

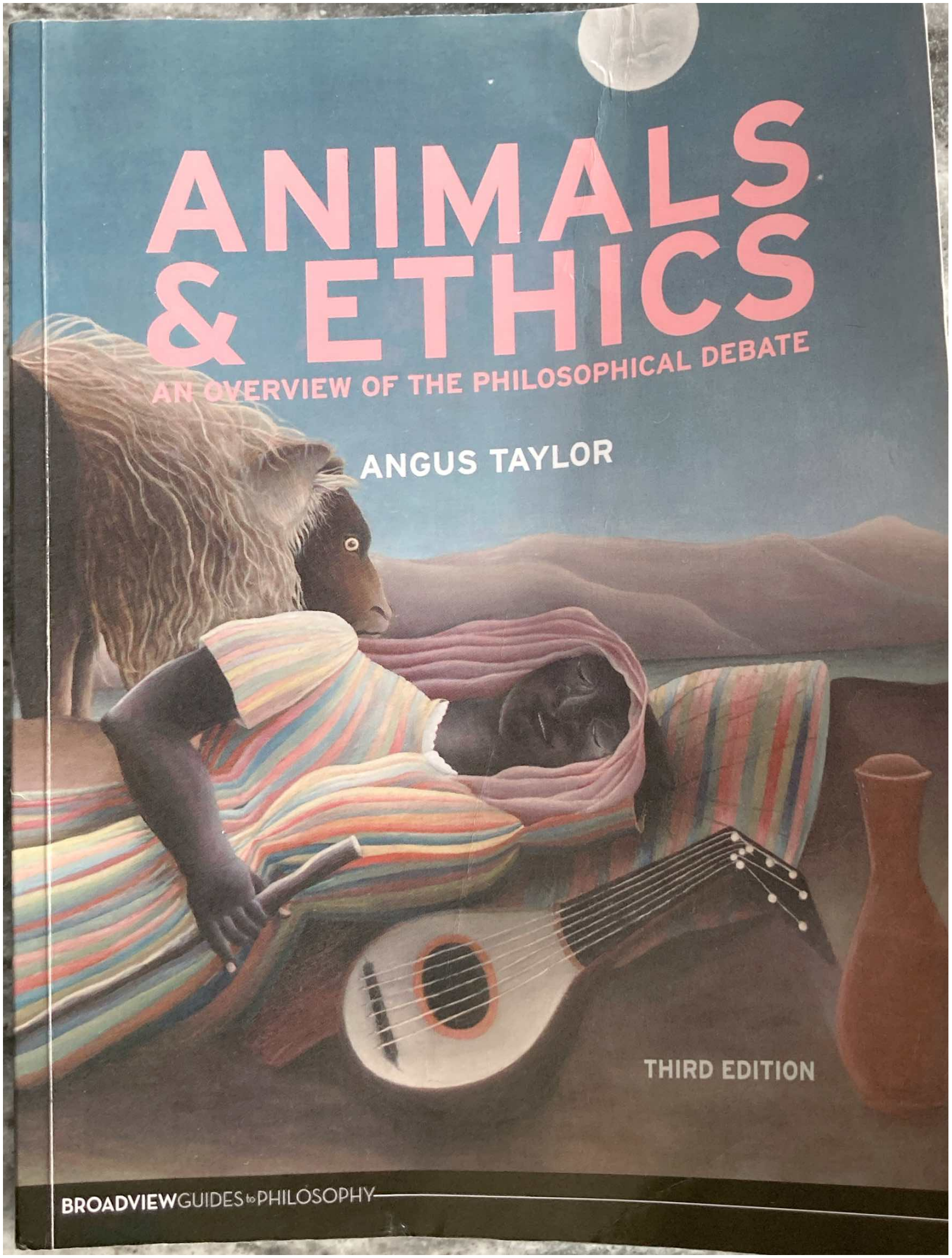
# ANIMALS & ETHICS

AN OVERVIEW OF THE PHILOSOPHICAL DEBATE

ANGUS TAYLOR

THIRD EDITION

BROADVIEW GUIDES to PHILOSOPHY



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3RD EDITION

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**BROADVIEW** GUIDES to PHILOSOPHY

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## CHAPTER FIVE

# IS IT WRONG TO USE ANIMALS FOR SCIENTIFIC RESEARCH?

**8a pages: 119-27**

**9a pages: 129-34**

Norman led Jennie into the laboratory and had her sit on a metal table near the windows. She sat there quietly while Norman and Peter fitted her with a helmet containing electrical monitors and couplings for attaching the helmet to other devices. She was watching the people walking across the lawn outside the windows. When they had finished, she had to lie down while the helmet was secured to a large machine and her arms and legs were secured to the table. All she could see now was the ceiling. Peter and Norman hooked up the monitoring devices in the helmet to a large console, checked out their equipment, and then turned it on. Jennie's head was given a tremendous blow by a piston that crashed into her helmet. She was knocked unconscious and stayed that way while Peter pried off her helmet. When she regained consciousness, she went into convulsions for five minutes. When the convulsions stopped, Peter and Norman ran some tests on her. She was blind now and could not control her arms sufficiently to grasp and carry to her mouth some food placed in her hands. Finally, she was wheeled into another room, where she was given an injection. Jennie died in less than a minute, and Norman and Peter began the work of decapitating her, describing the condition of her brain, and preparing slices of her brain tissue for microscopic analysis.

*S.F. Sapontzis*<sup>1</sup>

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<sup>1</sup> S.F. Sapontzis, "On Justifying the Exploitation of Animals in Research", *The Journal of Medicine and Philosophy* 13 (1988), pp. 177-78.

Of course, says Steve Sapontzis, Jennie was not human; she was a squirrel monkey. To do such a test on a human being would be immoral. The question then is, what justifies using a monkey?

In this chapter we turn our attention to the use of animals for scientific research. The arguments for and against the use of animals in scientific research to a considerable extent overlap those we have encountered in the debate about the use of animals for food, clothing, and sport, since much of what is at issue is the justifiability of subjecting animals to suffering or death for human purposes. What gives the issue of animal experimentation its distinct edge is, first, that the infliction of pain and injury is frequently a *desired* aspect of the activity and, second, that such treatment of animals is said to be a *necessary* condition for the relief of human suffering. This chapter also addresses another, recent, aspect of the use of animals in scientific research: genetic engineering. Here the issue is not just the infliction of suffering or death; rather, it has to do with re-creating the very nature of animals, the better to exploit them for human purposes.

Globally, about 115 million animals were used for research in 2005, according to a joint report by the Dr. Hadwen Trust and the British Union for the Abolition of Vivisection. Most of those used in research are rodents, but pigs, fish, dogs, cats, monkeys, chimpanzees, and others are also objects of experimentation. Animals are used for basic biomedical research, where the purpose is to gain original knowledge that does not necessarily have immediate application to the treatment of diseases. Animals are also used for the development and testing of drugs and for the testing of consumer goods (cosmetics, food additives, herbicides, pesticides, etc.). In addition, they are used for educational purposes, including dissection, surgery practice, and high-school science projects (Orlans 1993; Rollin 2006; Singer 2002).

