RANDOM SAMPLES

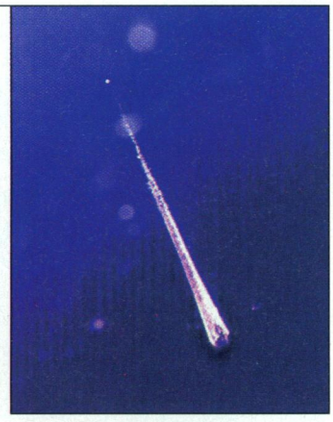
edited by JOCELYN KAISER

NASA Decides to Grab a Bit of Stardust

It has been 23 years since the last samples of matter from outer space were brought back by the astronauts of Apollo 17, but now scientists have received the go-ahead to fetch more bits from beyond our planet. And they'll do it at a bargain price: Instead of the billions of dollars for Apollo, the Stardust mission will sweep up tens of thousands of dust particles fresh from a comet and parachute them onto a Utah desert for just $200 million.

The National Aeronautics and Space Administration (NASA) selected Stardust last month to be the fourth in the series of Discovery missions, the embodiment of NASA Administrator Daniel Goldin's "smaller, faster, cheaper, better" approach to planetary exploration. Stardust's selection comes on the heels of the designation of the $59 million Lunar Prospector last spring (*Science*, 10 March, p. 1425). Stardust may not be that cheap, notes its principal investigator, Donald Brownlee of the University of Washington, but a sample return mission for $200 million is "nearly miraculous." Some planetary scientists felt the NASA selection of Prospector was unduly swayed by its extremely low cost, but the selection process "is improving," says space physicist Christopher Russell of the University of California, Los Angeles. "NASA did a much better job; I'm much more pleased."

Scheduled for launch in 1999, Stardust will fly by Comet Wild-2, which travels between the orbits of Earth and Jupiter, in 2004. It could pass only 100 kilometers from the comet's icy nucleus, a remnant of the material that formed the solar system. As it takes the most detailed pictures ever of a comet nucleus, the spacecraft will sweep up microscopic dust particles spewed by the nucleus using a collector made of aerogel, the lowest density solid material known. The aerogel will gently slow the particles from impact speeds of 20,000 kilometers per hour so that researchers back on Earth can get their first close-up look at bona fide primordial matter.



D. BROWNLEE/UNIV. OF WASHINGTON

Dust trap. A 10-micrometer meteoroid *(upper left)* captured near Earth in a chunk of aerogel.

Europe's Beef Against Hormones

Seven years after the European Union (EU) banned U.S. imports of beef from animals raised with hormone supplements, an international meeting of scientists to examine the issue has concluded such hormones cause no harm to humans. But the EU may still resist any change.

Last June the U.S. Secretary of Agriculture, Dan Glickman, called on the EU to end the ban—which costs the United States $100 million a year in lost revenues—or the Americans would bring the matter before the World Trade Organization (WTO). In response, the EU Commissioner for Agriculture, Franz Fischler, held a "Scientific Conference on Growth Promotion in Meat Production" in Brussels from 29 November to 1 December to discuss the health risks of veterinary hormones.

"The conference scientists found no evidence of human health risk associated with use of growth-promoting hormones used under 'prescribed conditions,'" says food scientist A. W. Randell, an observer at the meeting for the Codex Alimentarius Commission, which publishes food standards for the international community and the WTO. Last July the commission endorsed the use of three natural hormones when used according to "good veterinary practice" to speed weight gain in cattle, as well as two synthetic hormones, as long as the residues from them in meat remain below certain limits.

Although the conference results add yet more support for lifting the ban, Randell notes, "the EU may try to delay making a decision" on hormone acceptability. EU consumer and farmer groups have a beef against the imported beef and are pressing the union to maintain the ban. Vincent Perort of the European Consumers Organization says, "European consumers are completely against the use of added hormones in meat."

EU and U.S. officials are meeting in early January to discuss the ban, and the U.S. side is still optimistic. "We are waiting with a lot of confidence to hear what the EU decision will be," says Paul Drazek, special assistant to Glickman. "Hopefully we can work this thing out bilaterally, and we won't have to go to the WTO."

Cheering on Science

Science educators are always scouring their brains for new ways to sell their product to the nation's youth, and at the University of Wisconsin, Madison (UW), they've decided to combine it with the great American college pastime: football. The UW stadium scoreboard now presents science "brain teasers" during game time-outs.

In addition to scrolling ads or game statistics for as many as 80,000 fans, the electronic scoreboard badgers the Badger boosters—the UW team is named for the animal—with questions such as: If the quarterback plans to throw one pass each to three different receivers, in how many possible sequences can he do this—3, 6, or 9? After about a minute, the correct answer—6—appears. When this question appeared during a recent game, the answer was greeted by wild cheers from those who guessed right, says UW chemistry professor and football fan Art Ellis. Ellis helped develop the questions as one of the first projects of the new National Institute for Science Education (NISE), a National Science Foundation–funded institute headquartered at UW. (More about NISE programs can be found at its still-evolving Web site: **http://www.wcer.wisc.edu/nise**.)

JEFF MILLER

Fan teasers. Scoreboard at Wisconsin Badgers game.

Other questions include: If you sit behind the end zone and see a spectacular tackle at the opposite end of the field, how long after you see the tackle do you hear it—at the same time, 1/4 second later, or 1 second later? (Hint: The speed of sound in air is about 368 yards per second.) Football season ended last month, but NISE educators are already cooking up questions to be aired at winter basketball games.

Radiation Research Subjects Sue

Fourteen men who as teenagers in the 1940s and 1950s were subjects of ethically dubious radiation experiments have filed a $56 million lawsuit against the Massachusetts Institute of Technology (MIT), several doctors, and Quaker Oats Co., which alleg-

(continued on page 1765)

(continued from page 1763)

edly funded the work to make its oatmeal more competitive.

