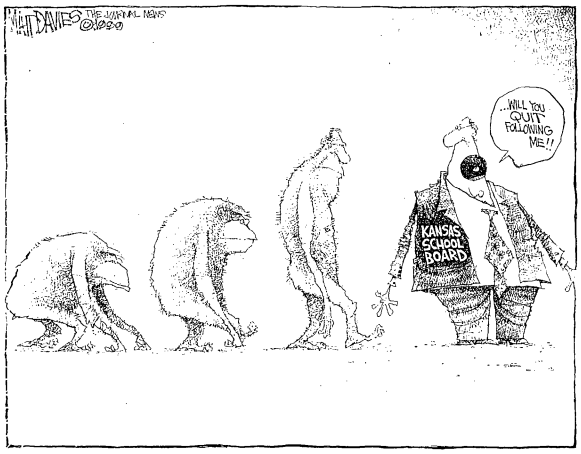
**An effective response to the decision by the Kansas Board of Education to eliminate evolution from the state's science curriculum is suggested. A Seussophile offers information. A broad view of information technology research is advocated: "the most critical...research questions...concern the basic principles of the organization of complex information processing systems, at both hardware and software levels." Scoring in NIH study sections is criticized. A market solution is urged for energy R&D funding. Education is related to reducing destruction of the rain forest. New U.S. program initiatives in natural disaster mitigation are described. And extrapolation in work on responses of the biosphere to elevated atmospheric $CO_2$ is questioned.**

## Kansas Evolution Ruling

The decision of the Kansas Board of Education to eliminate evolution from the state's science curriculum (more precisely, the standardized state tests, which amounts to the same thing) (C. Holden, News of the Week, 20 Aug., p. 1186) demands an effective response from the scientific community. In the past, scientists have been quite vocal in their condemnation of such efforts, but more is needed.

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One approach that would make a most powerful statement against the lunacy in Kansas is for collective action by the nation's colleges and universities. Nearly all of these institutions require at least a year of high school science for admission, and that year of high school science is usually biology. Biology without evolution hardly counts as science and thus does not logically fulfill any university's admission requirement for science. It remains to be seen if the board's decision will stand, but if it does, the colleges and universities of the nation could make an enormously powerful statement by announcing their refusal to count as an academic subject any high school biology course taught in Kansas. In the interest of fairness, a student from Kansas should be allowed to demonstrate adequate exposure to biology's fundamental principles, perhaps through an acceptable score on a national biology achievement test.

In the past, statements and publications about evolution and creationism from mainstream scientists have amounted to not much more than handwringing. The Kansas Board of Education has unwittingly provided a vehicle for institutions of higher education to take concrete action in an entirely unprecedented way, and the universities and colleges of the nation should not let this opportunity go unheeded.

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## Seussiana

With respect to the letter by Samuel P. Kounaves ("Left with the truth," *Science*'s Compass, 13 Aug., p. 1014), interested readers may have difficulty locating the source as given. The Seussian method of "*Calculatus Eliminatus*" is not presented in the printed form of the book *The Cat in the Hat*, but rather in the form of song lyrics in the film. (The memorable line is "*Calculatus Eliminatus*, it's the best friend that we've got," the method having been taught at "Cat-tech.")

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## Information Technology Research

In a recent editorial (*Science*'s Compass, 6 Aug., p, 833), D. Allan Bromley comments on "appropriate" information technology (IT) research. I agree fully with the importance he attaches to fundamental research and to continued support of basic sciences that would lead to new advances that would have an impact on IT. However, contrary to some of his comments, that is also what the President's Information Technology Advisory Committee (PITAC) report recommended. That committee simply had a different (broader and, I believe, sounder) view of basic IT research than what Bromley presents.

Bromley draws far too narrow a boundary around the sciences that are basic to research in IT, identifying them largely with the physical sciences underlying IT hardware. Without denigrating the importance of continuing development of faster and more reliable hardware, I believe that the most critical and fundamental research questions in IT for the coming decades, as PITAC argued correctly, concern the basic principles of the organization of complex information-processing systems, at both hardware and software levels. These are not primarily physical-science problems, but arise wherever high levels of system complexity are found.

These organizational problems are, for example, central to understanding the evolution of biological systems and adaptive and learning systems in general, including IT systems. There is a whole history of disaster in IT research that ignored such organizational problems (for example, research on the design of parallel general-purpose systems), and the computer industry lagged for decades in recognizing the importance of relevant basic software research. Theory and design of the organization of both hardware and software are crucial to the success of the enormous, highly decentralized systems that are already becoming an integral part of our whole industrial, governmental, military, and social communication structure and which are today given real-world tasks that are way beyond their capabilities for rapid, accurate, intelligent, and safe performance.

Bromley is mistaken in saying that House bill H.R. 2086 is simply supporting competitive industries. Solutions to fundamental software problems of designing ultra-complex systems are extremely important for the future security and competitiveness of the nation, they are not of burning interest to industry today, and they are largely pursued in universities. The PITAC report also recommended a study of the social implications of IT. These equally basic and important research problems must also be addressed vigorously by the public sector.

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