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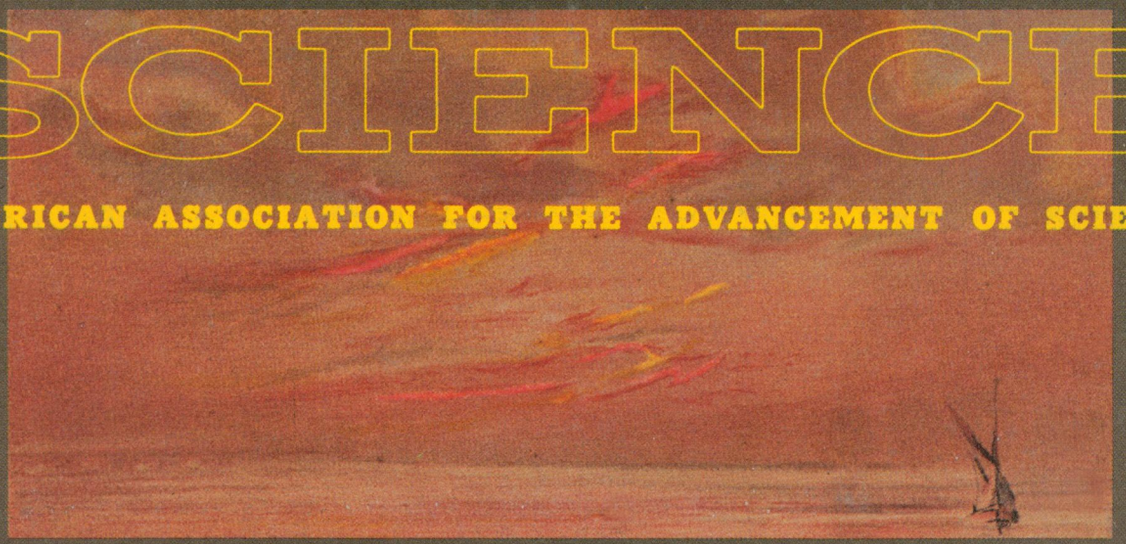

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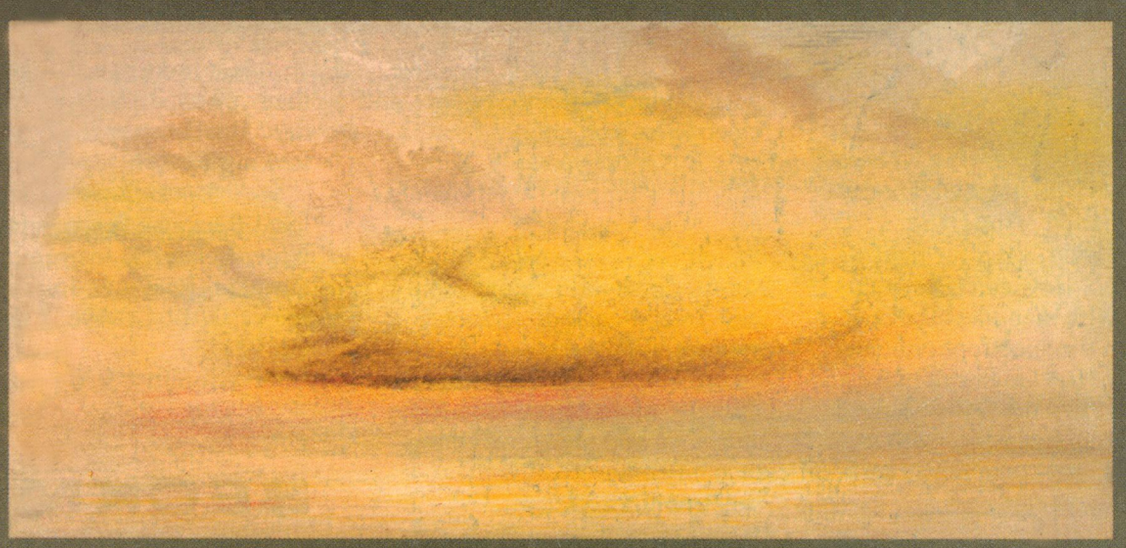