The men, who lived at the Fernald School for mentally retarded children in Waltham, Massachusetts, were among 70 boys given radio-tagged milk so scientists could learn whether eating oatmeal inhibits the intestinal absorption of iron and calcium (*Science*, 28 January 1994, p. 470). Although the doses were very small, neither the boys nor their parents gave informed consent. This came to light in 1993 when news reports revealed a slew of radiation experiments conducted by the federal government following World War II. President Clinton and MIT's president later offered the Fernald School subjects an apology, but no compensation, as Massachusetts and federal task forces formed to look into such experiments had concluded the boys suffered no significant harm.

But Michael Mattchen, lawyer for the group, says, "these gentlemen have decided that an apology is not enough." In a suit filed 1 December and reported last week in the *Boston Globe*, Mattchen's team argues that the 14 men and three of their wives each should get $1 million for suffering and $3 million to dissuade other researchers from using people "as guinea pigs." The suit says some doses were higher than the 1 microcurie approved by the government, and it says the men now suffer unspecified health problems from the experiments. And it claims that Quaker Oats paid MIT to conduct the research to show oatmeal's effects on mineral metabolism were insignificant, helping the cereal to compete with wheat-based cereals. An MIT spokesperson declined to comment on the lawsuit, other than to point out "that the state commission did find that there were no significant health effects."

Harvard Joins Telescope Project

The Carnegie Institution and the University of Arizona, which are trying to build two new telescopes to probe Southern Hemisphere skies, are hoping that a deal they made with Harvard University last week will jump-start their funding drive. Harvard has agreed to fund 25% to 33% of the $40 million needed to complete Magellan I, a 6.5-meter-aperture optical and infrared telescope under construction since 1993 at Las Campanas, Chile. And Carnegie officials say a telescopic twin, Magellan II, will be built on the site if more funds can be raised in the next year by Harvard and other potential partners. Harvard's final share of the Magellan costs will entitle astronomers at the Harvard College Observatory to an equivalent share of viewing time, says Stephen Shectman, the Magellan Project director. The university will also help pay instrumentation and operating costs of $2 million to $3 million per year.

Magellan I won't be of unprecedented size; the Keck I telescope in Hawaii has a 10-meter mirror, and several 8-meter telescopes are in the works, some in the south. But those telescopes tend to be shared by large groups of users that compete for time, while Magellan astronomers will have "more regular and reliable" access, Shectman notes. "We want a minimum type of facility to [stay competitive] into the next century," he says. If two are built, the telescopes could also be used together in a high-resolution technique known as interferometry, but adding that capability would be costly; at least at first, the telescopes will be used individually, Shectman says.

Upturn Seen for Industrial R&D

Next year's outlook for U.S. industrial R&D is rosier than at any time since 1990, according to a new survey of corporate spending, suggesting that high-tech industries may be gearing up for another growth spurt.

The Industrial Research Institute (IRI), whose 257 member companies carry out the vast majority of the country's industrial R&D, reported last month that 38% of the 151 companies who responded to its annual survey plan to increase R&D spending in 1996, compared with only 27% last year. Twice as many companies as last year expect to increase capital spending, and more than four times as many as last year plan to hire more science and engineering graduates than they did in 1995. Total R&D spending is expected to rise by 6%, after remaining flat for the past few years.

Leading the pack are the pharmaceutical, electronics, communications, and personal care products sectors, with estimated increases of more than 10%. At the same time, petroleum and energy companies foresee a drop of 6%.

"This is some of the best news I've seen in a long time," says Paul Germeraad, chair of the IRI panel that carried out the August-September survey and director of corporate research for Avery Dennison, a California aerospace firm. "The turnaround represents a shift in corporate strategies from increased productivity to growth, and the rise in capital spending reflects the fact that companies are concentrating on making new products."

Although the survey is a forecast, policy-makers think its numbers are solid. "These R&D managers are a pretty conservative lot," says Graham Mitchell, assistant secretary for technology in the Commerce Department and a past chair of the IRI survey. "Barring an economic downturn, I would be very surprised if these numbers didn't turn out to be absolutely the case in 1996."

Bird of Another Feather

The hoatzin (pronounced "watson"), one of the world's most unusual birds, may have spent the last 2 centuries in the wrong family tree, according to a new genetic analysis. The South American bird is the only avian species to have a ruminant digestive system: Like a cow, it predigests its food in a muscular crop containing cellulose-munching bacteria. Since it was first described 219 years ago, the hoatzin has usually been placed in the order *Galliformes*, which includes pheasants, chickens, and other birds with heavy bodies.

OXFORD SCIENTIFIC FILMS

Mistaken identity? Hoatzin.

Some experts have argued, however, that the bird's plumage and markings resemble the cuckoo's and that it should be grouped in the order *Cuculiformes*. And in a paper published in the 5 December *Proceedings of the National Academy of Sciences*, scientists led by biologist S. Blair Hedges of Pennsylvania State University provide the first statistically significant genetic evidence that the hoatzin is more closely related to the cuckoo than to the *Galliformes*. "We're proposing a major move for this bird. It's like moving something from the rodents to the primates," Hedges says.

The scientists came to their conclusion after comparing more than 1850 base pairs of DNA—including three different genes, two of them mitochondrial—from eight species of birds. A University of Georgia group had earlier tried to find a cuckoo link using half as many base pairs and one gene, but the authors had deemed their study inconclusive.

Paul DeBenedictis, a systematic zoologist at the State University of New York Health Science Center in Syracuse, says that while some ornithologists who favor grouping the hoatzin with the *Galliformes* "will have reservations" about the Penn State team's work, "the majority would accept this as an interesting conclusion."