The positive reception of transgenic organisms in Europe is noted. Thomas Edison's contributions to science are lauded by a letter writer, who asks, "Why can't we just adore this giant personality?" Several of the many reactions received to an editorial about animal rights are presented. A plea for improvements at the Spanish Natural History Museum is put forth. Evidence that animals were domesticated in places other than the Near East is offered. And a Biosphere 2 scientist suggests one possible, partial explanation for the North American carbon sink.

Transgenic Crops in Europe

Regarding "Scorecard '97: Designer crops" (Breakthrough of the Year, 18 Dec., p. 2159), your prediction regarding a battle over transgenic crops in Europe was certainly borne out; however, the score totaled up at the end of the year does not mention the recent election in Switzerland, in which experiments dealing with transgenic organisms were given a sound vote of confidence by the population of the country. Accordingly, it seems to me that the score at present is 1 to 1. It will be interesting to see how the score changes in the near future, with the increasing availability of transgenic crops.

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Edison and His Laboratory

Upon perusing the 11 December issue of *Science* (p. 1997), I found in Bettyann Holtzmann Kevles's review of the book *Edison: A Life of Invention* by Paul Israel, the following about Thomas Edison's laboratory: "Nevertheless, Israel explains, Edison's laboratory was never really more than an overgrown workshop." The man who gave us automated telegraphy, mimeograph copiers, incandescent lighting systems, talking machines, the Edison effect, telephones that worked, electric locomotives, superior storage batteries, cinematic films, and other epic items deserves better.

Calling Edison's laboratory an "overgrown workshop" does not do justice to either his laboratory or workshops in general. It is the workshops within laboratories that make them effective. Try to imagine Faraday or J. J. Thomson without their "workshops." Or, more recently, E. O. Lawrence.

If Edison's laboratory was not a model for General Electric's (GE's) laboratory, then why did its first version, Steinmetz's barn, look so much like Menlo Park? And why did GE's laboratory have a large machine shop, a precision instrument shop, a metalworking shop, a vacuum-tube shop, a foundry and forge shop, a glass-blowing shop, and more?

If Edison depended on "knowledge achieved through tinkering, rather than research" (again quoting from the review), why was his desk at the East Orange, New Jersey, site located in the center of the atrium of a magnificent multistoried library? Tinkerer indeed! The very tube I am writing this on uses his "effect," and his technological advances, for its operation. Why can't we just adore this giant personality?

CREDIT: JOE SUTLIFF

Was Thomas Edison a "tinkerer" with an "overgrown workshop" for a laboratory?

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Animal Rights

The 20 November editorial "Animal rights: Reaching the public" by P. Michael Conn and James Parker (*Science*'s Compass, p. 1417) defends a noble cause—animal research. But like essentially all such defenses, it rests on the medical model and counsels scientists to do the impossible.

Research on animal behavior, which is usually conducted (grant-getting rhetoric apart) out of interest in the behavior of animals, is one of the areas hardest hit by animal care regulations. Yet the real defense of this work is not medical advance (although such advances may come from such research), but the fundamental importance of understanding the biological world. Most animal behavior research is noninvasive, depends for its success on the health and well-being of its animal subjects, and may help improve the welfare of individual animals as well as the survival of many endangered species. Consequently, the fact that it has been especially hard hit by the costly, bureaucratic, and often harmful animal care regulations we all suffer under is especially disgraceful.

I have tried without success to get the American Psychological Association to at least seek some relief for noninvasive animal researchers. But an ethologist at my university must still file a 14-page protocol for his research watching wild birds or keeping goldfish in a tank (and the tank had better not be in a room with any other animal!). It will not do to advise working scientists to "communicate their message to the public." Science is competitive; few can succeed as both scientist and political activist. We must rely on our professional associations to take up the cudgels on our behalf. On this topic, they seem to be failing us.

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Conn and Parker misrepresent individuals in the animal rights community by using a "grandmotherly" figure (who is portrayed as uneducated and scientifically unsophisticated) to represent those concerned with animal welfare. We are both trained scientists who are not exceptional members of the animal rights community. Most are well educated. Carl Sagan best expressed our feelings when he said that he was "conflicted about animal experimentation." So are we. Although we do not advocate abandonment of all animal research, we strongly support the humane treatment of all animals.

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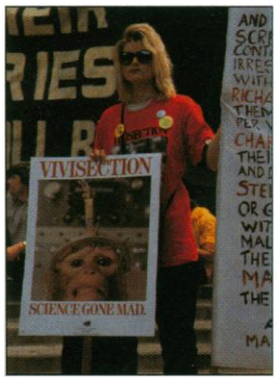
In their editorial, Conn and Parker emphasize outreach as a means of educating the public about the indispensable role animals play in biomedical research. More important, they stress the need to pursue a more compassionate approach to the publicly sensitive issue of animal experimentation. One critical issue left unmentioned

is a further need for the biomedical research community to reach out to more moderate and rational elements of the animal welfare advocacy movement. Rather than fighting continued battles for public sentiment, why not strive to diffuse misunderstanding at its source? By dismantling loggerheads and declaring détente, the biomedical research community might actually succeed in reaching a weary public that sometimes legitimately views scientists' attitudes toward animals as indifferent at best. An incentive to the animal welfare community might be heightened financial support by the National Institutes of Health for the continued development of nonanimal research alternatives and the implementation of validated alternatives when available. In return, animal welfare groups might begin spotlighting efforts of biomedical researchers to ease the plight of animals in lifesaving research. Such alliances would benefit animals and research alike while discrediting extremist views.