Two types of experiments that have drawn particular public attention are the Draize test, in which cosmetics and other potentially hazardous products are tested on rabbits' eyes, and the LD50 (lethal dose 50 per cent) test, in which toxicity is measured by administering a substance to a group of animals and determining how much it takes to kill half of the group within fourteen days. Protest campaigns by activists have succeeded in reducing the frequency of these tests and the numbers of animals used (Singer 1998). Experiments that harm primates

tend to arouse particularly strong emotions, as in the case of videotapes taken from a laboratory at the University of Pennsylvania in 1984 that showed lab personnel making fun of paralyzed baboons whose heads had been smashed by a hydraulic piston during experiments on head trauma—an incident that eventually sparked a major sit-in by protesters at offices of the National Institutes of Health and led to a minor fine being imposed on the university for violations of the Animal Welfare Act (Orlans et al. 1998).

"Vivisection", strictly speaking, refers to the dissection, or cutting up, of living animals for scientific research, though in a broader sense the term includes any painful or harmful treatment of living animals for scientific research. Much, but not all, animal experimentation falls under the heading of vivisection in the broader sense. The issue of vivisection has long provoked strong emotions on both sides (Rudacille 2000). Experimenters have often been portrayed as immoral monsters. The Victorian and Edwardian eras witnessed a notable anti-vivisection movement, one in which women played the major part (French 1975; Lansbury 1985; Rupke 1987; Ryder 1989; J. Turner 1980; Vyvyan 1969). Among them was British feminist Frances Cobbe, co-founder of what became the National Anti-Vivisection Society.

As noted in Chapter 2, Charles Darwin, while sickened by the thought of vivisection, refused to lend his support to the movement because he believed that experimentation on animals was necessary for the progress of science. Alfred Russel Wallace, who independently originated the theory of natural selection at about the same time Darwin did, decided that vivisection should be totally abolished. He reached this conclusion despite believing that no animals have the same highly developed capacity to experience pain that humans have. According to Wallace (1911), pain is not as prevalent in nature as we are likely to imagine, since the capacity to experience pain only develops in species to the degree that it is useful for the preservation of life. Nevertheless he insisted that vivisection was not to be condoned. This was because, in addition to whatever suffering it caused, vivisection produced callousness in the experimenters and more often than not was carried out for trivial reasons.

Most scientists, however, have not displayed Darwin's ambivalent attitude, much less Wallace's antipathy. Even today some scientists deny

that animal experimentation raises any moral issues at all. Some still hold a neo-Cartesian view and refuse to use the word "suffering" because it implies that animals are conscious beings. In general, though, the scientific community has come to subscribe to what are called the "three Rs", three goals for the researcher concerned about animal welfare. These are (1) *replacement* of animals altogether by the use of alternative methods, (2) *reduction* in the numbers of animals used, by means of statistical techniques, and (3) *refinement* of experiments so as to cause less animal suffering (Mukerjee 1997; Rollin 2006). Even so, many scientists (e.g., Botting and Morrison 1997) insist that significant use of animals remains essential to scientific progress and that it is wishful thinking to imagine that animal experimentation now or in the foreseeable future can be completely replaced by *in vitro* ("test-tube") methods, by computer simulations, or by any of the other alternatives that are becoming available.

While there is evidence that many scientists are becoming more aware of the moral dimension of their research, there remains much resistance in the scientific community to engaging in dialogue with supporters of animal liberation (Bowd and Shapiro 1993; Orleans 1993). Liberationists are often dismissed as sentimental and irrational and are portrayed as being interested in hypothetical animal rights to the detriment of human rights (Baldwin 1993; Lansdell 1988; Pardes, West, and Pincus 1991). Thomas Gennarelli, who directed the experiments on baboons at the University of Pennsylvania's Head Trauma Research Center, refused to discuss the studies publicly because of the likelihood of stirring up what he called "all sorts of unnecessary fuss" (Orlans et al. 1998, p. 74). Two scientists at the University of California, Berkeley, have characterized an anti-vivisection rally on their campus as being attended by "a motley crew" of "frenzied fanatics" — whom journalists are said to have described as ranging from "purple-haired punks to violent vegetarians" (Nicoll and Russell 1990, p. 985).

The Berkeley scientists, co-founders of a pro-vivisection group called Coalition for Animals and Animal Research, conducted their own survey of some of the best-known books of pro-liberation philosophy. They found that the space devoted in this literature to the use of animals in research and teaching is out of all proportion to the number of animals "consumed" by humans in this way. In other words, while only

a small percentage of the animals killed by humans are killed for purposes of research and teaching, the animal-liberation movement directs a great deal of its criticism at the use of animals in science. The two scientists' conclusion: the movement is fundamentally anti-science, anti-intellectual, and misanthropic. They describe its members as "latter-day Luddites", a reference to the craft workers in early nineteenth-century England who destroyed the new machinery that was threatening their traditional livelihoods — the scientists' implication being that those who are opposed to vivisection are opposed to science-based progress.

Surveys of public attitudes toward animal experimentation do not support a simple Luddite thesis. A combination of rational and emotional factors determines the attitudes of people on both sides of the issue. Although those who are anti-vivisection and pro-liberation tend to be more sceptical about the benefits of science than the general population, they also tend to be younger and better educated than their opponents; a high percentage of activists are employed in professional occupations. They are also more likely to be female than male (Galvin and Herzog 1992; Groves 1997; Guither 1998; Herzog 1993a, 1993b; Jasper and Nelkin 1992; Jerolmack 2003; Mukerjee 1997; Sperling 1988).

### Cohen's Case for Animal Experimentation

We begin our look at the philosophical literature with an oft-cited essay by Carl Cohen, "The Case for the Use of Animals in Biomedical Research". Cohen adamantly endorses the use of animals in biomedical research, and indeed urges that the use of animals be increased. He considers and rejects the idea that biomedical research involving animals is wrong either because it violates the rights of animals or because it causes them suffering. Invoking Kant, he maintains that animals cannot have rights because they are not moral agents. From this his principal conclusion follows: we cannot violate the rights of animals for the simple reason that they have no rights to violate. Like others (e.g., McCloskey 1987) who subscribe to the traditional view that only moral agents qualify for moral rights, Cohen maintains that our duty to respect human persons justifies, and even requires, our experimental use of animals. However, he adds, we do have an obligation to treat sentient animals "humanely".

Turning to utilitarian arguments, Cohen begins by saying that he finds Peter Singer's equation of speciesism with racism and sexism not

only unsound but atrocious. Racism and sexism have no rational foundation; because human beings are moral agents, they have rights we must respect. By contrast, animals are not moral agents and therefore do not have the same moral standing. Cohen finds it offensive that anyone should claim that we owe the same moral regard to animals as to humans. He then makes a second point: even if, for the sake of argument, we were to grant Singer's claim that the interests of animals ought to be accorded equal consideration with the like interests of human beings, the use of animals for biomedical research would still be justified on utilitarian grounds, since the sum of benefits that result from this research is so very great.

