that such materials or education programs have had much long term influence in changing public views. In the 1930s there were millions of children enrolled in humane education clubs around the country but these individuals were not particularly visible or active in the 1950s when they reached their most productive adult years.

It appears as though public attitudes to animals change due to subtle social forces and that animal protection literature tends to exploit rather than stimulate changes in public attitude.

c) Public Demonstrations

- i) 1983 Mobilization for Animals demonstrations against the Primate Centers
- ii) 1990 Washington March for the Animals

Demonstrations and direct actions are usually

organized when the target of the campaign is not responding to specific inquiries. In other words, they are usually a sign that the group is outside the power structure. On some occasions, demonstrations may be mounted specifically to attract press attention or to provide a chance for activists to reaffirm their goals and reassert their commitment. Both of the demonstrations listed above ended up mainly as opportunities for activists to recharge their batteries.

In fact, the 1983 Mobilization helped rather than hurt the primate research centers that were its targets. Because of the proposed Mobilization, primate researchers spent considerable time and effort talking to NIH officials and their elected representatives in Congress. When the Mobilization produced little in the way of a lobbying counterweight, the U.S. Congress appropriated an extra \$2 million to support the Primate Research Center program. While three thousand people cheered the organizer of the Mobilization in a rally in Boston, the demonstrations produced exactly the opposite effect of that intended.

The June 10, 1990, March for the Animals was a relatively efficiently organized event that drew about 25,000 people to Washington but it was unable to convert those numbers into effective political or public relations actions. The scientific community made good use of the attention surrounding the march to get its message out to the media and, for the most part, published stories led with the establishment's viewpoint that animals had to be used and were, in any case, used humanely. Many of the news reports from the march also noted how Christopher Reeve of Superman fame, who had agreed to address the march, was booed by the marchers for taking only a moderate animal welfare stand.

"... [O]n June 7, 1990, Secretary Sullivan made headlines ... by calling militant animal rights activists 'terrorists' who he said were trying to disrupt valuable scientific research ..."
(Leepson, 1991)

d) Targeted Campaigns

i) Draize eye irritancy test campaign

ii) Campaign to stop pound animal release to laboratories - ProPets

The animal protection movement launches many campaigns every year but only a few are sustained for any length of time with both staff time and financial resources. In the 1960s, the treatment and care of animals in research was the focus of various campaigns and the handling of dogs and cats by dealers became a major issue leading to passage of the Laboratory Animal Welfare Act in 1966. In the early 1970s, there was a massive public furor over the Pentagon's use of beagles. This is the incident that supposedly generated more mail to the Pentagon than Truman's firing of MacArthur.

Apart from the legislative campaign, the Draize and pound seizure campaigns were among the few that were sustained for more than a year. As noted, the Draize campaign was very successful while the pound seizure effort was not.

The Draize campaign was described earlier and its success was due in significant measure to Henry Spira's skill in street politics and to the fact that the campaign goals were clear and simple. By contrast, the pound animal campaign was run by a committee of representatives from the various member groups and they could never come to a firm agreement on what the ultimate goals should be. For example, there was considerable argument over whether they should campaign for the abolition of all use of research dogs, or just pound dogs. In addition, the pound animal campaign was always likely to be more problematic because dogs have been used in research that has led to medical benefit while causing a rabbit to suffer to develop a new cosmetic seems to be a much clearer cost-benefit decision in favor of the rabbit.

e) Underground or Illegal Activities

i) Taub/Silver Spring case - 1981

AMERICAN MUSEUM OF NATURAL HISTORY The Cat Sex Experiments Campaign

Many consider the campaign organized by Henry Spira against experiments on cat sexual behavior at the American Museum of Natural History in New York City to be the first successful campaign by animal activists against a specific animal research project.

In the summer of 1975, Spira learned of the cat sex experiments and started collecting information. It appeared to be an ideal issue around which to build a campaign and it was also convenient since Spira lived just around the corner from the Museum. After a year of planning, Spira launched his campaign in June of 1976. Protestors picketed the Museum every weekend. By August, the Museum had received over 2,500 letters on the subject, some sixty people had cancelled their membership and about thirty congressional representatives had inquired about the study. In particular, Congressman Ed Koch (later the Mayor of New York) picked up the campaign and questioned the merits of the project in eye-catching terms (Koch, 1976).

In October, Nicholas Wade brought the attention of the scientific community to the campaign with an article in *Science* (Wade, 1976). This was the first time that the concerns of the animal activists were taken seriously in a major scientific publication. Wade also examined the relative merits of the research using the technique of science citation analysis and pointed out that Aronson's research had not been widely cited. Garfield (1980a & b), the pioneer of citation indexing, criticized Wade's article, arguing that he missed some citations and overlooked some of the basic problems of citation analysis. Nevertheless, Garfield came to approximately the same conclusion on the question of merit. At the end of his article, he stated:

"While it is clear that Lester Aronson's cat research does not merit the kind of furious criticism it has received, the case brings up some more fundamental issues. I am perplexed by the assertion that Aronson's work is deemed quite significant by Beach and others when their citation of his work is minimal."

The campaign continued throughout 1977. In August, 1977, Lester Aronson retired. At the end of the year, the Museum announced it would concentrate on field rather than laboratory studies and closed his laboratory.

- ii) Head Trauma Laboratory- Pennsylvania - 1984
- iii) Orem Laboratory Vandalization - 1988

Other than the Draize eye irritancy and LD50 campaign, the most successful (in terms of impact) animal protection campaigns of the last decade to target animal research have been the Silver Spring and Pennsylvania Head Trauma laboratory actions. The Silver Spring case involved an animal activist, Alex Pacheco, volunteering at Dr. Edward Taub's laboratory in Silver Spring, MD, for the summer of 1981 to find out firsthand what went on in research. (Pacheco says he chose the laboratory because it was near his home but it had been an object of suspicion for Washington-area animal activists since 1977.) At the end of the summer, evidence provided by Pacheco to the Montgomery County Police led to the charging of Dr. Taub with cruelty to animals and to the confiscation of seventeen monkeys housed in the laboratory. The subsequent cruelty trials, Congressional hearings, NIH investigation and later battles for the custody of the monkeys horrified the scientific community, upset many in Congress and in the general public, and helped to boost PETA (Pacheco was chairman of PETA) from a small grass-roots organization into a rapidly growing national organization.

"Never has a major social movement been engendered by two more unlikely and relatively unsavory protagonists. Although neither Alex Pacheco, physically courageous but self-dramatizing and fanatical, nor Edward Taub, uncomprehending, lost in denial, is anything close to a simple heroic icon, the strange fact remains that their meeting was the spark that touched off what we now think of as the American animal-rights movement."
(Fraser, 1993)

One of the key features of the Silver Spring case was that Pacheco did not vandalize the laboratory but simply took photographic and other evidence to the police. There were no confounding images of illegal break-ins and vandalism to divert attention away from the treatment of the monkeys.

The Head Trauma laboratory case involved a break-in by Animal Liberation Front activists who removed files, 60 hours of laboratory videotapes of the baboons, and vandalized equipment and the facilities. The materials were turned over to PETA who edited the

videotapes into a 25-minute tape that showed graphic scenes of head trauma and inappropriate care and handling of the baboons. The visual material was extraordinarily powerful and nearly everyone who saw it (including conservative and liberal commentators alike) were sickened by it. Coming only a few years after the Silver Spring case, it sparked widespread changes in the way animal research was regulated (NIH adopted revised animal research policies in 1985 and the Animal Welfare Act was amended at the end of 1985).

However, the Head Trauma laboratory also galvanized many scientific and research organizations into action to deal with this new threat. No subsequent break-in and "liberation" of material allegedly documenting abuse of animals has had the same impact. The break-in and vandalizing of Dr. John Orem's laboratory at Texas Tech University produced relatively little media impact while it hardened the resolve of research advocates. Although John Orem used cats in sleep-deprivation research, the activists who broke in found little evidence that he had contravened any laws or regulations (at least the Office for Protection from Research Risks of the NIH found no evidence of wrongdoing in the materials supplied to them) and there were no dramatic visual images to support animal activists' claims of cat abuse. In addition, by 1988, the media had begun to pay more attention to the research advocates' message that animal activists were dangerous fanatics so the vandalism of Orem's laboratory and the anonymous threats against him and his family merely served to confirm the characterization.

As underground actions to "liberate" information and expose wrong-doing became more violent or became simple acts of destruction, the media became less interested in what was being exposed and more interested in the acts of destruction themselves.

f) Cooperation, conflict and future trends in the animal protection movement

There has always been a tendency for animal groups to fight with one another and various leaders throughout the history of the animal movement have sometimes taken such fights to extremes of personal animosity. Whether the animal protection "movement" is peculiarly antagonistic or whether such internecine wars are a natural consequence of being a social protest movement has never been studied. However, the rise of the animal rights (both political and philosophical) message has appeared to lead to greater internal consistency of beliefs and to a tendency to co-operate with one another more than in the past.

"No. 1 antivivisectionist is the plumed former dancer Irene Castle McLaughlin who now keeps a home for stray dogs."

(Caption to photograph of Castle wearing a feather boa, Life Magazine, October 24, 1938)

For example, the old anti-vivisection groups have become revitalized by young activists and become more coherent and consistent in their philosophies and their programs. One now rarely finds antivivisectionists protesting against animal laboratories while wearing furs and most members are either vegetarian or heading in that direction. Nonetheless, some of the old divisions and animosities remain and the political potential of the animal protection movement has never been reached. It has as many committed activists as the National Rifle Association (NRA) and five times as many members but has not been able to translate that emotional commitment into the same level of political clout at either the state or federal level as the NRA.

While disunity and lack of cooperation is one of the weaknesses of the animal protection movement, there is another problem that may be just as critical. Most successful activist social movements go through various stages - formation, growth, acceptance as political players, and incorporation of issues into establishment programs, or decline and disappearance. When social movements or their issues become incorporated in the power structure, what generally happens is that the establishment takes on board only those messages

that it can live with and discards those that it cannot. By doing this, the establishment brings some, perhaps even a sizable proportion, of the movement's support back into the establishment fold.

Those activists who are unable to live with incorporation into the establishment may either fade away or form (or join) another organization to promote the goals that have not been taken up. Depending on the size of this new group and their ability to touch the pulse of the public, the faction will either grow into a new social movement or will fade into relative (albeit possibly irksome) obscurity. The animal protection movement is now in the acceptance/incorporation phase and it is not clear how the movement will deal with the pressures and new tactical and strategic challenges that it will face in the next decade.

The movement has not been particularly successful in developing links with potential allies in the establishment because of past mutual suspicion and distrust. For example, the veterinary community could provide an important source of technical expertise and support for animal organizations but productive ties with organizations (as opposed to individuals) are relatively few and far between.

Academe is another potential source of expertise and support as demonstrated by the activities and support of many philosophers. But there is only limited contact between biomedical specialists and animal protection. This is probably because university faculty and researchers are regarded with suspicion because universities are the places where animals are used ("tortured") for research. While the environmental movement has made good use of academic scholarship and has developed strong ties with academia via a variety of centers and other academic programs, the animal movement is still uncertain how to interact with and develop alliances with academe. For the most part, the animal protection movement has hired its own specialists but

then loses the authority and credibility of an "independent" voice.

2. RESEARCH ADVOCACY GROUPS

Research advocacy and professional scientific and health organizations tended to ignore the animal protection movement for the most part until the mid-1980s. Up through the 1970s, those who spoke out against criticism of animal research tended to direct their remarks either to their colleagues (in academic publications) or simply informed the public that they should believe the scientists rather than the animal activists who were described as (or implied to be) a

deluded fringe of society. These tactics had little impact on public opinion and the animal movement continued to grow and enjoy excellent media relations.

"In the last two years, the American medical and biomedical research establishment, federal health officials and associations representing industries that use animals in research have launched a multi-million dollar campaign to counter the animal rights movement."

(Leepson, 1991)

Some individuals involved in animal research became concerned by the lack of attention given to the issue by existing research advocacy

organizations, especially the National Society for Medical Research (NSMR), and, in 1979, started a new research advocacy organization, the Association for Biomedical Research (now the National ABR after merging with the NSMR in 1985). A 1978 letter in *Science* urged scientists to look beyond the emerging personalities and engage the issues raised by the critics (Loew, 1978). Then, in July of 1985, Margaret Heckler, Secretary of the Department of Health and Human Services suspended a grant to the University of Pennsylvania head trauma laboratory because of violations of animal care and use policies. This was a wake-up call for the research community and corporations, non-profit institutions and professional societies that all began to develop programs to counter the animal rights movement.

The Association for Biomedical Research (which

had many corporate members) and the National Society for Medical Research (which had many university and medical school members) combined forces to form the National Association for Biomedical Research. Many states either established state-based societies for medical research or revived organizations that were active in the early 1900s but then gradually fell into a dormant state.

These groups developed a range of tactics and approaches to the issue. They monitored state and federal legislatures and lobbied against animal protection legislative initiatives. In Congress, a bill was introduced and eventually passed and signed into law making theft and destruction of property at a research facility a federal crime and subject to FBI jurisdiction. The groups developed numerous brochures and other materials for the public, including a rather successful series of posters promoting the need for animal research.

