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1 Issues in animal experimentation

> Looking back at the first half of my life as a zoologist I am particularly impressed by one fact: none of my teachers, lecturers, or professors with whom I came into contact . . . none of the directors of laboratories where I worked, and none of my co-workers ever discussed with me, or each other in my presence, *the ethics of zoology*. No one ever suggested that one should respect the lives of animals in the laboratory or that they, and not the experiments, however fascinating and instructive, were worthy of greater consideration.
>
> *Miriam Rothschild (1986, p. 50)*

AIMS

The purpose of this book is to introduce life science students to the major issues that constitute modern debate about animal experimentation. Many such students will complete tertiary studies and go on to become the new generation of scientists. Those in the medical and allied health professions may only be exposed to animal experimentation in their undergraduate years. Others, such as geneticists, molecular biologists, veterinarians, physiologists, zoologists and agricultural scientists, may be actively involved in animal research at a postgraduate level and beyond. The welfare of animals in their care will continue to be of major concern to their employers, the granting bodies that fund their scientific research and to the public at large.

At some stage all such students will have to make a personal decision about the extent to which they are prepared to use research animals. Such decisions may influence potential career options. Most will be able to justify, to themselves and others, many forms of experimentation. Conversely, others will find that they are incapable of any intrusive procedure involving certain sentient animals. For some, sentience will not be an issue – they will be unable to experiment using *any* animals. I argue that decisions as serious as this ought to be taken only after informed discussion about major issues in animal experimentation.

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These decisions will inevitably be made against a backdrop of differing societal and personal opinions about what is, and is not, appropriate treatment of animals. Adrian Franklin (2007) reported ambivalence and inconsistencies in the attitudes of people towards the treatment of animals in general. In his survey, almost all respondents (93 per cent) were comfortable with the idea of the humane killing of animals for food. But what happens if you muddy the waters a little? People have vastly different opinions about the treatment of particular species. In western society, it is acceptable to kill lambs for food but it is unacceptable to kill dogs for the same purpose. What about wildlife? In Australia there is ongoing debate about whether kangaroos that are killed in pastoral areas when numbers become too high ought to be used for food (Franklin 2007). Again, opinions differ and rational arguments in favour of kangaroo culling for human consumption do not necessarily gel with the emotional responses people may have when considering the eating of that nation's wildlife symbol.

Similarities are evident in any discussion of animal experimentation. Surveys of general attitudes to the use of animals for experimental and teaching purposes have consistently reported the majority of people in favour of such practices, where the procedures are important and suffering is minimised (e.g. Pifer, Shimizu and Pifer 1994; Franklin 2007; Leaman, Latter and Clemence 2014; Joffe *et al.* 2016). Another laboratory animal use, in product testing, does not receive the same level of public support. In response to the statement: 'It is acceptable to use animals in scientific research to test . . . chemicals that could harm people', Leaman, Latter and Clemence (2014) reported only 41 per cent of Britons in favour (pp. 15–16). In a comprehensive review of public attitudes towards animal based research, Ormandy and Schuppli (2014) also reported less support for animal use in product testing than in medical research.

Specific attitudes to laboratory animal use also differ by gender, nationality and how well informed are the survey respondents (Swami, Furnham and Christopher 2008; Leaman, Latter and Clemence 2014; Ormandy and Schuppli 2014). The species of animal used, too, can influence public attitudes (Crettaz von Roten 2012; Ormandy, Schuppli and Weary 2012).

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Ultimately, though, most people who answer survey questions will never test potentially harmful chemicals on laboratory animals, nor will they perform any animal experiments. Many of the readers of this book will, and it is my contention that it is these people who need to be most informed. You must be able to determine what you are, and are not, capable of doing, and to express these opinions clearly and openly.