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Can scientists find common ground with animal rights activists?

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Conn and Parker reject the suggestion by animal rights advocates that computers can completely replace experimental animals. However, they may have overstated their case when they say that "scientists depend on computers for processing data that we already possess, but can't use them to explore the unknown in the quest for new information." Just a few pages away, in the same issue of *Science*, Evelyn Strauss, in her article "New ways to probe the molecules of life" (News Focus, p. 1406) describes the great potential of simulation models for pretesting drugs before human trials. Use of such models might reduce, if not eliminate, the need for animal trials.

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While I applaud virtually all of the suggestions communicated by Conn and Parker about the necessity of addressing mainstream society with compassion and realism regarding animal research, I am concerned about one of their recommendations. They suggest that research institutions provide tours through animal facilities to the concerned public. In their view, this would dismiss public worries about inhumane treatment of the animals in our charge.

This is an effective strategy if we assume, and unfortunately many of us do, that it is, indeed, humane to allow animals to spend their days confined in an area where little to no positive human contact is provided. But I have to ask, "Why must we be coerced to provide animals with attention and enrichment?" It isn't necessarily costly or time-consuming.

The public realizes that these creatures will commit the ultimate sacrifice to improve the quality of human lives. They will die for our benefit. Accordingly, humane treatment of these animals must necessarily be founded on respect, compassion, and attention to all of their needs. We must assure these invaluable resources the best quality of life permissible within

experimental constraints. It's good for the animals and good for science.

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Conn and Parker are justified in their concerns that the animal rights movement may harm scientific research, but I fear that their arguments may set their cause back even further. The strategies they propose are essentially public relations moves and, while they have their place (as the animal rights movement well knows), they still leave the key philosophical issue unanswered: do animals have rights that preclude their use by us in scientific research?

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Spanish Natural History Museum

The Museo Nacional de Ciencias Naturales (MNCN, Spain) has a serious problem: around 67% of its total floor space (40,000 square meters) is taken up by the Technical School of Industrial Engineering. The MNCN is located in downtown Madrid, close to the Prado gallery. It was founded in 1772 by King Charles III and, for more than a century, was one of the most important museums in the world; in fact, the present Prado museum building was initially designed by Charles III to be used as the Natural History Museum. In 1915, the MNCN was moved, together with the Technical School of Industrial Engineering, to its present location (a palace built in 1887).

The MNCN has one of the most important natural history collections in Spain, with around 6 million biological and geological specimens, including unique samples from scientific Spanish expeditions to Latin America (for example, those of Humboldt, Malaspina, and Heuland), extinct species of unusual shells from the Far East, meteorites that fell 400 years ago, and the first naturalized paleovertebrate in the world. Many important educational and research projects are directed from the museum, including the Atapuerca "Homo Antecessor" project; studies of Iberian fauna; geophysic and volcanic research on Teide Volcano and in Antarctica; and research on global climate change.

The Spanish Research Council (CSIC) is the institution responsible for the scientific and cultural activities of the MNCN. However, its economic and scientific support is severely handicapped by the presence of the Technical School of Industrial Engineering in the heart of the building. This situation not only causes a lack of space for laboratories to house new modern analytical techniques, but also splits the exhibition halls into two separate areas. Visitors (80% are groups of children) are forced to move from one area to the other, while avoiding traffic and carpark barriers.

The MNCN urgently needs to solve this problem. Now that other Spanish museums (for example, the Prado) are expanding to surrounding buildings, it seems appropriate that both the UNESCO International Committee for Museums and Collections of Natural History and the Spanish authorities monitor and correct this unusual assemblage of two centers on the same premises.

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Animal Domestication

In her article "The slow birth of agriculture" (Special Section, Archaeology, 20 Nov., p. 1446), Heather Pringle outlines some recent archaeological developments that have been used to push back the dates for crop and livestock domestication. The article provides an interesting perspective on how demographic approaches can be used to glean new information from existing sites and how these data are changing our views on the early origins of agriculture. The map used to illustrate the article suggests that cattle were domesticated in the Near East, with a putative secondary domestication in North Africa. However, there is a considerable body of archaeological and genetic evidence that supports a separate domestication of humped zebu cattle, most likely by the early Neolithic cultures of the Kachi Plain in present-day Baluchistan (*1*). Recent surveys of genetic variation in contemporary cattle populations have provided strong evidence for an independent domestication of zebu cattle (*2*). In addition, based on these same data, there is tentative evidence that African taurine cattle may also have an independent origin (*3*). Molecular studies in other domesticated species such as pigs (*4*) and sheep (*5*) have also produced similar results and suggest that the earliest herders were not confined to the Near East. One should be aware that there is a traditional