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Cover

Cliffs of the Miocene Monterey Formation, Naples Beach, California. These finely laminated sedimentary rocks rich in organic matter were deposited during a period of worldwide cooling about 14 million years ago. A record of this climate change is revealed by the carbon isotopic signatures of certain molecules synthesized by organisms, such as marine algae and bacteria, and subsequently fossilized after the sediments were deposited. See page 1122. [Photo: Kevin Irwin, Chevron Petroleum Technology Company]

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EDITORIAL

Strategic Goals on an NIH Model

Senator Barbara Mikulski's (D–MD) definition of "strategic goals" for research using the National Institutes of Health (NIH) model offers an opportunity for legislators and scientists to join forces and make research a productive ally in creating a better world (see Editorial of 11 February). What the country needs is no longer "a good cigar" but a good research policy for solving the problems of a complex and ever more overlapping ecosystem.

The NIH, with its stellar record of achievement in health research, is an excellent model for research on other frontiers. Numerous examples for government action immediately come to mind: (i) a National Institute of Transportation to help relieve the problems of clogged roads, deficit-ridden public transportation, and bankrupt airlines; (ii) a National Institute for the Environment [an expansion of an existing National Institute of Environmental Health Sciences (NIEHS)] to prevent species extinction, handle toxic wastes, get clean air, and prevent job losses; (iii) a National Institute for Immigration to examine in an imaginative and objective way the true costs and implications of immigration, to ease the path of immigrants, and to alleviate fears of job competition; (iv) a National Institute for Public Safety to replace bureaucratic and political positions on the roles of crime prevention, education, legalisms, and incarceration with good data and investigator-initiated ideas; and (v) a National Institute for Defense to open up this area of research in a world in which terrorism and small wars may be more of a threat than superpower war. Much research is already under way in many of these areas, but many are not organized according to the successful formula of continuity and investigator-initiated emphasis of NIH.

The model of a long-term goal designed around largely investigator-initiated research is a tried and true formula that has worked in the past. The success of NIH, contrasted with the dismal failure of the Superfund (which had little research or scientific input), is a case history for all who need to learn the lesson of making policy without scientific input. If government officials want to solve some of these very difficult problems, they can do so with policy that uses scientific, not emotional, standards. Investigator-initiated ideas should be welcomed even if they fly in the face of conventional wisdom and should be discarded out of hand only if juries of peers consider them scientifically impossible. Needless to say, a superficially attractive idea may be given a lower priority after more in-depth review, but the unconventional view should be welcomed until careful analysis indicates its impracticality. Much of the emotion in the current immigration debate might be defused by a careful study of the fate of immigrants, their contributions as well as their costs to society, the problems of language, and so forth. Research has already ranged from a minor role in the Environmental Protection Agency (EPA) to a stronger role in defense research and is recognized as a major player in such complex areas as industrial competitiveness and immigration policy.

But can science and government work more effectively together? The recent National Academy of Sciences–sponsored meeting of officials from the EPA with university administrators, industrial leaders, and bench scientists, in which a constructive spirit of "what can we do" rather than "you're to blame" prevailed, is an indication that it can be done. Other agencies of government with great global problems still seem to think a busy person with preconceived ideas and no research support can solve a problem such as drugs or crime and then they are puzzled when the programs fail. Polio would still be a disease without a vaccine if that had been the approach.

If we developed a goal-oriented but investigator-implemented structure in areas of direct national needs following Senator Mikulski's concept, perhaps it is appropriate to select one institute that is designed for those ultimate national goals that no one can predict in advance—the x-rays, the penicillins, the genetic code, the wireless, and the E = mc² that opened up new vistas. That institute should be called the National Science Foundation.

If the research is to flower, a strong investigator-initiated atmosphere on the NIH model must be generated by other government agencies and a willingness for flexibility and adventure must be the attitude of scientists. Homo sapiens has achieved unbelievable control over the world by innovation and flexibility. As a result we have a population explosion that creates new problems, but these can be solved if we proceed rationally. It is time to see if Homo sapiens can now devise social structures to match their mountainous problems.