Like others who defend the use of animals for experiments that involve pain or death, Cohen must confront the argument from marginal cases. How can we justify doing to an animal something that we would find morally repugnant if done to any human being possessing similar mental faculties? Singer (2002) asks researchers to consider whether they would be prepared to conduct their experiments on orphaned human infants or brain-damaged humans. David Sztybel (2006a) proposes that, in the name of ethical consistency, researchers might consider signing living wills, making themselves available as experimental subjects should they ever suffer mental debilitation.

Cohen rejects this sort of argument on the grounds that what counts in assessing the moral standing of any individual are not the capacities of that individual but the *kind* of being he or she is. Moral agency, he asserts, is natural or essential to the human kind. The free choices of moral agents ought to be respected; hence they may be subjected to experiments only with their consent. Those human beings who are not full moral agents are still to be considered members of the moral community precisely because they are members of humankind. Further, says Cohen, the fact that many animals may be said to exhibit desires and preferences, to care passionately for their young, to communicate or even to reason misses the crucial point, which is that animals cannot conduct themselves on the basis of moral judgements—they cannot discern and apply moral rules.

Against Cohen, James Rachels (1990) advocates "moral individualism", the idea that the proper treatment of an individual depends on his or her own characteristics and not on the group to which he or she

belongs. Rachels offers the following thought experiment. Suppose there is an unusually intelligent chimpanzee, one who can read and speak English, who can converse about science, literature, and morals. Suppose this chimpanzee wishes to attend university. Would it make sense to refuse him admission to university on the grounds that normal chimpanzees cannot read? Rachels thinks that doing this—judging him not on the basis of his own qualities but on the basis of the qualities of others—would be not only unfair but irrational.

We might also ask whether we could justify subjecting an unusually intelligent animal—let's say a rat who could use a computer to write a philosophy textbook—to painful biomedical experiments and death by pointing out that normal members of her species are often subjected to such treatment with few qualms. Of course, it is hard to imagine that there could ever really be such an intelligent rat (though the prospects for genetic engineering may make us think twice on that score). The issue before us, however, is not the potential intelligence of rats but whether an individual's moral status depends on species membership.

### Is Species Membership Morally Relevant?

The very concept of species is untidy and controversial (Graft 1997; Waldau 2002). Since Darwin, biologists have generally abandoned the idea that every species has an immutable essence that distinguishes it from every other species. It cannot even be held without exception that a species is a group of individuals that can breed among themselves but cannot breed with members of other species to produce viable hybrids. There are cases where members of one species can breed with members of another species (for example, lions with tigers); there are other cases where recognized species contain subgroups that cannot interbreed. In Britain the herring gull and the lesser black-backed gull are two non-interbreeding species; yet they form the two ends of a chain of interbreeding populations of gulls that circles the globe. Similarly, says Richard Dawkins (1993), living human beings and living chimpanzees form the two ends of a chain of individuals that extends back through time to common ancestors who lived sometime between five and seven million years ago. The idea of species, it might seem, is a shaky foundation on which to erect a defence of human interests.

One problem with the strategy of basing the treatment of individuals

If Darwin is correct, there are no absolute differences between humans and the members of all other species.... Therefore, the fundamental reality is best represented by saying that the earth is populated by individuals who resemble one another, and who differ from one another, in myriad ways, rather than by saying that the earth is populated by different *kinds* of beings. Moral individualism is a view that looks to individual similarities and differences for moral justification, whereas human dignity emphasized the now-discredited idea that humans are of a special kind.

—James Rachels, *Created from Animals*, pp. 174-75

The issue is one of kind. Humans are of such a kind that they may be the subject of experiments only with their voluntary consent. The choices they make freely must be respected. Animals are of such a kind that it is impossible for them, in principle, to give or withhold voluntary consent to make a moral choice. What humans retain when disabled, animals have never had.  
—Carl Cohen, "The Case for the Use of Animals in Biomedical Research", p. 866

on the attributes of some or most other members of the class(es) to which they belong is that it opens the door to all sorts of absurdities (Nobis 2004). Should students who have failed their exams be given passing grades because most of their classmates have passed? Should human beings be treated like plants because most organisms are not sentient? Then there is the error of attributing to a class what can only belong to some of its individual members. A species is not an experiencing subject. It cannot feel, think, or be held morally accountable. If a species has value, that value derives not from possessing moral agency but from, say, its place in the web of life, or perhaps from the fact that its continued existence supports the existence of individuals who are moral agents. A human lacking moral agency cannot derive intrinsic value of the sort conferred by having moral agency simply from membership in the human species (McMahan 2005). The attempt to refute the argument from marginal cases by appealing to moral agency as a typical human capacity—what David Graham, with regard to Tibor Machan (2004), has dubbed “the argument from species normality”—is questionable, at best.

This is not to say that species membership is wholly irrelevant. Elizabeth Anderson (2004) has argued that species membership matters in that it bears on the question of just *which* set of rights an individual is entitled to. For example, the fact that chimpanzees or parrots may have the same facility for language acquisition as a mentally handicapped human does not mean they should be accorded the same right to be taught a language, since they do not have the same intrinsic interest in participating in human society, being normally able to flourish without such participation. The argument from marginal cases, says Anderson, is undermined by the illegitimacy of deducing that individuals who have the same capacities have the same rights.

Anderson’s reasoning is not the same as Cohen’s. She is not attributing elevated moral status to disabled humans on the basis of morally relevant capacities not possessed by them but possessed by other members of their species. She is not saying we should treat them as if they had those absent capacities. Instead, she is saying that the argument from marginal cases fails to capture the complexity of human and animal lives. Our treatment of disabled humans must take into account not just their intrinsic (non-relational) capacities but also what is required

for them to live as members of a human community. In general, the ascription of rights to individuals, human or non-human, depends in part on their natural and social relations to moral agents (Gunnarsson 2008).

Daniel Dombrowski (2006) responds that the argument from marginal cases is perfectly consistent with recognition of the fact that the interests of an individual depend in part on species membership. What the argument inveighs against is the *unfair* treatment of individuals. It is not only the social relationships peculiar to humans that can entitle one to rights. Animals, like humans, have intrinsic capacities (like the ability to feel pain) that vindicate rights, something not negated by humans’ having additional rights as participants in human society.

As Evelyn Pluhar (1995) sees it, we have an unacquired duty not to interfere with the freedom or well-being of others, including animals, unless they pose a threat to us. In addition, she says, we have acquired duties to those beings (human or non-human) whose existence or living conditions have resulted from our choices. Whatever acquired duties we have to various human beings are independent of genetic kinship. (If you have acquired duties to members of your family, this is because your lives are entwined and not because you are genetically related.) Having acquired duties to humans does not allow us to disregard the basic interests of non-humans. Similarly, in his examination of our obligations to companion animals, Keith Burgess-Jackson (1998) makes the point that our obligations to see to the welfare of those animals that we choose to bring into our lives are in addition to obligations that result from their intrinsic natures.