"The lack of ethical self-examination is being masked by an atmosphere of war that exists between animal activists and biomedical researchers."
(Gluck and Kubacki, 1991)

They supported the development of patients' organizations to counter animal protection campaigns and emphasize the importance of animal research to the advancement of medical knowledge. They also developed a variety of curricula and other materials aimed at school teachers and school children that are designed to confirm the importance of animal research and re-affirm how good laboratory animal housing and care are.

There has also been a tendency among some research advocates to characterize animal activists as violent fanatics who are anti-science and anti-human. There are signs that this has had some impact. Media coverage is not as positive as it was in 1985 and there is more mention of the violent aspects of animal protection movement campaigns and activities.

An interesting analysis of the research community reaction to animal activists was produced by two animal researchers from New Mexico (Gluck and

Kubacki, 1991). They started their analysis with Habermas' *The Theory of Communicative Action* (1984, 1987; cited by Gluck and Kubacki, 1991). Habermas distinguishes between two types of activity - instrumental action, which is control and success oriented, and communicative action which is aimed at developing understanding. All human actions constitute some mixture of these two forms of interaction but when instrumental action dominates communicative action, then participants focus on achieving a goal rather than developing an understanding with the effect of dehumanizing the participants on both sides of the debate.

Gluck and Kubacki (1991) identify three working assumptions that research scientists have about animal activists that have now become hardened abstractions that serve as significant obstacles to the development of any constructive understanding of what really underlies the debate. These assumptions are:

- i) although the animal movement may be threatening and powerful, it is trivial;
- ii) all science is excellent and some especially so; and
- iii) an ethical consensus cannot be reached

While the authors also feel that animal activists have painted a far too negative picture of the utility of animal research, they focus most of their attention on the argument that the above assumptions are incorrect and that the efforts by the scientific community to dominate and control the issue serve to undermine scientific discourse rather than protect and foster its development. In other words, the scientific community is as guilty of undermining its basic core values (of free exchange and scholarly debate) by avoiding open and non-coercive discussion as the animal liberation movement is when it resorts to intimidating and violent actions.

Research advocacy organizations have also por-

trayed themselves as being up against powerful and much better funded opponents, but the playing field is more equal now than it was in the 1970s and research advocacy groups may have the advantage in both resources and connections to establishment institutions. While the national animal protection groups have combined annual expenditures of around \$100 million, they probably devote no more than \$15 million annually to the animal research issue.

By comparison, the national and state-based research advocacy groups together currently devote \$5-6 million a year to support the need for animal research (see Appendices). However, the considerable activities of the professional scientific and medical societies, of the National Institutes of Health and of the many corporations that are now actively engaged in the debate are not included in the above figures. Given the fact that the research establishment also has better access than animal advocates to the sources of power and to the policy makers in America, the balance of influence in the debate over animal research appears to lie with those who support the need to use animals in the laboratory.

2. PRESTIGE OF SCIENCE

Polls indicate that scientists belong to one of the most admired professions. In the U.S., 88% of the public believe that the world is better off because of science and scientists are second only to physicians in public prestige (National Science Board, 1989). In the UK, the three most respected public institutions are medicine, the military and scientists in that order (Kenward, 1989).

3. THE TROUBLED MIDDLE

Although it may appear from a quick survey of media stories that the debate over animal research is hopelessly polarized, there are many scientists and interested members of the public who occupy what philosopher Strachan Donnelly of the Hastings Center in

...the scientific community is as guilty of undermining its basic core values (of free exchange and scholarly debate) by avoiding open and non-coercive discussion as the animal liberation movement is when it resorts to intimidating and violent actions.

New York has called the "troubled middle." In other words, they accept (albeit with some reluctance) the need for animal research but also acknowledge and worry about the moral challenges raised by the practice. This group may constitute a silent majority since more than half of those polled object to the use of animals in the testing of household products and also express concerns over the manner in which animals are housed and handled. This silent majority could be mobilized to participate in and support a constructive dialogue, leading to reasonable and effective public policy initiatives that would allow progress toward the elimination of animal pain and distress in research without placing unreasonable barriers in the quest for greater biological and medical understanding.

In England, Australia and a number of European countries, a constructive dialogue has been developed around the "troubled middle," involving both critics and defenders of animal research, with the active encouragement and support of government authorities. In England, for example, the Animal Procedures Committee (APC) is established by Statute under the 1986 Scientific Procedures Act and includes a broad range of opinions. The APC provides a forum for in-depth discussions and arguments about specific aspects of animal use as well as some of the underlying assumptions. In the U.S. such dialogue has been less visible (because there is no officially sanctioned forum?) but is nonetheless occurring. Representatives from pharmaceutical and household product companies have been working with representatives from several major selected animal protection groups to support initiatives that would lead to the development and use of alternatives to some animal testing. Both defenders and critics of animal research have lobbied for more funding for the enforcement of the Animal Welfare Act. In addition, as more people on each side develop a better understanding of the arguments and basic assumptions of the other side, chances for a meaningful and productive dialogue improve.

C. ROLE OF THE MEDIA

Like the animal protection "movement" and the scientific "community," the media is not a monolithic force in the presentation of the animal research issue to the public. In fact, one sometimes finds diametrically opposed media messages in the same article let alone opposing stories in the same publication or program. For example, *Time* (8/26/91) ran a story about threats to science and identified animal activists ("fanatic critics") as a threat to Alzheimer research. However, later in the same story, the authors talked in glowing terms of the "moderates" who have worked with scientists to find alternatives to animal blinding in the testing of "harsh cosmetics." These conflicting messages in the same story may be simply a result of poor editing (major stories in *Time* are often pulled together by a number of different journalists) or it may reflect the different attitudes to Alzheimers' research and cosmetic testing.

1. ANIMAL IMAGES

It is a standard dogma in media circles that animal stories always play well with the public and even quality magazines are known to use an animal on the cover for the week when circulation is measured. ("Cover animals" apparently increase newsstand sales.) Certainly, images of animals under experimentation evoke powerful emotions and are quite capable of overwhelming even carefully crafted and considered text or commentary. This is a particular problem for television where images play such a central role and where both activists and scientists are likely to be disturbed by what they see (particularly since the images are taken out of the laboratory context and beamed into living rooms). It may also be one reason why nearly every television program that attempts to achieve even a modicum of balance on the issue (by giving both sides in the debate a voice on the program) is usually criticized as being biased by both animal and research advocates.

Some key (influential) print stories on the animal research issue include the following:

1966 *Life*, (February), ran a story on dealers who provided dogs to laboratories. The pictures were horrific, showing starving, dead and injured dogs in appalling conditions in a dealer's compound. The story is widely credited with provoking such a storm of public outrage that Congress rapidly passed the Laboratory Animal Welfare Act of 1966.

1973 The Department of Defence ran into a storm of public outrage and criticism for their use of beagles in research. One of the unverified stories that has circulated about the incident is that Congress received more mail on this subject than when President Truman fired General MacArthur.

1976 *Science* (August) carried a story by Nicholas Wade on the protest by New York animal activists against experiments on cat sexual behavior at the American Museum of Natural History. This was the first feature story in *Science* that took the issue of animal activist protests against animal research seriously. Wade used citation analysis to evaluate research claims that the studies were very important and concluded that the research claims were overblown, thus confirming some of the claims of the activists. After a year of demonstrations, the principal investigator retired and the Museum closed the laboratory down.

1980 The campaign against the Draize eye irritancy test was launched with a full-page *New York Times* ad (April 15) featuring a rabbit under the title "How many rabbits does Revlon blind for beauty's sake?" The ad became a news item itself and was followed a few months later by a second ad featuring a rabbit in dark glasses carrying a white cane.

1981 *Discover Magazine* (February) ran the animal research issue as its cover story. This was the first of the popular science magazines to give the issue such a high profile.

1981 The story about the police raid on Dr. Edward Taub's laboratory, his being charged with cruelty to animals, and the seizure of seventeen monkeys from his laboratory in Silver Spring, Maryland, was widely covered by the media. It is still a focus of media interest as evidenced by features in the *Washington Post Magazine* (1991) and the *New Yorker* (1993).

1985 The head trauma laboratory story broke in 1985 and was widely covered. Most of the stories were very negative. When NIH suspended support for the laboratory, both the *New York Times* (7/31/85) and the *Washington Post* (7/28/85) ran editorials condemning the project in very strong terms.

1986 Katie McCabe's *Washingtonian* article (August), "Who will live? Who will die?", was the first major feature that heavily criticized the arguments, motives and tactics of the animal movement. It was followed four years later by a sequel in the February, 1990, *Washingtonian* ("Beyond Cruelty") that continued the criticism of animal activists and PETA in particular. PETA sued and the *Washingtonian* subsequently retracted some of the statements and allegations in the article (Dec., 1991).

1988 *Newsweek* ran a cover story in December of 1988 on animal rights (and also another cover story earlier in the year on animal thinking.)

1991 The *Sacramento Bee* (Nov 25-29) series on primate research by Deborah Blum won a Pulitzer Prize. Blum noted that neither side entirely approved of the way she wrote the series.

Why then have scientists been relatively unsuccessful in countering media images of protests against animal research and testing and allegations of laboratory animal abuse?

The public may admire science but its perception of science has fallen since the halcyon days of the 1950s when it was felt that federally funded science could surmount any problem the country or world could throw at it. The development of the polio vaccine was a clear example of the "omnipotence" of science. However, beginning in the late 1960s and lasting throughout the 1970s, more and more of the public began to ask whether science might not be more harmful than beneficial. However, the public is less trusting of authority in general and it is likely that the increasing concerns about science were simply a reflection of this larger trend (science carries significant authority in modern technocracies).

The media has focused more attention on the human fallibility of scientists and has not simply concentrated on scientific breakthroughs. It is not surprising that initial public hopes about the benefits to be derived from science give way to fear of the risks of innovation and of losing control of one's own life. Also, the public swing towards more conservative values has tended to undermine support for science because science is an agent of change and, therefore, antithetical to conservative values. Despite this, science is still considered a prestigious profession in most polls (Pion and Lipsey, 1981).

3. SCIENTIFIC PERSONALITY

The perception of scientists' personalities by the public has always been stereotyped and distorted. In surveys from the late 1950s, scientists were seen as intellectual and dedicated but difficult to comprehend and erratic in interpersonal relationships. A 1975 survey reported that they were seen as remote, withdrawn,

secretive, unpopular and single-minded souls (Pion and Lipsey, 1981). Other surveys identify qualities such as rationality, objectivity and coldness with scientists (Gerbner, 1987; Weart, 1988). Gerbner (1987) reports that television images of scientists do include some positive roles, but ambivalent and troublesome portrayals of scientists are more common. He found that public exposure to science and technology through television influences the viewer to be less favorably disposed towards science.

However, television does not invent this ambivalent view of science. The caricature of the curious, if not mad, scientist who ignores the dangers of his research (the scientist is nearly always male) in his relentless quest for knowledge is found throughout literature (e.g. *Frankenstein*, *The Island of Dr. Moreau* and *Jurassic Park*) and other entertainment media. For example, several recent popular films (e.g. *Project X*, *Greystokes* and *Splash*) reinforce the image of the callous and unfeeling scientist caring nothing for or even mistreating the beings under investigation. The public also tends to view laboratory animals as helpless innocents and when animal innocence is combined with the above stereotype, it is not surprising that it might be easy to influence the public to believe that a "cold and rational" animal researcher would lack concern for his or her research animals.

Research scientists usually reinforce this image in the media by failing to express any concern for the moral ambiguities of animal research and by using dispassionate language and rational argument. For example, one medical researcher commented during a public talk that she would use her own, much loved pet cat in research if she thought it would advance her search for a therapeutic intervention for human disease.

...the public is less trusting of authority in general and it is likely that the increasing concerns about science were simply a reflection of this larger trend (science carries significant authority in modern technocracies).

4. PUBLIC ATTITUDES TOWARD ANIMAL RESEARCH

Numerous polls of attitudes to animal research and testing have been conducted and the findings can be summarized as follows.

- a) About two thirds to three quarters of the American public are prepared to *accept* the need for animal research.
- b) The percentage that actually *supports* animal research is usually about 10 percentage points lower.
- c) About 10-15% of the public actively opposes animal research.
- d) The percentage opposing animal research changes depending on the type of animal used and the type of research. Thus, most people support research that uses rats but this figure may be halved if dogs are the research animal. Similarly, cancer research is considered very important by the public but support drops off for alcohol and drug addiction research and for cosmetic and household product testing.
- e) So-called "basic" research does not receive as much public support as goal-oriented medical research.
- f) About half the public is uncertain whether animal researchers treat their animals humanely.
- g) It appears as though the public is becoming less tolerant of the use of animals in research. The biennial Science Indicators survey commissioned by the National Science Board (National Science Board, 1991) in the U.S. find that public support for animal research dropped between 1985 and 1990.

"[The public] tend[s] to respond sceptically to scientific knowledge that does not admit, for example, that things could have turned out differently, that the assumptions underlying particular experiments could be incorrect, or that there are difficulties putting theory into practice in the real, unpredictable world."

(Birke and Michael, 1992)

5. BIOMEDICINE, ANIMAL RESEARCH AND THE MEDIA

In the past year or two, professional societies such as the American Medical Association and the Federation of American Societies for Experimental Biology have begun to take a more militant stand towards their animal activist critics and a debate that was already

sharply polarized has become even more so. The overall aim of these scientific organizations seems to be to persuade what is viewed as an unfortunately ignorant public that continued good health depends on animal research and that there is a health-dependent choice to be made: animals or people, but not both.

