search (NIWA) in Lauder, New Zealand, report that over the past 10 years peak levels of skin-frying and DNA-damaging ultraviolet (UV) rays have gradually been increasing in New Zealand, just as concentrations of protective stratospheric ozone have decreased. By the summer of 1998–99, peak sunburning UV levels were about 12% higher than they were during similar periods earlier this decade. Experts say that the NIWA study provides the strongest evidence yet that a degraded stratospheric ozone layer causes more hazardous conditions for life on the planet's surface. "They have done about as careful a study as you can do," says atmospheric physicist Paul Newman of Goddard Space Flight Center in Greenbelt, Maryland.

Atmospheric scientists first detected the notorious "ozone hole" over the South Pole 14 years ago, the apparent result of chemical reactions caused by chlorofluorocarbons and other pollutants in the stratosphere. Ever since, their calculations have predicted that loss of stratospheric ozone—which acts like a protective sheath around the planet, absorbing much of the harmful UV-B radiation (290 to 315 nanometers)—would let through more of the rays. And not just in the sparsely populated polar regions: Researchers soon began to realize that stratospheric ozone was also thinning above populous midlatitude regions such as northern Europe, Canada, New Zealand, and Australia.

But nailing the expected relationship between ozone loss and increased UV-B radiation has proven to be anything but simple, says atmospheric physicist William Randel of the National Center for Atmospheric Research in Boulder, Colorado (see Randel's Review, p. 1689). Efforts to find a definitive link have been complicated by the fact that transient environmental features—such as clouds, snow cover, volcanic ash, or pollution—can filter or reflect UV-B. In 1993, for example, James Kerr and Thomas McElroy of Canada's Atmospheric Environment Service reported that winter levels of UV-B radiation reaching Toronto had risen more than 5% a year over the previous 4 years, a rate in step with declining peak ozone levels. But that study came under fire for being too short to detect a trend.

Now, NIWA atmospheric scientists Richard McKenzie, Brian Connor, and Greg Bodeker have come up with data that appear to clinch the connection between ozone and UV-B in the midlatitudes. They began their study in 1989, positioning their spectroradiometers and other equipment on the ground at Lauder, a rural region on New Zealand's South Island that enjoys unpolluted, cloudless days much of the year. In measurements taken each year since, the team has found that the maximum summertime UV-B levels crested higher and higher until they are now at least 12% above what they were at the beginning of the study. That agrees remarkably well with the roughly 15% increase the researchers had predicted based on the known decline in stratospheric ozone levels measured since 1978 in Lauder. Meanwhile, the longer wavelength UV-A radiation (315 to 400 nanometers), which is unimpeded by ozone, remained relatively constant.

According to meteorologist Jim Miller at the National Oceanic and Atmospheric Administration's National Centers for Environmental Prediction in Camp Springs, Maryland, New Zealand's peak UV-B levels, which are about 20% higher than those that bathe Toronto, could put inhabitants at increased risk of skin cancer, cataracts, and perhaps immune problems. What's more, elevated UV-B levels may perturb marine ecology, killing important algae and bacteria, says Ottawa University ecologist David Lean. Despite the increases, McKenzie notes that UV levels in New Zealand are still lower than levels in unpolluted, low-latitude regions of Australia, Africa, and South America.

Researchers should have plenty of time to study possible effects in New Zealand and elsewhere. The 1987 Montreal Protocol and its amendments, which restrict the use of ozone-destroying chemicals, have stemmed the flood of damaging pollutants reaching the stratosphere. But it will take decades for the ozone layer to recover, says McKenzie, because chlorine and bromine compounds can hang around in the atmosphere for years. "The problem isn't going to go away until the middle of the next century, at the earliest," he says. –KATHRYN S. BROWN

Kathryn S. Brown is a writer in Columbia, Missouri.

ANIMAL RESEARCH

Research Lab to Surrender Chimps

In a move that animal rights activists claim as a victory, the Coulston Foundation, the largest primate research facility in the United States, agreed last week to surrender up to 300 chimpanzees—half its current chimp

Founding father. Ham, being prepared for space flight in 1961, was one of the first of the Air Force chimps to be housed at the Coulston Foundation.

