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Letters

Little bugs take big bites

The letter to the editor titled "Elephant hunters catch mice" (SN: 5/25/91, p.323), which includes comments on my evaluation of emergency-shutdown software developed for the Darlington reactors ("Finding Fault," SN: 2/16/91, p.104), contains far more misinformation than I ever thought possible to pack into four column-inches.

The AT&T programming error discussed in "Finding Fault" is far more significant than its financial cost. Our society is increasingly dependent on communications systems. One of the calls that did not get through on the day the network failed might have been carrying life-critical information from one doctor to another.

I am not a "foe of ever trusting computer programs." I am known for identifying a specific project as impractical and writing papers explaining why that project was unique.

When Kurt Asmis of Canada's Atomic Energy Control Board stated that "the two computer

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Cover: The remarkable ability of certain species of Asian fireflies to synchronize their flashes, so that an entire group stays in step for long periods of time, has inspired both biological and mathematical research. Recently developed mathematical models address the factors that permit pulse-coupled oscillators to achieve synchrony. (Illustration: Taina Litwak)
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programs remained essentially the same as before," he meant only that the basic structure had not changed. Only those changes that improved safety were considered, and many changes were made.

Most important, readers should understand that when one inspects a program, one does not look for either elephants or mice. One searches for "bugs," tiny errors that can have major effects. A single error in punctuation, or even an extra blank line, can cause a failure just when the system is needed most. It is this that makes software such a challenge.

David L. Parnas
Professor of Computer Science
Queen's University
Kingston, Ontario

AIDS dementia: Misplaced blame?

The notion that AIDS dementia is caused by HIV infection of brain neurons ("AIDS dementia: Neurons nixed by virus?" SN: 5/18/91, p.311) is unlikely for four reasons.

First, unlike other viruses that attack the central nervous system, HIV has no known

tropism for neurons. Second, HIV generally requires the CD4 receptor of T-helper cells and macrophages to enter a cell, but neither the CD4 protein nor any similar protein exists on neurons. Third, viruses do not usually have access to the brain until the blood-brain barrier has been breached. Fourth, and most important, the same sorts of dementias seen in AIDS patients also occur in other immunosuppressed people, proving that HIV is not a necessary cause. Once the blood-brain barrier has been breached, any infection can — and in AIDS patients often does — get in. Cytomegalovirus, herpes simplex viruses, cryptococcus and toxoplasmosis are very frequently isolated from the central nervous systems of AIDS patients.

For these reasons, I proposed a radically different explanation of AIDS dementia last year. Animal models of diseases that cause nervous system destruction have existed for nearly a century, and their pathology mimics many aspects of AIDS dementia, including

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National Youth Sports Coaches Association



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demyelination and neuron death. To induce these experimental diseases, an immunostimulating bacterial "adjuvant" and a protein mimicking one found in the nervous system (such as myelin basic protein) are combined and inoculated into an animal. Neither alone is sufficient to cause the disease process, but in combination they produce an autoimmune reaction that destroys the blood-brain barrier and then destroys the myelin sheaths and neurons.

Autopsy records of patients with dementias involving demyelination—a large proportion of dementia patients—almost always reveal a combination of bacterial (usually mycobacterial) and herpesvirus (usually cytomegalovirus) infections. People who do not develop such dementias have one or neither infection, but almost never both.

The importance of these observations for understanding AIDS dementia is fourfold. First, the known prerequisites for producing nervous system destruction in animals exist in both AIDS and non-AIDS dementia, but not in people who are spared this problem. Second, there is no correlation between dementia and the presence of HIV, since HIV is present in virtually every AIDS patient, with or without dementia. Third, once the blood-brain barrier has been breached by the autoimmune process, HIV (and many other infectious agents) have access to the central nervous system, explaining the frequent isolation of the virus without implicating it directly in the dementia. And fourth, if my explanation is correct, then antimycobacterial and antiherpesvirus treatments should protect many HIV-positive pa-

tients from developing dementia.

Robert S. Root-Bernstein
Associate Professor of Physiology
Michigan State University
East Lansing, Mich.

Not a lobbying group

"Ecologists seek help for menaced hybrids" (SN: 8/17/91, p.102) misrepresents the activities of the Association of Systematics Collections. The article states, "Although the association primarily seeks to preserve individual species, it is also considering lobbying for the protection of plant hybrids."

I had said that the *Endangered Species Act* primarily seeks to preserve individual species, and that the *Endangered Species Act Reauthorization Committee* (an ad hoc coalition of organizations) was discussing the issue of protection of hybrids.

ASC is not considering lobbying for the protection of plant hybrids. We will take no position on this issue. We are not a lobbying organization.

K. Elaine Hoagland
Executive Director
Association of Systematics Collections
Washington, D.C.

Glitches that grow

"Phone glitches and other computer faults" (SN: 7/6/91, p.7) sounded very familiar to one who experienced the Great Northeast Blackout of 1965. In the blackout, a network of interconnected power stations designed to cope with every conceivable emergency nevertheless had a built-in instability that closed down almost every power plant in New York state, and several in New England, following

the relatively minor failure of a single relay at Niagara Falls. After an analysis of the blackout and its causes, the instability appeared to have been corrected—until another blackout darkened all of New York City and many of its northern suburbs a few years later.

In his description of the Patriot missile failure, computer scientist Peter G. Neumann seems to miss the point of failures such as these and the recent telephone system disruptions. His description, if accurate, showed that no hardware or software failure was involved and that no human error of omission or commission took place, except possibly the decision to use a software timer with a small inaccuracy—and that, given the assumption of regular shutdowns for maintenance, could not be considered important.

The failure here was in communication. Were there no written instructions calling for the shutdown after 14 hours? If there were, didn't the missile crew read them? Why did the cassette with the corrected software take so long to reach the missile crew?

Neumann is 100 percent correct in his statement about not learning the lessons well enough to avoid future problems. I'm willing to bet that the telephone problem will turn out to be something similar to the relay failure that triggered the 1965 blackout.

Wallace B. Riley
San Francisco, Calif.

CORRECTION

Sputnik I, the world's first space satellite, went up in 1957, not 1958 as stated in "We learned that he really does it right" (SN: 8/10/91, p.83).