The many news stories in the print and electronic media that describe the latest medical discovery are now much more likely to mention the role that animal research has played in the development. Leaders of the biomedical community have also devoted more time and effort to counter the animal protection message. For example, Secretary of the U.S. Department of Health and Human Services, Dr. Louis Sullivan, reached out to the media before the 1990 "March for the Animals" in Washington, DC. As a result, most of the media stories on the march led with Dr. Sullivan's utterances about the need for animal research and the struggle to counter the activities of "animal terrorists."

The strategy of aggressively taking the biomedical research message to the public is too new to judge its effectiveness but some of the earlier campaigns and arguments in support of biomedical research have misfired or have failed to slow the decline in public support of animal research. The following analysis of some of the arguments and strategies indicates why they may have misfired.

a) Stressing the need for animals

About ten years ago, the National Association for Biomedical Research (an organization similar to the Research Defence Society in the U.K.) released a film called "Will I Be All Right, Doctor?" The main theme was the importance of animal research in developing new therapies and treatments. A lesser theme was the good care that the laboratory animals received. However, three quarters of the public already accepted that animals are needed in research and testing. Therefore,

the film did not address the real public concern about animal research - animal suffering and the perceived lack of concern by scientists mentioned above. On the question of animal care, the film was accurate but said to be unexciting and uninteresting.

b) Stressing the benefits of animal research

The biomedical research establishment commonly argues that animal research is conducted only because of the benefits it produces for human and animal health and usually follows with a long list of developments resulting from animal research. In so doing, the research community continues a long-standing tradition of science "education" (Birke, 1990) where critics are perceived to have incorrect information and facts and merely need to be provided with the "correct" facts to fall back in line.

Throughout this century, efforts to popularize science and to educate the public have tended to stress the benefits of science. As health care became more successful and more technical and the public became more demanding of those in authority, the public took purported benefits for granted. Groups that were critical of science started to speak out (e.g. environmentalists, animal activists, opponents of genetic engineering) more effectively and question the benefit claims. In most instances, the scientific community did not address the criticisms carefully or directly but tended to respond merely by stressing the benefits even more strongly. In other words, they tried to shout louder than their critics.

From observations of the debate and the effectiveness of public relations pronouncements, the public tends to accept animal research and testing when it appears to be of obvious benefit and does not produce too much suffering. However, when the research is perceived to produce a great deal of animal suffering, then the benefits have to be significant, immediate and

self-evident if the public is to accept such research.

c) The media and the public are victims of a good public relations campaign by the animal protection community

One relatively common view among the research community appears to be that the animal movement has made very skillful use of the media to exploit a gullible public. It is certainly true that the animal research controversy makes for good media copy, but the animal protection groups have, for the most part, not been that skilled at disseminating their message nor have they had particularly good media contacts.

Some activists have made effective use of images and have known how to develop media interest and cooperation. For example, the campaign against the rabbit Draize eye irritancy test provides such an example. The advertisement in the *New York Times* that asked "How many rabbits does Revlon blind for beauty's sake?" became a media story itself. People for the Ethical Treatment of Animals (PETA) has also done well in obtaining coverage (in part, probably, because of the exposé or undercover characteristics of its information).

d) Animal activists and terrorism

In the past five years, biomedical spokespersons have frequently used terrorist descriptors when discussing the the animal rights movement. Underground animal groups that break into and vandalize animal facilities have, for example, been identified as dangerous terrorists who threaten the fabric of American society and culture. At times, the linking of animal activists with terrorism is very broad as though all activists are engaged in vandalism and life-threatening activities. There are indications that this tactic has had some impact on media coverage.

Historically, the argument over animal research

has always been sharply polarized and the more militant of the protagonists on either side have consistently identified their opponents as either sadists or over-emotional misanthropes. At the moment, the militant research advocates are labeling animal activists as dangerous misanthropes. Many in the animal protection and research community wish to avoid such counter-productive labeling but, with the media's attraction to diametric opposites, it is not easy.

e) Do not apologize for animal use

There are some in the research establishment who have decided that there is no need to be apologetic about the use of animals in research and testing. They even argue that any establishment support for the idea of "alternatives" to laboratory animals is inherently apologetic and should be resisted. However, opinion polls all indicate that the public strongly supports the search for and use of alternatives and seems to believe that this is one way that they can have advances in health care without having to endure the psychic cost of animal research or the stigma of being labeled "anti-science."

f) Conclusion

In the modern animal research controversy, "many citizens have begun to judge science according to their own moral standards rather than accepting the

Some might find the following story bizarre but it encapsulates very well the uncertainties and ambivalence that many scientists experience in their use of animals in research. Tom Peters, a research scientist, describes his life with Commander, a red-on-white dog whom he met when he did an experimental transplant procedure on him. For some reason, Commander was different from the other dogs and eventually, after some uncertainty, Peters took Commander home when the experimental protocol was finished and he became part of Peters' family and a neighborhood favorite. Peters' epitaph was an article about Commander in *JAMA* (260:1460, 1988) and the words, "He was a great dog."

measures of professional achievement that scientists apply to themselves" (Ritvo,1984). Thus, experimentation on animals has become a focal point for opposing animal protection and scientific points of view. The result has been little more than shouting matches, accusations of immorality by both sides, and a steady progression of one-downmanship with little constructive progress or careful analysis of the central issues in the media.

Ultimately, when dealing with the animal research issue in public, biomedical science and its spokespersons need to avoid the arrogance and cloistered smugness that lurk in wait for intelligent and creative but unwary professionals. In the world of the media as in politics, one is only as good as one's ability to make an argument and present oneself as a credible spokesperson. Self-interest or condescension or inability to produce a believable rebuttal to the critics' arguments will undermine credibility.

D. AD HOMINEM ATTACKS

1. INTRODUCTION

It is not uncommon for animal rights activists to view scientists as sadists, or for scientists to view animal rights activists as emotional fanatics. Obviously such views are slanted, but they are ubiquitous backdrops to the debate over animal research that obstruct constructive dialogue and the development of sound and effective public policy initiatives. How true are these caricatures and what do we really know about these two opposing groups? Who are they, and what do they hold as their goals?

2. ANIMAL RIGHTS ACTIVISTS

The typical activist is stereotyped as: wanting to eliminate all animal research; valuing animal life and welfare over that of humans; subscribing to veg-

etarian or vegan ethics; not purchasing products made from animals, such as leather or fur; and supporting or engaging in laboratory break-ins and terrorist activities.

In the modern animal research controversy, "many citizens have begun to judge science according to their own moral standards rather than accepting the measures of professional achievement that scientists apply to themselves" (Ritvo, 1984).

There have been no studies of the attitudes of those who support animal welfare causes (who are now estimated to number 6% of the American adult population according to one private poll) but there have been several surveys or studies of animal rights supporters. Plous (1991), Herzog (1993), and Jamison and Lunch (1992) all surveyed activists who were present at the 1990 animal rights rally in Washington, D.C. Richards and Krannich (1991) conducted a random survey of 853 readers of *Animals' Agenda*, the magazine of the animal rights movement. The findings were consistent across the surveys.

a) The activists were drawn to the movement by a variety of factors with a major proportion changing their life-styles (e.g. becoming vegetarian, not wearing leather) in order for their behavior to be consistent with their beliefs.

b) More than two thirds of those surveyed were female, confirming the general belief that concern for animals is influenced by gender. However, animal activists were no more likely to be unemployed than the general population. This contradicts the view that animal activists are drawn from those who have too much "time on their hands." In addition, the age structure of the population of activists was as might be expected given the samples that were surveyed.

c) Activists were much better educated (and enjoyed higher incomes as a result) than the general population. For example, Richards and Krannich (1991) report that 82% of their sample had some college education (33% had a masters degree or better) compared to 32% of the general population. Jamison and Lunch (1992) reported that 62% of their sample had at least some college

education. (Magazine subscribers are known to have generally higher educational achievement levels than non-subscribers.)

d) The animal activists also report high levels of commitment to other social movements includes the environmental, anti-war, women's and civil rights' movements.

Overall, the studies show activists to be female, college educated, financially well-off, in white collar jobs, and active politically.

3. SCIENTISTS

Medical researchers are often portrayed to as murderers, butchers, and even Nazis by some animal activists. In one survey, 87% of activists polled stated their belief that the typical animal researcher does not care about the animals used and views them as "expendable supplies" (Plous, 1991).

However, actual data from studies of scientific attitudes indicate that many researchers do have reservations about animal research (Birke and Michael, 1992; Takooshian, 1988). Arluke (1988 and 1990) conducted ethnographic research on the culture of a variety of animal research laboratories in Boston and found that scientists and technical staff experienced significant conflict in their use of animals. For example, about a quarter of those he spoke to reported having nightmares about animal research when they first started using animals. These nightmares stopped after about three months when they had managed to construct appropriate psychological defenses to deal with the conflicts (Arnold Arluke - personal communication, 1990). Laboratory personnel (and the technical staff in particular) also tended not to talk about their work at social gatherings except in vague and general terms.

"We therefore can share a common goal, though differing as to the speed with which we can reach the goal. Affection for animals is the thread that binds laboratory animal scientists to animal rights activists. We know what our difficulties are; now let us emphasize our similarities." (Jerry Silverman, 1993, laboratory animal veterinarian)

In general, the research indicates that scientists and technical staff are just as concerned and caring about animals as other people but that they need to assimilate into a culture in the research institution that tends to avoid expressions of emotion and feeling about the animals. There are a few examples of breaks in the culture (when technicians take laboratory animals as pets, for example) but such actions are usually against institutional policies and so are concealed from the authorities. While the laboratory culture creates a superficial appearance of a lack of normal human emotion and concern for animals, those emotions and concerns are certainly present and are a source of continuing ambivalence and uneasiness.

4. SHARING A COMMON GOAL

Is it possible that the above two groups, research scientists and animal activists, who appear to be so opposed to one another, could share a common goal? The data indicate that the attitudes and concerns of the two groups may not be as polarized as the rhetoric might indicate and that there may be some (perhaps considerable) common ground.

For example, Medawar, the 1961 Nobel Prize winner for medicine, once stated that “nothing but research on animals will provide us with the knowledge that will make it possible for us, one day, to dispense

Katie McCabe is a free-lance reporter who spent nine months researching both the animal rights community, particularly People for the Ethical Treatment of Animals, as well as the research establishment. It is McCabe's opinion that the animal rights movement is a “well-organized, well-funded, politically powerful force with carefully orchestrated, but profoundly *duplicitous* public relations, legislative and financial strategies” (McCabe, 1987). McCabe believes the plea for humane treatment to be merely a smokescreen for the movement's core of hatred and anti-science sentiment, and urges the scientific community, long silent, to communicate with the public as aggressively as their opposers.

with the use of them altogether" (Medawar, 1972). In other words, Medawar implies that we should seek the goal of total replacement and that scientists should play a role in reaching for it. This is also the goal of the antivivisectionist.

If there is some agreement that the ultimate goal of replacement is both valid and desirable (and there are still some scientists who balk at the idea that they might agree with antivivisectionists on any goal), the two sides certainly do not agree on when the use of animals in research can be phased out or how much effort should be devoted to achieving replacement of all laboratory animals.

In a recent book on the animal movement, British political scientist Robert Garner (1993, pg. 215) talks of a "...simplistic dichotomy between, on the one hand, traditional animal welfare and constitutionalism and, on the other hand, the equation of animal rights/liberation with violence and illegality." This dichotomy is also apparent in the debate about animal issues in the U.S.

For example, the majority of scientists do not concentrate on the search for "alternatives." Their major focus is on solving their research problems. It is both understandable and legitimate that their research priorities should be ordered like this but activists want to see more resources devoted to the search for alternatives. It is also legitimate that their activist priorities be ordered to favor alternatives. The public governance goal is to develop policies and programs that meet enough of the needs of both sides to reduce tensions and allow social institutions to function more efficiently.

E. INTIMIDATION AND VIOLENCE

When Peter Singer published *Animal Liberation* in 1975, he clearly stated that those dedicated to animal liberation should be concerned with human suffering as well as non-human animal suffering, asserting that animal rights activists need to be for animals, not against humans. In the twenty years since Singer's philosophy caught the public's attention, break-ins and acts of violence to protest alleged animal suffering have become more common. Women in fur coats are harassed, laboratories are broken into and vandalized, and researchers have their homes picketed and receive threat-

ening letters and phone calls. In the second edition of *Animal Liberation*, Singer (1990) reiterated his argument that violence on behalf of animals would only serve to undermine the goals of the animal liberation movement.

Acts of intimidation and violence have brought media attention to the cause of animal liberation, but, when illegal actions move beyond the "liberation" of information to actual violence, the indications are that the animal movement loses rather than gains. Violent actions provide ammunition to those advocates of animal research who have worked to label all activists as dangerous and people-hating, rather than animal-loving. Certainly, the passage of a law specifically aimed at illegal actions against animal-using institutions could not have passed if research advocates and farming interests were unable to convince members of Congress that there was a real threat.

The enactment into law of the Animal Enterprise Protection Act on August 26, 1992, was, in part, a response to the growing establishment expression that activism on behalf of animals constitutes an important threat to American society. One section of this act directed the Attorney General and the Secretary of Agriculture to produce a report to Congress, within a year of the act's passage, on the extent and effects of terrorism on enterprises that use animals. That report (32 pages long) was sent to Congress on September 2, 1993.

