nately named "writhing test," in which they were injected in the stomach with a dilute solution of acetic acid. Others were injected in their hind paw with an irritating liquid, and a final group was subjected to the paw withdrawal test which involved measuring how quickly a mouse would lift its feet from a hot surface. If I have calculated correctly, the research involved over 800 mice.

Did the mice feel each other's pain? The short answer is yes. The animals injected with acetic acid writhed more when tested near another writhing mouse than when tested alone. But—and here is the interesting part—pain contagion only occurred when the other mouse was a relative or a cage-mate. Mice showed no signs of empathy in the presence of suffering strangers!

How does a mouse know if his cage-mate is suffering? Does he see an agonized look in his friend's eyes or hear their ultrahigh-frequency moans? Or perhaps a mouse in pain emits an odor that signals fear. The researchers checked each of these possibilities by systemically disrupting the sensory systems of mice. Vision was easy. They just put an opaque screen between two writhing mice. Eliminating the sense of smell was harder. After injecting the mice with a local anesthetic, they flooded each of their nostrils with a caustic chemical that fried their smell receptor cells. This procedure permanently destroyed their ability to ever smell anything. To eliminate hearing, they injected mice with a chemical called kanamycin every day for fourteen days. Two weeks later, the mice were permanently deaf.

From a scientific perspective, the experiment was a success. The researchers discovered that mouse empathy is the result of vision alone. The mice deprived of their senses of smell or hearing remained empathetic. The mice that were blocked from seeing their suffering compatriots were not.

Was the research ethical? Pretend for a moment that you are a member of the McGill University animal care committee charged with approving or rejecting research proposals involving animals. How would you have voted? Did the results of the experiments justify the pain and suffering of the animals?

Make your decision: approve or reject.

For me, this is a tough one. The research was well done, and while most scientific articles are never read by anyone except perhaps the author's mother, the results were published in the journal *Science* and garnered worldwide publicity. Further, the researchers made a reasonable argument that the pain was relatively mild and short-lasting.

But I vote to reject.

The reason I would not approve the study is that listening to the Rolling Stones played loud is one of life's great pleasures, and I love the toasty aroma of fresh French bread. Hence, I did not like the idea of deafening and wiping out the sense of smell of so many mice. (I would probably have approved the study if the researchers had agreed to dump the sensory deprivation experiments.)

When I read their research report, my first thought was, "These guys are in deep shit." I figured they would be getting death threats from the lunatic wing of the anti-research movement. I was completely wrong. The radical Animal Liberation Front, a group that advocates the harassment of animal researchers, prominently featured the McGill mouse pain study on their Web site as proof that humans and mice are kindred spirits. Even some scientists who normally oppose experiments that involve the infliction of suffering and permanent deformity in research animals seemed to tacitly approve of the study. Marc Bekoff is an eminent ethologist and a powerful voice for animal protection. He argues that scientists should not conduct research on animals that they would not do on their own dogs. Thus I was surprised to find that Marc used the mouse pain study in his book *Wild Justice: The Moral Lives of Animals* as evidence that even rodents experience sophisticated emotional states.

Like Marc, Jonathan Balcombe is both an animal activist and a scientist. (His doctoral research was on the behavior of bats.) The author of *Second Nature: The Inner Lives of Animals*, Jonathan opposes all invasive and painful research on other species and is a popular speaker in animal protection circles. Articulate, thoughtful, and calm, Jonathan is the perfect face for a movement that is often stereotyped as a band of wild-eyed fanatics. Given his opposition to invasive animal research, I was puzzled

when Jonathan used the McGill pain study results to argue that mice have emotions in a lecture at a conference I recently attended. Jonathan is an old friend and I called him up to find out how he would have voted if he were on the McGill animal care committee.

"Of course, I would have voted to reject it," he said.

"But don't you find it ironic that so much of what we know about the mental abilities of animals is based on research that would not be permitted if you had your way and experiments on captive animals were abolished?" I asked.