Daniel E. Koshland Jr.
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Animal Rights and Radical Politics

Harold Herzog, in his recent review of four books on the animal rights movement (17 Dec., p. 1906), seems not to have examined closely the movement's radical politics. Certainly Rod and Patti Strand [The Highjacking of the Human Movement (Doral, Wilsonville, OR, 1993)] and Lorenz Lutherer and Margaret Simon [Targeted: The Anatomy of an Animal Rights Attack (Univ. of Oklahoma Press, Norman, 1992)], whose books he dismisses as having a "parchment for half-truths and over-generalization," have done so; and from the vantage point of more than a dozen years of "interacting" with the movement, I can say with assurance that their exposés of the clever machinations of the leaders of this movement ring true.

Herzog describes the two books' concerns about terrorism as exaggerated because the recent governmental Report to Congress on the Extent and Effects of Domestic and International Terrorism on Animal Enterprises reported only three terrorist attacks. To say this, he relies on a technicality of definition and does not mention that the report lists these attacks in a group of 21 incidents with damages of more than $10,000 occurring between 1983 and 1992, the total damages being $7.66 million. I suggest he talk with John Orem, the subject of the book by Lutherer and Simon, or to his own North Carolina colleague, Walter Salinger, who has suffered for years having the temerity to testify to the value and appropriateness of releasing animals for research from his local pound, to gain a greater appreciation of the debilitating effects of selective terrorism on the research enterprise. The chapter "Effects on a targeted investigator" in Targeted reveals clearly that random intimidation is the essence of terrorism.

Herzog criticizes the books for offering only "superficial insights into the movement's appeal . . . " to the "typically bright and well educated . . . " young [31 years old on the average, according to a large survey (1)] individuals who are the animal activists. One need not look far for the answer: In addition to being members of the healthiest generation in history (therefore not really able to appreciate the problems they have escaped), they live in a country, according to the Strands, in which only 2 in 50 have had an experience with the realities of farm life. This contributes to their unrealistic, romantic view of animal life.

Finally, the Strands' thoughtful last chapter, which discusses the basically misanthropic underpinnings of the movement's philosophy, can hardly be said to "gloss over the moral quagmire conveniently ignored by dogmatists on either side of the debate . . . ." as Herzog suggests.

In the Name of Science (Oxford Univ. Press, New York, 1993) by Barbara Orlans fares better in the review, although researchers do not in her book. While disparaging the use of patients by the "incruebly ill For Animal Research"—these are suffering people after all—to lobby against animal rights-inspired, anti-research legislation, the worst Orlans can say about the extremist organization People for the Ethical Treatment of Animals (PETA) is that they sing pro-Animal Liberation Front anthems at the National Zoo.

Herzog seems to accept Orlans' contention that researchers are not particularly concerned about animal welfare. He credits activists for having "done a service for those of us who work with animals by forcing us to consider the moral implications of our research . . . ." and then quotes my recent statement (2) that "I go through a soul-searching every couple of months, asking myself whether I really want to continue working on cats . . . ." as if this personal feeling were a response to activists' prodding rather than a concern I have had for the more than 30 years of my career. The Strands quoted the following from elsewhere in my article (2), pp. 133–134):

What animal can match in suffering the heartbreak of parents, who lose a child to illness or have given birth to a child with severe birth defects, or the despair of a teenager who learns that life in the future will be incomplete as a result of the car accident that severed his spinal cord? Even chimpanzees cannot participate in the grief of others. We can, even when learning of a tragedy in the newspaper. This makes us special.

in a moving discussion of the inhumanity inherent in too much of the animal rights literature, which does not recognize the humanity of making a choice that favors people. The Strands certainly do not "gloss over" moral issues.

Adrian R. Morrison
Program for Animal Research Issues, National Institute of Mental Health, Parklawn Building, Room 17C-26, National Institutes of Health, Rockville, MD 20857, USA
Response: Differences of opinion over the relative merits of four books which cover the gamut of positions on a complex and divisive moral issue are inevitable. I suspect that Adrian Morrison and I agree about several important aspects of the animal rights debate. These include our shared beliefs that animal research is critical to biomedical progress, that violence and intimidation are unacceptable as political tactics, and that human and nonhuman animals do not have the same moral status. His letter, however, does reflect some fundamental differences in our views.

