

in turn could cause cells to function poorly, causing premature aging.

If the DNA damage happened to inactivate tumor suppressor genes or activate oncogenes, it might also cause cells to grow out of control and produce cancerous tumors. In fact, there's already evidence that a faulty helicase can cause cancers. Just 5 months ago, a team led by geneticist James German of the New York Blood Center in New York City pinpointed the gene for Bloom's syndrome, another rare disease associated with several cancers and numerous chromosome abnormalities, and it, too, specifies a helicase, German reported in the 17 November 1995 issue of *Cell*.

Still unclear, however, is why a helicase mutation would cause the unusual cancers seen in Werner's syndrome patients. Most cancers arise in epithelial tissue—the skin

or the linings of the colon and lungs and of the mammary ducts. But in the April issue of *Cancer Epidemiology, Biomarkers and Prevention*, Japanese and U.S. researchers, including Miller, report that the cancers associated with Werner's syndrome are just as likely to develop in nonepithelial tissue, such as muscles and connective tissue.

But before researchers can explore this issue or pursue analogies between the Werner's syndrome gene and known helicase genes, they will need to test the hypothesis that it really does code for a helicase. Then they will want to explore what effects, if any, mutations in the gene have on DNA repair or other aspects of DNA metabolism. Another promising avenue of investigation concerns whether even "normal" people carry different versions of the gene that might affect their life-spans.

Still, as Schellenberg cautions, answering these questions won't explain everything about aging. "I don't want to sell Werner's syndrome as a total mimic of aging," he emphasizes. He notes that there are some key differences between how people with Werner's syndrome age and the way everyone else ages—and not just in the kinds of cancer they suffer from. Although prematurely old, the patients do not develop Alzheimer's disease or high blood pressure, for example.

And even if the gene does play a role in normal aging, it can't be acting alone. Researchers estimate that some 70% of human genes are involved in some way in determining how long people live. "There's no one switch that you flip and the organism ages," Jazwinski says.

—Elizabeth Pennisi

## ASTRONOMY

### Comet Hyakutake Blazes in X-rays

If you trained a pair of dime-store binoculars on Comet Hyakutake on a clear night 2 weeks ago, it seemed to be sitting in your lap. But when a team of astronomers examined the comet with a far more sophisticated instrument, the German X-ray Roentgen Satellite (ROSAT), they hoped to see a dim smudge at best. X-rays had never been detected from any earlier comet, and theorists had come up with only a few mechanisms by which a comet could muster any x-rays at all. In fact, says Konrad Dennerl of the Max Planck Institute for Extraterrestrial Physics in Garching, "some astronomers wondered why we intended to point an x-ray telescope at a comet" in the first place.

The emission flickered on a time scale of hours and reached intensities roughly 100 times higher than even the most optimistic theorists had predicted. "We were prepared to see nothing," says Robert Petre, a team member at the Goddard Space Flight Center in Maryland. "So it was an enormous surprise when this thing was just a boomer."

He and his colleagues—team leader Carey Lisse and Michael Mumma at Goddard and Dennerl, Jacob Englehauser, Joachim Truemper, and Juergen Schmitt at Max Planck—are a long way from explaining their surprising discovery. But they already think it could yield clues to the composition of the comet itself or the behavior of the solar wind, the stream of charged particles from the sun that is washing over the comet.

The team had justified its request for observing time on the off chance that Hyakutake's proximity to Earth—just 10% of the Earth-sun distance at the end of March—and high level of activity would make it possible to see weak x-rays from collisions between dust grains loosed by the comet and those normally present in interplanetary space. Over a 30-hour period, ROSAT took nine exposures of about 2000 seconds each as the comet hurtled across the field of view, capturing the x-ray photons on an instrument called a microchannel plate detector—essentially millions of tiny photomultiplier tubes bundled together. From the raw data, a computer corrected for the comet's motion during the exposures to produce sharp images.

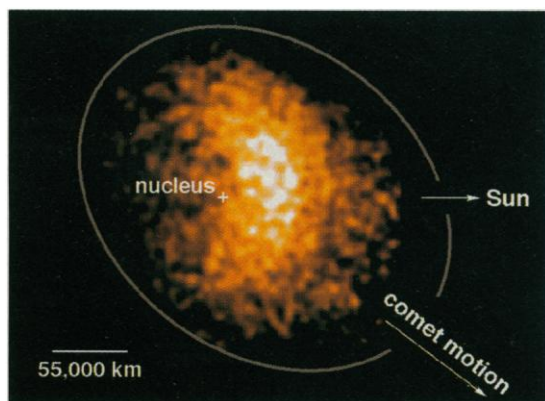
The images reveal what looks like a cres-

cent moon near the sunward edge of Hyakutake's coma—a halo of gas evaporated from the comet's much smaller nucleus of dust and ice. That location, says Mumma, suggests that the emission might result from interactions between the water molecules in the coma and x-rays radiating from the sun. Solar x-rays, he says, could jostle the innermost electrons of, for example, the oxygen atoms in the water; when the electrons returned to their ground states they would reradiate x-rays in all directions—a kind of fluorescence. If so, the detailed spectrum of the emission could yield insights into the elemental composition of the coma. Team members are now thinking of requesting observing time on the Japanese ASCA satellite, which has an x-ray spectrometer, when the comet swings around the sun and passes through ROSAT's field of view again in early July.

But Mumma notes that the fluorescence theory has a serious drawback: The rate of evaporation needed for this mechanism to explain the observed x-ray intensity "strains the imagination." If fluorescence can't do it, he says, perhaps the solar wind is somehow producing x-rays by piling up at the coma's edge and forming a sort of shock wave. Such interactions are known to produce energetic particles that could give off x-rays, but so few of the details have been worked out, says Mumma, that "at this point we're still struggling with the concept."

Other comet researchers, for their part, are applauding the discovery as an example of fortune favoring the bold. "Most people wouldn't even have the guts to ask for the observing time," says Harold Weaver of Applied Research Corp. in Landover, Maryland. "They took a chance and saw something pretty amazing."

—James Glanz



**Making light of theory.** Hyakutake's gaseous coma emits unexpected x-rays.

No one is questioning the decision now. A series of snapshots taken between 26 and 28 March had the team as open-mouthed as amateur astronomers in a cornfield: The images revealed a bright, crescent-shaped region of emission on the comet's sunward side, about 30,000 kilometers from its