**stop here**

### Steinbock on the Significance of Human Suffering

If those who condone harming animals in scientific research are to avoid the charge of being speciesist, they must either present a convincing utilitarian case based on the consequences of such research, or show (not merely assert) that there are morally relevant differences between humans and animals that justify subordinating animal interests to human interests. Bonnie Steinbock (1978) believes that there are such morally relevant differences and that because of these differences the suffering of humans ought to count more than the suffering of animals.

While agreeing with Peter Singer that there is no justification for not taking into consideration the suffering of animals, Steinbock disagrees



with his assertion that the suffering of any being ought to count equally with the like suffering of any other being. Mere sentience, she says, should not be sufficient for equal consideration of interests. Humans have certain capacities that animals lack, including the capacity for moral autonomy, the capacity to act from altruistic motivations, and the desire for self-respect. Humans cannot exercise these uniquely valuable capacities if they are severely afflicted by pain or disease. To live a fully human life, a human being must be free from significant suffering. Hence, concludes Steinbock, we are justified in making animals suffer if that is the only way to free humans from pain and disease. In short, then, human suffering is more deplorable than comparable animal suffering. Steinbock provides the rationale that is missing or merely hinted at in Cohen's essay: namely, that freedom from pain and disease is a necessary condition for the exercise of those unique capacities that make possible a fully human life.

Of course, pain and disease impede a rat or a monkey from exercising those physical and mental capacities that make possible a full rat life or a full monkey life. If that is so, why sacrifice a rat or monkey for the benefit of a human? Steinbock's argument rests on her judgement that the distinctive capacities of human beings make human lives more valuable than animal lives. What then of those disabled human beings who lack the distinctive human capacities—are they, like animals, suitable material for experiments designed to benefit normal humans? Steinbock attempts to meet the challenge of the argument from marginal cases by responding as follows. First, she says, animals can manage their lives very well without special care from us, whereas severely disabled humans cannot, and it seems worse to experiment on those who are dependent on us than on those who are not. Second, we identify more closely with the disabled human than with a monkey; we can imagine having been born mentally handicapped, whereas we cannot imagine having been born a monkey. Steinbock claims that even if this sense of identification points to no morally relevant difference between the human being and the animal, it is not wrong to extend special care to members of our own species, just as it is not racist to provide special care to members of our own race—provided we do not fail to carry out our basic obligations to all people regardless of race.

Is Steinbock's claim about dependent human beings consistent with her main thesis? Animals are commonly denied equal consideration with

I am willing to admit that my horror at the thought of experiments being performed on severely mentally incapacitated human beings in cases in which I would find it justifiable and preferable to perform the same experiments on non-human animals (capable of similar suffering) may not be a moral emotion. But it is certainly not wrong of us to extend special care to members of our own species, motivated by feelings of sympathy, protectiveness, etc.  
—Bonnie Steinbock, "Speciesism and the Idea of Equality", p. 256

humans because animals typically have a lesser capacity for autonomous behaviour. Indeed, this is a key element of Steinbock's thesis about the moral weight we should attach to suffering. However, in those instances where animals exhibit a greater capacity for autonomous behaviour than some human beings, then on Steinbock's view their greater capacity also counts against their suffering being considered equally with similar human suffering. Either way, it seems, animals can't win.

What about her claim that it is acceptable to provide special care to members of our own species? The idea is that, so long as we do not fail to meet our basic moral obligations to anyone, human or non-human, then, when it comes to those instances where we must choose between individuals of similar faculties, we do no wrong if we favour humans. We might liken this to someone of Ukrainian background contributing to a medical fund for victims of the Chernobyl nuclear accident. Surely there is nothing wrong here with giving special consideration to others of one's own kind. As long as there are no morally relevant differences between individuals, and some of them can be spared pain, surely we may choose to spare whichever ones we like. However, now imagine a biomedical researcher who dislikes other humans but is fond of dogs. If a potentially valuable experiment requires cutting up either an unwilling dog or an unwilling human being of similar mental capacities, is the researcher doing anything wrong if she chooses to experiment on the human being? (See Cushing 2003.)

### Fox's Case for Animal Experimentation

9a pages 129-34

In *The Case for Animal Experimentation*, Michael Allen Fox defines the moral community in a traditional way, arguing that its members must be autonomous beings who can function as rational moral agents. Because animals do not have the capacity to examine their own lives reflectively and to assess the quality of those lives, their lives have no intrinsic value. We are therefore under no obligation to refrain from using animals for our purposes. Such value as animals possess is instrumental only; in other words, all of their value derives from their use to us. As for the utilitarian defence of animals mounted by Peter Singer, this fails because it confines itself to consideration of the capacity for pleasure and pain and ignores those other attributes possessed by humans that give their lives a special value. Fox points out that Singer

actually admits that human lives have a special value (recall Singer's views on the wrongness of killing self-aware beings); Fox doubts that this admission on Singer's part can be squared with utilitarianism.

Fox does not deny that animals have interests, but these interests, he says, are simple ones that do not have the moral significance of the interests possessed by moral agents. Hence we have no duty, in the strict sense of the term, to prevent animal suffering. Nevertheless, as independently developing creatures with characteristics that resemble to a greater or lesser degree those human characteristics we associate with having full moral status, animals are still proper objects of our moral concern. Hence we should refrain from treating them cruelly, we should provide for the natural needs of those in our care, and when we kill them we should do so as quickly and painlessly as possible.

What about marginal cases? According to Fox, our relations with infants should be guided by the fact that most of them are potentially fully autonomous beings. As for those humans who were autonomous but are now senile or otherwise incapacitated, and those who never have been and never will be autonomous, our actions should be guided by charity. Just as we can be said to have special obligations to members of our own families, so we can be said to have an obligation to extend preferential treatment to members of the human family.

Because Fox denies intrinsic value to animals and assesses their worth in terms of their use to us, his injunction to treat them humanely has little force whenever it can be shown that experimentation provides benefits to humans. An example of this is his judgement on the notorious "maternal deprivation" experiments of Harry Harlow. For many years Harlow, a psychologist at the University of Wisconsin, and his colleagues conducted experiments in which monkeys were separated from their mothers at birth and reared in total isolation, without even human contact (M.A. Fox 1986; Orlans et al. 1998; Singer 2002). Some monkeys were isolated for as long as twelve months before being introduced to the company of other monkeys. The experimental animals exhibited severe psychological problems, including fear of others, an inability to form affectionate bonds with others, and extreme passivity. Some baby monkeys in isolation were provided with a surrogate mother made of cloth or metal that would rock violently, or emit a jet of compressed air, or suddenly eject sharp brass spikes from its surface. Researchers also

employed an alternative to these abusive surrogates: some female monkeys raised in isolation were impregnated so that they became mothers themselves; these mothers tended either to ignore their offspring or else to abuse or even kill them. Researchers invented various other experimental devices to produce psychopathology in their subjects, including what they called a "well of despair" and a "tunnel of terror". Despite describing Harlow's experiments as "nightmarish and regrettable", Fox says that in retrospect they can be morally justified by the usefulness of the information obtained.

