same direction. But to see the gravitational effect, the astronomers first had to filter out similar but much larger distortions caused by optical imperfections and the atmosphere. For that, they turned to stars within our own Milky Way galaxy that lie close to the line of sight of the distant galaxies. At such close range, weak lensing could not affect the stars' images; any distortions had to be due to optical and atmospheric effects. By calculating how to turn the blurred images of the stars back into points and then adjusting the shapes of the distant galaxies in the same way, the researchers could isolate the distortion due to dark matter—a distortion so slight that each group surveyed tens of thousands of galaxies to see it.

The three groups spent years analyzing their data. They picked up the pace as soon as the competition for recognition was on. On 27 February, the CFHT team posted a preprint detailing its results on Astro-Ph. Within 5 days, the Herschel and Blanco groups followed suit. On 7 March, the CFHT group issued a press release claiming to have seen weak lensing first.

The three preprints are just a drop in a still-gathering tsunami of unofficial publications in astronomy, astrophysics, and other physical sciences. In 1995 researchers posted 1663 papers on Astro-Ph; in 1999 they posted 5639. Last month alone, 531 papers appeared on the site.

"[Astro-Ph] has taken over [from the journals] as far as I'm concerned," says Nick Kaiser, an astronomer at the University of Hawaii, Manoa. "Every morning the first thing I do is read the Astro-Ph e-mail I get." The server will soon put traditional journals out of business, Kaiser predicts, and formal peer review will give way to some sort of electronic dialogue. That wouldn't surprise Princeton astrophysicist David Spergel. "For me personally, publication doesn't matter," he says. "I've pretty much stopped reading the journals."

The leaders of the three weak-lensing teams don't go that far. Tyson thinks it's presumptuous to post a paper before it's been accepted for journal publication. In fact, he says, his group's paper was in review with a journal when the CFHT preprint forced his hand. Richard Ellis, an astronomer at the California Institute of Technology in Pasadena and leader of the Herschel telescope team, tells a similar story and says he is leery of what can happen when fear of being wrong loses out to fear of being late. "There's a terrible danger that the standards go down," he says, "that it becomes just a race."

Yannick Mellier, an astronomer at the Institut d'Astrophysique de Paris and leader of the CFHT group, is more sanguine. Researchers should post as soon as they are confident of their results, he says; fear of humiliation will prevent them from posting weak or incomplete work. "If you do a bad job in this aspect, submitting a bad or nasty paper, you are almost immediately criticized by your colleagues." But even he would regret the passing of the traditional journal, he says, "because [journal publication] means a paper has been completely refereed; it has been officially accepted."

Whether or not traditional publications survive, weak lensing seems sure to thrive. Each of the three groups has already collected more data with which to sharpen and expand its results. Moreover, the Sloan Digital Sky Survey, a nine-institution collaboration working with a telescope at the Apache Point Observatory in New Mexico, intends to survey a full quarter of the celestial sphere and capture images of roughly 80 million galaxies by 2005. Within a decade, astronomers and astrophysicists may be telling long, detailed stories about the universe's childhood. And you're likely to read them on a server like Astro-Ph first. **–ADRIAN CHO**

CREDITS: (RIGHT) S. BAUER/USDA

SCIENTIFIC MISCONDUCT

Cancer Researcher Sacked for Alleged Fraud

It seemed too good to be true: Where others had only disappointing results, Werner Bezwoda found that breast cancer patients, blitzed with drugs and then given a bone marrow transplant, lived longer than patients on standard chemotherapy. Now investigators say the promising findings were indeed too good to be true. On 10 March, officials at the University of the Witwatersrand in Johannesburg, South Africa, brought to a close a 6-week probe triggered by a report from a U.S. expert team, which concluded that Bezwoda misrepresented his findings and had failed to obtain approval for the trial before proceeding. The university fired him.

Bitter pill. Bezwoda says he will appeal firing.