This book, therefore, aims to introduce to its readers important issues which have arisen out of the animal experimentation debate, which will assist them in making well-thought-out decisions. Not many students are fully conversant with the origins of modern animal experimentation practices, and fewer still with the intricacies of philosophical debate about the moral status of animals. In an increasing number of nations, animal experimentation is governed by legislation that aims to ensure that animals are used in ways in which suffering is minimised. It is important to know how the day-to-day practice of animal experimentation is regulated. Are you aware of the increasing number of available alternatives to using animals in experiments? By the time you have read this book, it is hoped that such information will assist you as you explore your thoughts and feelings about the use of research animals. You, too, have a voice in any discussion of animal experimentation.

Debate over issues in animal experimentation has come a long way, particularly since the 1970s. No longer does reasoned debate take the following form: opponent: 'All experimentation must cease!'; proponent: 'You're being totally sentimental; scientists know best!'. Instead (thankfully), contemporary discussions involve such issues as: What constitutes an essential experiment? What is appropriate conduct when using animals in research? What alternatives to using animals are available? In many countries (e.g. Australia, Canada and New Zealand), such debate is conducted against a background of progressive legislation that ensures, through a system of enforced self-regulation involving institutional ethics committees, that all experimentation, from undergraduate rat dissections to complex surgery on cats, dogs or wildlife, is reviewed and approved before such procedures take place. Other countries (e.g. Britain) rely on rigorous government regulation and a staff of inspectors rather than on self-regulation in addition to an ethical review

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process. Whatever the regulatory framework, its presence also acts to ensure that most public concerns about the unrestricted conduct of experiments are allayed.

Nevertheless, whenever an emotive issue is under discussion, opinions will differ. For those who are vehemently opposed to the use of animals for scientific research, no experiment will ever be considered essential, no conduct when using research animals will be deemed appropriate. At the other end of the spectrum there still may be advocates of scientific research free from any regulation. From this perspective, the welfare of human beings will always outweigh the welfare of non-human beings, and the quest for knowledge must never be hindered by what may be interpreted as ignorance or sentimentalism.

Wherever you or I choose to stand along this continuum, we must never lose sight of the fact that many of the medical benefits humanity carries with it in the twenty-first century arose through the use of research animals. Dreaded diseases such as poliomyelitis were once a scourge that ended many a young person's life. Survivors bore crippling limb deformities or were kept alive using artificial respirators. Because of experiments in which monkeys were integral, polio no longer poses the dire threat it did in the twentieth century. When a vaccine is developed which reduces the risk of humans becoming infected with human immunodeficiency virus (Gray *et al.* 2016; Harmon *et al.* 2016), it is certain that animals will have had a role to play in ensuring that such a treatment is safe for people to use.

So why is there a dilemma? Why do some students and researchers feel they are unable to conduct experiments involving certain animals? Why are scientists attacked, verbally and physically, for participating in research which may provide similar breakthroughs to that made in the containment of polio (Cressey 2011)? What is it that some sections of society find so reprehensible in such scientific activity? The answers to all such questions have an ethical basis. Few in society would object to an increased quality of life, human or non-human, for reasons other than ethical ones. For some, it is simply that the price of such advances may be too high. Thinking opponents of animal experimentation argue that for every experimental procedure that involves research animals,

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the means must justify the end. Radical opponents of animal experimentation argue (sometimes violently) that the end can never justify the means.

For people not involved in animal experimentation in any direct sense (remember, everybody who buys commercial products that have been tested on animals, or who has taken antibiotics or many other forms of medication is involved, indirectly), it is a relatively simple thing to be generally in favour of, or opposed to, research that involves animals. Most people are not working in laboratories, however. If you are to be part of the next generation of scientists, you might be. Readers have to determine what they are, and are not, capable of doing with research animals in their care. After all, if you are unable to justify aspects of your work to yourself, you will have difficulty justifying them to others.

