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The article about the excruciating agony felt by Nobel laureates because they are required to pay taxes on a $1-million prize brought tears to my eyes.

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Pauling on Pauling

In the book review by Seymour Mauskopf of *Before Big Science: The Pursuit of Modern Chemistry and Physics, 1800–1940* by Mary Jo Nye (Simon and Schuster Macmillan, 1996) (11 Apr., p. 216), there is a quotation about Linus Pauling "becoming a 'biochemist.'" Sixteen years ago, Stephen Raymond and I were writing a book about the homocysteine theory of arteriosclerosis (*1*). I sent Pauling a late draft of our manuscript, in which we had referred to the controversy surrounding Pauling and vitamin C and described him as a biochemist. Pauling wrote back with a critique of what we had written about him and added

I may point out that you refer to me as a biochemist, which is hardly correct. I can properly be called a chemist, or a physical chemist, or a physicist, or an x-ray crystallographer, or a mineralogist, or a molecular biologist, but not, I think, a biochemist.

In our final draft we described him as a "chemist."

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1. E. Gruberg and S. Raymond, *Beyond Cholesterol: Vitamin B6, Arteriosclerosis and Your Heart* (St. Martin's, New York, 1981).

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West Antarctic Ice Sheet Collapse?

Charles R. Bentley (Perspectives, 21 Feb., p. 1077) suggests that a useful estimate of the probability of a West Antarctic ice-sheet collapse in the next 100 years can be obtained by assuming it to be a random event occurring once every 100,000 years. He bases this view on results of a single model experiment that imposed a strong 100,000-year forcing resulting in an asynchronous (but not random) response behavior of occasional total collapse and more frequent partial collapse (*1*). I strongly disagree with the view that the probability of collapse is either random or quantifiable at present. The ice sheet dominates an environment that itself responds to past and ongoing climate changes in a variety of time scales. Because climate changes are not random, neither can the ice sheet's response to these changes be random.

Research has uncovered a historical record of the ice sheet that is indicative of instability. Microfossils from beneath the ice sheet indicate that at least once since it formed, the West Antarctic ice sheet disappeared and reformed (*2*). Analysis of sea-level records, of global isostatic adjustments, and of Antarctic geology defines a retreat of the ice sheet that began 11,000 years ago and contributed from 10 to more than 20 meters to sea level (*3*). Over half of this rise occurred in the last 7000 years, once the Pleistocene ice sheets had virtually disappeared (*4*).

Areas studied in detail have typically been found to be changing on shorter time scales (decades to 1000 years). Ice streams in the Ross Embayment are changing width and speed and are migrating farther inland; recent grounding of ice shelves has occurred; and in the northern sector of the ice sheet, one ice stream has accelerated while the floating terminus of another has possibly retreated rapidly (5). The overall picture that emerges is definitely not that of a stable ice sheet.

Strong nonlinearities and thermomechanical feedbacks that govern the ice flow have yet to be incorporated in even the most sophisticated numerical models of the ice sheet, making credible prediction of the West Antarctic's future beyond current capabilities. Opinions vary widely about the probability of even a partial collapse, but there is general agreement that the probability is not yet quantifiable and is certainly not random. The solution to this situation is better knowledge of the ice-flow physics and of the West Antarctic environment than is currently available (6).

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4. B. Hall and G. H. Denton, *Geol. Soc. Am. Abstr. Progr. 1996 Annu. Mtg.* **28**, A-57 (1996).
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6. R. A. Warrick *et al.*, in *Second Assessment Report of the Intergovernmental Panel on Climate Change: Contribution of Working Group I*, J. T. Houghton *et al.*, Eds. (Cambridge Univ. Press, Cambridge, 1996).

Response: I agree with Bindschadler that the behavior of the West Antarctic Ice Sheet is physically based and is not inherently random. Furthermore, I emphatically agree with his last sentence. The point of my Perspective was not to imply that physics does not control ice-sheet behavior, or that all the glaciological problems have been solved, but simply to point out that I see no compelling reason, theoretical or observational, to suppose that a massive, order-of-magnitude increase in glacial outflow from West Antarctica, which would be required for there to be a major effect on sea level, is likely to occur any more often than once per 100,000-year glacial cycle, if at all. Nothing in the arguments for larger or smaller ice sheets at various times in the geologic past (*1*, *2*) speaks against these points—indeed, Hall and Denton (*2*) specifically refer to the grounding line in the Ross Sea "retreating slowly to its present position" over the last 7000 years or so. The small-scale, short-term changes to which Bindschadler refers (*3*) are essentially the same ones I cited in arguing that minor variability has not led to the major response of the ice sheet that would be needed to affect sea level significantly (those changes are, in themselves, too small by at least two orders of magnitude to have any serious effect). The point often lost, I believe, and the one I wish to emphasize, is that a major catastrophe would be required in West Antarctica to have even a modest effect on world-wide sea level. There is no convincing evidence that such a catastrophe is impending, or that there is anything special about the present time relative to a hypothetical collapse cycle, the only existing model for which (*4*) is pseudorandom.

