Too real. Strip searches and delousing helped student "guards" assert power over "prisoners" in a 1971 experiment.

CREDITS: (TOP TO BOTTOM) PHILLIP ZIMBARDO; GEMINI OBSERVATORY

signed the role of either guard or detainee. The researchers have chosen a setup similar to Zimbardo's but with a less oppressive atmosphere and safeguards such as independent observers and clear boundaries for subjects' behavior. The BBC will televise the results, but the researchers retain control of the experiment's design and presentation.

Reicher and Haslam say this is a unique chance to test "social identity theory," which posits that group identity can override individual personality in shaping behavior. Dominic Abrams, a psychologist at the University of Kent in Canterbury, agrees: "It is rare that one gets an opportunity to simulate a powerful situation." And in the wake of the 11 September attacks, there is an urgent need for such research. "We don't have to be part of a terrorist cell to gain insight into the psychological processes involved with terrorism," he says.

Large-scale social psychology studies can cost hundreds of thousands of dollars, Abrams says, and TV companies may be the only source of funding. Haslam says safeguards alone will cost more than $100,000, but he and the BBC declined to disclose the overall budget for the program.

Although crews have not yet begun filming, Zimbardo and others have expressed concern that entertainment will be the overriding factor in carrying out the experiment. "There is no question in my mind but that the BBC and their consultants are hoping for something dramatic to erupt, to make it riveting for viewers," Zimbardo says. He says he declined the BBC's offer to participate because of the danger to the research subjects. Excessive precaution could also doom the experiment, says Peter Collett, a retired University of Oxford psychologist who consulted on the reality TV program *Big Brother*. "If we don't get the phenomenon that Zimbardo observed, then the whole thing is pointless," he says.

Reicher and Haslam insist there is a middle ground between cruel and dull. For one, the study will tone down the power imbalance between prisoners and guards through variations in housing, dress, and status, with the hope of exploring questions Zimbardo left open. For example, they will examine whether groups can have positive effects and if the results might also apply to milder social situations, such as relationships between employers and employees.

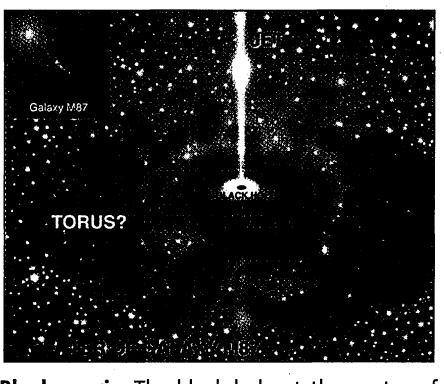
The dangers of Zimbardo's experiment and the trivializing influence of reality TV are the "Scylla and Charybdis" of the new project, Haslam says. Psychologists may differ on the potential perils of the study, but they agree on the importance of its goals. Viewers and researchers alike will have to wait until the show premiers next year to see if the partnership of science and television survives these treacherous waters.

–BEN SHOUSE

ASTROPHYSICS

Black Hole Blazes Away Without a Fuel Supply

The massive jets of supermassive black holes—plumes of gas and dust that extend for thousands of light-years from the centers of some galaxies—require considerable reserves of firepower. The most likely source is the giant doughnut-shaped cloud of gas and dust thought to surround such black holes. But scientists have now found that the black hole at the center of a nearby galaxy called M87 somehow maintains its jets without this vast stockpile of fuel. The apparent paradox has theorists baffled.



Black magic. The black hole at the center of galaxy M87 has a brilliant jet but apparently no torus-shaped gas-and-dust cloud to fuel it.

"The most directly puzzling thing is the 'Here we see it, here we don't' aspect," says Julian Krolik, an astronomer at Johns Hopkins University in Baltimore. "What is striking here is that active galactic nuclei of both greater and lesser power than M87, which also resemble M87 in many other respects, are wrapped in thick clouds."

Until recently, the energy-spouting center of M87—an elliptical galaxy 50 million light-years from Earth in the constellation Virgo—was thought to be a typical active galactic nucleus, powered by a typical supermassive black hole. However, last year astronomer Robert Antonucci of the University of California, Santa Barbara, noticed that the cloud seemed to produce surprisingly faint infrared emissions. But the observations left many questions about the cloud unanswered.

