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LETTERS

Elimination of Scholarships

Jay Hegde (Letters, 29 Oct., p. 637) asserts that science students "enter graduate school for the wrong reasons" when they seek "wholesale tuition waivers and stipends." The implication is that students, with their sights set only on the big bucks they'll rake in as graduate students, disregard that they may be unemployed after receiving their doctorate because of the lack of professional-level positions. Anyone who has gone through graduate school on a tuition waiver and stipend knows that big bucks it ain't, so that is unlikely to be the major reason someone chooses to continue his or her education.

There are a number of reasons why elimination of scholarships is not in the best interest of scientists and the future of science. For one, eliminating scholarships would eliminate students who come from low-income families. Second, scholarships provide an incentive for all undergraduate students to compete and do their best. In addition to financial return, scholarships bring prestige and afford students the opportunity to focus on academic endeavors either unencumbered or in conjunction with research-related jobs. Finally, departments that offer attractive scholarships are able to woo outstanding students who have varied talents and interests. A published, summa cum laude biology student who also has a flair for chemistry may get an offer from the chemistry department that would be hard to pass up.

Regardless of the number of students who could not or chose not to pursue science due to the elimination of scholarships, if the aim of science education is to secure the best interest of future scientists and the future of science, then the goal should be to gain the broadest spectrum of talented science students. This is because, of course, a broad base of input tends to stimulate innovation. Scholarships are certainly one means to that end.

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The reduction or elimination of stipends and tuition waivers would have two immediate and counterproductive effects: it would greatly bias the applicant pool toward those from wealthy families, just at a time when recruitment efforts need to be broadened. It would also necessitate even larger undergraduate laboratory sections (absent sufficient teaching assistants), also just when the quality of science education is being challenged by classes that are too large.

I know of no evidence that the paltry subsidies our graduate students receive are an incentive sufficient to encourage entering graduate schools "for the wrong reason." Doctors and lawyers, unlike most scientists, can usually manage to pay off loans accumulated during their studies. I doubt a zoology graduate student would even find a bank foolhardy enough to make a tuition loan.

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Women in Biomedicine

With regard to the Random Samples item "Women in biomedicine: Still slugging it out" (29 Oct., p. 650), we are pleased to see the issue of women in science being directly addressed, both by the Howard Hughes Medical Institute and in *Science*. However, we would like to mention several additional points that we addressed in our discussion and place some of the quotes into context.

As women at various stages of our scientific careers, we think it is useful to talk about the problems that women often face, the factors in our own lives that have helped us overcome some of them, and potential solutions to those that we are still struggling with. We believe both positive and negative experiences should be included if such a dialogue is to be of any value. Because the positive aspects of our discussion were not reported in the Random Samples piece, our comments appeared to have a negative tone that did not accurately reflect our feelings.

We are particularly concerned about how our comments about having children were conveyed. Many women either drop out of or do not pursue academic positions because of the difficulty in combining such a demanding profession with the responsibilities of caring for young children. This conflict is not a problem unique to science or to women. Our purpose was to discuss ways to ameliorate the problem, not to suggest that women in science would "be well advised to forget about babies." We suggested (as have many others) that the scientific establishment should recognize and respect the fact that people who have committed themselves to caring for a dependent family member

may experience a temporary loss in productivity. Both universities and granting agencies need to find ways to offset this.

Another important area that was discussed was that of mentors. All of us independently noted the role our mothers played in supporting us in our career decisions and in setting an example for us to follow early in life. We also talked about the crucial role that past and present mentors, both male and female, have had in teaching us how to be effective scientists, encouraging us to continue on and actively helping us to advance. We cannot emphasize enough the importance of these individuals in shaping our paths and the debt that we owe them.

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Bottleneck in Human Evolution and the Toba Eruption

Ann Gibbons' Research News article "Pleistocene population explosions" (1 Oct., p. 27) discusses an apparent bottleneck in human evolution in the period before about 50,000 years ago and a possible link to climate cooling related to the massive Toba volcanic eruption in Sumatra 73,500 years ago. In a recent study of the possible effects of the Toba eruption (*1*), we calculated that climate cooling for 1 or 2 years after the eruption could have been quite severe, representing "volcanic winter" conditions similar to those proposed in scenarios of nuclear winter following a major nuclear exchange (*2*). Land temperatures in the latitude zone from 30° to 70°N may have ranged from about 5° to 15°C colder than normal, with widespread hard freezes in mid-latitudes and very low summer temperatures. Hemispheric temperature decreases of 3° to 5°C may have persisted for several years. Increased snow cover and sea ice and perturbed sea-surface temperatures could have led to longer term (decadal) cooling.

The Toba eruption occurred at a prominent transition from warm to cold climates in the last glacial cycle, at a time of abrupt ice-sheet growth and sea-level fall and when Milankovitch insolation parameters were such as to favor the growth of Northern Hemisphere ice sheets. Because climate cooling was already under way when Toba erupted, it may be that sea-level fall related to the cooling had some role in triggering the eruption from an unstable magma chamber (*1, 3*). Calculations suggest that the brief cooling related to the dust and aerosols from the Toba eruption may have been a contributing factor in the rapid climatic switch.

Toba was apparently the largest explosive eruption of the last few 100,000 years and it may have been connected to a possibly unique Late Pleistocene bottleneck in human evolution. More accurate dating of the eruption, and a record of its short-term effects on climate could come from the detailed archive of the newly drilled GISP2 and GRIP ice cores in Greenland.

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1. M. R. Rampino and S. Self, *Nature* **359**, 50 (1992).
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The Baucus Bill

The ScienceScope item regarding proposed legislation (the Baucus Bill) to protect fossil vertebrates on federal lands (15 Oct., p. 323) is a somewhat downbeat recitation of the situation. In fact, neither commercial nor amateur collectors can legally collect fossil vertebrates from federal lands at the present time. Thus, commercial collectors who take fossils from federal lands are already (would not be "put") "on the wrong side of the law." The Baucus Bill recognizes the valuable contributions made in the past by amateur collectors and attempts, for the first time, to develop ways in which the amateurs can apply for a permit to collect fossils. As already in effect with permits to scientific or academic institutions, the permits would specify that an arrangement had been made to curate the scientifically significant specimens with a suitable institution where they would be conserved (along with associated contextural data) for the citizens of the United States.

Regardless of what museums or institutions may think is the case, none actually "has title" to the federal fossils under its jurisdiction, and the Baucus Bill emphasizes that any person collecting fossil vertebrates from federal land has responsibility for *stewarding* these fossils on behalf of the