Afghan archaeologists attended the Kabul meeting, but the rigors of life in modern-day Kabul might discourage prospective students and returning scholars.

The German foreign ministry has promised $350,000 to conserve a number of archaeological sites. One of the most fragile is the Minaret of Jam, the second highest in the world. Built in the 12th century, the structure is leaning because its foundation is weakening. Italy will provide $800,000 for repairs and an additional $500,000 for other conservation projects.

Most of the pledges will be held in trust by UNESCO. But the largest gift—$5 million from the Aga Khan Trust for Culture, a Geneva-based organization—will go directly to the municipal government to recreate the Bagh-e-Babur gardens, planted by the famed first Moghul emperor and the site of his 16th century tomb. The funds also will help rebuild traditional Kabul residences and improve public sanitation.

Interim President Hamid Karzai spoke at length to participants about the importance of rescuing and rebuilding the country's cultural heritage. But any long-term restoration requires an end to chaos and war, leaving scientists at the mercy of the political winds. "No one really knows what will happen," says Bucherer-Dietschi.

–ANDREW LAWLER

EXOPLANETS

'New Jupiter' Turns Up In Strange Company

Planet hunters are expected to announce this week that they have discovered 13 new planets that orbit sunlike stars in our corner of the Milky Way. This new harvest, which brings the total number of known extrasolar planets close to 90, includes an exoplanet that orbits farther from its star than Jupiter orbits the sun—the greatest known star-planet distance of any exoplanet. "This [far-out planet] is the first good evidence that planets actually form where our basic theories say they ought to," says Charles Beichman, a planetary expert at the Jet Propulsion Laboratory in Pasadena, California.

The new planets were discovered by Geoffrey Marcy and Debra Fischer of the University of California, Berkeley; Paul Butler of the Carnegie Institution of Washington in Washington, D.C.; and Steven Vogt of the UC Observatories/Lick Observatory near San Jose, California. The astronomers used telescopes in California, Hawaii, and Australia to measure Doppler shifts in the spectra of light from the planets' stars. The Doppler shifts arise as the orbiting planets tug the stars in different directions.

Like most other extrasolar planetary systems discovered so far, the newcomers include several enormous objects orbiting extremely close to their host stars. It's not surprising that star-hugging super-Jupiters unlike anything in our own solar system were the first to be discovered by the Doppler method, Marcy says. Not only do they exert the greatest gravitational pull on their stars, but their short orbital periods make their effects on starlight show up relatively quickly in astronomers' observations. But that doesn't mean that massive, close-in planets are the rule, Marcy says.

EXOPLANETS WITH LARGEST ORBITAL RADII

Planet	Distance (AU)	Period (Earth years)	Mass (Jupiters)
HD145675	2.9	4.9	≥4.05
EpsEri	3.4	6.9	≥0.88
HD39091	3.5	6.2	≥9.94
HD74156	3.5	6.2	≥7.46
47Uma c	3.8	7.2	≥0.76
Jupiter	5.2	11.9	1.00
55 Cancri c	5.8	14.8	≥4.05

The new far-out planet brings mixed evidence that solar system–like star systems are indeed out there. With a mass at least 4.05 times that of Jupiter (that is, 1290 Earth masses), the planet orbits the star 55 Cancri every 14.8 years at an average distance of 5.8 astronomical units (AU), slightly greater than Jupiter's distance of 5.2 AU. (An astronomical unit is the average distance of Earth's orbit from the sun, about 150 million kilometers.) So far, so familiar. The catch is that 55 Cancri also hosts two large, close-in planets, one just 0.12 AU from the star, the other 0.24 AU.

Planets such as 55 Cancri's inner companions vex astrophysicists with two big questions: How did they get there? And what do they say about the likelihood that planets with Earth-like masses and orbits exist in the same system? Current theories imply that Jupiter-like "fluid giants" must form at least 3 to 4 AU from the star. To explain how they might move closer, Douglas Lin of the University of California, Santa Cruz, and others have proposed that newly formed giant planets follow a shrinking disk of preplanetary material that swirls into the star, drawing the planet inward by tidal interactions. Fred Rasio of Northwestern University in Evanston, Illinois, and others support a planetary pinball game scenario in which a close encounter between two massive planets shoots one into a much tighter orbit and the other into a somewhat larger orbit around the star. If the migration model is correct, Earth-like planets could potentially form after a giant planet had spiraled inward, if additional matter remained in a disk around the star. In the planetary-pinball model, however, the interactions between a close-in and a far-out giant would sweep up or kick out any Earth-like planets orbiting in between them.