Then a team led by Eric Perlman, an astronomer at the University of Maryland, Baltimore County, observed M87 with the Gemini North telescope in Hawaii. In the 1 November *Astrophysical Journal Letters* Perlman's team reports that longer observations have provided a much clearer picture of the infrared emissions of M87's black hole. Comparing the emissions from the torus-shaped cloud with the energy coming from the jet, Perlman found that M87's torus-to-jet ratio was only about 1/1000 as great as those of other active galactic nuclei such as Centaurus A and Cygnus A.

Perlman's findings will force theorists to revisit their models to account for black holes without giant dust clouds, Krolik says. "This makes it harder to produce any model," he says.

–MARK K. ANDERSON

Mark K. Anderson is a writer in Northampton, Massachusetts.

GENETIC RESOURCES

Seed Treaty Signed; U.S., Japan Abstain

Delegates from 116 nations have agreed on a landmark treaty intended to ease exchange of seed collections held in the world's agricultural "gene banks." The United States and Japan were the sole holdouts, both abstaining from a final vote taken 3 November in Rome.

The agreement, formally known as the International Treaty on Plant Genetic Resources, mandates the free exchange among plant breeders of seeds from 35 crops, including major cereals such as rice, wheat, and corn (*Science*, 26 October, p. 772). Other crops, however, including soybeans, tomatoes, and peanuts, are not included in the treaty after nations with extensive collections insisted on maintaining national control. Many nations have adopted laws restricting the export of such "genetic resources" since the international Convention on Biodiversity entered into force in 1993.

Under the new agreement, any company that uses seeds from public gene banks to breed a new variety must pay royalties into an

international fund dedicated to preserving agricultural biodiversity. The requirement applies only to varieties that are unavailable to other researchers because they are covered by patents or treated as trade secrets.

African nations pressed for a total ban on patenting of plant genes obtained from public gene banks, while the United States rejected any restrictions on patenting that would contradict U.S. law. In the end, in wording that many negotiators admitted was ambiguous, the treaty outlawed patents that would restrict the ability of gene banks to distribute "genetic parts and components" in their original form.

U.S. negotiators felt that this still might block patents on genes that an inventor had isolated and purified from plant seeds. European delegates, meanwhile, were angered that so many crops remain subject to national restrictions, potentially crippling efforts by nonprofit plant breeders to develop improved varieties.

Despite such disagreements, the final vote triggered a spontaneous celebration. "There was half a day of wild emotion," says Pat Mooney of the ETC Group, a Canadian-based advocacy group that has followed the negotiations. "People were hugging each other. The U.S. negotiators were partying, too."

The treaty will go into force when 40 nations ratify it. Mooney says that the U.S. abstention will not cripple the effort and that the United States is expected to abide by most of its terms. **–DANIEL CHARLES**

Daniel Charles is a science correspondent at National Public Radio.

SPACE STATION

Science Comes First, Panel Tells NASA

NASA has been told to revamp its current plan for the international space station and put greater emphasis on science. A new report by an independent panel led by former aerospace executive Thomas Young says NASA must come up with realistic costs for building the orbiting lab, pay more attention to its research components, and adopt a new management structure before finishing with construction.

The 20-member panel, which delivered its blunt report on 2 November, was set up in July by the White House and NASA to analyze the station's costs, which have nearly doubled to $30 billion in the past 4 years. The task force unanimously concluded that even its plan for a scaled-down version "is not credible." But the panel, which could not even guess at what the current price tag is, offers the agency a reprieve. If NASA can fix the station's problems in the next few years, then the government could consider enlarging the station to accommodate a crew of six. That recommendation marks a political middle ground between White House officials who don't want to spend any more money on the program and agency managers, researchers, and international partners who want a top-of-the-line facility.