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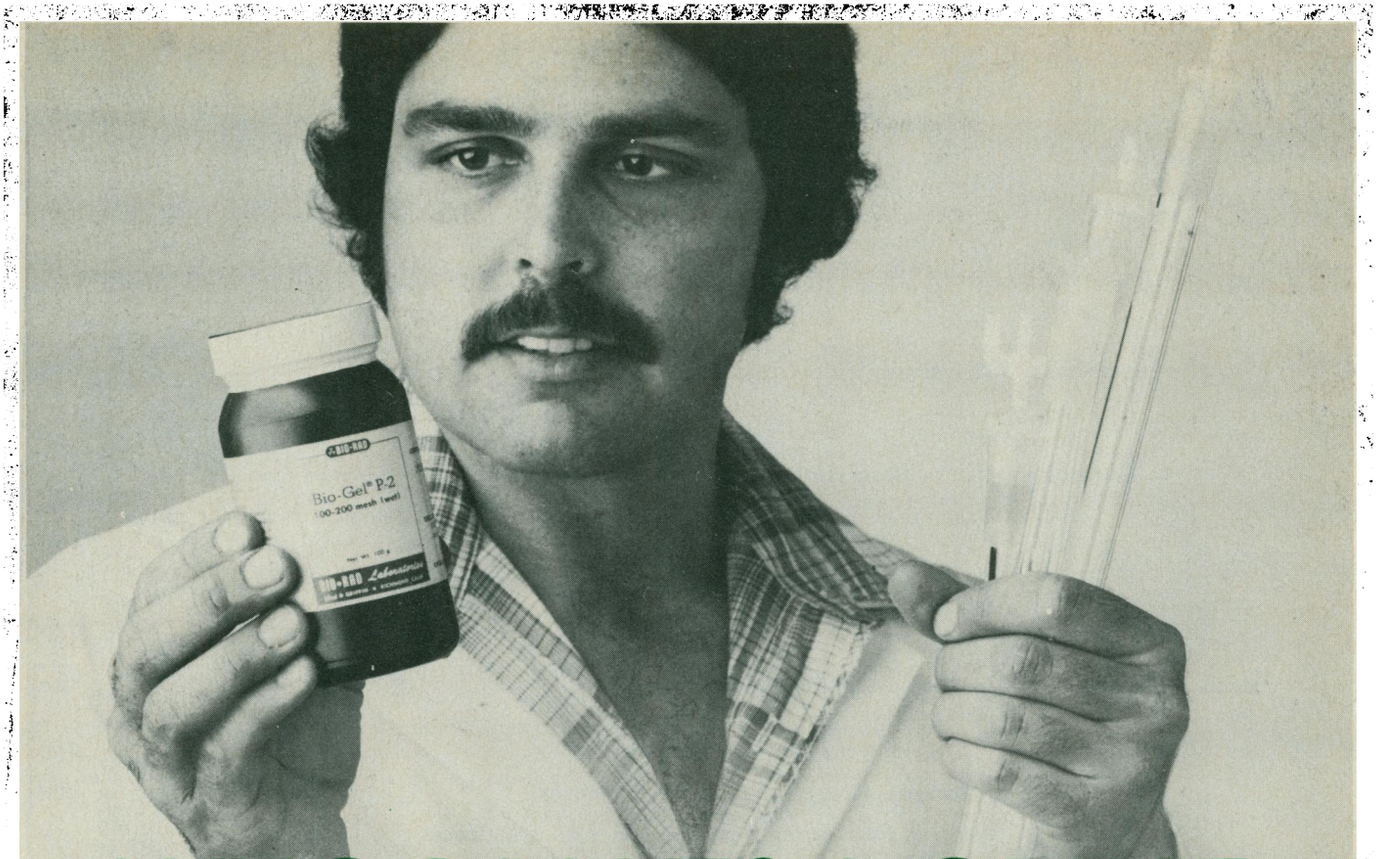

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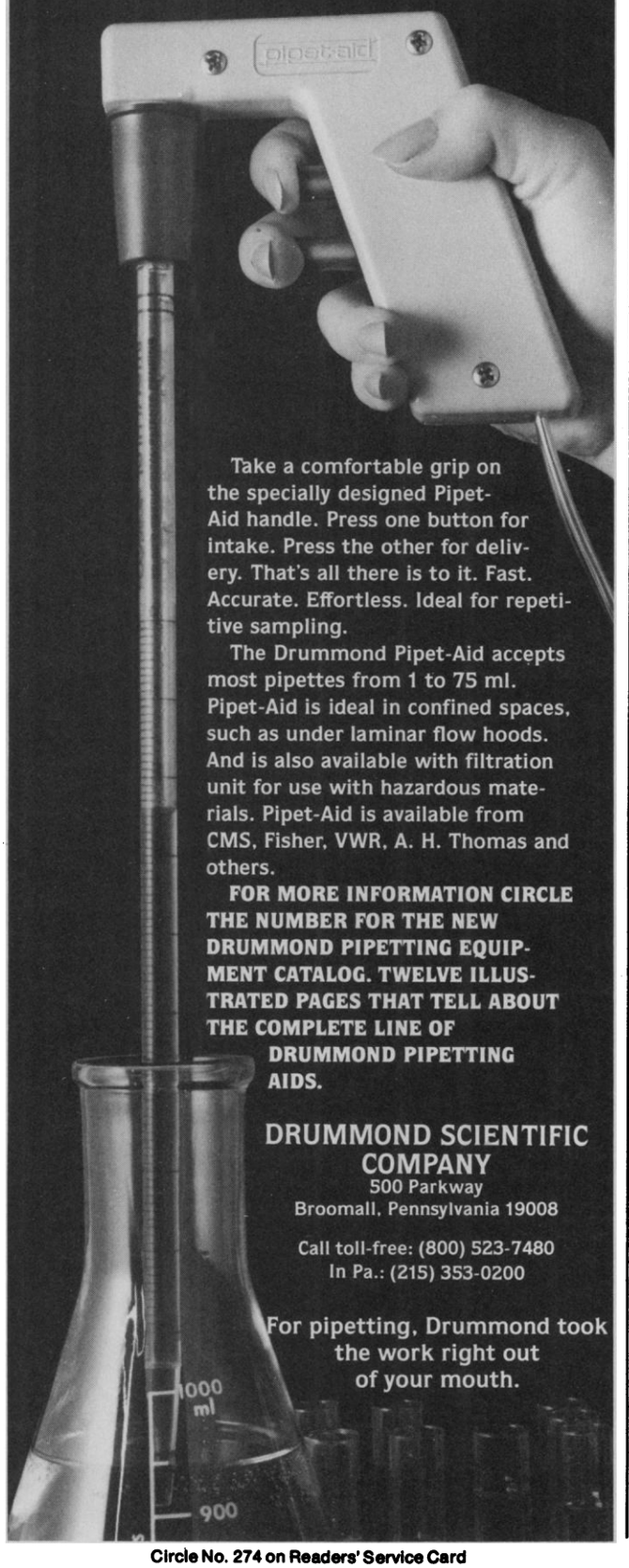