The next few years should bring a flood of new data to help resolve these possibilities, says Marcy's longtime collaborator Butler. With 1200 stars now under study and more to come, another half-dozen years of observations should bag several more Jupiter-like planets in Jupiter-like orbits, Butler says—objects that might help determine how hospitable, or hostile, the universe is to planets like our own.

–DONALD GOLDSMITH

Donald Goldsmith, the author of *Connecting With the Cosmos: Nine Ways to Experience the Wonder of the Universe*, is a science writer in Berkeley, California.

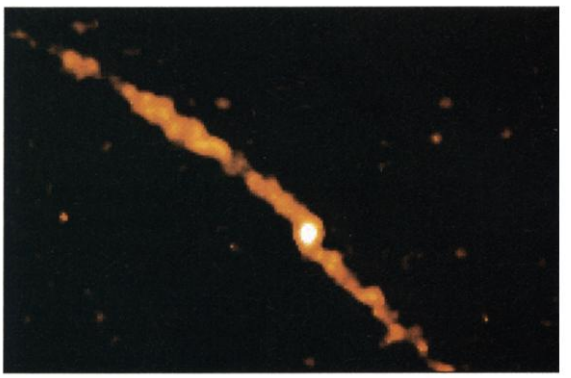
ASTRONOMY

Lucky Catch Identifies Disintegrating Cluster

ALBUQUERQUE, NEW MEXICO—The Milky Way galaxy is tearing apart its oldest inhabitants, and for the first time astronomers are witnessing the slaughter. A striking image presented here 3 June at a meeting of the American Astronomical Society* shows a globular cluster known as Palomar 5 being torn asunder by tidal forces of our home galaxy. Researchers say the observation and others like it could shed new light on the distribution of dark matter in the halo of the Milky Way. "This is a very exciting and beautiful result," says theorist David Spergel of Princeton University.

Globular clusters are large, spherical aggregations of old stars. They probably formed along with the galaxy, some 12 billion to 14 billion years ago. About 150 globulars are known to loop in wide orbits around the Milky Way's center. Some of them contain

* 200th meeting, 2–6 June.



Tails of woe. Streamers of stars from Palomar 5 reveal a globular cluster being torn to shreds.

CREDIT: (BOTTOM) MAX PLANCK INSTITUTE FOR ASTRONOMY

millions of stars; others are more sparse and diffuse. It's these loose systems that run the highest risk of being torn apart by tidal forces, which arise because the Milky Way's gravity is stronger on one side of the cluster than on the other. Astronomers have suspected that this fate might befall some clusters, but convincing direct evidence was missing.

Now there's definitive proof in data from the Sloan Digital Sky Survey, a large international project to map one-quarter of the sky in exquisite detail (*Science*, 25 May 2001, p. 1472). A team led by Eva Grebel of the Max Planck Institute for Astronomy (MPIA) in Heidelberg, Germany, scrutinized stars near Palomar 5, a sparse globular cluster 75,000 light-years from Earth. On opposite sides of the cluster the astronomers found streams of stars stretching 13,000 light-years from end to end—20 times the apparent width of the full moon. These "tidal tails" form when stars are torn loose from the cluster and then slowly drift away. "It's a very amazing structure," says team member Michael Odenkirchen, also at MPIA. "Nothing like this has ever been seen before." Odenkirchen expects the cluster to disappear completely within 100 million years.

To discover the tails, astronomers had to filter out the countless stars and background galaxies in the field of view that did not match the expected colors and brightnesses of globular cluster members. The finding suggests that many other sparse globulars have been torn apart completely in the past; detecting Palomar 5 in the process of being ripped to pieces was apparently just a lucky catch.