What you will learn in your chosen field is that science demands professional objectivity from its adherents – little, if any, room is available for subjectivity, sentimentality and value judgements. Yet you, as scientists, are only human. You may find yourselves in the position of having to justify certain activities conducted within your laboratories which, if conducted outside them, might be viewed as barbaric. A provocative example: Why is it that a researcher can spend his or her weekend at home playing with a family pet and then, on Monday morning, return to their laboratory and test a potentially harmful chemical compound on stray or unwanted dogs? What is it about the donning of a white coat and the entering of the clinical atmosphere of a laboratory that can create an air of professional detachment? Opponents of animal experimentation may argue that such a scientist simply has ceased to feel. The scientists will argue that their work is of sufficient importance to the community at large to outweigh their feelings. Such scientists learn to manage the tension that arises between their professional objectivity and their personal feelings. For some readers, learning how to manage similar tensions will be an essential part of their education.

Contrary to what some opponents of animal experimentation may believe, it is both unfair and incorrect to state that western scientists currently conducting animal experiments are not fully conversant with

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their responsibilities. The overwhelming majority of practising scientists with whom I have been associated have a profound respect for the sacrifice made by their experimental subjects. They understand and work within their legal obligations and are in tune with the commonly voiced concerns of an increasingly well-informed general public. Modern society (rightly) insists that investigators increasingly pursue what are known as the 'three Rs' of modern research (Russell and Burch 1959). Namely:

- a *replacement* of animals in research, which follows on from an active development of alternatives;
- a *reduction* in the numbers of animals used in experiments;
- a *refinement* of laboratory and field techniques to reduce invasiveness and/or to increase the value of the results.

The 'three Rs' can be achieved in many ways. One tremendously important way is to alert science students to their future obligations as a part of their curriculum. In the European Union, appropriate training is now mandated (2010/63/EU Directive; Franco and Olsson 2014) and it should be an ideal of all modern nations that no university be able to graduate students from the biological or medical sciences who have not been educated formally in theories and practices that promote the humane care of animals used for scientific purposes. It is towards this goal that this book is directed.

DEFINITIONS

For clarity, it is necessary to define certain terms that will be used throughout. *Animal* is used in its broadest sense to encompass all animate life forms. Where necessary, I will differentiate between human and non-human animals. Much discussion about animal experimentation is concerned only with certain 'higher' animals. Instead of using 'higher' to describe those animals with which we most associate (i.e. vertebrates generally and certain mammals in particular), I will refer to their *sentience*. A *sentient* animal not only has an awareness of its surroundings but is capable of suffering and experiencing pain. Pain is a difficult concept to define, and I deal with this in Chapter 7.

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I use the term(s) *animal experiment(ation)* when discussing the use of live animals in research in the biological, ecological, psychological and medical technological sciences. The term also is appropriate to describe animal use in xenotransplantation and the generation of genetically altered and cloned animals, the production of biological extracts and the testing of consumer products, drugs and food. *Vivisection,* in the strictest sense, is the partial or complete dissection of live animals for research purposes. This is the definition that will be applied here. The word dates from a time when the majority of experiments involved dissection. *Anti-vivisection(ists)* is used to describe the stance of opposition (and its advocates) to this form of animal experimentation.

In many countries, research institutions now have committees that consider ethical aspects of research which involves sentient animals. They come under many names, so in this book, for consistency, all are referred to as *Animal Ethics Committees (AECs)*.

SCOPE

Currently, information on all aspects of animal welfare is available online and in many printed publications. Hundreds of articles have been written by moral philosophers, scientists and others advocating increased consideration for research animals. Many documents, too, are available that defend existing research procedures. In this book, I outline much of this extensive and specialised information for the readers for whom it is of the most value – the next generation of life scientists.

In the following chapters, readers will be introduced to the past, the present and the future of animal research.

- The origins of western vivisection are traced, and the parallel rise in opposition to such practices is discussed in context.
- Some of the many advances in human and non-human welfare that have been made possible by experiments which have involved research animals are described. Particular attention is given to the rapid growth in the number of animals bred and used in genetic alteration and associated research.