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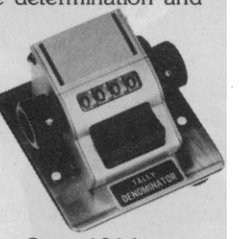

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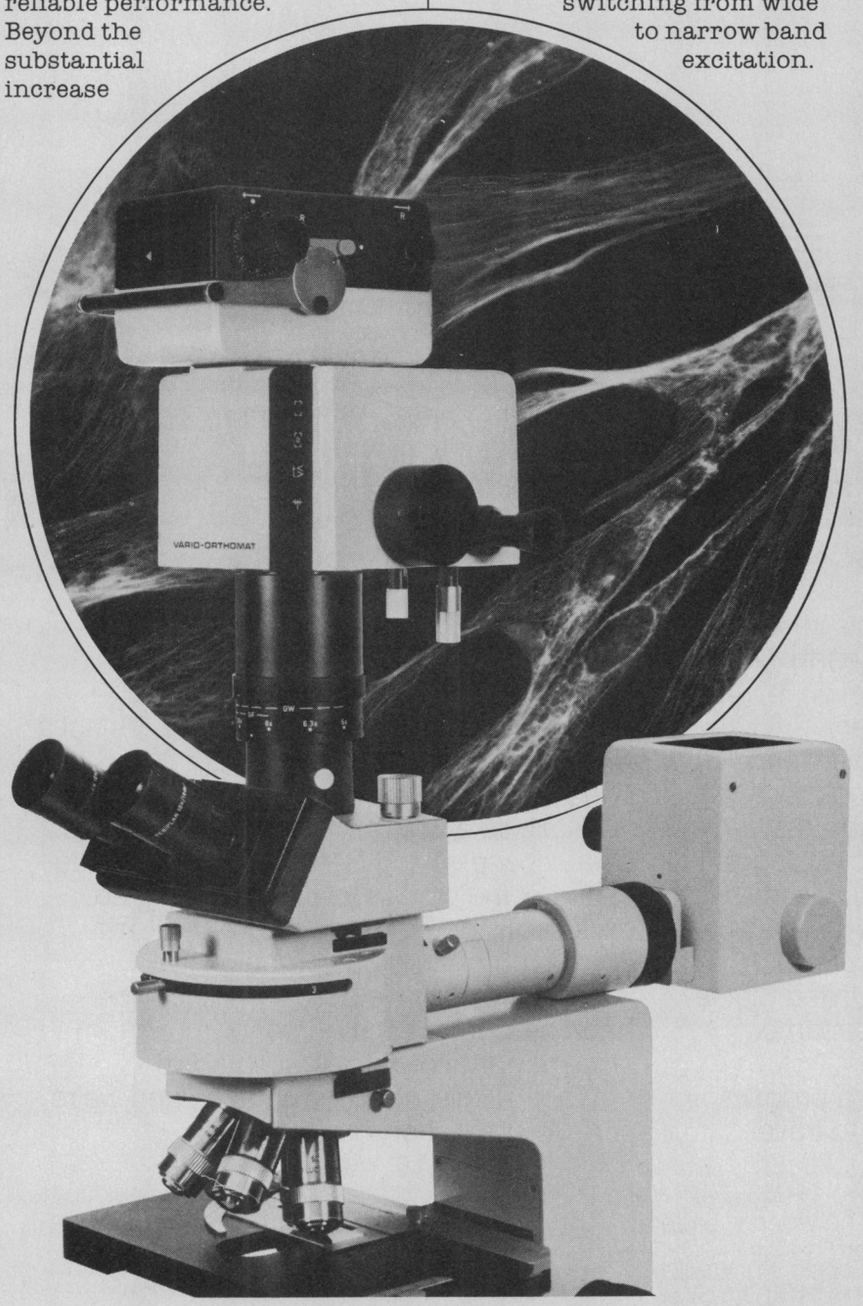