### Fox's Case against Animal Experimentation

There is a surprising postscript to add to Fox's book. Not long after the publication of *The Case for Animal Experimentation*, its author publicly repudiated the main views expressed in it, now calling those views arrogant, complacent, and arbitrary. Fox (1987) attributes his former willingness to embrace a strongly anthropocentric position to a combination of factors. These include social conditioning and a philosophical training that emphasizes the application of abstract principles and argument for argument's sake, thus ignoring the important role that feeling and emotion should play in morality. In addition, there is the praise and approval that he received from members of the scientific community in the wake of the book's publication.

In particular, the new Fox draws our attention to the harm-avoidance principle, or "principle of non-maleficence", which says that we have an obligation to avoid harming the innocent. He now rejects the idea that experimentation that harms animals is justified if the benefits to humans (and/or other animals) "outweigh" the harm done to the animals experimented upon. Those scientists and others who accept this cost/benefit approach, he says, ignore the deeper question of whether it is morally acceptable to benefit from the harms we cause to other beings. In other words, to show that we would be worse off if we stopped animal experimentation is not to resolve the moral issue. Fox goes on to say that if we are not prepared to forgo the benefits we derive from animal experimentation, despite the moral argument against it, we ought at every opportunity to seek alternatives to such experimentation and perform only those sorts of experiments that *might* be morally justified. These include, in the first place, experiments that cause no

harm, experiments that benefit the individual experimental animals, and experiments in which the animals are willing participants (such as language learning by apes or the training of dolphins).

Fox's new emphasis on the moral imperative of doing no harm to the innocent individual is in line with an animal-rights view but is likely to be challenged by utilitarians, even those sympathetic to animal liberation. For example, Peter Singer (2002), who is highly sceptical about the alleged benefits of vivisection and calls for an end to most of it, is not prepared to issue a blanket condemnation. After all, utilitarians may ask, what is so wrong about the cost/benefit approach? If much suffering, whether human or animal, can really be averted by subjecting some animals to a lesser amount of suffering, can it be right to opt for allowing the greater amount of suffering to occur?

### Scepticism about the Benefits of Animal Experimentation

It appears to be regarded as a truism by most supporters of animal experimentation that such research has had, and continues to have, far greater benefits than costs. In particular, thanks to animal experimentation there is much less suffering in the world than there would have been otherwise. The belief that a simple utilitarian calculation of this kind can be used to justify animal experimentation is challenged at length by Hugh LaFollette and Niall Shanks in *Brute Science*. LaFollette and Shanks argue that even if we hold that animals have considerably less moral worth than human beings do, it is doubtful that animal experimentation can be justified on the basis of its consequences. In making their argument, they point to three "moral asymmetries".

The first asymmetry has to do with acts versus omissions. It is widely (though not universally) held that it is worse to do evil than to fail to prevent evil. For example, it is worse to drown someone deliberately than to fail to rescue from drowning someone that you could have saved. In harming animals in their experiments, scientists deliberately bring about evil consequences, whereas refraining from doing these experiments would at worst mean failing to prevent some amount of human suffering. This suggests that, even if animals are presumed to be worth less than humans, the benefits to humans from experimentation must be substantially greater than the costs to animals if the experiments are to be morally acceptable.

The second asymmetry involves definite harms versus possible benefits. The harm inflicted on animals in experiments is definite. By contrast, at the time of doing the experiments it is merely possible, not definite, that beneficial consequences will result. This means it is difficult or impossible to quantify accurately the benefits to be derived from experiments.

The third asymmetry involves the creatures who suffer versus the creatures who benefit. The animals experimented on seldom benefit from whatever knowledge is gained. If there is any benefit, it is others—generally humans—who benefit. If we reject harming human beings solely for the benefit of other humans, it is not clear how we can justify harming non-humans solely for our benefit, even if we judge them to have less moral worth than we do.

But the problems involved in justifying animal experimentation in terms of beneficial consequences do not stop there, say LaFollette and Shanks. Animal models can sometimes be misleading. (See also Barnard and Kaufman 1997; Greek and Greek 2000.) We must factor into our calculations both the known and the possible costs of misleading experiments. LaFollette and Shanks claim, for example, that preoccupation with a misleading animal model delayed for many years the development of effective measures for preventing polio. Finally, and perhaps most importantly, we miscalculate if we place on the plus side of our scales all the benefits that research on animals has produced and will produce. The real question, after all, is what are the benefits that only animal research could produce. In other words, what is the increase, if any, in benefits relative to alternative programmes (those without animals)? There is no clear answer to this question. LaFollette and Shanks conclude that, while none of this shows that animal experimentation is worthless, it does show that the benefits are less than we are commonly led to believe and that an accounting of those benefits would be hard to give. Since animal experimentation involves significant moral costs, the onus is on those who wish to perpetuate the system to demonstrate clearly that its benefits exceed its costs. This they have failed to do.

The idea that animal experimentation is justified by its benefits for human beings is further undermined if we accept that we are confronted with the following dilemma. The closer a particular species of animal is to humans physiologically and/or psychologically, the more useful it is as an object of research where the idea is to use the animal to

An obvious paradox arises—the more a species is like us in its physiology, the more useful a model it is for human biomedical problems. But, precisely because a species resembles us biologically, the more likely it is that it experiences similar mental states. In short, the more justified the use of a species on scientific grounds, the less justified is its use on moral grounds.

—Harold Herzog, "Human Morality and Animal Research", p. 340

model human responses. Hence apes and monkeys are particularly useful as experimental models. For example, in their maternal-deprivation experiments Harry Harlow and his collaborators emphasized the psychological similarities between baby monkeys and baby humans, there being little difference between the two in terms of emotional and intellectual needs; they also pointed out that monkey mothers display the same sort of maternal affection as do human mothers. The dilemma for the responsible researcher is that the more closely an animal resembles humans, and thus the more useful it is in experiments where it would be unethical to use a human being, the more ethically questionable the use of that animal becomes. Ideally, what is wanted is an animal that resembles human beings very closely but whose use poses none of the ethical problems that using a human would pose. It is difficult to see how the researcher can have it both ways (LaFollette and Shanks 1996; Rachels 1990)

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### Does the Rights View Rule Out Vivisection?

One way of avoiding this problem is simply to deny that any dilemma exists. Cohen, for instance, is prepared to admit that animals resemble human beings in many ways, physically and psychologically—including having emotions and perhaps an ability to reason—but finds all of that to be irrelevant. From his standpoint, it is only having the capacity to conduct oneself according to moral principles (or at least being a member of a species in which that capacity is normal) that entitles one to protection against being exploited for the benefit of others. Animals, not being moral agents, are not entitled to the protection afforded by moral rights and so are fair game for all manner of scientific research.