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- The principal moral objections to animal experimentation are introduced and readers are urged to find an ethical position with which they are most comfortable.
- The regulatory umbrellas under which experiments are conducted in western countries are discussed.
- Efforts made towards finding alternatives to animal experimentation are given their full due.

By the time they reach the end of this book, readers should be in a better position to consider their responses to the complexities inherent in any discussion of animal experimentation. Numerous references are provided for those who wish to enquire more extensively into particular areas of interest. These are intended to be illustrative rather than exhaustive and you are encouraged to use them as a stepping stone to further reading.

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2 A history of animal experimentation

> Those who think that science is ethically neutral confuse the findings of science, which are, with the activity of science, which is not.
>
> *Jacob Bronowski (1956, pp. 63–64)*

THE ORIGINS OF VIVISECTION IN EUROPE

Early records of vivisection procedures provide sobering reading. However, it is worthwhile to examine some of them in order to understand how public concern over animal experimentation arose. We also need to consider the origins of western scientific practices and the prevailing societal attitudes towards them. Readers interested in a complete history of animal experimentation and further insight into the historically important attitudes of humans towards animals are referred to excellent discussions elsewhere (Maehle and Tröhler 1987; Rupke 1987; French 1999; Ryder 2000; Franco 2013).

Live animals, both human and non-human, appear to have been first used in ancient times, principally to satisfy anatomical curiosity. In the third century BC, the Alexandrian physicians Herophilus and Erisistratus are recorded as having examined functional differences between sensory nerves, motor nerves and tendons (Singer 1957). Galen of Pergamum (AD 129–199), a Greek physician working in Rome, catalogued these early experiments, as well as conducting his own. He described, for the first time, the complexities of the cardiopulmonary system, and speculated on brain and spinal cord function (Duckworth, Lyons and Towers 1962). All such procedures were conducted without anaesthetics (which were not discovered until the mid-nineteenth century), and it is interesting to note the expression of his feelings during such experiments. When investigating the anatomy of the brain, Galen preferred to vivisect pigs to 'avoid seeing the unpleasant expression of the ape' (Maehle and Tröhler 1987, p. 15). Galen

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(1956) left a legacy for future scientists. In *De Anatomicis Administrationibus* (On Anatomical Procedures), he detailed precise experimental methods and indicated which instruments would be best to perform many specific procedures.

Documentation of vivisection from the Dark Ages is scanty. It was not until Galen's records were rediscovered during the sixteenth century that there appears to have been any renewal of interest in anatomy and scientific methods. Such experiments often were conducted as public demonstrations. Belgian Andreas Vesalius (1514–1564) and his students in Padua, Italy, illustrated public lectures on anatomy by using systematic non-human vivisection. An animal, usually a dog, would be cut open while still alive and the function of each organ would be speculated upon as it was located. It appears, from the records of these procedures, that the welfare of their experimental subjects was a low priority for these early vivisectionists. Maehle and Tröhler (1987) recorded that the experiments of one of Vesalius' pupils, Realdo Colombo (1516–1559), involving pregnant dogs, were greatly admired by members of the Catholic clergy:

> Colombo pulled a foetus out of the dog's womb and, hurting the young in front of the bitch's eyes, he provoked the latter's furious barking. But as soon as he held the puppy to the bitch's mouth, the dog started licking it tenderly, being obviously more concerned about the pain of its offspring than about its own suffering. When something other than the puppy was held in front of its mouth, the bitch snapped at it in a rage. The clergymen expressed their pleasure in observing this striking example of motherly love even in the 'brute creation' (cited in Maehle and Tröhler 1987, p. 18).

PREVAILING HUMANIST ATTITUDES TO ANIMALS

The Christian view

It may be difficult for readers to understand the apparent indifference to suffering exhibited in southern Europe at this time. What must be considered, however, is that the Christian church subscribed to the view that humans, blessed with the divine gift of reason, did not share a common evolutionary lineage with other animals. Three hundred

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