tional Library of Medicine. Annual membership will be $25, $10 for students. Additional information can be obtained from Ginger Richardson, Santa Fe Institute, 1120 Canyon Road, Santa Fe, NM 87501.

Planetary Malignancy

The rapid growth of the world's population has from time to time been compared to various disease processes. But physician and anthropologist Warren M. Hern of the University of Colorado at Boulder has gone beyond casual analogies to offer a detailed "diagnosis." The proliferation of human communities and the accompanying environmental destruction, he says, is "a malignant ecopathological process" that—"failing a radical reconsideration of many of our most cherished assumptions"—is "ultimately ecocidal."

In the fall 1990 issue of *Population and Environment*, Hern argues that population growth shares the four main features ascribed to cancer:

Rapid, uncontrolled growth. Although humans have the ability to regulate their numbers, growth continues now largely unchecked.

Invasion and destruction of adjacent normal tissues. Like tumors, humans aggressively invade adjacent space and replace the ecosystems with their own.

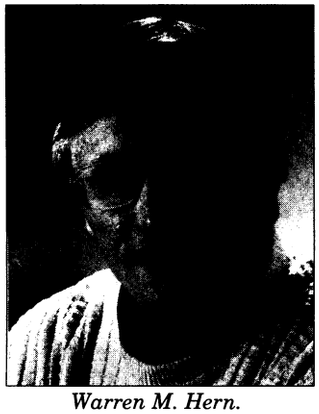
De-differentiation. "A striking feature of human communities is that they are becoming indistinguishable in appearance." That means they are losing specialized adaptations that keep them confined to, and others out of, local ecosystems.

Metastasis. With human communities, it's called colonization and urbanization.

Hern writes that "the observations of the scientific community over the last 20 years have provided massive support for this hypothesis and little, if anything, to refute it."

But while some scientists, such as biologist E. O. Wilson, responded favorably to Hern's proposition when he solicited their opinions, others were less than supportive. Astronomer Carl ("nuclear winter") Sagan rejected the analogy because although humans can do surface damage, "the Earth cannot be harmed by the human species." Oceanographer Roger Revelle made the puzzling observation that "biological hypotheses and 'laws' that apply to other animals cannot be used to describe human beings." And zoologist Clifford Grobstein said he prefers to see humans as "spreading life like Johnny Appleseed" by colonizing extraterrestrial sites.

Says Hern: "I don't think many people are ready to hear what I have to say."



Warren M. Hern.

Stanford: New Focus on Teaching

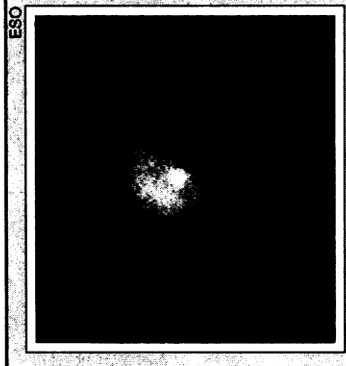
Stanford University president Donald Kennedy has been talking lately about the need to upgrade teaching at universities. His concern: the increasing faculty preoccupation with research.

Now he's announced $7 million worth of new programs, including financial incentives, to improve undergraduate teaching and "increase the resonance between teaching and research."

Kennedy has proposed changes in promotion and hiring policies to place emphasis on the quality rather than quantity of an individual's publications. "Scholarship" would be expanded to include textbooks and instructional materials. Kennedy further calls for regular evaluations of tenured professors' teaching and peer review to complement student evaluations of teaching effectiveness.

Financial incentives for undergraduate teaching will be mainly supplied from the new Bing Fund for Teaching, a $5-million endowment from Stanford trustee Peter Bing. Programs will include base salary increases, and awards, stipends, and fellowships for superior teaching. Half of a $600,000 donation of computers from Apple Computer will be used to improve teaching in undergraduate science and engineering programs. Kennedy, in a review of promotion records, found that much less attention was given to teaching in the natural and social sciences than in the arts and humanities.

A good comet is hard to keep down. *Comet Halley had a surprise for astronomers last month, staging the most distant cometary tantrum ever observed. Thought to be frozen in deep space far beyond Saturn's orbit, Halley startled observers at the European Southern Observatory in Chile with an outburst of dust and gas. The result: a 300,000-kilometer wispy coma. A year ago the comet had receded so far from the sun's warmth that its surface temperature dropped toward –200°C. Lacking enough heat to vaporize its nucleus, Halley lost its familiar coma, laying bare its icy nucleus. But then something went to work on this piece of dust and frozen gas. Planetary scientist Fraser Fanale of the University of Hawaii says carbon monoxide—highly volatile and abundant in comets—most likely drove dust off the nucleus. The gas may have been stirred up by solar heat stored deep below Halley's surface. But what triggered the spectacular display remains a mystery.*



Super Linkage

In a step towards a new generation of supercomputer networks, scientists have for the first time linked a conventional—or vector—supercomputer to a massively parallel computer. The link allows the two very different types of machines to combine their capabilities on a wide class of problems, doing many calculations at least five times as fast as one computer.

Built by scientists at the Pittsburgh Supercomputer Center, the linkage transmits data at up to 250 megabits per second between a CRAY Y-MP (the vector supercomputer), and a Connection Machine (the parallel one). Scientists can divide a program between the two machines, allowing them to toss a problem back and forth as each performs the jobs it does best. The CRAY, for instance, is faster at sequential computations—such as calculating forces between chemically bonded atoms—reports center codirector Michael Levine. But the Connection Machine is faster at chores that can be divided into many simultaneous parts—such as computing electrical forces between nonbonded atoms.

The first researcher to use the link was Carnegie-Mellon chemical engineer Gregory McRae, who says he has solved difficult problems involving resource allocation in chemical process plants up to 40 times faster than he could on a supercomputer alone. "This has got to be the future of computing," he says enthusiastically.

Other potential uses include air pollution modeling, analyzing DNA sequences, and doing problems in molecular dynamics. Now that the link has been completed, Levine believes researchers will lose no time in discovering further applications.