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LETTERS

Use of NSFNET

Christopher Anderson's article about the privatization of the National Science Foundation's NSFNET (News & Comment, 21 May, p. 1064) mentions an Office of Technology Assessment report which says that most U.S. researchers use computer networks only for electronic mail and suggests that the benefits of Internet to scientific collaboration are yet to be realized. Earth scientists, and seismologists in particular, however, are already making extensive use of NSFNET and Internet facilities for the rapid distribution of large data sets and for collaboration between researchers at widely separated institutions. We are concerned about plans that could restrict the high-speed NSFNET backbone to a select group of scientists and could encourage a system of charges that hampers access by the wider research community.

The Incorporated Research Institutions for Seismology (IRIS) supports an automatic system that gathers data, through Internet and phone modem, from up to 27 globally dispersed broadband digital seismic observatories, including stations in Russia, Western Europe, Australia, and Japan, and at the South Pole. Whenever a significant earthquake occurs around the globe, researchers can obtain data by Internet from the IRIS Data Management Center within hours. Data from this system was critical in the planning of the aftershock surveys that followed the 19 October 1989 Loma Prieta earthquake in the San Francisco Bay area and the 28 June 1992 Landers earthquake in Southern California. On 21 May 1992, the Chinese detonated a high-yield (Richter magnitude, 6.6) nuclear explosion underground. University seismologists in the United States augmented the automatically retrieved data set for this explosion with digital waveforms from the IRIS open seismic station in Obninsk (outside of Moscow) by a satellite telemetry link and sent the data across the United States on the Internet system. Within a day of the explosion, scientists in Russia, California, and Colorado had analyzed the data in a collaborative effort.

The utility of the current academic networking system is a direct consequence of its fairly uniform software protocols and its low cost to individual users. Easy access to large shared databases and seamless collaboration between distant researchers are becoming essential to modern research. We trust that, as the National Science Foundation and Internet respond to pressures for expansion and privatization, access restrictions and burdensome charging structures do not curtail these healthy trends.

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Whither Directed Mutation?

In their letter of 28 May (p. 1222), Richard E. Lenski and John E. Mittler made several misleading statements about the experiments that John Cairns and I have published (*1*, *2*). The relevant results can be summarized as follows. In most of our experiments we used a strain of *Escherichia coli* that cannot use lactose because of a frameshift mutation affecting the *lacZ* gene. When these Lac$^-$ cells were plated on medium with lactose as the sole source of carbon, Lac$^+$ revertants, scored as colonies, appeared after 2 days and continued to appear for a week or more. Early-appearing Lac$^+$ revertants had a Luria-Delbrück distribution, indicating that they arose during nonselective growth before plating, from which we calculated a mutation rate of 1.4×10^{-9} per cell per generation. Later appearing revertants had a Poisson distribution, as they should if they arose after plating, and appeared at a constant rate of 2.2×10^{-8} per cell per day. Lac$^+$ revertants did not accumulate if the cells were starved in the absence of lactose or in its presence if the cells were also deprived of another requirement for growth (*1*).

Lenski and Mittler state that our methods were not sufficiently sensitive to detect the growth of Lac$^-$ cells in the presence of lactose or the death of cells (both Lac$^-$ and