LETTERS

Helium Policies

Edward F. Hammel *et al.* (24 Feb., p. 789) advocate helium policies that are common in the literature. However, we disagree with their analysis.

Yes, helium is a unique element; no, it is not scarce. Society will never run out of helium. What will disappear will be cheap helium. But storing helium now for use in half a century is not a source of cheap helium. Time matters. Would anyone volunteer to eat nothing this year on the promise that twice as much food would be available next year? Would anyone volunteer to have National Science Foundation funding for his area reduced by $1 million each year for the next decade, if the $10 million were put into the budget for fiscal year 1995?

The solution proposed by Hammel *et al.* would cost hundreds of millions of dollars; where would this come from? Their proposal is to earmark revenues obtained when helium is sold from the Cliffside field (near Amarillo, Texas), but these revenues are no less valuable than revenues generated from other sources. Indeed, if helium is essential to future advanced energy systems, why not take the funds from the Department of Energy/National Science Foundation budgets? If helium is truly essential to fusion, and so forth, then it makes sense to take funds from research and use them for conservation.

The inconsistency is the notion that we ought to pay $50 per million cubic feet or more to conserve helium at the same time that we are selling it to fill children's balloons at $30 per million cubic feet. If helium is unique, we could reduce its use by 89 to 90 percent by eliminating "nonessential uses." We could buy the helium being vented at liquid natural gas facilities and air separation facilities. If society decided to conserve helium, the government could buy all that was offered at $50 per million cubic feet and prohibit "nonessential" use.

We have suggested a more moderate policy that would separate and conserve "cheap" helium for a decade, and then reevaluate (*1*). The additional evidence mentioned by Hammel *et al.* suggests that demand for helium is not growing; increased use (almost all nonessential) stems from the fall in the real price.

The past few years make us more skeptical about the value of conserving helium. However, if society decides to conserve, surely the policy ought to focus on using price as the guideline rather than arbitrarily declaring that helium from natural gas in a particular field must be conserved. Furthermore, to make the social cost of the policy clear to everyone, the funds should come from the budget for advanced energy system.

DENNIS EPPLE
LESTER LAVE
Department of Economics, Graduate School of Industrial Administration, Carnegie-Mellon University, Schenley Park, Pittsburgh, Pennsylvania 15213

References

1. D. Epple and L. Lave, *Bell J. Econ.* **11**, 617 (1980).

Epple and Lave have previously noted that helium conservation is one of "a class of problems maximizing the conflict between physicists and economists. Incurring costs now to minimize entropy, the solution often proposed by physicists, makes sense [in the view of Epple and Lave] only if the discount rate is zero" (*1*). In a subsequent article (*2*), they stated that "[p]olicy decisions regarding the use of exhaustible natural resources raise questions about equity, economic efficiency, and entropy. Ethicists, economists, and physical scientists often present drastically different proposals because of their differing objectives and opinions about the future." We agree that these differences exist and doubt that they will be resolved soon. We also believe that these differences are real, that no discipline holds a monopoly on being able to produce correct solutions to complicated public policy issues, and in consequence all informed viewpoints should be considered before decisions are made. Mistakes in exhaustible resource consumption are not reversible.

Even in the economics community, little unanimity of opinion exists regarding the applicability of present value theory to problems with time horizons of 50 to 100 years (*3*). Furthermore, that theory (and hence the reliability of any results derived therefrom) depends, as Epple and Lave have themselves pointed out, upon whether or not certain conditions are met (for example, perfectly competitive markets, no externalities, no institutional restrictions preventing free operation of the market, and so forth). In our judgment, these conditions are far from having been met in the U.S. helium industry, nor are they likely to be met in the foreseeable future.

It is correct that the "solution" we recommend for consideration would cost perhaps $200 million, but the sale of the Cliffside helium should recover more than ten times that amount, if one assumes that the demand for helium increases at an average rate of 5 percent per year (a conservative estimate, as helium sales have actually been increasing at an average rate of more than 10 percent per year since 1960). It therefore appeared to us that parleying about 40 billion cubic feet of federally owned helium into 100 to 200 billion cubic feet with an investment of less than 10 percent of the available capital made good economic sense and was worth consideration.

It does *not* make good public policy sense to require today's potential users of helium to bear the costs of a national conservation program because it is impossible to know whether a given technology still under development and currently believed to require helium will achieve technological and economic feasibility or even need helium in its final form. What seems far more certain is that, in a high-tech future, substantial amounts of helium will be required and that no substitutes will be possible. For example, 20 years ago several energy-related applications of helium were dimly perceived, but the uses of helium in high-speed rail transportation, nuclear magnetic resonance imaging, and high-speed computing systems were not. Helium conservation is therefore a national responsibility rather than that of a specific segment of society.