One of the first issues that the report addresses is the definition of terrorism. For example, the Animal Enterprise Protection Act characterizes terrorism as the physical disruption of an animal enterprise. However, the FBI defines terrorism as "the unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives." The authors of the report note that they address a wider range of activities than covered by

either the act's or the FBI's definition. It is not immediately clear what this range might be. The associated table, identifying the types of protest up to and including terrorism that have been employed on behalf of animals, may be of some use in thinking about the issue of violence, non-violence and public protest in general.

From 1977 to June 1993 (the first known illegal act on behalf of animals in the U.S. occurred in 1977), there have been 313 documented break-ins and acts of vandalism or intimidation. Demonstrations, protests and sit-ins were not included in the report. Forty-three percent (135) of the incidents involved attacks on research facilities or individual scientists. Fifty-one percent (160) of the incidents involved minor vandalism, 25% (77) involved the theft or release of animals, 9% (29) involved threats against individuals, 8% (26) involved major vandalism, 7% (21) involved arson, 5% (16) were bomb threats, 4% (14) were firebombs and 3% (9) were bomb hoaxes. Almost half (46%) the incidents occurred in California while another 34% occurred on the Eastern seaboard. There was an initial peak of activity in 1984 (31 incidents) and then a second surge from 1987 to 1991 with an average of 40 incidents per year (a high of 53 incidents in 1987). During 1992 and the first half of 1993, there were 24 incidents. It is not clear why the incident rate has fallen recently although several Grand Jury investigations were active during 1992.

Twenty-one incidents were reported to have caused more than \$10,000 estimated damages each for a total of \$7.75 million. One of these incidents, the arson attack on a veterinary diagnostic laboratory at the University of California, Davis, caused \$4.5 million in damages.

The report draws several general conclusions. First, it stated that the number of activists engaged in illegal actions is believed to be relatively small (around 100 in the ALF which claimed credit for about 60% of the incidents). Second, while the majority of actions in-

volved only minor vandalism and the theft of animals, the proportion of more militant actions that cause more damage, or that threaten or potentially threaten individuals with harm, may be increasing. Third, while the

**Forms of Public Activity Aimed
at Changing Opinion**

Protest

Letter writing
Publications
Lobbying
Demonstrations

Civil Disobedience

Persuasive: change
attitudes
Non-persuasive: change
behavior

Property Destruction

Intimidation and Violence

Picketing individuals
*Overt threats to individuals
*Physical harm to individuals

(*"Terrorism" - definition may include property destruction as well)

institutions and industries targeted for attack claimed that their operations have been significantly affected (e.g. they have implemented tighter security, are paying higher insurance rates and have suffered damage from delayed and disrupted research), the costs have not been reliably quantified.

The illegal activities of the Animal Liberation Front and related organizations raise troubling questions not only for the targeted institutions but also for animal activists who engage in legal protest. For example, the Massachusetts-based animal activist group, CEASE, specifically disavows illegal actions. At the national level, the four major animal protection organizations (AHA, ASPCA,

HSUS and MSPCA) have issued a formal statement criticizing violent actions on behalf of animals. In fact, the very philosophy of animal rights, which opposes harm to sentient beings, also militates against violent protest. In a recent letter to *USA Today* (9/23/93), the successful and widely respected animal activist, Henry Spira, comments that the animal "...movement promotes consistent non-violence: It's wrong to harm others - and that goes for both humans and other animals."

The public debate about the underground actions of animal activists indicates that there are differing views of what constitutes violent behavior. Most of those raising the alarm about animal activists tend to

define any illegal action as violent and therefore as terrorism. Activists themselves tend to distinguish between illegal activities that liberate animals and information and destroy property, versus those that go even further and intimidate or threaten harm to people. For the most part (as the government report acknowledges), underground activities in the U.S. have concentrated on liberating animals or gathering information to expose the conditions found in certain laboratories.

As mentioned earlier, this approach proved to be quite successful, both in attracting media attention and in changing public policy. However, press coverage began to change to a more critical tone towards the end of the 1980s. Part of this change may have been caused by a more aggressive defense of the need for animal research by funding agencies and scientific organizations. But it may be more than just coincidence that media coverage of animal rights has become more negative as the “dangerous” and “violent” labels have begun to stick to the more visible actions of the movement (the Justice Department report notes that actions against people and property [as opposed to gathering information or releasing animals] increased towards the end of the 1980s). The attitudes of law enforcement authorities in the U.K. and the U.S. showed a similar evolution. There was no great enthusiasm for investigating the illegal activities of animal activists until they started causing significant property damage and threatening harm to individuals.

The question of the “justice” of legal protests and illegal actions in a democratic society is not an easy public policy issue. It is generally recognized that civil disobedience (see table) does have a place in a democracy and that even non-persuasive tactics, aimed simply at changing behavior (rather than opinion and then behavior), can be justified. Nevertheless, even legal protests aimed at specific individuals can be very intimidating. The Montgomery County Council in Maryland struggled for a long time with attempts to develop

legislation that would prevent the picketing of a research scientist's home by animal activists without contravening "free speech" protections under the Constitution. Clearly, the council views the picketing of an individual as unacceptable although the picketing of an organization would be unlikely to rouse the council to similar action.

The limits of protest and direct action in a pluralistic and democratic society are not easy to determine. Clearly, most legal protests are viewed by society as acceptable and some illegal actions have even been viewed as acceptable law-breaking. The limits of appropriate civil disobedience have been the focus of considerable discussion (e.g. Rawls, 1971; Applbaum, 1991). For example, civil disobedience must be a public act, aimed at changing peoples' attitudes (persuasive civil disobedience), or aimed at changing peoples' behavior but not necessarily their attitudes (non-persuasive civil disobedience).

In the past, acts of civil disobedience have been used to challenge racial segregation and other discriminatory laws and those who led those challenges are now regarded as American heroes (e.g. Martin Luther King and Rosa Parks). Even the theft of property is sometimes viewed as justified (e.g. Daniel Ellsberg and the Pentagon Papers) although there is plenty of room for argument. However, destruction of property and actions aimed simply or largely at intimidating or harming individuals have rarely if ever been regarded as acceptable by a democratic society outside a declared war.

The targeting of an individual outside the support structure of the institution he or she represents is, even if legal, unlikely to be viewed as acceptable by society, or even by many animal activists, because it carries such a heavy burden of intimidation. As long as animal research is sanctioned and supported by society, then protest should be aimed at the relevant institutions

and not specifically at the individuals who belong to those institutions. However, the situation is not that clear in other areas of animal use where it is the individual choice and behavior that is perceived to be objectionable as much as the industry that supports it (e.g. fur wearing). Clearly, more thought and discussion on the limits of acceptable action in pursuing animal liberation goals is necessary.

Some animal activists do regard the liberation of animals as tantamount to a war, but, as long as they subscribe to the basic and defining premise of animal liberation - namely, not harming or causing suffering to other sentient beings, their campaign tactics should incorporate the same principle. Because humans are sentient beings, they must be given at least as much consideration as the animals.

F. CONCLUSION

The current debate over the use of animals in research may be intense but it is largely unproductive. The assumptions that both sets of protagonists have about each other are generally false and obstruct constructive discussion. While there are always likely to be intense feelings about animal research, it is not necessary to assume that progress toward a broad public consensus is impossible. Some progress has already occurred although more by accident than by design. Formal mechanisms should be established where free and open discussion of the issues that concern both sides is initiated and encouraged between both sets of protagonists.

Colin Blakemore, an Oxford physiologist and vision researcher has spoken out in support of animal research but not without cost. Apart from receiving the usual hate mail, his daughters have also been threatened with kidnapping and death. On December 23, 1993, Blakemore also received a letter bomb filled with needles which was defused by the police. However, when Vernon Coleman, a U.K. animal activist, said he was going to publish Blakemore's home address and telephone number, other activists condemned Coleman for being highly irresponsible. The British court system agreed and awarded a gag order preventing Coleman from proceeding with his plans. (Seachrist, 1994)

CHAPTER XI

POLICY PROPOSALS

A. OFFICIAL PANEL ON ANIMAL RESEARCH

An officially sanctioned forum should be established with representatives from animal protection and research organizations, independent analysts and an experienced chairperson and moderator to determine how much reasonable common ground exists and to address specific assertions and claims by either side.

The obvious question that arises is what is the most appropriate institutional home for such a forum. The National Institutes of Health already have bureaucratic structures (e.g. the Office for Protection from Research Risks) that deal with these issues but they are far from the only government agency that is faced with laboratory animal issues. The National Science Board could also provide a home for such a forum and there are ongoing discussions on Capitol Hill about the need for a Bioethics Board (possibly to fulfill a function in values evaluation similar to the Office of Technology Assessment in technology evaluation). If such a board were established, the animal research controversy certainly qualifies as a bioethical issue (although bioethics has traditionally concentrated on human biology and medicine) and could become one of the problems addressed by the Board.

B. DATA AND INFORMATION

The USDA should develop a more extensive annual report form so that those involved in making and influencing public policy can have reliable data to support or refute arguments.

Discussion of animal research issues in the United States has always been severely compromised by the lack of basic and agreed data on the numbers of animals

used, on how the animals are used, on the types of research that is conducted on laboratory animals, and on the trends in animal use over the years. In Europe, where such data have been generated by Great Britain for many years and are now becoming more widely available in other countries because of a European Union directive, it is possible to identify trends and problem areas with some reliability. Critics may not always agree with how the data are interpreted but the two sides would not have to spend as much time simply trying to establish a baseline set of agreed "facts."

The Regulatory Enforcement and Animal Care (REAC) group in the Animal and Plant Health Inspection Service of the U.S. Department of Agriculture is already charged under the Animal Welfare Act with collecting some information on animal numbers (rat and mouse data are not collected although rats and mice account for 80-85% of all laboratory animal use). The reliability of the current data has been questioned and no independent audit has ever been undertaken of the REAC annual reports. The USDA has always resisted expanding its data-collection activities. However, REAC is the obvious institution to be charged with collecting and reporting such data.

C. LABORATORY ANIMAL SUFFERING AND DISTRESS

Because the public is chiefly concerned about how much distress and suffering laboratory animals experience, mechanisms should be developed:

- 1. to establish a more accurate assessment of the extent of animal pain and distress in research and testing (see B above); and**
- 2. to investigate ways that laboratory animal suffering and distress can be minimized and to support appropriate research on the topic.**

Gathering information on the nature and extent of laboratory animal pain, distress and suffering could be another of the charges given to REAC if its data-collection role were to be expanded (see B above). There are models that have been tried in Europe that might be modified for the United States so it need not be a completely "blind" activity. The development of accurate (and trusted) data would prevent exaggerated claims by both sides in the debate and would provide guidance on the areas where efforts to develop alternatives (to reduce animal pain and distress) would directly address a major public concern.

There are also important philosophical and technical components to the issue of animal pain, distress and suffering, but there is little systematic and coordinated effort to develop new technical approaches that would significantly reduce laboratory animal pain and distress. Institutional Animal Care and Use Committees have set a variety of limits on what can and cannot be done to research animals to reduce animal distress but there is little data to support the effectiveness of those limits. Funding for research into this issue is very limited and such research is not of high prestige. Nonetheless, it is important from both the animal's point of view and also to promote and support the best science. It can be relatively easily shown that animals that experience pain and distress generally are not good research subjects and will give rise to data of questionable quality.

D. ALTERNATIVES TO ANIMAL TESTING

The new Applied Toxicology program authorized under the 1993 NIH Revitalization Act should be funded and built into a program that addresses new method (i.e. alternative) development, validation and implementation.

Representatives of a group of corporations and animal protection organizations agreed on language that was inserted into the NIH Revitalization Act that authorized a new program to develop and validate new toxicity tests, especially tests that would reduce animal use or animal distress. Both the corporations and animal protection groups agree that there is an urgent need for government coordination of the many private initiatives to develop, validate and implement alternatives so that the needs of both the corporate and regulatory sectors can be properly addressed. In addition, the European Union has recently set up a European Centre for the Validation of Alternatives Methods (ECVAM) that will be driving the development and use of new testing techniques in Europe. Given the global economy, any initiatives taken by Europe will have immediate consequences for companies in the U.S., and it is important that there are strong communication and collaborative ties between ECVAM and the U.S. Such ties would be most productive and constructive if they were established between ECVAM and a program in the U.S. that had similar responsibilities.

E. BUILDING BLOCKS FOR CONSENSUS DEVELOPMENT

Scientific organizations should formally accept that the use of animals in research entails some costs in animal death and distress and should establish programs that specifically support efforts to minimize those costs. At the same time, animal protection groups should recognize that clinical (i.e. human), animal and non-animal research techniques have all played a significant role in the advance of biological knowledge and that removal of one of these three elements is likely to slow down the advance of biological knowledge.

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APPENDICES

APPENDIX I ORGANIZATIONS AND RESOURCES

- A. Animal Protection Organizations
- B. Research Advocacy Organizations
- C. Budgets
- D. Trends in Funding

APPENDIX II HISTORY OF THE ANIMAL PROTECTION MOVEMENT

APPENDIX I

A. LISTING OF ANIMAL PROTECTION ORGANIZATIONS

For the sake of brevity, the terms “animal rights,” “animal welfare” and “animal protection” are used as follows. “Animal rights” refers to individuals or groups who have fundamental objections to both animal killing and animal suffering. “Animal welfare” refers to individuals or groups who have fundamental objections to causing animal suffering but who are prepared to accept the painless killing of animals for “necessary” human ends. “Animal protection” is a more general, collective term for all groups (including the two just described) interested in promoting the well being of animals.

