these programs, the return to the American taxpayer is about 20 cents. Corporate welfare is certainly not the best way to spend research dollars.

As an alternative, I intend to focus government research on basic science. This means, contrary to Nicholson's statements, that I have no intention of discontinuing the basic research conducted at our universities and colleges. I was a teacher myself and know the importance of training a new generation of scientific leaders to keep America the frontrunner of an increasingly technological world. The committee's current budget protects basic research, ensuring that federal commitment to this area remains strong.

Additionally, by prioritizing basic science, government can leave technological development to industry. Private corporations are much more efficient than government at applying scientific discoveries, and, as our experiences with corporate welfare have shown, work best with minimal federal interference.

Finally, the federal science bureaucracy has become bloated and unmanageable. It does not allocate funds efficiently and forces researchers to spend too much time competing for funds and not enough researching. This type of waste can be reduced without hurting science. Former Chairman of Motorola Inc. Robert Galvin has just completed a study of the government's biggest labs, and he has concluded that reforms could cut the lab budgets in half without affecting the scientific research done there at all. Clearly, there is room to improve the way that government approaches science.

We must realize that today we live in a time when there are great restraints on government. Even with budgets being cut across the board, I am committed to keeping basic academic research strong and healthy. With an end to corporate welfare and a trimming of bureaucracy we can invest in our children's future through science without a large budget deficit mortgaging this future at the same time.

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China's "Missing" Girls

The report "High sex ratios in China's future" by Shripad Tuljapurkar *et al.* (10 Feb., p. 874) is provocative. Although it was not stated in the report, the implication of a high ratio of male to female babies born in recent years in China was that female fetuses were aborted or female infants were killed. However, there are several alternative answers to the question of the "missing girls" in China.

According to Nicholas Kristof (*1*), two Swedish experts working in conjunction with a Chinese demographer concluded, on the basis of an extensive survey, that up to half of the 500,000 infant girls who appear to be missing each year are adopted informally. A second possible explanation proposed by Kristof is that parents, unwilling to pay fines for their second child if she is a girl, send the infants to be raised by relatives in other areas. A third possibility, according to Kristof, is that, in areas where family planning is lax, parents simply raise their daughters at home without registering them.

The strongest evidence that some of the "missing" girls are indeed hidden is evident from China's 1990 census. While the sex ratio for newborn infants was a highly abnormal 111.3 to 100, it dropped to about 108 for toddlers and declined further to 107 for elementary school–age children. If all the girls were killed at birth, how could they be resurrected later? It seems likely that, at a young age, the

girls are hidden, but later are reported because they go to school (*2*).

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References

1. N. Kristof, "A mystery from China's census: Where have young girls gone?" *New York Times*, 17 June 1991, p. A1.
2. T. O. Cheng, "China's lost girls," *Washington Post*, 1 November 1991, p. 24.

Response: The study by Swedish experts that Cheng mentions is almost certainly the work by S. Johansson and colleagues that we cited in notes 3 and 6 of our report. We pointed to these in our first paragraph, where we said that unreported births can affect the reported sex ratio at birth.

Cheng makes an error in discussing the data he reports as being from the 1990 census (which are presumably from a sample of that census). Even assuming his numbers are correct, the sex ratio among children at, say, ages 5 to 6 years in 1990 reflects the sex ratio at birth 5 years before the census date (that is, in 1985). Thus his data in fact demonstrate an increasing sex ratio at birth over time, as is shown by the historical data we cited in our report. Ansley Coale (note 8 of our report) has done such checks correctly and has shown that a large number of females is indeed missing (*1*).

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References

1. A. Coale's study has since been published [*Demography* **31**, 459 (1994)].

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New Light on Free Electron Lasers

Two new reports indicate an exciting future for free electron lasers (FELs) and recommend construction of user facilities as well as development of FEL technology in the vacuum ultraviolet (VUV) and x-ray wavelength regimes for scientific and industrial applications. An earlier study by the U.S. National Research Council (NRC) (E. Marshall, News & Comment, 16 Sept. 1994, p. 1651; G. Margaritondo and N. Tolk, Letters, 4 Nov. 1994, p. 713) (*1*) was limited to scientific applications of the FEL in the United States and recommended the construction of an FEL user facility operating in the far-infrared (FIR) wavelength region as well as funding research and development (R&D) for FELs operating in the VUV and x-ray wavelength region of the spectrum.

The first of the new reports, both of which extend the NRC report, was issued in December 1994 and is a "Commentary on the NRC Report" from our committee, appointed by the International FEL Executive Committee (*2*). We urge that funding agencies around the world take notice of the NRC recommendations regarding FEL R&D for scientific applications and take specific actions to implement them.

Our report (*2*) emphasizes the important nonscientific potential applications of the FEL in industry, energy, and medicine; highlights advancement and trends in FEL R&D outside the United States, mostly in Europe and Japan; and updates recent developments and trends in FEL R&D. We also recommend three areas of FEL technology development: (i) low-cost, compact FELs that would lead to economical, table-top FIR FELs; (ii) high-average power FELs producing low-cost photons; and (iii) short-wavelength FELs with low emittance photocathodes. These areas would be important for FEL development in the VUV or x-ray wavelength regimes that use shorter undulators and lower-energy and lower-cost accelerators.

The second of the new reports, issued in January 1995, is the "Report of TMR Study Panel on FELs" (*3*) from a European panel set up by the directorate of "Training and Mobility of Researchers" (TMR) of DG-XII of the European Commission. The general findings and recommendations of the European and NRC reports are similar. The European report recommends strengthening the activity of the four European FEL user facilities operating in the FIR wavelength regime and foresees a 2.5-fold growth in the availability of FIR radiation user-hours by the year 2000. It calls for support of FEL technology development in the range from x-rays to UV (XUV) to eventually reach "a number of European XUV-FEL facilities and one large-scale facility in the hard x-ray range." It is recommended that high-average power, high-efficiency FELs should be developed for nuclear fusion research and industrial processing by other European agencies.

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