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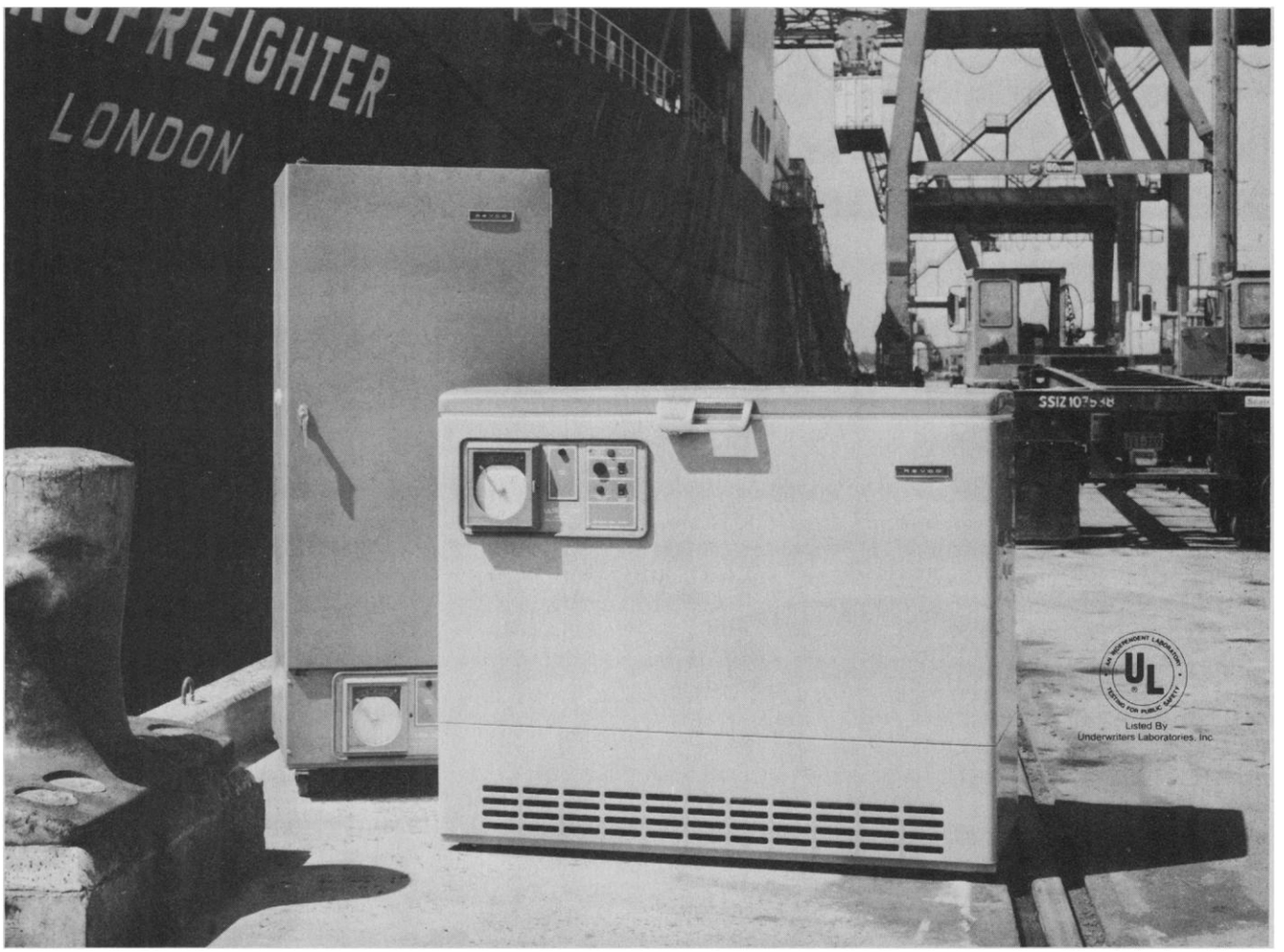

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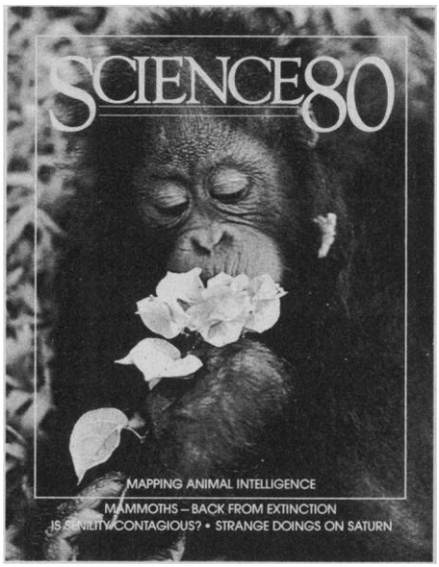

OF SCIENCE FROM THE AAAS

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LETTERS

New Recombinant DNA Guidelines

The statement that "All gene splicing experiments with *E. coli* K12 may now be conducted in minimal (P1) containment" (News and Comment, 15 Feb., p. 745) is not correct. The revised National Institutes of Health (NIH) Guidelines for Recombinant DNA Research, as promulgated on 29 January 1980, continue to prohibit certain experiments using *E. coli* K-12 and continue to exempt others from the guidelines. Still other experiments are permitted at P1 containment, but only when an EK1 host-vector system is used, "(i.e., (a) the host shall not contain conjunction-proficient plasmids or generalized transducing phages, and (b) lambda or lambdoid bacteriophages or non-conjugative plasmids shall be used as vectors)." The September 1979 proposal of the NIH Recombinant DNA Advisory Committee was not accepted in toto. The NIH Director rejected an exempt status for such experiments and required a more conservative review procedure for "any experiment in which there is a deliberate attempt to have the *E. coli* K-12 efficiently express any gene coding for a eukaryotic protein."

BERNARD TALBOT

Office of the Director,
National Institutes of Health,
Bethesda, Maryland 20205

Caffeine Study

Michael Jacobson (Letters, 18 Jan., p. 258) quotes a paper by our team in support of his assertion that caffeine is teratogenic (*1*). This statement is somewhat overstretching our conclusions.