What follows from the contrary view that animals do, after all, have rights? At first glance it appears that a rights view must be inimical to vivisection. But just as the defence of vivisection in terms of its alleged beneficial consequences has been questioned, there are those who have denied that a rights view necessarily rules out all experimentation that harms animals. Certainly, the most prominent rights philosopher, Tom Regan (2004a), calls for the abolition of all scientific practices that harm animals, whether carried out for purposes of education, or to test the toxicity of new products and drugs, or for purposes of original or applied research. However, some writers (Lehman 1988; Varner 1994a) suggest that Regan is drawing the wrong conclusion from his own prin-

ciples, or at least that an abolitionist conclusion does not necessarily follow from his basic rights view.

The argument here for permitting some vivisection runs broadly as follows. Yes, if animals have rights, many ways we currently treat them are wrong. If they have rights, it is almost always wrong to eat meat. In terms of nutritional requirements, everyone can at least survive on a vegetarian diet and, arguably, most people would actually be healthier if they stopped eating meat. Sport hunting is unnecessary, even if it does give some hunters a feeling of being connected with nature. Similarly, we do not need to confine animals in zoos, or make them perform in circuses, or use them in rodeos. But scientific research is a different case. If we do not discover cures for the diseases and injuries that afflict us, we shall die prematurely or live lives filled with suffering that could have been prevented. So when it comes to the issue of preventable suffering and death, it's "us or them". In short, we are in a lifeboat situation and since human beings would be harmed more by suffering and premature death than animals would be, this justifies sacrificing animals for our well-being.

For his part, Regan maintains that we cannot apply the worse-off principle to biomedical experimentation because of a special consideration: namely, that risks of being harmed are not morally transferable to those (animals, in this instance) who do not voluntarily choose to take them. Regan does not agree that animal experimentation is an example of a lifeboat case. Lifeboat cases, as he sees them, are exceptional cases and the application of the worse-off principle in exceptional cases cannot fairly be generalized to unexceptional cases, since doing so would allow the institutionalized subordination of some individuals (indeed, many individuals, including human ones) to other individuals. Routinely to subordinate some individuals to others would be to treat the former without the respect they deserve.

Susan Finsen (1988b), Alan Clune (1996), and Julian Franklin (2001) agree with Regan that the worse-off principle cannot be invoked to justify routine animal experimentation. Unlike the dog in Regan's lifeboat example, healthy animals are not in imminent peril—they are not in the lifeboat to begin with. They do not face harm until we decide to use them for research. Like Regan, Finsen and Clune say that the rights view does not insist on an end to all experimentation but demands that science apply the same basic ethical restrictions to the use of animals as to

In short, the continuing practice of killing nonhuman animals for medical purposes ... cannot be painted as a party of innocents trapped in a lifeboat. The only lifeboat situation that would be parallel to this one would be one in which a healthy young individual, minding her own business, is forced onto a lifeboat at gunpoint and made to serve as one's lunch, organ supplier, or vaccine tester. We could even breed her first so that we do not have to leave the lifeboat so often. We have a "deathboat" here, not a lifeboat!

—Evelyn B. Pluhar, *Beyond Prejudice*, p. 297

the use of human beings. Clune argues that tests on animals should aim to benefit them and should be allowed only in cases where some humans afflicted with the same medical condition give informed consent to undergo such testing themselves. Steve Sapontzis (1987) similarly maintains that animals employed in research should be afforded the same sort of moral protection afforded human research subjects and stresses the need for freely given consent, if necessary by a guardian acting on the animals' behalf.

### Feminists Emphasize the Legitimate Role of Feeling

In recent decades the vaunted objectivity of science has been called into question, first by scholars influenced by Marxism and then by feminists. These critics have maintained that the notion of "objectivity" often masks ideological biases. Feminists have emphasized that the demand for objectivity typically involves a distancing of the scientist from what is being studied; in particular, any emotional response on the part of the researcher is equated with bad science. Thus biologist Lynda Birke (1994) maintains that the dispassionate, technical form of language employed in describing experimental animals and the procedures performed on them distances scientists and readers of scientific reports from any sense that the creatures used are living, sentient individuals. Even when they are put to death they are usually not "killed"; rather, they are "sacrificed" or "culled". Animals are seen not as *subjects* of research toward whom an emotional response of some sort is appropriate but as standardized and interchangeable objects or "models".

According to Brian Luke (2007), use of the word "sacrifice" is entirely appropriate. He argues that vivisection is a modern-day form of the sacrificial rituals found in many religious traditions. It is a ritual in which a specially designated class of men (priests or researchers) display their alleged power to sustain human life and maintain the well-being of society by regularly killing animals. Sacrifice constructs men as fathers who can rival women in the reproduction of human life. Vivisection also perpetuates the attitude evident in the scientific revolution of the seventeenth century, when Francis Bacon and others explicitly characterized the natural world as female and extolled science (including vivisection) as the masculine means to dominate and exploit her.

As has been noted, feminist philosophers tend to be sceptical of the

application of abstract principles to moral problems, and this includes the issue of animal experimentation. Although she has an antipathy to animal experimentation, Deborah Slicer (1991) rejects what she sees as the attempt by Singer, Regan, and others to arrive at some pat formula for solving problems. Instead, she says, we must recognize that every case has its own particular features that must be attended to. In particular, emotional bonds with family members, friends, and other human beings should count for something in our moral decision-making, even though these bonds should not count as automatic trump cards against the suffering of animals.

### Genetic Engineering of Animals

In February of 1997 came the announcement that scientists in Scotland had made a major breakthrough in genetic engineering. The product of their endeavours, born the previous July and named Dolly, was the genetic copy, or clone, of a sheep that had been born years before and that had probably already been slaughtered by the time Dolly arrived. Dolly did not come into being as a result of the union of a sperm and an egg but was created from genetic material taken from the udder of the sheep that, as the result of the procedure of cloning, became her lost twin.

Cloning is a dramatic instance of genetic engineering. It involves replacing the nucleus of an egg cell with the nucleus from a non-egg cell, usually from another individual. The egg, now with new genetic material, is then implanted in the womb of a surrogate mother so that it develops to produce an individual genetically identical to the individual who donated the nucleus. Dolly was not the first clone. Other animals, including sheep, had been produced by cloning. What was new about Dolly was that the genetic material used came not from the undifferentiated cell of an early embryo but from the differentiated (specialized) cell of an adult sheep. The advantage of using the genetic material of an adult is that identical copies can be made of an animal whose traits are already known.