CREDITS: NASA

ScienceScope

On the Fritz Space shuttle wiring problems have forced NASA to delay several upcoming launches, including one to deliver an urgently needed spare part to the Hubble Space Telescope.

Earlier this year, Hubble researchers became alarmed after three of the spacecraft's six gyroscopes failed, leaving it with the minimum number of working stabilizers needed to do science. To prevent another loss from shutting down the $2 billion telescope, NASA officials announced in March that an emergency repair mission would visit Hubble in October (*Science*, 19 March, p. 1827). But a short circuit on the shuttle Columbia in July, and the subsequent discovery of more than 60 frayed wires aboard three shuttles, has prompted NASA to ground the fleet. The Hubble mission may not leave the pad until November.

Can the healthy gyros last that long? Says John Campbell, Hubble project director at NASA's Goddard Space Flight Center in Greenbelt, Maryland, "We've got our fingers crossed."

Out of Sync Protesting a government decision to fund a new foreign synchrotron, French scientists are refusing to fire up two major x-ray sources.

Last month, science minister Claude Allègre decided that France would help build the DIAMOND synchrotron in the United Kingdom, rather than a competing French device called SOLEIL (*Science*, 6 August, p. 819). Now, scientists at LURE, an x-ray laboratory in Orsay near Paris, are condemning that decision. This week, they voted to refuse to collaborate with DIAMOND's planners, and announced that they will idle the aging SUPER-ACCO and DCI x-ray sources for at least a week in a bid to pressure the government to open negotiations on building a new synchrotron in France.

As *Science* went to press, French officials hadn't responded to the shutdown, which could affect the work of 1800 materials scientists, chemists, and other users. In the meantime, LURE director Robert Comès is promising that his protesters will meet again next week "to discuss the situation."

that are already approved and under construction (*Science*, 30 April, p. 734). "We're very disappointed, because we've been leading this field and now we're on hold while our rivals move ahead," Weekes says.

There is a chance, however, that astronomers may be able to proceed with VERITAS—possibly even at Mount Hopkins. Weekes says he hopes to discuss with the Forest Service the feasibility of two alternative sites in the vicinity of the present Whipple base camp. Although both sites suffer from rougher ground and greater exposure to transient light, they retain most of the cost savings of the original plan. Another possible site in Mexico would be considerably less accessible, he notes.

Even better, both of the Arizona alternatives lie more than a mile from the sweat lodge. Smithsonian officials hope that distance will allow Trevor Weekes's high-energy view of the universe to coexist with Cayce Boone's more traditional one. **–MARK MURO**

Mark Muro writes from Tucson, Arizona.

CANCER RESEARCH

A New Way to Combat Therapy Side Effects

For decades, physicians have been treating cancer with chemotherapy and radiation, and for decades, the side effects have been brutal. Because the treatments damage healthy tissues even as they kill tumor cells, patients develop anemia, infections, vomiting, diarrhea, and other problems. These side effects can be so severe that they prevent patients from receiving effective treatment. Now, by capitalizing on their knowledge of a powerful tumor suppressor gene, researchers may have found a better way to ease side effects in some patients.

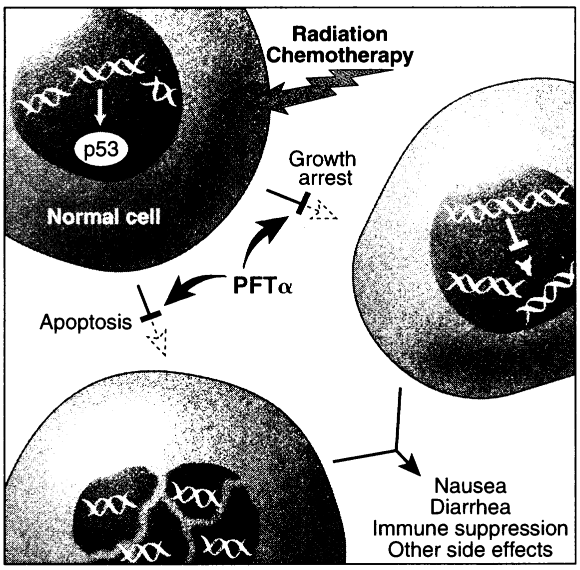
On page 1733, a team led by Andrei Gudkov of the University of Illinois, Chicago, reports that it has identified a novel compound that protects mice against side effects induced by radiation and allows them to withstand what would otherwise be lethal radiation doses. Other known compounds that help protect healthy tissue from cancer therapies have only limited effects, for example, helping restore the bone marrow's ability to make red blood cells. But because of its unusual mechanism of action, the new compound, a small organic chemical called pifithrin-α (PFTα), may protect all vulnerable tissues.