Besides dashing hopes of a new last-ditch weapon against breast cancer, the ignoble episode may tarnish the public image of clinical research, some experts fear. "The message [Bezwoda's] behavior sends out is 'Medical researchers should not be trusted,'" says Peter Cleaton-Jones, chair of Witwatersrand's Committee for Research on Human Subjects. Others agree. "It may become increasingly difficult to recruit patients" for clinical trials, says oncologist Robert Rifkin of U.S. Oncology, a national

ScienceScope

Ag Grants in Limbo A new $120 million pot for peer-reviewed agricultural research is facing extinction just 2 months after it was unveiled by U.S. Department of Agriculture (USDA) Secretary Dan Glickman (*Science*, 21 January, p. 402). Last week, the House Appropriations Committee added language to a supplemental budget bill for disasters and other items that would kill the Initiative for Future Agriculture and Food Systems by barring USDA from paying employees to run it. The move—prompted by a disagreement over the program's funding mechanism—came just 3 days after the agency published a request for proposals for applied studies in areas from crop genomics to food safety.

The House must still vote on the bill, and ag research supporters are hoping for a save in the Senate, where budgeteers will likely begin action next week. In the meantime, program staff are "proceeding as normal," says USDA's Cindy Huebner. Given the uncertainty, however, the agency has cancelled four workshops later this month that were meant to help scientists shape proposals for an 8 May deadline.

DNA Delay Interior Department scientists have won some extra time to try to extract DNA from the 9300-year-old bones of Kennewick Man, ancient remains found along Washington state's Columbia River in 1996. Judge John Jelderks of the U.S. District Court in Oregon had given the government until 24 March to respond to scientists suing for access to the remains. But last week he agreed to allow 6 more months—until 24 September—for DNA tests. Some scientists hope the long-delayed tests will help resolve Kennewick's cultural affiliation, but Native American groups that claim the remains have fought them (*Science*, 11 February, p. 963).

Jelderks noted that the government offered "no compelling reasons" for being so sluggish, but decided that hasty testing might create worse delays in the long run. Now the government must develop a work plan by 10 April and file monthly progress reports thereafter.

Contributors: Jocelyn Kaiser, Constance Holden

network of cancer clinics.

Before his fall from grace, Bezwoda had raised high hopes in the cancer community. At the American Society of Clinical Oncology's annual meeting in Atlanta last May, he described a trial involving 154 breast cancer patients whose advanced tumors were removed but who remained at high risk of metastasis. According to his presentation, Bezwoda gave each of 75 patients two treatments with a high-dose drug cocktail. Designed to kill the cancer cells, the bombardment also inflicts heavy collateral damage: It destroys bone marrow, where blood cells are formed. To compensate, Bezwoda transplanted the patients' own marrow cells after each round of chemotherapy.

Compared to control patients given a low-dose drug therapy, Bezwoda reported, the high-dose group survived about twice as long without a relapse, on average. Similar blitzkriegs have worked against testicular cancer and some leukemias, so "many people were very enthusiastic and thought we should go ahead" with a major trial based on Bezwoda's protocol, says oncologist Marc Lippman of Georgetown University's Lombardi Cancer Center in Washington, D.C.

Observers were puzzled by a major discrepancy, however: At the Atlanta meeting, three other trials, all similar to Bezwoda's, reported that a high-dose regimen offered no benefits over standard therapy. When Rifkin and others met last December at the U.S. National Cancer Institute (NCI) to sketch out plans for a follow-up study, Rifkin recalls, "we felt we should go over there and have a closer look." NCI dispatched a seven-member audit team to South Africa on 25 January.

They were in for what Rifkin calls "a big surprise." As outlined in the audit team's report, published 10 March on *The Lancet*'s Web page (www.thelancet.com), Bezwoda could produce only 58 records of patients treated with high-dose chemotherapy, 17 fewer then he claimed in Atlanta to have treated. By his own protocol, the majority of patients should never have been enrolled, the auditors reported. Even more disturbing, there were no records on any of the 79 control patients. "It's unclear whether [the missing patients] ever existed," says Rifkin. Bezwoda offered no documentation that any patients gave informed consent to take part in the trial, and when asked by the audit team, the university's ethics board had no record that the study was submitted for review.

Apprised of these revelations, Cleaton-Jones launched a probe on 31 January. One day earlier, he had received a letter from Bezwoda in which the researcher acknowledged "improving" his results by misstating which drugs were given to control patients. However, asserts audit member Allen Herman, an epidemiologist at South Africa's National School of Public Health in Pretoria, "this was a very narrow admission that did not at all correspond to the full range of his misconduct."

According to Cleaton-Jones, Bezwoda resigned before the investigation began, effective the end of March. But a three-member jury that presided over the hearing deprived Bezwoda of that exit, firing him on 10 March instead.