Our study compared the frequency of various environmental, including dietary, factors in a group of 202 mothers (cases) of newborn children with birth defects and in a group of 175 mothers (control) of normal children. Average coffee intake, during pregnancy, as reported by the mothers after delivery, was one factor that showed a statistically significant ($P < .05$) difference between the two groups. This difference was particularly marked for heavy coffee consumption, defined as 8 cups or more per day. Heavy coffee drinkers were represented by 22 percent of the case group versus 12 percent in the control group.

While we considered this observation worth publishing, our conclusions were deliberately cautious: "The data pre-

sented do not permit us to conclude a direct relation between coffee consumption and birth defects. . . . A longitudinal study could further clarify the issue."

The reason for caution is that a number of factors, methodological or others, could be at work to produce these results. They include testing for multiple associations, which increases the chance of finding spurious ones, and indirect association of coffee drinking with birth defects through other unidentified factors.

Retrospective epidemiological studies are useful for generating or validating hypotheses. These, however, must be independently repeated before conclusions are made. Until additional ongoing studies on the relation between coffee drinking and birth defects are completed, we consider that the statement by Jacobson that "caffeine is teratogenic" is, at least as far as reference is made to our study, premature.

M. F. LECHAT, I. BORLÉE
A. BOUCKAERT, C. MISSON
École de Santé Publique,
Catholic University of Louvain,
B-1200 Brussels, Belgium

References

1. I. Borlée, *Louvain Med.* **97**, 279 (1978).

Sea Turtle Conservation

The generally excellent article "Experts gather to talk turtle" (News and Comment, 21 Dec. 1979, p. 1383) contains errors and omissions concerning restrictions on trade in sea turtles and products derived therefrom.

First, the author incorrectly asserts that "the United States recently added farmed turtle products to the forbidden list in CITES [Convention on International Trade in Endangered Species]." The green sea turtle was added to Appendix I (the most protected category) of CITES in 1976. This action was done by agreement of the parties to CITES and not unilaterally by the United States.

Normally, all commercial trade in Appendix I species is prohibited under CITES. However, Article VII of CITES permits limited commercial trade in specimens of Appendix I species that are "bred in captivity." CITES itself does not define the term "bred in captivity," however, and before 1979, there was no agreed upon interpretation among the parties. At the 1979 meeting of the CITES parties, a uniform interpretation was adopted which limits the term to the offspring of parents that mated in captivity, *provided* that the breeding herd is managed in a way that has been shown to be reliably capable of protecting at least two successive generations in captivity. This uniform interpretation was likewise made by agreement of the parties and not unilaterally by the United States. Since a judge of the U.S. District Court for the District of Columbia has recently found (*1*) that "a significant percentage of the [Cayman Turtle Farm's] . . . recent hatchlings were not born of parents which had mated on the farm" (*1*, p. 15) and that "it may be premature to determine that the breeding cycle at Cayman Turtle Farm can be completed from farm laid egg to farm laid egg" (*1*, p. 15), it is clear that many of the turtles the farm now markets fail to qualify as "bred in captivity."

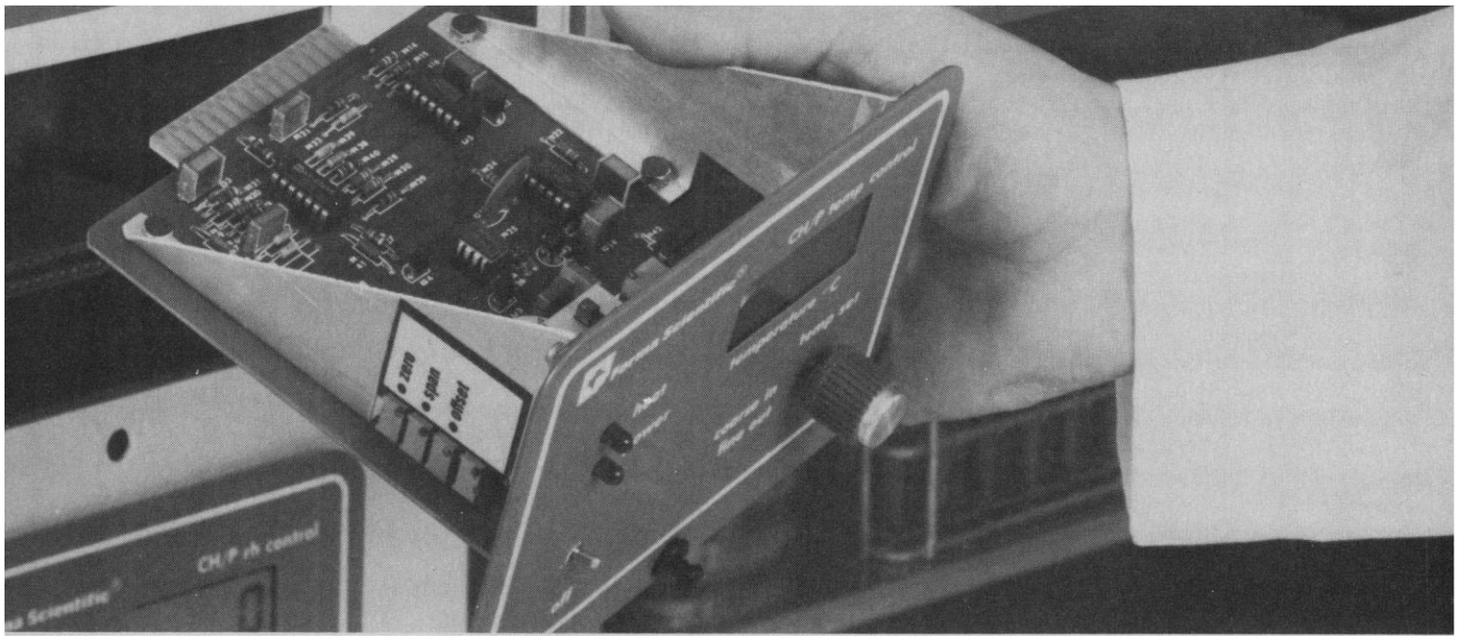
Second, the author notes that most conservationists believe commercial mariculture will further jeopardize wild turtle stocks, whereas farm owner Judith Mittag holds out the possibility that farm turtles could be used for restocking the wild. Not mentioned is the fact that the same judge found that evidence in the voluminous administrative record compiled over 4 years by the Secretaries of the Interior and of Commerce was "more than ample" to support their conclusion that "the survival of wild sea turtles would be threatened by either the formation of additional turtle farms or by illegal poaching" (*1*, p. 12). The Cayman Turtle Farm has not appealed that finding, although it has appealed the single issue of whether the Endangered Species Act is applicable at all to its turtles. In fact, while the turtle farm owners are saying their turtles may one day restock the wild, the farm is arguing to the U.S. Court of Appeals in its appellate brief (*2*) that their turtles "have no connection with the wild turtles roaming the oceans" and are, in fact, "domesticated" (*2*, p. 8).