Epple and Lave's remark that we were recommending the purchase of conservation helium for $50 per million cubic feet is incorrect. The concentration of helium in the raw gas at Riley Ridge, Wyoming, is at least twice that of present sources, and that in the Riley Ridge reject streams will have been increased by the necessary natural gas upgrading process to several percent with the only remaining impurity being nitrogen. The cost of concentrating the helium in this reject stream to storage quality crude helium (50 to 60 percent helium) should be substantially less than present extraction costs of about $10 per million cubic feet. The amount of helium currently available from domestic liquified natural gas and our separation plants is negligible in comparison to demand; forbidding the use of helium in "children's balloons" would not help the situation very much either.

Finally, the Epple-Lave model was designed to provide one type of economic insight into the U.S. helium situation as of several years ago. Its results were used to support an alternative, more moderate approach to helium conservation than was then being proposed by Congress (*4*). The provisions of the bill under consideration were opposed, how-

ever, by almost every witness at the 1979 hearings and, mercifully, that bill eventually died in committee.

E. F. HAMMEL
M. C. KRUPKA
K. D. WILLIAMSON, JR.
Analysis and Assessment Division,
Los Alamos National Laboratory,
Los Alamos, New Mexico 87545

References

1. D. Epple and L. Lave, *Bell J. Econ.* **11**, 617 (1980).
2. ———, *Am. Sci.* **70**, 286 (1982).
3. S. Ben-David, A. V. Kneese, W. D. Schulze, *A Study of the Ethical Foundations of Benefit Cost Analysis Techniques* (Department of Economics, University of New Mexico, Albuquerque, 1979).
4. U.S. House of Representatives, Committee on Interstate and Foreign Commerce, Subcommittee on Energy and Power, *The Helium Energy Act of 1979* (96th Congress, 1st session, 11 June 1979) (Government Printing Office, Washington, D.C., 1979).

Bob Ormes: An Appreciation

In the obituary for Robert V. Ormes (6 July, p. 44), mention is made of his "solid personal contribution to the development of a standard style guide for biology journals." This in no way conveys the importance or extent of that contribution.

For 25 years, Bob was a member of the Council of Biology Editors (CBE), and served on its Committee Form and Style for 12 years. This committee was responsible for the preparation of the first *Style Manual for Biological Journals* in 1960. The second edition was published in 1964, and the third, under the new and current title *CBE Style Manual*, was published in 1972. Bob contributed substantively to the content and format of those first three editions.

From 1965 to 1972, I had the privilege and pleasure of working with Bob on the committee preparing the third edition of the style guide. His vast knowledge of the English language was reflected in the excellence of those sections of the manual dealing with vocabulary, word usage, punctuation, abbreviations and symbols, typographical conventions, and proofing. Seemingly unresolvable differences by committee members with respect to etymology and syntax would be agreed upon after a reasoned explanation by Bob and his reference to the proper source for verification. His calm, thoughtful, and considerate demeanor provided the committee with a sense of scholarship and dignity that enhanced its labors. "A gentleman and a scholar" are terms that fit Bob Ormes perfectly.

During the past decade Bob was rarely involved in CBE activities, but those of us who worked with him years ago know the impact he had in helping develop the style standard for biological publications. This may have been just one small facet in a long and distinguished career, but readers deserve to know the role that Bob Ormes played in influencing and improving the quality of scientific publications in general, as well as that of *Science* in particular.

PHILIP L. ALTMAN
Council of Biology Editors, Inc.,
9650 Rockville Pike,
Bethesda, Maryland 20814

Campus Planning

Thomas Bender's review (18 May, p. 715) of my book *Campus: An American Planning Tradition* (*1*) makes some interesting points, but contains a misrepresentation of one of the work's themes. According to Bender, "[Turner] declares that . . . American campuses are 'cities in microcosm,' " and he proceeds to point out "several problems with this thesis." In fact, my book makes no such simple equation of campuses with cities. In the preface, I suggest that a common trait of American campus planning has been "the *conception of* colleges and universities as communities in themselves—in effect, as cities in microcosm" [emphasis added]. Examples of this trait are described throughout the book, as in Thomas Jefferson's vision of the University of Virginia as an "academical village," the frequent planning of universities around 1900 as "cities of learning," and attitudes of more recent designers, such as Harvard's J. L. Sert, who said in 1963 that "a university campus is a laboratory for urban design." I discuss at some length whether this "urban model" is appropriate, and I point out that whereas the campus can, indeed, be seen as a city in many respects, it nevertheless is "not exactly a city." My remark, in the conclusion of the book, that "as a kind of city in microcosm, [the American campus] has been shaped by the desire to create an ideal community" must therefore be read in the context of my entire treatment of this theme.

PAUL VENABLE TURNER
Department of Art,
Stanford University,
Stanford, California 94305

References

1. P. V. Turner, *Campus: An American Planning Tradition* (Architectural History Foundation, New York, and MIT Press, Cambridge, Mass., 1984).