This is not a complete list of all animal protection groups, or even all that address animal research issues in some form. However, most of those that contribute to the public debate in a significant way are included.

American Anti-Vivisection Society (AAVS)

Suite 204, Noble Plaza, 801 Old York Road, Jenkintown,
PA 19046 (215/887-0816)

1992 budget - \$988,000; assets - \$5.8 million

The AAVS was the first anti-vivisection (AV) society in the U.S. (founded in 1883). It formed a loose partnership with the National and New England AV Societies in the 1970s and 1980s when all three became more active in the debate after a long period of relative dormancy (other than mailings to their own supporters). Under former executive director Bernard Unti (a historian and bibliophile), the organization started to develop more detailed (i.e. scientific) criticisms of animal research and contracted with Dr. Robert Sharpe, a British chemist and antivivisectionist, to prepare material for brochures and pamphlets. The Demeter Fund was established to fund alternatives research and Dr. John McArdle was brought on board as science advisor and administrator of the Fund. The Demeter Fund has now filed to incorporate separately as the Alternatives Research and Development Foundation.

The American Society for the Prevention of Cruelty to Animals (ASPCA)

441 East 92nd St., New York, NY 10128 (212/876-7700)

1992 budget - \$20.3 million; assets - \$30.7 million

The New York-based ASPCA, the oldest animal protection organization in the United States (founded in 1866), avoided criticism of animal research for much of the twentieth century. In the mid-seventies, the organization became more activist and has been rebuilding a national membership and reputation. It now has a constituency of over 400,000

developed via direct mail. Roger Caras, the ABC TV personality, serves as president. Stephen Zawistoski, who holds a Ph.D. in animal behavior, is building links between the ASPCA and academic scientists. Amelia Tarzi, a European-trained lawyer, directs the Alternatives Center at the ASPCA which was started with Lasker money.

The American Humane Association (AHA)

63 Inverness Dr., East, Denver, CO 80112 (303/792-9900)
1992 budget - \$5.1 million; assets - \$5.4 million

This was the nation's first national animal protection group. It was founded in 1877. It is relatively conservative in the positions it takes and is better defined as an animal welfare than animal rights organization. It is recognized for the work it does on animal shelter issues and for its Hollywood office which scrutinizes the use of animals in films. Adele Douglass, in the AHA Washington office, is one of the most knowledgeable and effective lobbyists for animal protection in Washington. The AHA also has a Child Protection Division.

Animal Legal Defense Fund (ALDF)

1363 Lincoln Ave., #7, San Rafael, CA 94901 (415/459-0885)
1992 budget - \$1.2 million; assets - \$108,000

This organization is composed of lawyers who promote animal rights through the legal system. They accept cases that challenge the main-stream legal view of animals as merely property. They support the Students' Hot-line for advice on dissection and animal experimentation issues. Roger Galvin, one of the founding members of the ALDF, was the Montgomery County attorney who prosecuted Edward Taub in the Silver Spring monkey case. Steven Wise, who played a significant role in setting up the Cambridge, MA, city ordinance overseeing animal research and who argued against animal patenting before the Court of Patents and Appeals, is president of ALDF. Joyce Tischler is the executive director.

Animal Protection Institute (API)

P.O. Box 22505, Sacramento, CA 95822 (916/422-1921)
1992 budget - \$2.0 million; assets - \$457,700

This group was established in 1968 and built up by its founder, Belton Mouras (now no longer at API), using direct mail and print advertising. They are best known on the West coast although they do employ a lobbyist in Washington. Dr. Tim Manolis, a zoologist, serves in a professional role covering animal research among other duties.

Animal Rights International

P.O. Box 214, Planetarium Station, New York, NY 10024
(212/873-3674)

1992 budget - \$115,500; assets - \$73,000

This is a one-person organization run by Henry Spira who organized the first animal research protest (against sex experiments on cats at the American Museum of Natural History) that was successful in stopping research on animals. He subsequently organized the Draize and LD50 campaigns in the US that resulted in the spending of millions of dollars on alternatives research by corporations. Spira is an animal rights activist who is willing to negotiate for practical solutions where appropriate (and where everyone, especially the animals, benefit). Spira has taken some unpopular stands but his success at stimulating real progress has gained him the respect of many animal activists while his willingness to negotiate with "the other side" has given him credibility in industrial circles.

Association of Veterinarians for Animal Rights (AVAR)

P.O. Box 6269, Vacaville, CA 95696-6269 (707/451-1391)

AVAR was formed by veterinarians Neil Wolff and Nedim Buyukmihci. It has concentrated on issues such as the use of animals in veterinary education and animal use and treatment in the veterinary profession.

Animal Welfare Institute (AWI)

P.O. Box 3650, Washington, DC 20007 (202/337-2332)

1992 budget - \$723,000; assets - \$768,000

This group was founded by its current head, Christine Stevens, in 1951, who has a significant record of legislative achievement on behalf of animal protection behind her. She is considered one of the most effective lobbyists for animal causes in Washington. The Animal Welfare Institute has focused mainly on animal research, trapping, wild animal issues, and marine mammals and has fought for legislation and regulation through its lobbying arm, the Society for Animal Protective Legislation. Christine Stevens has been a major player in the passing and amending of the Animal Welfare Act.

Doris Day Animal League (DDAL)

111 Massachusetts Ave, NW, #200, Washington, DC
20001 (202/842-3325)
1992 budget - \$1.8 million; assets - \$269,900

The DDAL was founded to work for animals through legislative advocacy. Their main spokesperson, Holly Hazard, is an attorney and lobbyist in Washington.

Friends of Animals (FOA)

P.O. Box 1244, Norwalk, CT 06865 (203/866-5223)
1992 budget - \$3.7 million; assets - \$1.7 million

FOA was founded in 1947 by Alice Herrington and has traditionally focused on low-cost spay/neuter programs, trapping and animal research issues. They have been the lead organization in the protests against the use of dogs by U.S. Surgical Corporation located near them in Connecticut. Priscilla Feral is their current president.

Fund for Animals (FfA)

200 West 57th St., New York, NY 10019 (212/246-2096)
1992 budget - \$1.9 million; assets - \$8.5 million

The president of the FfA is Cleveland Amory, the author of numerous books and a media personality. He is also on the board of directors of the New England Anti-Vivisection Society. Although basically an animal rights organization, the many branch offices have considerable latitude and the basic organizational position varies from branch to branch. The FfA has not concentrated on animal research or alternatives issues.

The Humane Society of the United States (HSUS)

2100 L. St., Washington, DC 20037 (202/452-1100)
1992 budget - \$16.9 million; assets - \$36.5 million

This is the largest of the national animal welfare organizations. Since 1980, their membership has grown from 55,000 to around 500,000 and their constituents (people on the donor list) number around 1.5 million. Their budget has grown from just under 3 million to almost 19 million in 1992. The organization has a set of standard policy documents, but individual staff are given relatively wide latitude to develop and implement policy.

The laboratory animal department has been granted vice presidential status and is headed by Martin Stephens, a Ph.D. in the life sciences, who supports dialogue and negotiation. The HSUS has established a Scientific Advisory Panel, headed by David Wiebers, a Mayo Clinic neurologist, that advises on animal research issues. Other professionals associated with HSUS are vice president Randall Lockwood, a Ph.D. in animal behavior and psychology, and Michael Fox, a well-known veterinarian and dog and cat behavior expert who is now focusing on farm animal issues and the ethics of biotechnology. Paul Irwin is currently president of HSUS and John Hoyt, former president, is CEO of Humane Society International and remains an influential voice at HSUS.

The HSUS and the MSPCA jointly paid for the services of Paul Tsongas, the former senator from Massachusetts. Tsongas' efforts helped to gain more money for the NIH's Biomedical Models and Materials Resources program in 1990.

In Defense of Animals (IDA)

21 Tamal Vista Boulevard, #140, Corte Madera, CA 94925
(415/924-4454)

1992 budget - \$981,000; assets - \$219,000

This is a relatively new animal rights group in the San Francisco Bay area. The head of the organization is Elliot Katz, a veterinarian. A direct-mail fund-raising campaign has resulted in substantial membership growth. Under the coordination of Michael Budkie in Cincinnati, IDA spearheaded the campaign against Procter and Gamble's use of animals in testing and research. IDA tactics appear to favor confrontational approaches and media exposure.

International Society for Animal Rights (ISAR)

421 South State St., Clarks Summit, PA 18411 (717/586-2200)

1992 budget - \$586,000; assets - \$398,000

This is the first of the animal rights groups to be established in the U.S., but it has now been surpassed by other groups who have been more effective in gaining both media visibility and funds. This group has a special interest in the pound animal issue and has taken a hard-line stand against any use of dogs or cats in laboratories. Helen Jones is the head of the organization.

Massachusetts Society for the Prevention of cruelty to Animals (MSPCA)

350 S. Huntington Ave., Boston, MA 02113
(617/522-7400)

1992 budget - \$20 million; assets - \$60.3 million

The MSPCA is the third-oldest animal welfare group in America and the richest in terms of endowment (about 60 million dollars). However, the bulk of their annual budget is earmarked for their animal hospitals, a system of state-wide shelters, and their law enforcement officers who enforce animal cruelty laws and other animal statutes. Although the title suggests a state focus, this organization has a national presence and is usually identified as one of the "big four" and grouped with the AHA, ASPCA and HSUS. Their lobbyist, Martha Armstrong, is a very effective player in Washington and Massachusetts. The MSPCA and HSUS have also jointly paid for the lobbying services of former US senator, Paul Tsongas.

The president is veterinarian Gus Thornton. The vice president for hospitals, Peter Theran, has a special interest in animal research issues (he was in charge of laboratory animal programs at Boston University for many years) and has been named director of CLAW - the Center for Laboratory Animal Welfare.

The Medical Research Modernization Committee (MRMC)

Box 6036 Grand Central Station, New York, NY 10163
(Approximate budget in \$10,000's)

This is a small group of health professionals who have an animal rights viewpoint. However, due to limited resources, they have proven most effective as advisors to the larger groups. The leader of MRMC is an ophthalmologist, Stephen Kaufman, who is currently based in Ohio. The organization publishes a newsletter and other materials, including an annual "Perspectives" volume that uses a scientific approach to argue against animal research and testing. Individuals associated with or published by the MRMC include Dr. Irwin Bross, a biostatistician who has challenged the thinking of the cancer establishment for years; Dr. Nedim Buyukmihci, a veterinary ophthalmologist who is co-founder of the Association of Veterinarians for Animal Rights; Dr. Eric Dunayer, veterinarian and animal activist; Dr. Ulrich Fritzsche, a Seattle physician; Dr. Marvin Kraushar, a New Jersey physician and member of the HSUS Science Advisory Board; Dr. Brandon Reines, a veterinarian with an interest in medical history; Dr. Harvey Sapolsky, an MIT arms policy expert; and Dr. Kenneth Stoller, a California pediatrician.

National Alliance for Animals (NAA)

P.O. Box 77012, Washington, DC 20013 (703/527-1539)

1990 budget - \$16,000

This group played a leading role in organizing the "March for the Animals" on June 10, 1990, in Washington, D.C. that brought 25,000 people to demonstrate in front of the Capitol Building. They are an animal rights organization with limited resources. They have focused on legislation and legislative workshops.

National Anti-Vivisection Society (NAVS)

100 East Ohio St., Chicago, IL 60611 (312/787-4486)

1992 budget - \$1.5 million; assets - \$3.4 million

NAVS supports the International Fund for Ethical Research (IFER) that provides about two grants of \$25,000 a year for alternatives research. Their main spokesperson, Donald Barnes, used to conduct psychology research on animals for the Department of Defense before renouncing the work as useless and abusive. He is an effective speaker on both live panels and in the media.

New England Anti-Vivisection Society (NEAVS)

333 Washington St., Boston, MA 02135 (617/589-0522)

1992 budget - \$1.9 million; assets - \$6.7 million

NEAVS provided the first major grant for alternatives research in the U.S. in 1980. A few years later, it was "taken over" in a membership battle by a group of individuals with close ties to PETA (see below). Since then, NEAVS has provided funding support for a variety of animal rights projects and programs and has continued with its education programs in New England.

People for the Ethical treatment of Animals (PETA)

P.O. Box 42516, Washington, DC 20015 (301/770-744)

1992 budget - \$8.1 million; assets - \$3.6 million

PETA is the largest and most visible of the animal rights organizations. From a small group of activists who, in 1981, exposed the conditions at the Institute for Behavioral Research (the Taub/Silver Spring monkey case), they have grown to a national organization with a staff of more than sixty and an annual budget exceeding eight million dollars. PETA pioneered the tactic of the undercover investigation and their exposés have made national headlines. Apart from the Silver Spring monkey case, PETA also released video footage of a head trauma laboratory in

Pennsylvania and brought complaints against numerous other research institutions for abuse of research animals.