MICHAEL J. BEAN
Wildlife Program,
Environmental Defense Fund,
Washington, D.C. 20036

References

1. "Cayman Turtle Farm, Ltd. *vs.* Andrus *et al. vs.* Environmental Defense Fund, Inc. *et al.* Memorandum opinion" (Civil Action No. 78-1661, U.S. District Court for the District of Columbia, Washington, D.C., 29 May 1979).
2. "Cayman Turtle Farm, Ltd. *vs.* Cecil D. Andrus, Secretary, Department of the Interior *et al.* Appellants brief" (Case No. 79-2031, U.S. Court of Appeals for the District of Columbia, Washington, D.C., 1979).

Erratum: In the article "The Leopolds: A family of naturalists" (News and Comment, 7 Mar., p. 1051), the correct title of the Sierra Club book by Charles Steinhacker and Susan Flader which was cited in the footnote on page 1052, third column, is *The Sand Country of Aldo Leopold.*



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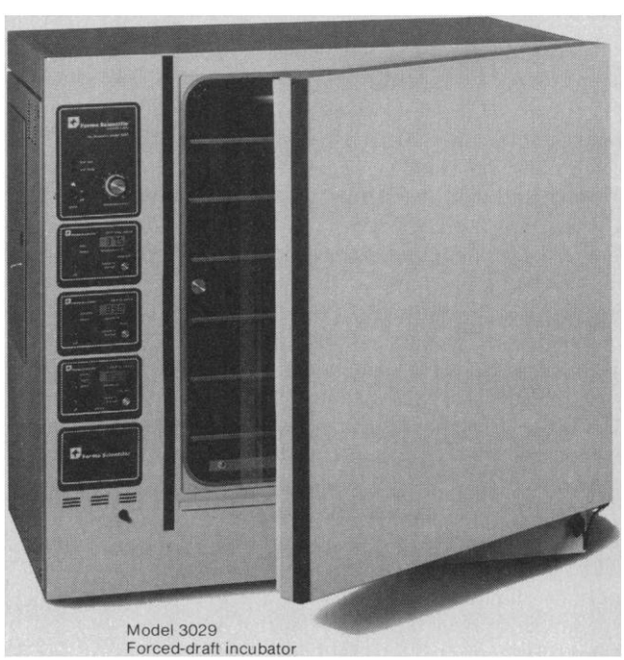

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21 March 1980, Volume 207, Number 4437 **SCIENCE**

Radioactive Wastes from Biomedical Institutions

The low-level radioactive waste burial grounds in the United States have been closed or have operated at reduced capacity for many months, much to the inconvenience of biomedical institutions that are prevented by federal and state regulations from disposing of such wastes by other means. Most of the radioactivity in the wastes produced by these institutions is due to two nuclides, tritium and carbon-14, which are largely contained in plastic vials used in liquid scintillation counters.

Tritium and ^{14}C are both produced naturally by cosmic-ray interactions with the atmosphere. Tritium is produced at an annual rate of 1.9×10^6 curies (Ci), leading to a steady-state environmental inventory of 34×10^6 Ci. Carbon-14 is produced at an annual rate of about 38,000 Ci, which because of its long life results in a global accumulation of 315×10^6 Ci. Humans have always been exposed to the radiations from these nuclides, but they are both soft beta emitters and the annual dose we receive is only 0.001 mrem from ^3H and 0.7 mrem from ^{14}C. The combined dose from the huge accumulation of these nuclides is thus about 0.5 percent of the 130 mrem to which the average person is exposed from all natural sources. Tritium and ^{14}C were also dispersed into the environment when nuclear weapons were tested in the atmosphere; by 1972, an estimated 5.8×10^6 Ci of ^{14}C and 4.5×10^9 Ci of ^3H were added to the atmosphere in this way.