The announcement of the arrival of Dolly immediately fuelled speculation about the possibility of cloning human beings. Ian Wilmut, leader of the research team, dismissed the idea as unethical and—somewhat naïvely—as pointless and unlikely to be implemented. At the same time, neither he nor most of those who reported for the mass media saw

any ethical problems attendant on the cloning of animals. It is true that, in itself, cloning animals is not likely to raise as many moral issues as the cloning of humans. However, the cloning of non-human creatures becomes more questionable when we consider that it is linked in practice to another aspect of genetic engineering: the creation of transgenic animals. Transgenic animals are ones whose genetic constitution has been deliberately modified by the insertion of foreign genetic material. Dolly was created as part of a commercial project to produce drugs in sheep's milk in order to treat human diseases like haemophilia and cystic fibrosis. The idea was to grow cells from sheep in the laboratory and then add genes that would direct the cells to produce the desired drugs. The altered cells would then be used to make sheep clones that would become "living drug factories". Cloning could also be used to produce copies of animals with genetically engineered defects to serve as models for the study of human diseases (Kolata 1998; Wilmut 1998).

The use of transgenic animals for the study of human disease is already well established. In 2008 the UK government reported that, of the 3.2 million experiments on animals in Britain the previous year, more than a third involved transgenic animals, typically mice or fish. For example, transgenic mice have been used as models for the study of cystic fibrosis and diabetes (LaFollette and Shanks 1996). Transgenic pigs are considered good prospective candidates for use in xenotransplantation—the transplantation of organs from one species to another. In 1984 surgeons in California transplanted a baboon's heart into an infant girl who had been born with a fatal heart defect. The girl lived only twenty days after the operation. Rejection of foreign organs by the immune system is a major impediment on the road to routine xenotransplantation. Pigs that have been engineered with human genes may provide a source of organs that the human immune system will not reject.

Much less has been written by philosophers about the moral implications of the genetic engineering of animals than about the morality of vivisection. This is largely due to the fact that genetic engineering is a more recent phenomenon. Also, perhaps, it is due to the fact that the full possibilities and moral implications of genetic engineering are not yet clear. What is clear is that the issues raised by genetic engineering will become increasingly pressing in years to come.

Jeremy Rifkin has been a leading critic of genetic engineering. As

Rifkin (1983, 1998) sees it, the new technology is part and parcel of a way of looking at the world that devalues living individuals. The natural world is no longer seen as a realm whose member organisms have intrinsic value. Nature has been "desacralized", drained of all meaning except as a storehouse of material to be manipulated and exploited. This change has not happened overnight. From the seventeenth century until recently, physics has described the world in mechanical terms. Many commentators have seen in Darwin's theory of evolution parallels with the social and economic values of the industrial age. Rifkin argues that Darwin succeeded in establishing the idea of organisms as mechanical assemblages of inanimate parts. Now, he says, in line with the modern sciences of cybernetics and genetics, including an understanding of the role played by DNA in programming the development of organisms, the idea that life is mere machinery is being replaced by the idea that it is mere information. In the modern desacralized world, carrots, foxes, and human beings are not essentially carrots, foxes, and human beings; they are essentially bundles of genetic information that can be used for industrial purposes. There is no respect for the integrity of the individual organism. By reducing individuals in theory and in practice to the level of their genes, science is opening the door to a possible future in which human destinies have been programmed from before birth and in which, as a result, human beings have ceased to be part of the planet's community of freely living creatures.

Rifkin's concern is echoed by Michael W. Fox (not to be confused with Michael Allen Fox). While seeing potential benefits in genetic technology, Fox (1992) deplores the attitude that reduces animals to genetic material that can be exploited for industrial purposes. He claims that the creation of transgenic animals has already caused considerable suffering, much of it from unanticipated health problems. As long as the primary purpose of genetic engineering is not to benefit animals but to fit them more efficiently into the industrial system, their suffering is likely to increase; and as society becomes more dependent on the products of such animals, this suffering will be excused as being "necessary".

The idea that through genetic engineering we are repudiating any sense of the sacredness of the natural world is given explicitly theological expression by Andrew Linzey (1994, 2000). The genetic engineering of animals, in his opinion, is the ultimate manifestation of the view that

they are mere things for human use. Through technology we are now manipulating the very nature of animals so that they are treated totally as human property—an attitude given legal form through the patenting of animals. (An example is the “oncomouse”, a mouse engineered to develop cancer. See Orlans et al. 1998.) But just as making other human beings our slaves is wrong, so is this absolute subjugation of animals, says Linzey. In theological terms, our claim of absolute ownership of animals is idolatrous, since only God owns the creatures of this world and we have no right to misappropriate what belongs to God.

Many of the fears expressed by critics of genetic engineering are addressed at length by Bernard Rollin in *The Frankenstein Syndrome*. The title of the book refers to the widespread concern about creating new forms of life. The original story of Doctor Frankenstein, by Mary Shelley, portrays a scientist who, with the best of motives, creates from human parts a creature that proceeds to wreak destruction on its creator and others. The story has struck a powerful chord in the modern imagination, symbolizing as it does the potentially harmful consequences of scientific progress and suggesting that there are aspects of nature that we meddle with at great peril.

Although he is one of the leading animal-rights philosophers, Rollin sees nothing intrinsically wrong with the genetic engineering of animals. This is not to say that genetic engineering cannot be used in unacceptable ways, but that it is not wrong in itself. Rollin rejects Rifkin's notion that genetic engineering necessarily involves a reductionist way of looking at organisms. Rollin thinks that part of the objection here may be the idea that viewing living things as merely collections of chemicals or information is not conducive to what is essential to a good society, namely respect for individual dignity and uniqueness. However, says Rollin, we cannot make genetic engineering go away. As with other scientific and technological advances, the way to deal with it is through education and rational discussion.

Genetic engineering may be believed to be intrinsically wrong for a number of reasons, says Rollin. It may be thought that there is a clear division between nature and culture and that it is wrong to breach the gap by introducing artifice into nature. Rollin points out that not only are human beings part of nature themselves, but throughout history they have altered nature in innumerable ways, including the domestica-

tion and breeding of animals. Some environmentalists and environmental philosophers may reject meddling with the characteristics of species because they see nature as intrinsically valuable. But Rollin argues that species do not have the moral status that sentient individuals do and that the focus of our concern should be the welfare of individuals. (More will be said in the next chapter about the moral status of individuals in relation to species and ecosystems.) Some people may object on theological grounds to the mixing of human and animal traits—but we already insert animal parts, such as skin and heart valves from pigs, into humans for medical reasons. Suppose that an animal were found to contain a gene that could prevent cancer and that had no undesirable side effects. Why should this gene not be transferred to human beings? Why should human genes—say, genes that help an organism resist disease—not be transferred to animals in cases where the animals would benefit?

Rejecting the idea that there is something intrinsically wrong about the genetic engineering of animals, Rollin affirms that particular applications of this technology must be morally evaluated according to their consequences. In particular, Rollin proposes what he calls *the principle of conservation of welfare*. This says that any animal that is genetically engineered to serve human purposes or for environmental benefit should be no worse off in terms of suffering, and preferably should be better off, after the new traits are introduced than the parent stock was. In other words, to be morally acceptable, an application of genetic engineering must be either neutral or beneficial in terms of its consequences for the animals affected.