First, Morrison maintains that The Hijacking of the Humane Movement offers significant insights into the motivations of animal activists. I found the book to be heavy on propaganda and light on intellectual substance. I was put off by its sensationalistic, almost tabloid, quality, and I believe that it distorts and oversimplifies the contemporary animal protection movement. For example, the book’s back cover promises, “A real insight into the workings of true fanatics. These people are shown to be the latest hate group, pure & simple, & the animal issue is just a vehicle to disguise its character.” The last chapter, which Morrison singles out as being particularly insightful, opens with a quotation from the text of the “bible” of a satanic cult (“Satan represents man as just another animal. . . .”) Later in the chapter, readers are advised to resist environmental legislation because, “Nothing removes private property as quickly as endangered species laws (biodiversity)” (1).

The Strands’ book does explicate the radical politics of the movement. But, by focusing exclusively on the hyperbole and illegal actions of a small group of extremists, the authors avoid serious examination of the social and moral issues that underlie the rapid growth of animal protectionism in the United States over the past 20 years. They simply dismiss the ethical issues raised by animal activists as the rantings of a small cult of sentimental, misanthropic urbanites. Any social movement can be discredited by treating the rhetoric of the most extreme elements as representative of the movement as a whole. I believe this strategy is misleading and counterproductive. Ironically, books such as The Hijacking of the Humane Movement may actually play into the hands of animal extremists by scaring researchers away from using animal models.

Second, it was the Federal Bureau of Investigation, not I, which concluded that the majority of animal extremists incidents do not fit the criteria of domestic terrorism. I do not say this to diminish the personal suffering that these “incidents” cause. As noted in my review, I believe the Department of Justice report (2) underestimates the actual number of such events. Further, I am indeed sympathetic to the plight of scientists who have been the targets of animal extremists. I am an animal researcher myself. I have had the disquieting experience of opening my morning paper to find that my own research was the subject of angry letters to the editor penned by animal activists who had no understanding of the work. Although this experience was decidedly unpleasant, it pales in comparison with the personal and professional costs suffered by scientists such as Orem, Salinger, and Morrison, who have endured serious threats and harassment at the hands of misguided militants. Some activists appear to forget that humans, including scientists, are also animals and thus would seem to deserve at least the same degree of moral consideration that the activists would have us accord dogs, pigs, and chimpanzees.
Third, nowhere in my review do I suggest that scientists are not concerned with animal welfare. I serve on several animal care committees, and I know that many researchers do give serious consideration to the well-being of their experimental subjects and the ethical implications of their research. I cited Morrison’s “soul-searching” quotation because I believe it is an eloquent statement of our obligation to consider the legitimate ethical questions raised by our use of animals. I did not mean to imply that Morrison’s position on this matter was a response to the prodding of animal activists, and I do not doubt his statement that he has always been concerned with the welfare of experimental animals. My experience, however, has been that the ethical culture of many laboratories is quite different from what it was when I was a graduate student two decades ago. My attitudes about our moral responsibilities toward nonhuman research subjects have changed over the years, and I suspect this is true for many scientists. Morrison and I simply disagree about whether these changes would have come about without the prodding of animal protectionists.

Finally, I am concerned about the polarized nature of the debate over the use of animals in research. Scientists who understand the philosophical, social, and psychological roots of animal protectionism and who recognize the complexity of the ethical issues posed by our interactions with other species are in a better position to argue the case for animal research in the court of public opinion. Partisans on both sides of this issue would do well to heed the advice of ethicist Earl Shelp, who cautioned, “May we have the wisdom, patience, and courage to perceive the limitations of our particular moral visions. . . . And may we have the wisdom, patience, and courage to respect similar limitations that we perceive in the particular moral visions . . . of persons with whom we disagree” (3), p. 116.

Harold Herzog
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References

Pork Barrel Funding an Embarrassment

I would like to point out an error in Christopher Anderson’s article “Leading pork opponent hog-tied by cancer project” (News & Comment, 15 Oct., p. 329). The article quite rightly points out a significant problem relating to “pork barrel funding” of science projects that do not go through the usual peer-review mechanism. The article discusses a boron neutron capture therapy (BNCT) program that was initially funded primarily through the Department of Energy, but for which direct congressional funding is now being sought by a university consortium. The University of Washington is incorrectly listed as being a member of this consortium.