Compared to these quantities, the amounts of ^{14}C and ^3H present in the wastes from clinics and laboratories are miniscule. An estimated 2390 facilities in the United States used one or both of these nuclides in 1978 and shipped a total of 720 Ci of ^3H and 221 Ci of ^{14}C to waste burial grounds.

Wastes containing ^3H and ^{14}C in these quantities can in most cases be disposed of safely by the same procedures that are applicable to nonradioactive wastes. Subject only to limitations imposed by characteristics other than their radioactivity, they can be flushed into sewers, put into trash bins, or incinerated. If the incinerator is well designed and operated, the risk to the nearby public will be of no consequence. If the ^{14}C and ^3H used in 1978 by all biomedical institutions in the United States were to be discharged by the incinerator stack of a single institution, the dose to the public would meet existing standards within a few tens of meters from the point of release to the atmosphere.

Other important nuclides used in biology and medicine include technetium-99^m, sulfur-35, phosphorus-32, iodine-125, and iodine-131. The properties of these nuclides are also such that in most cases they too could be released harmlessly to the atmosphere by incineration.

The rules of the regulatory agencies permit application for a permit to incinerate, but the institutions have not taken advantage of this option because it would be difficult to obtain public acceptance of the practice. The institutions have instead opted to accept the burden of unnecessary record-keeping and inspection procedures, as well as the expense of shipping their wastes to distant burial grounds. These have now been denied to them for reasons related more to unrealistic fears than to justifiable concerns.

Radioactivity continues to present the public with unfamiliar concepts and terminology that present formidable barriers to its understanding of the subject. It is not unusual for discussions of waste disposal to involve units as small as picocuries (10^{-12} Ci) and as large as hundreds of megacuries. This is a range of 20 orders of magnitude, a spread of values totally without precedent insofar as the public and most scientists are concerned. Members of the public and their elected officials may not understand the enormous difference between picocuries and megacuries. The regulating agencies not only should take the initiative in eliminating absurd restrictions such as the above, but should be prepared to defend their decisions in the public arena.—MERRIL EISENBUD, *Institute of Environmental Medicine, New York University Medical Center, New York 10016*

Excerpted from an invited lecture delivered at the 5th Congress of the International Radiation Protection Association, Jerusalem, 10 March 1980.

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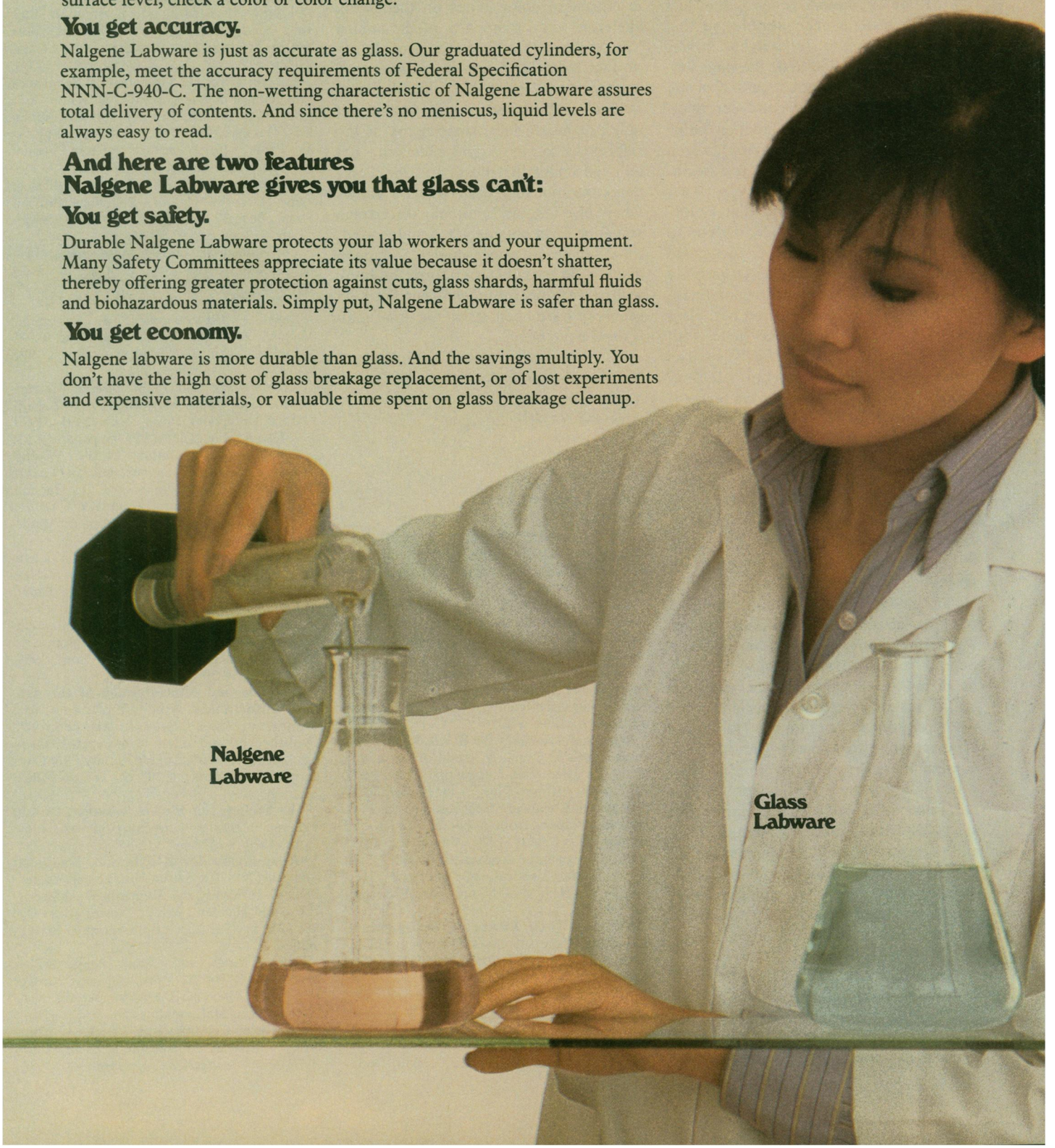