PETA has an active Compassion Campaign against the use of animals in product testing and, together with IDA, are very visible players on the testing issue. Their tactics have involved calls for boycotts, stockholder resolutions, and mailing campaigns. Recently, PETA released a letter from L'Oreal stating that the company would perform no more product testing on animals. Ingrid Newkirk and Alex Pacheco, who head up the organization, are the main public spokespersons on these issues.

Physicians Committee for Responsible Medicine (PCRM)

P. O. Box 6322, Washington, DC 20015 (202/686-2210)
1991 budget - \$1.1 million; assets - \$90,100

This organization is run by psychiatrist, Neal Barnard. PCRM has in the past received substantial support from NEAVS and produces a variety of heavily referenced publications. The AMA is anxious to identify PCRM as a fringe group and not in the mainstream of medical thinking. Barnard is intelligent and articulate. He stresses science and health, avoiding overt ethical arguments. In PCRM literature, there is heavy emphasis on the negative aspects of meat consumption and this issue has drawn large student audiences. The PCRM's promotion of the "New Four Groups" (food) coincided with the upheaval over the USDA's announcement of its new food pyramid and received prominent media attention. They were organizers of the widely covered press conference at which Benjamin Spock told mothers not to feed cow's milk to their infants. PCRM conducts a summer student internship program which supports a variety of student research projects.

Psychologists for the Ethical Treatment of Animals (PsyETA)

P. O. Box 1297, Washington Grove, MD 20880 (301/963
4751)
1991 budget - below \$100,000

PsyETA was founded to raise the issue of animal care and welfare within the community of psychologists in general and the American Psychological Association in particular. They publish a newsletter and a journal *Society and Animals*. The executive director, Dr. Kenneth Shapiro, is editor of *Society and Animals*.

Scientists Center for Animal Welfare (SCAW)

4805 St. Elmo Ave., Bethesda, MD 20814 (301/907-3993)

1991 budget - ca. \$300,000

SCAW was modeled after the British organization, Universities Federation for Animal Welfare, which is known for its scientific and technical approach to animal welfare issues. SCAW's original board contained representatives from animal protection organizations but it is now drawn entirely from university academics and industry scientists. SCAW holds conferences on animal care and use issues and has produced useful conference proceedings and other publications that mainly address technical aspects of laboratory animal care and use.

United Action for Animals (UAA)

205 E. 42nd St., New York, NY 10017 (212/983-5315)

1990 budget - \$877,000.

UAA was founded in 1967 by Eleanor Seiling who brought her own unique style and prose to the animal research issue. She was critical of many, especially the compromisers in the animal movement who did not agree with her that there were already more than enough alternatives. After her death several years ago, the organization drifted and began losing assets. They recently hired Brandon Reines, a veterinarian, who writes about medical history and contends that most medical discoveries are made in the clinic with subsequent animal studies simply dramatizing the earlier discoveries. The 1990 budget figure is misleading because they spent much more than they took in during 1990 and 1991 and the current budget is likely to be closer to \$200,000 than \$1 million.

WARDS (Working for Animals in Research, Drugs and Surgery)

1660 L Street, NW, Suite 612, Washington, DC 20036

(202/785-0423)

1992 budget - ca. \$300,000

WARDS was established by Peyton Dunn in the late 1950s to help push through laboratory animal welfare legislation. The organization has supported responsible animal research but has focused its efforts on improving animal care. Currently, the organization publishes a general newsletter and a quarterly aimed at the laboratory animal community called *Science and Animal Care*. They have supported a program for laboratory animal technician training and several projects at veterinary schools. They have also cosponsored several workshops and conferences with SCAW.



APPENDIX I

B. LISTING OF RESEARCH ADVOCACY ORGANIZATIONS

Alabama Association for Biomedical Research

P.O. Box Box 55335, Birmingham, AL 35255 (205/934-7677)

Americans for Medical Progress (AMP)

1735 Jefferson Davis Highway, Suite 907, Arlington, VA
22207-3401 (703/412-1111)
1992 budget - \$2.3 million

This organization, founded to educate the American people about the benefits of medical research including the role of laboratory animals, received a grant of \$980,000 from U.S. Surgical Corporation in 1991 and Leon Hirsch, president and CEO of U.S. Surgical, serves on the board of directors. Since then, AMP has distributed a biweekly column to, and placed numerous advertisements in, national and local newspapers, produced television ads (plus a half-hour television program) and developed education and public outreach programs through its subsidiary, Americans for Medical Progress Educational Foundation. Susan Paris is the president.

California Biomedical Research Association

48 Shattuck Square, Box 114, Berkeley, CA 94704 (510/644-0829)
3010 Wilshire Blvd., Box 238, Los Angeles, CA 90010

The CBRA is one of the more active state organizations.

Connecticut United for Research Excellence (CURE)

5 Brookside Dr., P.O. Box 5048, Wallingford, CT 06492-7548 (203/294-3521)
1992 budget - \$265,000

CURE is a coalition comprised of nearly 60 member organizations that was organized in 1990 to provide information to the public on the real life applicability of biomedical research. It is one of "the network" of state organizations and is well-known for *BioRap*, a newsletter for middle grades that is now distributed in six states. CURE also serves as resource to media and members of state general assembly. The president is Deborah Pasquale.

Educators for Responsible Science

10 Bay St., Suite 63, Westport, CT. 06880 (203/222-7933)

The group is closely associated with Americans for Medical Progress.

Foundation for Biomedical Research (FBR)

818 Connecticut Ave., NW, Suite 303, Washington, D.C.

20006 (202/457-0654)

1991 budget - \$1.2 million; assets - \$2.4 million

The FBR is the "sister organization" and educational arm of the NABR (see below). It has produced a wide range of educational publications and videotapes of high quality.

Georgia Association for Biomedical Research

P.O. Drawer 22275, Atlanta, GA 30322 (404/727-7428)

Health, Safety and Research Alliance of New York

P.O. Box 1256, Murray Hill Station, NY, NY 10156 (212/263-6505)

Join Hands

529 14th St NW, Suite 544, Washington, DC 20045

The organization was founded in 1990 by a number of companies who were concerned about public knowledge about animal testing. The organization produces educational programs and materials for the public on animal testing issues. Paul Ford is the executive director.

Massachusetts Society for Medical Research (MSMR)

1440 Main St., Waltham, MA 02254-9134 (617/891-4554)

1992 budget - \$300,000

The MSMR was founded in 1953 by medical schools, universities, hospitals and societies engaging in animal research to order to support the advancement of research in biology, medicine, pharmacy and veterinary medicine. In the past few years, they have focused on the research animal issue, and, while stating they support limited and humane use of animals, have undertaken aggressive campaigns and education programs for students, teachers, legislatures and the general public with the intent of counteracting the message of the animal rights organizations and to gain support for biomedical research. They have developed and distributed a very comprehensive curriculum for middle and secondary schools, *People and Animals: United For Health*. The

MSMR is one of the more active and better-know members of the state "network." Debra Cavalier is the president.

Maryland Society for Biomedical Research

Johns Hopkins School of Medicine, 720 Rutland Ave.,
Baltimore, MD 21205

Michigan Society for Biomedical Research

University of Michigan, Med Sci II, M7730, Ann Arbor,
MI 48109 (313/763-8029)

Missouri Association for Biomedicine

Washington University, Box 6081, 660 S. Euclid Ave., St.
Louis, MO 63110

National Association for Biomedical Research (NABR)

818 Connecticut Ave., NW, Suite 303, Washington, D.C.
(202/857-0540)

1992 budget - \$619,900; assets - 1.5 million

The NABR, established in 1979 and consolidated in 1985 with the National Society for Medical Research (which was established in 1946 in Chicago), is an organization of more than 350 institutions such as universities, medical, dental and veterinary schools, hospitals, academic and professional societies, pharmaceutical companies, laboratory animal breeders and other research-intensive companies. They advocate responsibility in the use of laboratory animals and the development of alternatives, and their literature states that they are "the only national nonprofit organization dedicated solely to advocating the vital role of humane animal use in biomedical research." They have developed excellent links with Congress and the Executive Branch in Washington and they were instrumental in the passing of the Animal Enterprise Protection Act of 1992. This act makes it a federal crime to cause physical disruption to the functioning of an animal enterprise. The NABR's focus is on legislative and regulatory activities where the FBR is focused on education. Frankie Trull is the president of NABR.

New Jersey Association for Biomedical Research

P.O. Box 8449, Elizabeth, NJ 07208 (908/355-4456)

North Carolina Association for Biomedical Research

Box 25459, Raleigh, NC 27611 (919/829-3911)

Ohio Scientific Education and Research Association

P.O. Box 14424, Columbus, OH 43214-0424

Oregon Biomedical Research Network

Oregon Regional Primate Research Center, 505 N. West
185, Beaverton, OR 97006 (503/645-1141)

Pennsylvania Society for Biomedical Research

P.O. Box 1163, Camp Hill, PA 17011 (717/731-3557)

Research! America

99 Canal Center Plaza, Alexandria, VA 22314 (703/739-
2577)

1992 budget - \$900,000

This organization, formed in 1989, is an advocacy and public outreach organization. Their focus is raising public awareness about and gathering support (funding) for medical research. The president is Mary Woolley.

Texas Society for Biomedical Research

401 W. 15th St., Austin, TX 78701 (512/370-1660)

Virginia Association for Biomedical Research and Education

P.O. Box 5608, Richmond, VA 23220 (804/371-6555)

Washington Association for Biomedical Research

200 Broadway, Seattle, WA 98122 (206/621-8556)

West Virginia Association for Biomedical Research

P.O.Box 4286, Star City, WV 26505 (304/292-2689)

Wisconsin Association for Biomedical Research and Education

750 N. 18th St., Suite 133, Milwaukee, WI 53233 (414/
933-9500)

C. BUDGETS, EXPENSES AND ASSETS OF SOME OF THE ORGANIZATIONS**1. ANIMAL PROTECTION AND WILDLIFE CONSERVATION**

(For either calendar or fiscal year 1992)

<u>Organization</u>	<u>1992 Budget</u>	<u>Total Assets</u>	<u>Spent on Programs</u>	<u>Spent on Overhead</u>
Nature Conserv.	\$214,787,407	793,754,297	179,777,685	35,009,722
Greenpeace	45,800,000	unavailable	28,000,000	17,800,000
Sierra Club	39,801,921	22,674,244	28,837,344	10,964,577
Nat. Aud. Soc.	36,022,327	61,281,006	28,003,604	8,018,723
ASPCA	20,348,275	30,661,093	14,859,057	5,489,218
MSPCA	19,986,210	60,351,099	15,715,031	4,271,179
HSUS	18,902,292	36,465,350	11,990,618	5,909,029
PETA	8,085,191	3,552,277	5,916,977	2,168,214
AHA	5,088,550	5,387,120	3,741,837	1,346,713
Fund for Animals	1,881,922	8,550,140	1,355,822	526,100
NEAVS	1,859,424	6,655,727	1,589,875	269,549
Doris Day A.P.L.	1,818,706	269,894	1,475,871	342,835
Nat'l. Antivi. Soc.	1,473,472	3,379,462	1,069,764	403,708
An. Leg. Def. Fund	1,155,730	107,758	687,634	468,096
Amer. Antiviv. Soc.	988,206	5,842,019	664,041	324,165
In Def. of Animals	980,775	219,041	708,382	272,394
Humane Farm. Ass.	972,041	1,621,746	874,832	97,832
An. Welf. Inst.	723,023	768,524	591,330	131,693
Farm Sanctuary	423,732	833,437	345,159	78,573
Primarily Primates	342,492	400,982	226,473	116,019

*Animal People, December, 1993***2. RESEARCH ADVOCACY (For either calendar or fiscal year 1991)**

<u>Organization</u>	<u>1991 Budget</u>	<u>Total Assets</u>	<u>Spent on Programs</u>	<u>Spent on Overhead</u>
AMP (1992)	\$2,300,000	not available	not avail.	not avail.
FBR	1,163,182	2,376,339	1,049,841	113,341
NABR	615,968	1,224,543	449,447	166,521

The state research-advocacy organizations operate on annual budgets that range from \$50,000 to over \$200,000. Figures for the national organizations may not be obtained via income tax returns filed for tax exempt organizations as some do not list themselves as non-profit organizations. Many professional societies and scientific organizations have also become actively involved in the debate over animal research, including the National Institutes of Health and the Alcohol, Drug Abuse and Mental Health Administration.



D. TRENDS IN FUNDING FOR ENVIRONMENTAL AND ANIMAL ORGANIZATIONS

(The following tables give the expenses for representative organizations individually and as a group.)

