

oxygen isotopes than ice volume did.” Indeed, deep-sea temperature, atmospheric carbon dioxide as recorded in the gas bubbles, and orbital eccentricity “all varied in step, on the same 100,000-year cycle,” Kerr reports, while ice volume “lagged behind,” apparently ruling out ice as a prime mover.

Shackleton sees the lockstep of the three factors “as a sign of cause and effect,” says Kerr. When an ice age began, in his view, “changes in eccentricity—presumably by

shifting the distribution of sunlight across the globe—could have decreased atmospheric carbon dioxide, weakening the greenhouse and cooling the ocean and atmosphere.” The opposite changes would have occurred at the ice age’s end.

Imbrie and others agree that Shackleton has made “a major step forward.” But many questions remain, geochemist Daniel Schrag of Harvard University told Kerr. How, for example, do orbital variations “muster” carbon dioxide into and out of the atmosphere?

Animal (Research) Rights

“Science and Self-Doubt” by Frederick K. Goodwin and Adrian R. Morrison, in *Reason* (Oct. 2000), 3415 S. Sepulveda Blvd., Ste. 400, Los Angeles, Calif. 90034–6064.

The animal rights movement has been condemning scientists’ use of animals in biomedical research for two decades now, with some

extremists even resorting to terrorism. In April 1999, for instance, the Animal Liberation Front caused more than \$1.5 million in dam-

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The nature-nurture dichotomy, which has dominated discussions of behavior for decades, is largely a false one—all characteristics of all organisms are truly a result of the simultaneous influences of both. Genes do not dictate destiny in most cases (exceptions include those serious genetic defects that at present cannot be remedied), but they often define a range of possibilities in a given environment. The genetic endowment of a chimpanzee, even if raised as the child of a Harvard professor, would prevent it from learning to discuss philosophy or solve differential equations. Similarly, environments define a range of developmental possibilities for a given set of genes. There is no genetic endowment that a child could get from Mom and Pop that would permit the youngster to grow into an Einstein (or a Mozart or a García Marquez—or even a Hitler) as a member of an isolated rain-forest tribe without a written language.

Attempts to dichotomize nature and nurture almost always end in failure. Although I’ve written about how the expression of genes depends on the environment in which the genes are expressed, another way of looking at the development of a person’s nature would have been to examine the contributions of three factors: genes, environment, and gene-environment interactions. It is very difficult to tease out these contributions, however. Even under experimental conditions, where it is possible to say something mathematically about the comparative contributions of heredity and environment, it can’t be done completely because there is an “interaction term.” That term cannot be decomposed into nature or nurture because the effect of each depends on the contribution of the other.

—Paul R. Ehrlich, a professor of population studies and of biological sciences at Stanford University, in *The Chronicle of Higher Education* (Sept. 22, 2000)

age to a University of Minnesota laboratory. The animal rights campaign has had powerful effects, write Goodwin, a former director of the National Institute of Mental Health, and Morrison, a professor of veterinary medicine at the University of Pennsylvania: “Nothing impairs creativity like fear.”

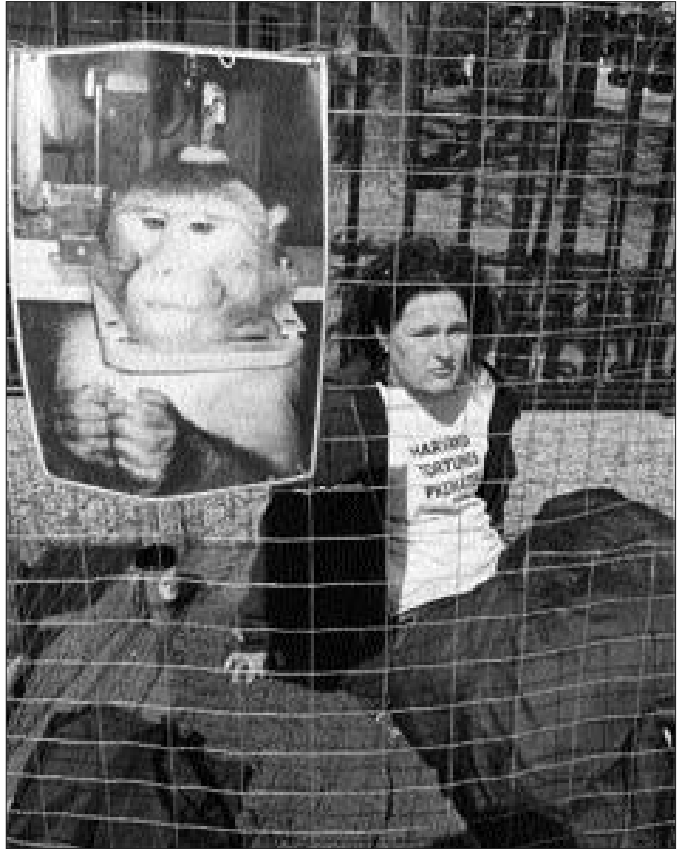
The animal rights movement considers animals “moral agents on a par with people,” Goodwin and Morrison note. Peter Singer, author of *Animal Liberation* (1975) and now a professor of bioethics at Princeton University, maintains that all creatures able to feel pain are morally equal to human beings. Ingrid Newkirk, national director of People for the Ethical Treatment of Animals, once infamously declared that “six million Jews died

in concentration camps, but six billion broiler chickens will die this year in slaughterhouses.”

The animal rights philosophy is “profoundly confused,” contend Goodwin and Morrison. “Rights stem from the uniquely human capacity to choose values and principles, then act on choices and judgment.” Extending the concept of rights to animals “dangerously subverts” the concept itself.

The activists also are guilty of opportunism in their choice of targets, the authors contend. More than 99 percent of the animals used by people are used for food, clothing, sport, and other everyday purposes, yet the activists aim their protests chiefly at scientific research. Why? Scientists have less political clout than farmers and hunters.

“Less than a quarter of the studies in biomedicine involve animals (and more than 90 percent of those are rats and mice), but . . . such animal studies are indispensable,” the authors assert. Dr. Thomas E. Starzl, a pio-



An activist pretends to suffer imprisonment at Harvard Square last April to dramatize scientists' alleged mistreatment of animals.

neer in kidney transplants, once noted that most of the subjects died in his first series of experimental transplants, but by the fourth series, all survived. Fortunately, the earlier subjects were dogs; only in the fourth series did he use human babies.

Even deliberately inflicting pain on animals is sometimes justified, the authors believe. This is done in an estimated seven percent of research, and it “has enabled us to develop effective painkillers.”

Attempting to meet animal rights activists halfway, Goodwin and Morrison say, is “a losing game.” Now a push is on to require justification of animal research by specifying the particular outcomes sought. But many scientific and medical discoveries—such as the value of lithium in treating bipolar disorder—came about by accident rather than design.

Scientists, they conclude, should recognize that they are in “a struggle for minds” and be clear about what justifies animal research: “Human beings are special.”