I am coordinating a BNCT-related project at the University of Washington with the ultimate goal of enhancing the effectiveness of a fast neutron radiotherapy beam. Funding for this project is being obtained through the usual peer-reviewed channels, as well as from discretionary University of Washington funds. We were asked to join the BNCT university consortium, but after considerable discussion decided not to. We were concerned about

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attempting to circumvent the peer-review process and thought that participating in this attempt would be a potential embarrassment to our university. Our decision not to participate was made in early 1993 and was communicated then to the consortium; we have not participated in any of the consortium lobbying efforts.

George E. Laramore
Clinical Director, University of Washington
Fast Neutron Radiotherapy Project,
Department of Radiation Oncology,
University of Washington Medical Center,
Seattle, WA 98195, USA

Response: The list published in Science was taken from a BNCT consortium membership document that included the University of Washington. The consortium has since amended that. Its ninth member is the Oregon Health Sciences University.

—Christopher Anderson

Safety in Quarks?

Nobelist Carlo Rubbia’s proposal (News & Comment, 26 Nov., p. 1368) to enter the thorium/U-233 cycle with the aid of accelerators has some charm and perhaps a bit of color. But his statement (quoted indirectly) that “because the thorium cycle produces little plutonium, the risk of weapons proliferation should be minimized” is flawed. The tamped critical mass (as in an implosion weapon) of uranium-233 is less than that of plutonium-239.

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Corrections and Clarifications

The report “Cure of xenografted human carcinomas by BR96-Doxorubicin immunonconjugates” by P. A. Trail et al. (9 July, p. 212), inadvertently omitted a reference to unpublished information about the specifics of the chemical synthesis of BR96-DOX conjugates. This information has now been published (D. Willner et al., Bioconjug. Chem. 4, 521 (1993)).

The Books Received listing of 26 November (p. 1463) for Thomas F. Lee’s Gene Future: The Promise and Perils of the New Biology (Plenum, New York, 1993) included a line of information that did not apply to that book. The price given for the book, $24.95, was correct.
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erogeneity of the molecular scale structure was observed only in the case of films of four layers or more (3). The existence of the molecular scale heterogeneity, as reported by Schwartz et al., is related to the underneath substrate of the observed upper bilayer.

Schwartz et al. compare one of the crystallographic structures they observed (called $3 \times 1$) to the structures we observed after annealing of the samples. Their discussion is based on the assumption that an observed structure in LB films should fit into the general frame of alkanes chains packing as predicted by Kitaigorodskii, which leads them to an incorrect analysis of the films' structures. We have shown that the simplest description of the structures of our annealed films could be performed in terms of a centered rectangular lattice on which one superposes a modulation of height and lattice spacings varying from one location to another on the samples. Such a description is only possible with local probe microscopes, which provide us with a local nonaveraged structure of LB films. The structure observed by Schwartz et al., which we also observed in some locations of our samples, is one peculiar case of a more general description in terms of modulated structures. The analysis of Schwartz et al. was performed with the help of autocorrelation functions of images; this is a nonlocal procedure that may smooth out slight deviations from an averaged structure. One should be aware of those subtle variations in order to give a full description of LB films structures, whether or not this leads to a more difficult comparison with the predictions of Kitaigorodskii, which furthermore do not take into account the crucial influence of counter-ions on LB films structures.

Finally, although the observations by Schwartz et al. are valid, the most interesting point about the AFM technique is that it can evidence slight deviations from the perfect crystallographic structures that can be obtained by using various easier and better established techniques such as electron or x-ray diffraction.

L. Bourdieu
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Books Received


Beneficial and Toxic Effects of Aspirins. Susan E. Feinman. Ed. CRC Press, Boca Raton, FL, 1993. xii, 130 pp., illus. $84.95. Pharmacology and Toxicology.


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Rereplication? The passage through mitosis release the block to rereplication? and then describing experiments that have helped to formulate answers. But no one could read this book and come away feeling that all the mysteries of the cell cycle have been solved; the persistence of unanswered questions is acknowledged (for example, "Do G1 cyclins play the same role in mammalian cells that they do in yeast?""). The authors manage to convey a lot of experimental detail, both techniques and results, without assuming much background knowledge beyond basic cell biology. Instead of cluttering up the text with citations, they have ended each chapter with a mercifully short list of suggested reading that provides a good entry point into the literature. An appendix lists the genes involved (in almost any way!) with cell cycle control—certainly useful for those who do not care for alphabet soup. It would have been helpful if this appendix had been cross-referenced to the text, especially since the index is not very comprehensive.

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