PFTα works by blocking a protein called p53. When cells are poisoned by chemotherapeutic drugs or barraged by radiation, p53 spurs them either to commit suicide or to go into growth arrest. People whose tumors contain an active *p53* gene won't be eligible for the drug, because it could help their tumors fight the therapy, too. But in about 50% of all human cancers, the *p53* gene is inactivated, and PFTα could help people with such tumors endure higher, possibly life-saving doses of radiation or chemotherapeutic drugs. It's a "beautiful" paper, says molecular biologist Scott Lowe of Cold Spring Harbor Laboratory in New York. "A lot of people are going to say, 'Gee, why didn't I think of that?' "

To come up with their drug, Gudkov's team reversed conventional thinking about the *p53* gene. Loss or inactivation of the gene is thought to be one of the genetic changes leading to cancer, presumably because it contributes to loss of growth control in tumors. That's led researchers to try to restore *p53* to the tumors lacking a functional copy. But earlier results had shown that the protein also mediates the side effects of cancer therapy. For example, the healthy tissues of p53-deficient mice suffered less damage from gamma irradiation than the healthy tissues of normal mice.

That meant that blocking p53 could potentially prevent side effects—but only if it could be done without triggering the formation of additional tumors. Many researchers doubted that was possible, but Gudkov says he gambled that a drug that blocks p53 "temporarily and reversibly" would do the trick. But first the researchers had to find such a compound. None was available, he says, "because nobody was ever interested in suppressing p53."

Because p53 turns on cell-suicide genes,



Defense line. By interfering with p53's ability to induce apoptosis and growth arrest, PFTα may protect cells against cancer therapy side effects.

SOURCE: GUDKOV *ET AL.*; ILLUSTRATION: K. SUTLIFF

ScienceScope

Teachers and Researchers: Unite! A new Russian initiative aims to bridge the gulf between universities and the nation's science strongholds, the institutes of the Russian Academy of Sciences (RAS). Russia's Ministry of Education and the U.S. Civilian Research and Development Foundation (CRDF) announced last week that three regions each will receive $1 million to create centers that bring university and RAS researchers together.

The RAS's 325-odd institutes have long been the preferred workplace for Russia's top scientists, as they can work unfettered by teaching demands. But last year, in a bid to improve science teaching, the Education Ministry and CRDF hatched a plan to create joint RAS-university centers that would be funded by U.S. foundations and Russian sources (*Science*, 29 May 1998, p. 1336).

From 80 proposals emerged three winners: Far Eastern State University in Vladivostok, whose center will focus on marine life; Krasnoyarsk State University in Siberia, which will develop techniques for environmental remediation; and three universities in the Rostov region, which will study earthquake safety and pollutant monitoring. Another four centers are expected to be announced next May.

In Flux Nuclear scientists have given a lukewarm endorsement to efforts to restart the Fast Flux Test Facility, a controversial research reactor that has been idle since 1993. The American Nuclear Society (ANS) is applauding last month's decision by Energy Secretary Bill Richardson to study a restart, but says it will only back the move if the reactor doesn't drain funds from other nuclear research projects.

On 18 August, Richardson decided to move ahead with an environmental study of using the mothballed reactor in Hanford, Washington, for everything from fusion research to medical isotope production (*Science*, 20 August, p. 1191). But critics have opposed such plans, contending that the reactor's potential for generating radioactive waste overshadows any possible benefits.

ANS president Andrew Kadak has a different worry: that the restart's estimated $400 million cost could siphon funds from DOE accounts that support university reactors and research. But he says the group will withhold final judgement until next year, when the restart study is expected to be completed.

Contributors: David Malakoff, Alexander Hellemans, Richard Stone