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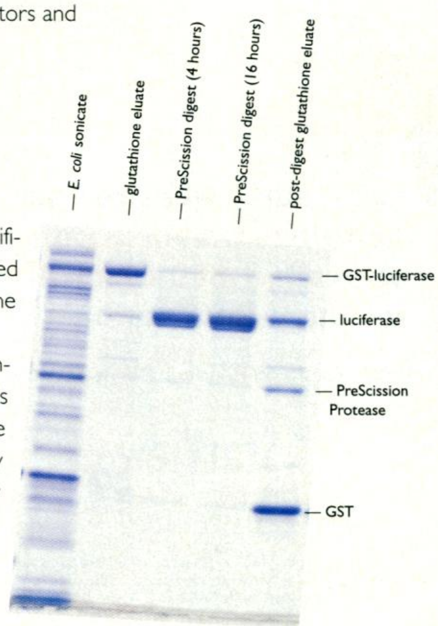

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Career Options in Science

Floyd E. Bloom's editorial "Future imperfect and tense" (14 Feb., p. 907) notes that something is amiss in the job market for new Ph.D. scientists and engineers seeking to launch their careers. He refers to the report of the AAAS Task Force on Careers for Young Scientists and particularly to one of its recommendations—increased investment in "Science's Next Wave," the World Wide Web site that has given wide exposure to career issues and also could be used as a resource for faculty.

The Task Force report (*1*) also indicated new areas for AAAS action, including the nomination of young scientists to the AAAS Board; creation of a new AAAS section to address the concerns of those in transition to the workplace; and improved collection, analysis, and sharing of timely data on employment trends through greater support for the Commission on Professionals in Science and Technology (CPST). A participating organization of AAAS, CPST plays a pivotal role in promoting professional society and other surveys and in disseminating job information (*2*). The AAAS Board of Directors charged the Task Force with evaluating data and AAAS activities that address the concerns of young doctoral scientists preparing for careers. The Task Force affirmed that federal agencies, professional societies, and universities seldom include the voices of young professionals in policymaking and priority-setting. Career options for doctoral scientists seeking to contribute in settings other than research-intensive institutions must be cultivated (*3*). Until the major decisions shaping our nation's science and technology enterprise are reconsidered in this light, we continue to risk those human resources who represent the future.

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References and Notes

1. *Report of the AAAS Task Force on Careers for Young Scientists* (American Association for the Advancement of Science, Washington, DC, 1996). Copies available from the Directorate for Science and Policy Programs, AAAS, or by e-mail to rrich@aaas.org.
2. A recent CPST workshop on postdocs and career prospects, for example, showed that data on postdoctoral appointments are uneven at best. Many institutions have no designated unit responsible for collecting and reporting information on their own postdocs and have no mechanism for even identifying them.
3. R. G. Greene, B. J. Hardy, S. J. Smith, *Issues Sci. Technol.* **59**, 59 (Winter 1995–96).

*Daryl E. Chubin (Chair), Finley Austin, Kevin Aylesworth, Roman Czujko, Maryrose Franko, Catherine Gaddy, Freeman Hrabowski, Catharine Johnson, Jules LaPidus, Jane Lubchenco, Robert Siegel, and Robert Rich (staff liaison).

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Birthrates: Russians Not Alone

Low birthrates are hardly unique to Russia ("Tumbledown pyramid," Random Samples, 14 Feb., p. 933). Recent estimates (see "Social indicators" at http://www.un.org/depts/unsd) show equally low total fertility rates of 1.2 births per woman in Hong Kong and Spain and rates nearly as low in Germany and Italy (1.3), Greece (1.4), and Austria, Bulgaria, Slovenia, and Romania (1.5). A "gloomy" assessment of the future may be one explanation, as the Population Reference Bureau hypothesizes, but it appears that other factors must certainly be at work.

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Evidence for Linkage Disequilibrium Between *HLA-DRB1* Gene and Multiple Sclerosis

In their Perspective "The future of genetic studies of complex human diseases (13 Sept., p. 1516), Neil Risch and Kathleen Merikangas emphasize that such studies might benefit greatly from approaches based on gametic disequilibrium. Recent genome scans (*1*) and our own data on human leukocyte antigen (*HLA*)-*DRB1* gene in patients with multiple sclerosis (MS) illustrate the issue well.

Despite the large number of affected sib-pair families investigated, the HLA region that is suspect from association stud-