1. ENVIRONMENTAL				
(Yearly budgets in millions)				
	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
Nature Conservancy	156.0	137.7	202.0	214.8
Wilderness Society	17.3	17.7	18.1	16.9
Defenders of Wildlife	4.4	4.2	4.4	5.4
World Wildlife Fund	47.5	51.2	51.2	53.9
Nat. Audubon Society	<u>34.9</u>	<u>33.5</u>	<u>39.2</u>	<u>36.0</u>
Total	260.1	244.3	314.9	327.0
2. ANIMAL PROTECTION - "WELFARE"				
(Yearly budgets in millions)				
	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
ASPCA	16.8	19.1	19.5	20.3
MSPCA	18.6	19.1	18.1	20.0
HSUS*	13.9	16.5	17.1*	18.9
AHA	3.2	3.2	3.7	5.0
Animal Protect. Inst.	2.7	2.8	2.8	2.0
Animal Welfare Inst.	<u>.5</u>	<u>.7</u>	<u>.7</u>	<u>.7</u>
Total	55.7	61.4	59.9	63.9
*The HSUS has recorded the most dramatic increase in funding, increasing from 2.62 million in 1980 to 16.49 million in 1990. In the 1980s, the growth rate ran at 62% per annum.				
** There are small differences between HSUS Annual Report figures and the figures reported in <i>Animal People</i> .				
3. ANIMAL PROTECTION - "RIGHTS"				
(Yearly budgets in millions)				
	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
PETA*	7.0	8.8	9.8	8.1
Doris Day An. Prot. League	4.7	3.1	1.5	1.8
Inter. Fund. An. Welf.	4.3	4.9	3.6	3.8
Friends of Animals	4.1	4.1	4.3	3.7
Defend. of An. Rights	0.5	0.5	0.6	0.6
Fund for Animals	1.3	1.7	2.1	1.9
Phys. Com. Resp. Med.	0.9	0.9	1.1	1.0
In Defense of Animals	<u>0.7</u>	<u>0.7</u>	<u>0.9</u>	<u>0.9</u>
Total	23.5	24.7	23.9	21.8
*Between 1980 and 1990, PETA grew from an annual income of \$20,000 to \$8.8 million.				

4. ANTIVIVISECTION

(Yearly budgets in millions)

	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
New Eng. Antiviv. Soc.	1.5	2.0	not avail.	1.9
Nat. Antiviv. Soc.	1.5	1.7	1.6	1.5
Amer. Antiviv. Soc.	<u>1.0</u>	<u>.9</u>	<u>1.0</u>	<u>1.0</u>
Total	4.0	4.6		4.4

5. RESEARCH ADVOCACY

(Yearly budgets in millions)

	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
FBR	Not obtained	1.2	1.2	Not obtained
NABR	0.4	0.5	0.6	0.6
CURE	Not in existence	0.1	0.2	0.3
MSMR	<u>0.2</u>	<u>0.2</u>	<u>0.2</u>	<u>0.3</u>
Total		2.0	2.2	

(Figures compiled from *Animal People*, December 1992, January/February 1993, December 1993; *Animals' Agenda*, April, 1992; *MSMR Annual Reports*; *FBR Annual Reports*, and provided by the Nature Conservancy)

OF THE \$90.1 MILLION SPENT BY ANIMAL ORGANIZATIONS IN 1992, PERHAPS 15-20% WOULD HAVE BEEN DEVOTED TO ANIMAL RESEARCH ISSUES AND CAMPAIGNS. THE RESEARCH ADVOCACY GROUPS THAT SPECIALIZE IN ANIMAL RESEARCH PROBABLY SPEND AROUND \$5 MILLION ANNUALLY BUT THIS FIGURE DOES NOT INCLUDE EXPENDITURES BY HEALTH PROFESSIONAL ORGANIZATIONS, SCIENTIFIC SOCIETIES AND GOVERNMENT BODIES.

APPENDIX II

THE HISTORY OF THE ANIMAL PROTECTION MOVEMENT

The animal protection movement has waxed and waned in social influence over the past two centuries. There were two periods during which it commanded significant public support. The first of these periods lasted from about 1870 to 1910. We are living in the second period, which started in the 1960s.

a) The Development of the Movement - the 19th Century

Societal concern for animals was not much in evidence from ancient times to the Renaissance although individual thinkers wrote about the issue from time to time. For example, Cicero, the Roman author, deplored the cruelty of the Roman games. Thomas (1983), the English historian, described the development of heightened concern for nature in Britain from 1500 to 1800. Organized animal protection did not appear on the scene until 1824 with the founding of the Society for the Prevention of Cruelty to Animals (later the Royal SPCA) in London.

These early efforts at preventing animal abuse tended to be concentrated on the treatment of horses and animals used in spectacles and entertainment. The first animal protection law was Martin's Act which provided some protection for horses, cattle and asses. Later, the animal movement became a potent political force with its campaign against the use of animals in research, a practice that has always touched a particularly raw nerve. A variety of reasons have been put forward why animal protection and antivivisection should have risen to prominence at the end of the Victorian era (French, 1975; Stevenson, 1956; Turner, 1980).

(i) The publication of the theory of evolution and Darwin's arguments about the evolution of human beings broke down assumptions that humans and animals were radically different in kind. People began to investigate animal behavior and discuss animal intelligence.

(ii) Some of the Protestant religions (e.g. Methodism) held that animals had souls and these teachings raised questions about how animals should be treated. By contrast, Roman Catholicism did not believe that animals had any claims on human beings.

(iii) British utilitarian philosophy laid the groundwork for Victorian concerns about suffering and promoted admiration for those who showed they were "men of feeling." The women's movement was also politically important at this time and may have increased attention to questions of caring for the exploited, be they black, slaves, children or animals.

(iv) There was considerable competition within the medical profession between the Anatomists who controlled the teaching of medicine and the new experimental physiologists who were gaining stature and influence within medicine. Some of the Anatomists were not shy about accusing their rivals of cruelty during their experiments. Also, the interest in public health led some to believe that animal research was a waste of time since far more could be achieved by public health measures.

(v) The public found it very hard to reconcile the idea of the physician as a concerned humanitarian with the individual who was also responsible for the perceived horrors of the research laboratory.

Similar developments were observed in other northern European countries, and, in fact, the Kaiser led all countries when he outlawed the baiting of animals in 1789. Several other animal protection laws were passed in Germany between 1840 and 1870.

In America, the first two SPCAs were the American SPCA founded by Henry Bergh in New York in 1866 and the Massachusetts SPCA founded by George Angell in Boston in 1868. Both men were part of the social set and carried considerable influence in their respective communities. Their lead was followed by others and numerous humane groups were founded in the next twenty years. The American Humane Association was established in 1877 as a national organization representing the interests of the local societies at the national level. By 1900, animal protection and antivivisection enjoyed support from prominent leaders in America and were driven by similar concerns to those identified for Britain.

b) The Development of the Movement - the 20th Century

After the First World War, animal protection and antivivisection lost influence and one does not observe any signs of a renaissance in the movement until the 1950s when new organizations began appearing at an increasing rate. Table 1 lists the years in which various groups with a national focus were founded in the U.S.

The rate of founding of these groups increased dramatically in the last 40 years (Rowan, 1989a). Membership grew steadily between 1950 and 1980 but then exploded in the 1980s. For example, the Humane Society of the United States grew from 35,000 members in 1978 to over 500,000 in 1989. People for the Ethical Treatment of Animals (PETA), the largest animal rights organization in

America, grew from a handful of members in 1980 to 300,000 by the end of the decade. The Humane Farming Association, a group that concentrates exclusively on farm animal issues, claims 50,000 members.

c) Social Factors

Very little scholarly analysis of the reasons for this explosive growth has been published but some of the elements appear to be very similar to those that powered the nineteenth century animal movement to political prominence. For example, academic philosophy appears to have played a very important role in providing rational (and hence respected) arguments in favor of increased concern for animals. (By and large, sentiment is not persuasive in moving the opinion leaders in the country.) There has also been a substantial shift in people's attitude towards what might be termed animal "intelligence." In contrast to the decades of behaviorism and positivism from 1920 to 1960, when animals were perceived to be little more than reacting machines, the modern focus on their psychological abilities has, as in the Darwinian era, narrowed the gap between humans and animals. Finally, the rise in the women's movement in the last three decades has increased the status of female concerns on the political agenda. It could be argued that nurturing and caring are more important concerns for women than for men and that there has been an increased emphasis on nurturing (be it children, the environment, or animals).

(i) A philosopher's contribution

The impact of Singer's book (Singer, 1975) on the growth of the animal protection movement cannot be underestimated. His argument was simple and was presented with compelling logic. He backed up his claims with many examples of perceived animal abuse. At the time, animal protection suffered from the stigma of sentimentality (it still does) and many who worked for the cause could not provide a logical and rational explanation of why they thought animal protection was important. More often than not, they would resort to arguments that could be dismissed as emotional. Singer changed all this and gave people arguments that could be used to justify concerns for animal protection, based not on appeals to sentiment, but on clear reason. Singer empowered many animal protectionists and helped launch the modern animal rights movement. (It is ironic that Singer's philosophy is based on utilitarianism which rejects "rights" arguments as unhelpful.)

Table 1. Founding Dates of "National" Animal Organizations in the U.S.

<u>Year Founded</u>	<u>Group Name or Initials</u>
<u>Phase 1: 1866-1916</u>	
1866	American Society for the Prevention of Cruelty to Animals (Bergh, New York)
1868	Massachusetts Society for the Prevention of Cruelty to Animals (Angell, Boston)
1877	International Humane Society (American Humane Association)
1883	American Anti-Vivisection Society
1889	American Humane Education Society
1895	New England Anti-Vivisection Society
<u>Phase 2: 1916-1950</u>	
1929	National Antivivisection Society
<u>Phase 3: 1950-1975</u>	
1951	Animal Welfare Institute
1954	Humane Society of the United States
1955	Our Animal WARDS
1957	Friends of Animals
1959	Catholic Society for Animal Welfare (now International Society for Animal Rights)
1966	<i>Passage of the Laboratory Animal Welfare Act</i>
1967	Fund for Animals United Action for Animals
1968	Animal Protection Institute
1969	International Fund for Animal Welfare
1971	Greenpeace
1971	(Founding of local animal rights groups begins)
1973	International Primate Protection League
1975	<i>Publication of Animal Liberation</i>

Table 1. Founding Dates of "National" Animal Organizations in the U.S.

<u>Year Founded</u>	<u>Group Name or Initials</u>
<u>Phase 3: 1976-Present</u>	
1976	Animal Rights International (Spira) Committee to Abolish Sport Hunting
1976	<i>American Museum of Natural History Case</i>
1977	Scientists Center for Animal Welfare
1978	Animal Legal Defense Fund Medical Research Modernization Committee
1979	Animal Rights Network - <i>Agenda</i> Magazine People for the Ethical Treatment of Animals Psychologists for the Ethical Treatment of Animals
1980	Action for Life
1981	Trans-Species Unlimited (now Animal Rights Mobilization or ARM!) Mobilization for Animals Association of Veterinarians for Animal Rights Farm Animal Reform Movement
1981	<i>Silver Spring Monkey Case</i>
1982	Farm Animal Concerns Trust National Alliance for Animal Legislation
1983	In Defense of Animals
1984	Humane Farming Association Performing Animal Welfare Society
1984	<i>Baby Fae Case</i>
1985	International Network for Religion & Animals Physicians Committee for Reform of Medicine ProPets(Coalition against pound animal release)
1985	<i>Pennsylvania Head Trauma Laboratory Case</i>
1985	<i>New PHS Guidelines and AWA Amendments</i>
1986	Farm Sanctuary
1987	<i>Animals Voice</i> Magazine
1988	Doris Day Animal Protection League (APL)
1992	<i>Passage of the Stenholm Bill on illegal activity</i>
1993	<i>First World Congress on Alternatives</i>

Singer's ideas were also very important in recruiting new members from the professions and academe into the movement. He articulated a provocative and persuasive theme that appeals to those who need a rational argument before they become involved in a cause.

(ii) Impact of change in views of animals

A shift in public attitudes towards animals - namely from seeing them as dumb animals to intelligent beings with emotions and drives similar to our own - is probably one of the the major societal factors driving the growth of concern for animals. The behaviorist tradition dominated thought about animals from 1920 to the early 1960s. In the mid sixties, scientists again started to discuss and explore the cognitive and psychological abilities of animals (Griffin, 1976). This period also marked the growth of ethology as a science and a re-awakening of public wonder over the natural behavior (and "intelligence") of animals.

In an increasingly urban society, where attitudes to animals are shaped more by companionship needs than by frontier and rural experience, animal cognition and intelligence became a popular topic. Television was an important influence, starting in the 1960s. *National Geographic's* footage of the human-like behavior and reasoning of the chimpanzees in Gombe and of Koko the gorilla and her pet kitten delighted millions of urban Americans. Studies with "talking" chimpanzees raised uncomfortable questions about the uniqueness of human language. Oceanaria featured dolphins and killer whales and promoted them as sweet, gentle and very intelligent creatures. The number of, and attachment to, companion dogs and cats grew. It is hardly surprising that the public has become much more concerned about the way animals are treated.

(iii) Gender issues and the women's movement

Carol Gilligan has argued that nurturing and caregiving is an important value for women (Gilligan et al, 1988). Indeed it is a truism that concern for animals is higher among women than among men and it has been argued that feminism and animal protection are closely linked (Donovan, 1990; Sperlinger, 1988). Certainly, many of the recently formed animal protection groups were started by women and women continue to play a significant role in the movement. A 1976 in-depth survey of a randomly selected national sample of over 3,000 persons, reported that 2.0% of the female population has supported an animal protection group while only 0.6% of the male population has (Kellert and Berry, 1981).

If women are more care-oriented, then "care" issues should receive more political attention in a society when the political status of women rises. It is noteworthy that the animal protection movement enjoyed relatively high social status in the 19th century when there was growing pressure to educate women and give them the vote (Elston, 1987). In the 20th century, the increase in status of the animal movement similarly follows a push for greater equality for women. Singer's book was titled *Animal Liberation* at the height of the push for women's liberation and this is probably more than simple coincidence. However, as with animal cognition, the link is interesting and suggestive but does not necessarily prove causality.

d) Who are the Members of the Movement?

