

letters

this biased terminology might have unconsciously influenced my thinking, leading me to omit mention of the plight of the female physics PhD raising children. This is a reasonable supposition (and I commend Rothenberg for his enlightened attitude toward sexism), for, in fact, I myself am an unemployed female physics PhD, and a mother. A part-time position would be ideal for me while my child is young! Professional women in general agree about the advantages offered by part-time positions when there are young children involved, and, in fact, groups of women, including the American Physical Society's Committee on Women in Physics, have specifically recommended that permanent part-time senior positions be made official policy in universities and in other organizations (see July, page 62). We women realize the necessity for such a change in policy, but the trouble is (especially in physics) that it is primarily men who have the power to effect such a change. The problem then becomes that of showing men (and, in my case, of showing men physicists) how it can be to *their* advantage to work at less than full-time positions. Only when men themselves want to work part-time will more flexible policies be implemented to any great extent. Hence my letter was directed specifically to male physicists.

I am glad that someone noticed that I had left out the women in our profession. I am delighted that a male physicist has chosen to work at less than full time. May Rothenberg be the first of many! And may his organization, Syracuse University, be one of the first of many to make permanent part-time faculty positions their official policy.

JANE C. JACKSON
Brookings, South Dakota

More chemical kinetics

To supplement your Search and Discovery report (December, page 17) on our observations of fluctuations at chemical equilibrium, we would like to point out some additional interesting work on this problem.

George Feher of the University of California at San Diego recently informed us of an impressive success in determination of chemical kinetic data through observations of fluctuations of the electrical resistance of an ionic solution. This approach was originally announced by Feher in *Biophysical Society Abstracts* 10, 118 (1970), and an article by Feher and M. Weissman describing the method and results is scheduled to be published in the March, 1973 issue of *Proceedings of the National*

Academy of Sciences.

We have also recently learned of some related studies by W. Hagins, F. E. Hanson and J. B. Buch who analyzed the photon-emission statistics of the emission of light by the luminescent systems of certain bacteria and fireflies, in an interesting but unsuccessful attempt to identify the rate-limiting mechanisms of phosphorescence in these systems ("Bioluminescence in Progress," F. H. Johnson, Y. Handea, eds, Princeton, 1966, page 475). With R. D. Penn, Hagins also has analyzed the kinetics of the photocurrent of retinal rods and thereby established some limits on the kinetics of the chemical reactions involved in visual receptors (*Biophysics Journal* 12, 1073, 1972).

W. W. WEBB
Cornell University
Ithaca, New York

Energy need

In the December letters column (page 15), both H. B. Rosenstock and P. W. Neurath wonder, in essence, whether "we really need five times as much energy per person in the year 2000?"

Both are guilty of a kind of ethnocentrism. They may not need five times the energy they now consume, but there are lots of Americans who, in order to live as well as I presume they do, will have to increase many times their consumption of energy.

H. HELLMAN
Leonia, New Jersey

The interchange (December, page 15) between Herbert B. Rosenstock who inquired "for what conceivable reason 35% more people need 650% more electricity," and F. L. Culler Jr and W. O. Harms who answered that the "estimates are based largely on extrapolation of past experience" merely points up the vast ignorance on which we are attempting to make rational decisions. The difference between the art of "extrapolationology" and scientific prediction is well illustrated by Oxford Philosopher Ryle's anecdote of the ducks, who after going down to swim in the pond everyday for a whole summer were astonished to find that one day the pond was frozen. Every scientist dealing with exponential growth knows of inevitable saturation, and that straight-line (logarithmic) extrapolations, which work well during the exponential-growth phase, fail completely when saturation occurs. Thus the above exchange reduces itself (in part) to contrasting Rosenstock's instinctive feeling that we must be approaching saturation with Culler and Harms's faith that we are not.

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letters

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As at ORNL and elsewhere, we have begun a program to evaluate the various elements that make up the US electrical energy consumption. Our initial efforts have been directed toward the examination of electricity use in the residential sector. This sector was chosen because it has a substantial share of total consumption ($\approx 30\%$), has been growing at an exponential rate slightly faster than total electrical energy, is well documented in statistical abstracts, and has the property mentioned by Culler and Harms that increases in electricity costs would probably not "significantly effect consumer use of power for 'gadgets'." The results of this investigation, although not the final word, are that Rosenstock's "instinct" was closer to the mark than Culler and Harms's "faith." The study indicated that, if we take into account the natural saturation of the major household electrical appliances, a factor of approximately two increase in residential electricity consumption would occur by the year 2000. This is in contrast to a factor of eight increase predicted from the straight-line (logarithmic) extrapolation. The study also showed that further savings could be made if energy-conserving policies were instituted, without affecting the "quality of life." For example an optimum economic use of insulation would cut the fuel expenditures for heating approximately in half. (J. C. Moyers, ORNL-NSF-EP-9, 1971.)

The above results do not imply that there is no need for new energy sources or that conventional fuels are not limited in supply. However, they do point out the importance of correctly evaluating the magnitude of the immediate problem. The study also indicates that we may have time to do the scientific studies required to bring the longer range, environmentally more desirable, energy sources, such as solar and fusion energy, to fruition.

ALLAN LICHTENBERG
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ARJUN MAKHIJANI
Energy Policy Project
Washington, D. C.

Theories of gravity

I read with interest Clifford Will's summary (October, page 23) of the present status of general relativity and other theories of gravitation. However, the situation with regard to perihelion shifts may be more complex than he imagines. A fourth cause of orbital precession may be associated with a gravitational Doppler effect (if it exists). It has been shown¹ that a

velocity-dependent gravitational potential, in a reasonable form, can account for a large part of the anomalous advance of the line of apsides of the planet Mercury. The same approach is also capable of producing an expression for the deflection of light by the sun similar to that obtained from the general theory of relativity.

Reference

1. M. Surdin, Proc. Camb. Phil. Soc. 58, 550 (1962).

L. A. KING
London, UK

Resonances critic

The editors of PHYSICS TODAY have done much to bind American physicists into a cohesive community. That purpose is ill-served by publication of the humorous contribution from Richard Robiscoe and others (January, page 101). The slurs in this piece outweigh its cleverness. There are many Northern-trained physicists such as myself whose relations with a Southern employer or prospective employer have been strained by real, carefully reasoned differences in outlook. Both parties in these situations are ill-served by the publication of such slurs and ridicule. I am hurt that my friends at PHYSICS TODAY would contribute to this problem.

ROBERT STOECKLY
Santa Barbara, Calif.

New Math and Physics

The decline in physics enrollment has occurred at a time to suggest that it was caused (at least in part) by the introduction of the "new math" in elementary and junior-high schools. Does anyone have data sufficient to test this hypothesis?

J. S. HUEBNER
University of North Florida
Jacksonville

Corrections

February, page 24—The equation in the second column, third line from bottom, should read $\int_S C dx = 1$

Page 26—The fifth line in the first column should read "rotation through angle ωt in the (q,p) . . ."

Page 29—The second part of the equation near the bottom of the first column should read

$$\phi(p,q) = [2p - 1, (q/2 + 1/2)] \\ \text{if } 1/2 < p \leq 1$$

Page 29—The missing reference 17 (see page 28, top of third column) should read "G. Gallavotti, University of Naples preprint." □



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