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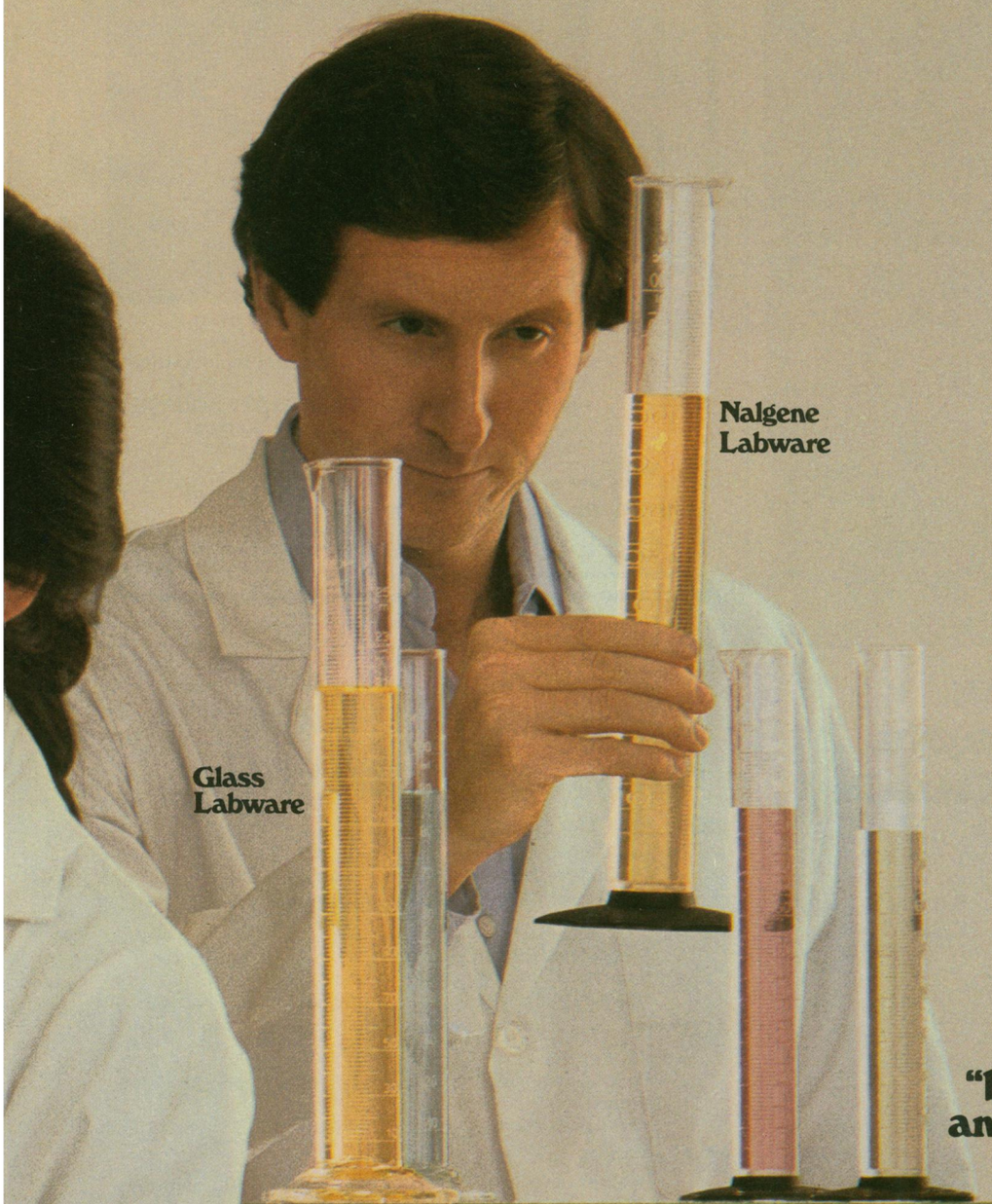

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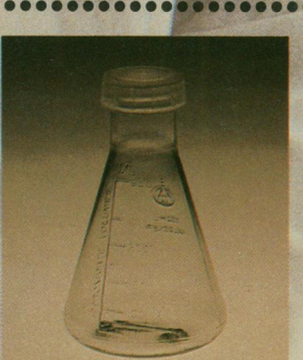

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