In Chapter 3 it was mentioned that Rollin holds that every animal should have its *telos* (intrinsic nature) respected. One might assume that this would lead him to reject genetic engineering as a violation of an animal's *telos*. This is not the case, however. Rollin's point is that, given an animal's particular nature, one should not violate the interests that constitute that nature. He is not maintaining that it is necessarily wrong to change an animal's nature. What is wrong is to change it in a way that violates the principle of conservation of welfare. Suppose that we can produce a chicken that has no nesting urge and prefers to lay eggs in a battery cage. Rollin sees nothing wrong with this, since the new chicken is better able to satisfy its nature than its predecessor was.

What I did assert was that given an animal's telos, and the interests that are constitutive thereof, one should not violate those interests. I never argued that the telos itself could not be changed. If the animals could be made happier by changing their natures, I see no moral problem in doing so (unless, of course, the changes harm or endanger other animals, humans, or the environment). Telos is not sacred, what is sacred are the interests that follow from it.  
—Bernard E. Rollin, *The Frankenstein Syndrome*, pp. 171-72

Would we accept the genetic engineering of human beings to make them fit their environment better? In his famous novel, *Brave New World*, first published in 1932, Aldous Huxley pictures a time when, by alteration of embryos and later with drugs and indoctrination, people are tailor-made to fit their respective environments and to be happy, productive members of society. The catch is that happiness has been bought by giving up freedom—or at least by giving up the sort of freedom that arguably makes us who we are and that gives our lives meaning even in the face of much unhappiness. Huxley clearly thinks that this engineered happiness is happiness that has been bought at too high a price. Does the same criticism apply to Rollin's endorsement of the genetically engineered chicken?

Rollin is aware of the *Brave New World* objection. There is an important difference, he says, between engineering chickens to be content with their cages and engineering humans to be content with the human equivalent of cages. The difference is that autonomy and reason are goods that human beings refuse to relinquish but that are not valued by animals. Furthermore, says Rollin, we already have a long tradition of modifying the *telos* of domesticated animals through artificial selection in order to serve human needs and, if we consider it essential to continue confining hens in battery cages, it is reasonable to consider changing their nature to fit them to their environment.

These justifications can in turn be challenged. Birke (1994) says that the rapid growth of molecular biology, in particular genetics and DNA technology, has encouraged us to see animals as "puppets of their genes". On the contrary, she argues, animals not only have genetic dispositions but, like humans, are also active agents who make themselves from the time they are born by interacting with their physical and social environments. As we have seen, the idea that animals are active agents in the world is fundamental to the rights view. Although animals are not able to reason about their actions in the way that humans can, many of them exhibit what Regan calls preference autonomy: they have preferences and the ability to initiate actions with a view to satisfying them. If, then, it is wrong to change human nature in order to alter the way that humans typically choose to live their lives, why is it not wrong to change the nature of a particular kind of animal—a chicken, for example—in order to alter the way it typically chooses to live its life?

You and I might be horrified at living the life of an inhabitant of the society depicted in *Brave New World*, but members of that society clearly are not horrified: they like their lives and would be horrified at the thought of living our sort, with its attendant miseries. If the principle of conservation of welfare can condone creating chickens that like their cages, why can it not condone creating human beings who are ecstatic about a society like that in *Brave New World*? As for the fact that we humans have a long tradition of modifying the *telos* of animals to suit our purposes, this in itself does not constitute an argument for continuing to do so. It may indeed be best to change the nature of chickens if we are going to insist on keeping them in tiny cages, but should we insist on keeping them in tiny cages?

Henk Verhoog (1992) says that the idea of engineering animals to adapt them to cages that would normally cause suffering goes against the moral intuition of many people. Verhoog suggests that Rollin's endorsement of the idea is inconsistent with Rollin's own exposition of the significance of animal *telos* in *Animal Rights and Human Morality*. By genetically engineering an animal, are we not imposing our own purpose on the animal, rather than allowing it to realize the *telos* intrinsic to it? And by judging what is best for an animal by reference to its experiences of pleasure or suffering, are we not implying a too limited concept of what constitutes the animal's real nature? (Recall from Chapter 3 Rollin's assertion that a sentient creature need not be aware of all the intrinsic functions and aims that constitute its *telos*.)

Verhoog maintains that the nature of a wild animal involves much more than experiences of pleasure and suffering. It includes both its social relations to members of the same species and its relations with the ecological bio-community. The animal's well-being depends on its ability to function in its natural environment according to its historically evolved nature. We should reject the temptation to think of domesticated animals as quite different, to think of them simply as artifacts whose further modification by genetic engineering poses no moral problems. The quality of life of domesticated animals includes the quality of their relations with us. To the extent that genetic engineering violates the species-specific interests of animals and leads to their being reduced in our eyes to exploitable material, says Verhoog, it is to be rejected in all but cases of life-and-death necessity.



Although he ascribes rights to animals, Rollin is also a pragmatist. He is aware of the enormous pressure exerted by industrial society for the maximization of productivity at the expense of animal welfare and he is prepared to consider measures that improve the lives of animals even though falling short of liberating them. He suggests too that we might consider rendering food animals "decerebrate", either surgically or through genetic engineering—in other words, rendering them incapable of conscious experience, so that they exist in a merely vegetative state and hence without any suffering. This procedure might also be considered for transgenic animals designed to model human diseases, animals that would suffer greatly if conscious. No violation of the principle of conservation of welfare would result, since animals incapable of subjective experience could not be said to have a welfare in any significant sense of the term.

### Conclusion

Although human beings exploit animals for many different purposes, the use of animals in scientific research, especially in research where they are deliberately subjected to harm, has long provoked intense controversy outside philosophical circles. Anti-vivisectionists tend to see the practice as particularly odious from a moral standpoint. On the other hand, most scientists defend vivisection as necessary for the progress of science and medicine and point to the advances in knowledge that have resulted from animal experimentation.

Those philosophers and activists who take a broadly utilitarian approach to the issue are likely to accept some vivisection while at the same time pressing for the utmost possible implementation of the "three Rs"—replacement, reduction, and refinement. On the other hand, those with a rights view are likely to say that all research that harms animals should be abandoned, even if that means forgoing the benefits that would have accrued. Even here, however, there are dissenters. There are those who argue that a rights view can condone some vivisection because total abolition would make some humans worse off than the animals harmed in research.

Genetic engineering has opened a moral can of worms. The creation of transgenic animals and their use for the production of drugs, as models for the study of disease, and for other purposes raises issues

around animal suffering and death. In addition there is the issue of whether we do wrong when we alter the fundamental nature, or *telos*, of an animal in order to use that creature for our purposes. Developments in the field during the twenty-first century are bound to confront us with questions that touch upon our very nature as human beings and force us to re-evaluate our notions of the place we occupy in the planet's web of life.

In 2003 Dolly the sheep, who suffered from arthritis and possibly from premature aging, was put to death after developing a severe lung infection.