The high-powered team of financiers, engineers, and scientists also went beyond its limited charter to tell NASA to emphasize research and to put biology at the top of the research agenda. "The space station needs to be looked at differently; it's a science mission," says Young. Some members want the Bush Administration to see the station as the first step toward future human space exploration. "The space station with nothing to follow it is worthless," says one. Adds panelist Rae Silver, a Columbia University research psychologist: "What's needed is strong leadership and clear vision."

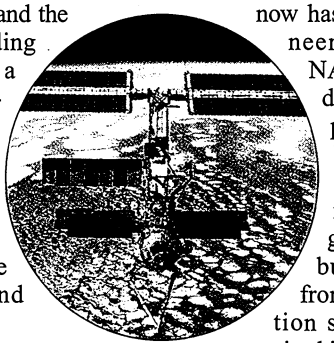
Such qualities may be hard to come by. Longtime NASA Administrator Dan Goldin steps down this month, at a time when the White House Office of Management and Budget is openly hostile to additional funding and Congress is skeptical of NASA's ability to deliver on its promises to provide a worthwhile laboratory. The fiscal constraints caused by a lagging economy and the focus on antiterrorism spending will hinder development of a long-term space strategy, Administration officials say.

The current station crisis, simmering for years, came to a boil this spring after the White House ordered NASA to trim costs. The agency cut the planned crew size in half and abandoned a living-quarters module and a rescue vehicle, sparking an outcry from potential users. But even those cuts are not enough to keep the station within the $8.3 billion spending limit between 2002 and the scheduled completion of the core U.S. portion in 2006.

The report doesn't tot up the bill, but panel members say privately that more than $1 billion extra is needed. The panel recommends that NASA find the money by limiting shuttle flights and other aspects of its human space-flight budget. Halting work on the core station, however, would have "significantly adverse impacts on the science," Young warns. The primary international partners—Canada, Europe, Japan, and Russia—also fear that a three-person crew would limit their access and capabilities.

If NASA can demonstrate they can complete the core program in a credible manner, then the Administration should consider adding the hardware necessary for a six-person crew, the panel concludes. But neither the panel nor NASA would estimate how much that additional hardware would cost. In the meantime, Young's group suggested boosting research dividends by docking two Russian Soyuz vehicles for at least 1 month out of six at the station. The arrangement would allow a six-person crew to conduct more experiments.

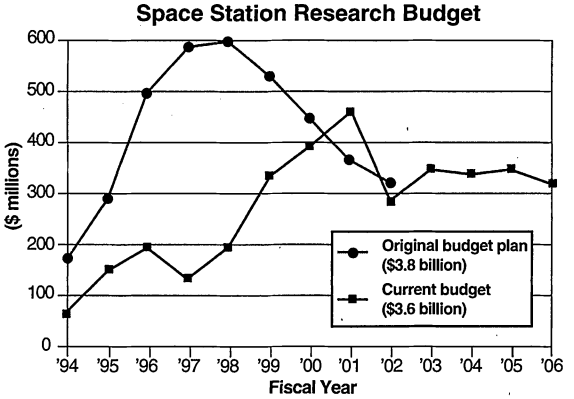
The panel also urges NASA to turn the massive engineering project into a realistic science program. "NASA has not been good at prioritizing its research" for the station, Silver says. "The whole program until now has been controlled by engineers." The panel calls for NASA to create a science deputy in the space station program and to coordinate better the research and space-flight offices. Planners must also come to grips with the 40% loss of buying power that resulted from diverting into construction some of the $3.8 billion promised in 1993 for research.



One victim has been the station's centrifuge, initially the responsibility of NASA and now being built by Japan. The 2008 launch date for a large centrifuge is "unacceptable," the report declares about a facility needed to test the effects of microgravity on living organisms. "If you are going to do the kind of science that gets published, you need a centrifuge," says Richard Roberts, panel member and Nobel laureate at New England Biolabs in Beverly, Massachusetts. And biology should be king, panelists add, if NASA hopes to obtain the sort of knowledge needed for continued human exploration of space.

A clearer idea of what NASA wants to accomplish is critical to a successful science program, say panelists. "You have to know

CREDIT: NASA/JPL



Research delayed. NASA's original research budget, adopted in 1994, has been stretched out and shrunk to make room for rising construction costs.