

The Factual Setting of Animal Experimentation

In the summer of 1948, I was a counselor in a children's camp in western North Carolina; one of our young campers was stricken by polio, an event that befell summer camps around the country that year. The fear in the faces of parents who rushed to the camp to take their children from that dangerous place, reaching with their arms across the quarantine chains, is vivid in my recollection. They trembled; my parents trembled; all parents trembled every polio season, which was every summer, never knowing whether their children would prove to be among the random victims of that crippling and often fatal disease.

The epidemic did not soon relent. During the summer of 1952, more than fifty-eight thousand American youngsters contracted polio. Thousands of these children died; thousands more were sentenced to a lifetime in the cruel machine that we called "the iron lung."

A vaccine for polio had been under development for some time, but years would pass before its safety and reliability were established and it could become widely effective. By the late fifties, however, childhood vaccination for polio had become routine; by the close of that decade, the number of reported polio cases in the United States had been reduced to twelve—*one dozen*. Polio was totally eradicated from the Western Hemisphere not long after that, and as I write the disease is nearing eradication in other parts of the world as well.

The astounding success of that first polio vaccine was announced at the medical center of the University of Michigan, only blocks from where I live in Ann Arbor. Its impact has been global. How many have been spared misery and death by this one great step in medical science we can hardly guess.

But about this wonderful vaccine and its successors we do know one thing for certain: *It could not have been achieved without the use of laboratory animals.*

To prepare the culture from which the polio vaccine was made, animal tissue was indispensable. And with that new vaccine greatest caution was obligatory. Many candidate vaccines had earlier been tried and had failed. From those earlier vaccines some healthy children had actually contracted polio. That could not be allowed to happen again. To test the new vaccine before its administration to humans, animal subjects were absolutely essential.

This true story, close to us in time and place, is widely known. But there are a thousand stories like it of which we are mostly unaware: scientific victories over tuberculosis and typhus, the discovery of insulin rescuing diabetics from misery and death, the discovery of antibiotics and the development of anesthetics—uncountable advances that have proved to be of incalculable importance to human beings. All this and much more could not have been done without the use of animals in the key experiments. The absolutely critical role of animals in these investigations cannot be emphasized too strongly. It is not simply that animals were convenient in such work or that they speeded the results—although if only that were the case, the justification of their use would be strong enough, heaven knows. But it is not like that. Experiments using animals are not merely helpful; they were and remain a necessary condition for most critical advances in protecting human health.

New vaccines are always dangerous. Testing them (and testing many new drugs as well) unavoidably risks the well-being, sometimes even the lives, of the first experimental subjects. When a new vaccine or new pharmaceutical compound has been devised and is at last to be tried, whose lives shall we put at risk? Not the lives of my children, certainly. The lives of yours, perhaps? You are offended by the thought—rightly. Shall we then use the children of unsophisticated people in underdeveloped societies? Heaven forbid. What, then, are our alternatives? There are only two: We will use animals (by which I mean nonhuman animals, of course) in such biomedical experiments, or we will not do those experiments at all.

The philosophical dispute about animal use therefore concerns each of us directly, insofar as we ourselves use, or expect to have available for use, vaccines and drugs that are effective and safe. Respecting every vaccine and almost every new drug, we will use animals in the research process, or we will not develop and we will not have that vaccine or that drug for our use.

Much talk in recent years suggests that animals in biomedical experiments should be replaced. Let us use “tissue samples” instead of whole animals, it is said; let us use “computer simulations” of the disease or the experimental organism. In a very few restricted settings, such replacements are possible and appropriate. But in most medical investigations the replacement of live animals with tissue samples or computer simulation is simply out of the question. The

reason is simple: Investigators must learn the impact of a new compound or a new vaccine on the living organism as a whole; side effects that may be dangerous can be investigated only in the living organism and its complicated network of constituent organs, as they actually function. Computers cannot give that information. The results of experiments using tissue samples, however favorable, will not be enough to warrant the use of a new drug in humans until we have done our very best to learn its full organic impact. We can learn that only by studying the outcome of its use on live animals who are not human.

The first use of a new compound on a living organism is inescapably experimental. The subject of that experiment will be a human or another animal. The use of humans in such experiments we will not permit, understandably. If, therefore, the use of nonhuman animals is also not permitted, there will be no such experiments.

The large-scale replacement of animals by tissue samples or computers or anything else is, to be blunt, a misleading fantasy. In this continuing discussion of the morality of animal use, all such wishful conjectures should be put aside. Where alternatives to the use of animals can yield the needed data, it is right to use them, and it is right to seek such alternatives, as we do. But romantic dreams cannot guide actual research and may prove dangerous if relied on. Professor Tom Regan (who condemns all animal experimentation as immoral) was asked publicly in Washington, D.C., what he would have medical investigators do if the use of animals were indeed forbidden. How should they proceed? His answer was that they must find alternatives somehow, somewhere. They must, Regan said, "set their imaginations on fire."¹ That is an embarrassing response, not very helpful advice from a philosopher to laboratory scientists. To those who labor for new treatments of stubborn diseases, and for those who suffer grave illness and who pray for relief and can only hope for the successful outcomes of investigations in which experimental animals are the key, "set your imaginations on fire" is close to insult. We use animals because in most medical contexts no known alternatives to animal use are available. It is virtually certain that no such alternatives will exist for a very long time at least, since none are even on the horizon. In fact, it is probable that there never will be feasible alternatives to the uses of animals in much of medicine.