Jonathan was ready for that question. It turns out that he gets asked this a lot during the Q-and-A sessions that follow his talks on university campuses. Inevitably, someone will stand up and ask, "Dr. Balcombe, you oppose animal research, yet your argument that animals are conscious beings relies on the results of experiments that have harmed animals. Isn't that a contradiction?"

This is not an ethical dilemma for Jonathan. "I hate these studies," he tells the audience. "If I had my way, we would not allow some of the research that I use to show that animals have feelings. But the fact is that they have already been done, and they do shed light on the question of animal consciousness. So I am going to keep using them."

It is obvious to me that Jonathan has thought a lot about this issue, but I am surprised when he brings up the Nazi medical experiments in our conversation. The reason is that, prodded by the mouse pain study, I have also been thinking about them. Dr. Sigmund Rasher, a German physician, immersed prisoners in Dachau in frigid water for extended periods to see how long pilots could survive if they were downed in the icy waters of the North Sea. Dozens of his subjects died. By some accounts, this research remains some of the best information we have on the effects of hypothermia on the human body. Some medical ethicists believe that because the data derived from the experiments at Dachau and Auschwitz are already collected, we honor the dead by using the information to save human lives today—even if it was obtained unethically. Others, however, argue that the data are morally tainted, ill-gotten gains that should not be used under any circumstance. Similarly, some animal activists believe that the

results of experiments on animals are also ill-gotten gains. They believe, for example, that it is immoral to take medicines that have been tested on animals.

Are the results of the McGill pain experiments or, for that matter, studies of language learning in captive chimpanzees and dolphins, also ill-gotten gains that should not be used, even to make the case against animal research? Jonathan is not losing much sleep over this one. When it comes to the campaign against animal research, he admits to me that he has reluctantly become a utilitarian. "I am willing to use any available evidence to plead the case of the animals. Whatever works," he says. But then he adds, "Within reason."

WOULD YOU KILL A MILLION MICE TO CURE DENGUE FEVER?

But reason can be elusive in the debate over animal research. I think the argument for animal research is stronger than that for any other human use of animals, including eating them. Others disagree. Indeed, public opinion polls indicate that more Americans object to animal research than disapprove of hunting.

The moral status of mice came up in a discussion I recently had with my colleague Linda, an English professor whose writings focus on inequality and oppression. She is deeply concerned with the exploitation of both animals and impoverished people, particularly people in post-colonial Africa. Linda has been involved in animal protection since she was a teenager. She and her husband are vegans. In her spare time, she volunteers at a sanctuary for farm animals. Linda does not wear leather and she hates zoos and circuses. Linda believes that animal exploitation is intimately tied to the oppression of women, minorities, and people of color.

"Animal abuse is the foundational form of oppression," she tells me.

For Linda, activities like hunting, raising animals for fur, and eating them are simple moral issues. They are wrong: end of story. But even for her, animal research is a quagmire.

"I don't believe humans have any right to use other species for our own benefit," she says. Then she adds, "On the other hand, I do think that some research might actually benefit humans."

"Can I press you on this?" I asked.

"Sure."

"What if a drug company decided to spend less money on erectile dysfunction commercials and more on research aimed at developing cures for neglected tropical diseases that destroy the lives of so many people living in developing countries? Would you be willing to sacrifice a million mice for a vaccine against Dengue fever, one of the leading causes of child mortality in sub-Saharan Africa?"

Linda looks at the floor.

After a long pause, she says, "I am not sure. I can't decide one way or another."

"Why not?" I ask.

She replies, "Well, I do not believe that the lives of human beings are more valuable than the lives of other animals. But *mice*?"

Linda's conflict about using mice to develop a vaccine that could potentially save millions of African children is understandable. Her belief in animal equality was bumping up against her commitment to improving the lives of the world's poorest people. But for me, this is not a tough call. Yes, I would swap a million mice to wipe out Dengue. In a heartbeat.

But a million mice for a treatment for baldness? Or erectile dysfunction? Hmm . . . probably not.