As with the sociology of the movement, there has been little analysis of who makes up the members of the various groups. However, several studies have been undertaken recently and both books and articles on who is motivated to join an animal group should soon be seen (available).

In 1976, Steven Kellert conducted a survey of over 3,000 American adults to determine their attitudes to wildlife. He asked questions about membership in various organizations (Kellert and Berry, 1981) and the results are reported in Table 2.

<u>Organization</u>	<u>Male</u>	<u>Female</u>
Animal Protection	0.6%	2.0%
Wildlife Preservation	3.4%	2.5%
Environmental Protection	1.5%	0.8%

From Table 2, it can be estimated that about 1.2% of American adults were members of animal protection groups in 1976. In 1989, a survey conducted for a large consumer goods company found that 6.0% of the public reported that they are members of animal protection groups and 20% said they had donated money to an animal group (did not distinguish between protection and conservation). Thus, membership of the animal movement grew five-fold, most of it probably in the 1980s since other data indicate that the exponential growth began between 1981 and 1984 (Rowan, 1989a).

In 1984 and 1990, the readers of *Animal's Agenda* were surveyed (*Animals' Agenda*, 1985; Richards and Krannich, 1991). The first study was an unscientific reader survey done by the magazine. The second was a random sample studied by an independent scholar as part of a sociology Ph.D. The data is set out in Table 3, together with comparative statistics on the U.S. population as a whole.

Table 3: Demographic characteristics of animal rights activists who subscribe to *Animals Agenda Magazine*.

	<u>Agenda Readers</u>	<u>General Public</u>
<u>1990 Survey</u>		
White	97%	
Female	78%	
Aged 30-49	57%	24%
College graduates	84%	18% (1984) ^{1*}
Masters/PhD	33%	8%
Urban	80%	77% (1987) ^{2*}
Income over \$50K	39%	5%
Pet ownership/hshld	4.7	1.2
<u>1984 Survey</u>		
Over 50	20%	26% (1985)*
Married	50%	63% (1988)*
Agnostic/Atheists	65%	13% (1987) ^{3*}
Business/professional	80%	29% (1987)*

* *Statistical Abstract of the U.S. 1990*. U.S. Dept. of Commerce, Bureau of the Census *Almanac of the 50 States, 1990*. Ed. Edith R. Hornor, Information Publ., Palo, Alto, CA 1. Figure mean of 1980 (16%) and 1988(20%) figures of those who have completed 4 or more years of college; 2. Figure for metropolitan percentage; and 3. Figure for all those who are not Protestant, Catholic or Jewish

The respondents in the 1990 survey indicated very strong support for the environmental movement with 98.4% supporting environmental organizations and 72% claiming to be active in the environmental movement. Some have argued that the animal movement is basically anti-science and disaffected but these results do not support such claims.

A

Ad Hominem attacks 143
 Advanced Tissue Sciences (ATS) 112
 AIDS 43
 Alternatives 51–52, 59, 60, 70
 animal testing 109–116
 chronology 70
 unnecessary animal research 46
 American AntiVivisection Society (AAVS) 4
 American Humane Association (AHA) 150
 American Medical Association (AMA) 138
 American Medical Student Association
 (AMSA) 67
 American Museum of Natural History 123, 134
 American Society for the Prevention of Cruelty to
 Animals (ASPCA) 4, 5, 150
 American Veterinary Medical Association
 (AVMA) 27
 Anesthesia use in animal research 62
 Angell, George 118
 Animal and Plant Health Inspection Service
 (APHIS) 16, 25
 Animal benefit 42
 Animal Enterprise Protection Act 148
 Animal images 133
 Animal Legal Defense Fund (ALDF) 8, 119
 Animal Liberation 5, 6, 147
 Animal Liberation Front (ALF) 22, 39, 150
 Animal models 50
 Animal pain and distress 7
 Animal Procedures Committee (UK) 29, 132
 Animal Protection Movement 117
 Animal research
 attitudes to 12
 criticisms of 44
 DoD numbers 17
 media interactions 138
 value of 37
 Animal Rights
 philosophy 33
 "Animal Rights" movement
 activists 143
 dialogue or confrontation 28
 launching 7
 Animal testing
 Cosmetic & Household Products 100
 number of animals 19
 Animal use, trends 15

Animal Welfare Act 6, 7, 25
 1985 amendments 8, 67, 119
 Animal Welfare Institute 6, 118
 Anxiety 77
 Armed Forces Institute of Pathology (AFIP) 50
 Aronson, Lester 123
 Association for Research on Vision and Ophthal-
 mology (ARVO) 27
 Association of American Medical Colleges
 (AAMC) 67, 95
 Attitudes, anti-science 1
 Attitudes to animal research 12, 88
 children 89
 public 11
 public, 1949 11
 Attitudes to animals 1
 Audiovisual 63
 Australian Association for Humane Research
 (AAHR) 53
 Australian Council on the Care of Animals in
 Research (ACCAR) 29
 Avon 101

B

Baby Fae 22
 Bacteria and protozoa, as alternatives 64
 Banting, Frederick 41
 Barnard, Neil 49
 Bentham, Jeremy 3, 31, 74
 Bergh, Henry 4
 Bernard, Claude 3
 Best, Charles 41
 Bigelow, Henry 73
 Blakemore, Colin 153
 Blum, Deborah 135
 Body Shop 102
 Boyle, Robert 3
 British Toxicology Society (BTS) 108

C

CAM assay 111
 CAM assay 71, 110, 113
 Canadian Council on Animal Care
 (CCAC) 28, 29
 Cassell, Eric 81
 CEASE 150
 Center for Alternatives to Animal Testing
 (CAAT) 71, 105, 119

Chemie Grünenthal 114
 Chlorpromazine 50
 Chronicle of Higher Education 40
 Ciba Geigy 18
 Citation analysis 50, 51
 Civil disobedience 152 *See also* Ad Hominem attacks
 Clinical studies 49
 Cohen, Carl 33
 Coleman, Vernon 153
 Collip, James 41
 Commander, laboratory dog 142
 Commercial 19
 Computer modelling, as alternative 64
 Comroe and Dripps 43
 Cosmetic, Toiletry and Fragrance Association (CTFA) 101, 104, 105
 Cost-benefit balance, animal research 56
 Cruelty-free 100, 101

D

Darwin, Charles 3, 4
 Department of Defense (DoD) 18, 134
 animal numbers 17
 Department of Health and Human Services (DHHS) 60
 Diagnosis 20
 Diphtheria 5
 Dissection 92
 Distillers Ltd. 114
 Distress 20, 79
 Dole, Robert 119
 Donnelly, Strachan 131
 Draize eye irritancy
 test 59, 71, 103, 120, 121, 134, 141

E

Education 19, 20, 66
 Environmental Protection Agency (EPA) 111
 EU (EC) 29
 EU (EC), 1986 Directive 29
 European Centre for the Validation of Alternative (ECVA) 68
 Exxon 68
 EYTEX 111

F

Fear 77
 Federation of American Societies for Experimental Biology (FASEB) 138
 Felix Wankel Prize 70
 Food and Drug Administration (FDA) 106, 111
 Food, Drug and Cosmetic Act of 1938 97
 Foundation for Biomedical Research (FBR) 38
 FRAME 70
 Freund's Adjuvant 54, 62

G

Galen 3
 Gallinger Bill, 1894 5
 Garner, Robert 147
 Gender differences, attitudes to animals 90
 Graham, Jennifer 93
 Great Britain 18, 24, 54

H

Hastings Center 131
 Hazleton Laboratories 105
 Head trauma 22
 Pennsylvania laboratory 124
 Health Research Extension Act 59
 Hearst, William Randolph 11
 Heckler, Margaret 37, 128
 Hoffman-La Roche 18, 52, 68
 Human benefit, animal research 38
 Human studies, as alternatives 65
 Humane Farming Association (HFA) 119
 Humane Society of the United States (HSUS) 6, 8, 117
 Close-Up Reports 119, 120, 150

I

Institute for Laboratory Animal Resources (ILAR) 15, 17, 93
 Institutional Animal Care and Use Committees 26
 Insulin 31, 41, 51
 International Association for the Study of Pain (IASP) 27, 85
 Invertebrates, as alternatives 82
 Irene Castle McLaughlin 126

K

- Kellert, Stephen 89
 Knowledge, from animal research 42
 Koop, C. Everett 37

L

- Laboratory animal care 73
 Laboratory Animal Welfare Act,
 1966 6, 122, 134
 Lawson Tait Trust 70
 LD50 71, 100, 104
 fixed dose procedure 108
 testing 54, 59, 106
 Leffingwell, Albert 5
 Lien, John 91
 Life Magazine 6
 Limulus Amoeboid Lysate 61
 Litigation, standing to sue 8
 Littlewood Committee 70
 Loma Linda University Medical Center 22
 Lord Dowding Fund 70
 L'Oreal 68, 101
 Lovenheim, Peter 117

M

- March for the Animals 120, 139
 Mary Kay 101
 Massachusetts Society for the Prevention of Cruelty
 (MSPCA) 150
 McCabe, Katie 135, 146
 Medawar, Peter 56, 146
 Media, role in debate 133
 Minkowski, Oskar 41
 Mobilization for Animals 120
 Monoclonal antibody 66

N

- National Antivivisection Society (NAVS) 6, 11
 National Association for Biomedical Research
 (NABR) 128, 129, 139
 National Association for the Advancement of
 Humane and Environmental Education
 (NAAHEE) 91
 National Association of Biology Teachers
 (NABT) 94
 National Cancer Institute (NCI) 18, 52, 62

- National Institutes of Health
 (NIH) 26, 39, 43, 59, 65
 Biomedical Models and Materials
 Resources 59, 119
 National Research Council (NRC) 75, 80
 National Rifle Association (NRA) 126
 National Science Board (NSB) 11, 138
 National Science Foundation (NSF) 27
 National Society for Medical Research
 (NSMR) 11, 107, 128, 129
 Netherlands, pain categories 24, 54
 Neutral Red assay 111
 New England Antivivisection Society
 (NEAVS) 4, 71
 NIH Revitalization Act 60
 Nobel Prizes, and research methods 56

O

- Office for the Protection from Research Risks
 (OPRR) 39, 60
 Office of Technology Assessment (OTA) 14
 Orem, John 39, 125
 Organization for Economic Cooperation and
 Development 28, 53, 108
 Osler, William 50

P

- Pacheco, Alex 124
 Pain 20
 guidelines 84
 Parvovirus 42
 Penicillin 114
 People for the Ethical Treatment of Animals
 (PETA) 22, 39, 93, 118, 124, 141, 146
 Physical & Chemical Techniques 65
 Physicians Committee for Responsible Medicine
 (PCRM) 67
 Polio vaccine 31
 Polio virus 62
 Pound animals 7
 Prefrontal lobotomy 75
 President Reagan 119
 Prevention, and animal research 46
 Procter and Gamble 68, 103, 105, 111, 112
 ProPets, pound animal campaign 122
 Public health, and animal research 46
 Public Health Service 25

- R**
- Reeve, Christopher 121
 Regan, Tom 33, 45, 74
 Reines, Brandon 49
 Research advocacy 128
 Research animal use 13
 Research Defence Society (RDS) 37, 139
 Revlon 101, 104, 105, 111, 134
 Richey, Charles R. 8
 Riley, Vernon 80
 Risk evaluation 98
 Rockefeller University 104
 Rollin, Bernard 74
 Russell and Burch 61, 70
- S**
- Salt, Henry 5
 Schroeder, Patricia 119
 Science 134
 Science achievement and opposition to animal research 87
 Scientific Personality 136
 Scientific Procedures Act, 1986 (UK) 63, 132
 Scientists Center for Animal Welfare (SCAW) 27
 Shaw, George Bernard 5
 SIDS 39
 Silicon Microphysiometer 112
 Silver Spring case 122
 Silverman, Jerry 145
 Singer, Peter 6, 32, 74, 80, 147
 Society for Neuroscience 27
 Speciesism 44
 Spira, Henry 104, 123, 150
 Stevens, Christine 118, 119
 Stress 79
 Suffering 80. *See also* see also anxiety, distress, fear, pain
 Sullivan, Louis 37, 139
- T**
- Taub, Edward 122, 124, 135
 Terrorism 141, 148. *See also* see also ad hominem attacks
 Texas Tech University 39, 125
 Thalidomide 97, 114
 Tissue Culture, as alternative 66
 Tom's of Maine 102
 Toxicity Testing 20. *See also* Chapter IX
 Troubled Middle 131
 Tuberculosis 48
 Turner, James 5
- U**
- U.S. Court of Appeals 8
 Unilever 68, 103
 United Action for Animals (UAA) 70
 United States Department of Agriculture (USDA) 8, 14
 statistics 20, 55
 University of California, Davis, 149
 University of Pennsylvania 37
 head trauma 128
 medical school 22
 Utilitarianism 31
- V**
- Validation 99
 Value of animal research 37
 von Mering, Joseph 41
- W**
- Wade, Nicholas 123, 134
 Washingtonian Magazine 135
 White, Caroline E. 5
 White, Robert 5
 World Congress on Alternatives 68
- X**
- Xenometrix Ltd 113
- Z**
- Zbinden, Gerhard 107
 Zeneca Ltd 68