The killer disease for which a vaccine is now most desperately needed is malaria, which infects about *three hundred million new victims each year*, of whom *more than two million die* every year, most of them children in Africa and Asia. Drugs to combat malaria have become less and less effective as new strains of the parasite, resistant to those drugs, arise and spread. In the United States also malaria is spreading, the number of cases in recent years up well more than 200 percent—attributable to people who return from visits in their

home countries, where they find that they are not immune. Many vaccines have been tried—not recently on children, thank God—but have failed. The parasite that causes malaria, carried by the anopheles mosquito, is so resilient that scientists have long been unable to generate in any living organism the antibodies needed to ward off the disease.

Recently, however, some striking progress has been made in this battle. After decades of effort a vaccine has been developed and tested at the Naval Medical Research Institute in Bethesda, Maryland; it does inoculate with safety and complete success against malaria—in mice.² For humans we do not yet have a vaccine proven safe. But before very long we probably will have one, and we will get it, if we do, only because we were able to experiment on mice, many mice, who will have been deliberately killed by investigators to learn what must be learned for the development of that new vaccine. In developing a malaria vaccine, we will use mice (as we do in the study of cancer, and diabetes, and hundreds of other human diseases) *because there is no other way*.

Many wince at the thought of using animals in biomedical research because they think immediately of dogs and cats, whom they love. In this view we are misled. The controversy should be understood to be one that mainly concerns the use of rodents, and among rodents chiefly mice and rats. Dogs, pigs, and other mammals (almost always anesthetized) are also used when they are the most suitable models for the disease under investigation. But only in a small minority of studies is that the case. The number of dogs and cats killed each year as experimental subjects is less than one-fiftieth of the number of dogs and cats killed *in animal shelters by humane societies for convenience*, because we have no place for them. About ten million dogs and cats are put to death in the United States each year for no good reason save that nobody wants them. Bearing in mind this wholesale killing of strays and former pets in animal shelters, how ought we respond to academic philosophers like Tom Regan who strenuously protest the carefully limited use of mice by medical science? Of all the animals used in biomedicine, dogs and cats make up less than 1 percent and primates less than three-tenths of 1 percent. Pigs, rabbits, and chickens are used more—but they amount to an extremely tiny fraction of 1 percent of all those billions of pigs, rabbits, and chickens killed for use as human food.

The U.S. Department of Agriculture recently estimated the number of animals used in medical and pharmaceutical research to be about 1.6 million, of which the vast majority, approximately 90 percent, were rats, mice, and other rodents. These animals would not have come to exist had they not been bred specifically for biomedical use.

Meanwhile, in the world of everyday life outside science, the extermination of rats and other vermin that infest our cities is a perennial objective, difficult to achieve but important for the sake of human health. The rats that multiply

in our central cities are dirty and dangerous animals, carriers of disease, and specially threatening to the poor. In Chicago, where until recently rats outnumbered people by more than two to one, an aggressive campaign to clean the lakefront of rats has had substantial success. Of the rat population of about six million in 1979, more than five million had been eliminated by 1997.

In Boston, a massive rat control enterprise, largely successful, has recently been made necessary by the Central Artery Tunnel project, called by locals "the big dig."³ A *huge* population of rodents, whose ancestors have been burrowing and breeding in the vicinity of the old Boston harbor for centuries, might have been dislodged by the construction of the new tunnel/highway and forced into the central city. These sewer rats (*Rattus norvegicus*) are not the cute little pets to be found in preschool classrooms; they are large (over a foot long), ferocious, often filthy creatures laden with disease, rats that eat virtually anything—including human babies when given the opportunity. The feces and urine of wild mice (*Peromyscus maniculatus*, not these rats) have very recently transmitted the deadly hantavirus, resulting in many human deaths in the United States. Rats like those of concern in Boston transmitted bubonic plague, the "black death," in ages past.⁴ Should those Boston rats have been protected, possibly chased into the alleys and basements of the crowded city center? Or should they have been poisoned, as they were? In my judgment, it would have been morally wrong to risk the invasion of the human habitations of Boston's poor by these rodents; it was right to kill them as humanely and as efficiently as possible. Readers are likely to judge similarly about any rats, possibly disease-laden, discovered in their own basements.

What, then, will be our considered view of the protection we owe to rats on moral grounds? This is not merely an abstract puzzle. Deciding what conduct is moral is, as Kant insisted, a very *practical* matter. What shall be our practice, our actions, in dealing with rodents? Do we seriously think it to be wrong to kill disease-carrying rats for the sake of human health? Wrong to use rats as the subjects of experiments designed to develop new drugs for cancer, new vaccines for malaria and other human afflictions?

Whether we are morally justified in using animals as we do in science must be decided in the light of what we know about safeguarding the healthy and curing the sick. The arguments in the continuing philosophical controversy that is the substance of this book should be evaluated in the light of the facts, often very unpleasant facts, of human and animal disease.

Notes

1. At a conference in which we both participated, on the moral status of animals, at Georgetown University in Washington, D.C., on 25 June 1995.

2. See Stephen L. Hoffman and others, "Protection against Malaria by Vaccination with Sporozite Surface Protein 2 Plus CS Protein," *Science* 252 (3 May 1991): 715-18.

3. See B. A. Colvin et al., "Planning Rodent Control for Boston's Central Artery/Tunnel Project," Proceedings, Fourteenth Vertebrate Pest Conference, University of California, Davis, 1990; and, more recently, F. Fothergill et al., "Control of Norway Rats in Sewer and Utility Systems," Eighteenth Vertebrate Pest Conference, University of California, Davis, 1998.

4. They do plenty of damage still. In New York City, where live millions of rats, eating virtually anything, hundreds of persons are bitten by rats each year. In spite of the fact that the rat control budget in the city rises steadily and is now about \$13 million per year, professional exterminators in New York report that the rat problem there is worse than it has ever been. See "Rats Love New York" in the *New York Times*, 12 July 2000. If rats have rights, the vicious rats of New York and Boston, and of every other city, have them, too.