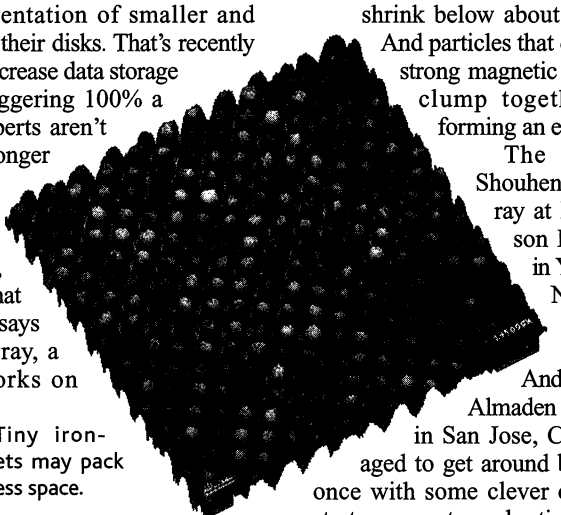
Bezwoda could not be reached for comment, but in an 11 March statement he maintains his findings are valid. He claims his misrepresentation of the control group "does not invalidate my basic conclusions" about high-dose chemotherapy and patient survival. He denies forging patient records and says he intends to appeal his dismissal.

The Health Professional Council of South Africa, which has the power to revoke Bezwoda's medical license, has launched its own investigation. Says Herman, "This story is far from over." –MICHAEL HAGMANN

CHEMISTRY

Nanocrystals May Give Boost to Data Storage

For companies that make magnetic disk drives, the future is scary. Over the past 5 decades, engineers have managed to control the magnetic orientation of smaller and smaller spaces on their disks. That's recently allowed them to increase data storage capacity by a staggering 100% a year. Industry experts aren't sure how much longer they can keep up that blistering pace, however. "Five years out, we don't know what will come next," says Christopher Murray, a chemist who works on new materials for future disk drives. "It's an unnerving situation."



Fine grain. Tiny iron-platinum nuggets may pack more bits into less space.

CREDIT: SUN *ET AL.*/IBM RESEARCH (WATSON AND ALMADEN LABS)

Now, Murray and his IBM colleagues have hit upon an answer that may steady a few nerves. On page 1989, the researchers report creating tiny carbon-coated metallic particles—each just 4 nanometers, or billionths of a meter, across—that they assemble into a thin sheet and bake into a magnetic film that could be used in hard disk drives. Down the road, if each of the tiny particles can be made to store a bit of information as a magnetic field, the films have the potential to hold terabytes of data per square inch, hundreds of times the capacity of today's disk drives. The new nanoparticle films aren't about to hit the computer superstores: Researchers must still work out how to make them compatible with the technology used for writing and reading bits of data to the films. Still, Jim Heath, a chemist and nanoparticle expert at the University of California, Los Angeles, says the progress thus far is impressive. "This is a big deal," he says. "It means that magnetic recording could be carried down to near molecular length scales."

Capturing the $35-billion-a-year market for disk drives won't be easy, however. Today's hard disks owe their storage prowess to films made from a cobalt alloy that are rugged and cheap to make. Manufacturers essentially spray-paint magnetic material onto a surface under vacuum and bake it. That leaves a material full of 15- to 20-nanometer magnetic grains whose magnetic orientation can be aligned by a recording head positioned just above it. Typically, a bit of information is stored as the common orientation of hundreds of those grains.

Engineers have long increased storage capacity by shrinking the magnetic grains in the films, so each bit of stored data takes up less space. But there's a limit to this process: Many magnetic materials, such as cobalt, lose their magnetic behavior when particles shrink below about 10 nanometers. And particles that do maintain their strong magnetic behavior tend to clump together instead of forming an even sheet.

The IBM team—Shouheng Sun and Murray at IBM's T. J. Watson Research Center in Yorktown Heights, New York, along with Dieter Weller, Liesl Folks, and Andreas Moser at the Almaden Research Center in San Jose, California—managed to get around both problems at once with some clever chemistry. Their strategy was to make tiny particles from iron and platinum, which would start out as weakly magnetic—allowing them to form an array—but then transform them into stronger magnets at the end.

The researchers started by concocting a solution that included two metal salts—one containing iron atoms, which are hungry for electrons, the other platinum atoms capable of donating electrons. As the salts dissolved, the iron atoms turned to the platinums for electrons, causing the atoms to begin assembling themselves into a ball. Also in the brew were soap molecules, oleic acid, and