Because the tails more or less delineate the orbit of the parent globular cluster around the Milky Way center—information that's impossible to come by otherwise—the data will help scientists map the distribution of dark matter in the Milky Way, Spergel says: "The tidal tail observations should enable astronomers to measure both the lumpiness of the dark matter and its central density." That kind of information can help scientists rule out or refine models of what dark matter is and how it has shaped the evolution of the universe, he says.

–GOVERT SCHILLING

Govert Schilling is an astronomy writer in Utrecht, Netherlands.

CLINICAL TRIALS

Agency Wants to Stop Shopping for Best Deal

Every child knows that if Mom says no, she can always ask Dad. Now, the U.S. Food and Drug Administration (FDA) is worried that clinical researchers might try the same trick: Find a new set of safety officials to approve a study involving human subjects that has been rejected by another panel. To deter such behavior, the government has proposed that researchers be required to tell safety panels about any prior reviews. But last week the biomedical community gave the plan* a mixed reception.

The safety panels—known as Institutional Review Boards (IRBs)—must approve all research involving human subjects. Most academic researchers have no choice but to submit their plans to the IRB at their home institution. But a drug company sponsoring a multisite trial has more options, from submitting plans to multiple boards to employing a private "superboard" to which individual institutions have ceded authority.

The FDA proposal is a response to a 1998 report by the department's inspector general that concluded new procedures were needed to prevent researchers from "IRB shopping" to find a more agreeable review panel. But critics aren't buying FDA's solution. They argue that shopping is rare and that disclosure rules would do little to improve patient protection. The debate "is part of a larger discussion about how to overhaul human subject protection" in the wake of the deaths of several study participants and a government crackdown on informed consent procedures at major research universities, notes Abbey Meyers, president of the National Organization for Rare Disorders in New Fairfield, Connecticut.

ILLUSTRATION: C. SLAYDEN

Some respondents to FDA's request for comment doubt that shopping is a problem worthy of federal regulation. Officials at drug giant Merck & Co. in West Point, Pennsylvania, for instance, said they could identify only one instance in more than 1500 clinical trials the company has sponsored over the last 5 years where researchers even discussed approaching a second IRB when they were unhappy with a first ruling. Even that case, says company vice president David Blois, occurred only after the first panel imposed legal requirements that boosted study costs. He recommends that FDA delay regulation until more data are available.

But some veteran reviewers say that big companies try to intimidate an IRB if it suggests changes in protocols or consent forms. Barbara Bigby, head of research subject protection at the Scripps Clinic in La Jolla, California, noted that research sponsors "frequently" tell her reviewers that they are the only ones expressing such concern. It's a tactic, she says, that's meant to get the panel to back down. "Yet when we communicate [with other IRBs that have reviewed the proposed study]," she wrote, "we find that our concerns are similar" to theirs.

Commenters also disagreed about who should notify IRBs. Companies nominated investigators, saying they are closest to the studies. But the American Society of Gene Therapy spoke for many researchers and universities in arguing that sponsors should bear the burden, especially in clinical trials that might stretch across hundreds of domestic and foreign sites.

There was more agreement on other issues. Both supporters and critics of disclosure warned that tracking multisite studies could cause paperwork-induced gridlock for researchers, institutions, and IRBs alike—although a Web-based filing system could help. They also worried about a "herd mentality" in which IRBs at large or prestigious research centers would set the pace. Some researchers fear that shoppers could avoid disclosure simply by tweaking their proposals to make them appear novel. There were also questions about how offenders might be punished.

FDA officials are expected to spend several months chewing on the comments before deciding on their next move. In the meantime, the scientific community is already taking some steps in the direction that FDA might be headed. Biomedical researchers report that some IRBs have already begun to ask researchers about prior decisions. And the Association of American Medical Colleges (AAMC), which offered qualified support to disclosure, believes that a new voluntary accreditation program for institutions conducting human research will standardize reviewing practices. That step, says AAMC, would reduce the chances that researchers can get a better deal at the next IRB.

–DAVID MALAKOFF

*www.fda.gov/OHRMS/DOCKETS/98fr/040102a.htm