produce proteins and grow, it's hard to understand how it could survive if the amino acid is destroyed in the placenta.

Munn and Mellor concede that more work will be required to show that loss of tryptophan, and not some currently unsuspected consequence of IDO action, is behind the embryo's ability to ward off an immune attack. They say they intend to pursue this issue in further mouse studies. And the investigators also want to see if possible defects in IDO production or action in the placenta might be linked to the repeated miscarriages experienced by some women.

In addition, immunologists will want to explore hints that IDO might have a broader role in immune regulation. The Georgia team has evidence in lab animals that the enzyme also suppresses the activity of T cells that might otherwise attack the body's own tissues. If so, then the researchers may have tapped into a new arena from which to look at the immune system's checks and balances, especially in patients with autoimmune illnesses. "We have come up with a natural immunosuppressive mechanism that is linked to an evolutionarily ancient mechanism: nutrient depletion," Mellor says. "And placental mammals have adapted it in a dramatic way to protect their fetuses."

–TRISHA GURA

Trisha Gura is a science writer in Cleveland, Ohio.

PLANETARY SCIENCE

Neptune's Hasty Moon Poses Celestial Puzzle

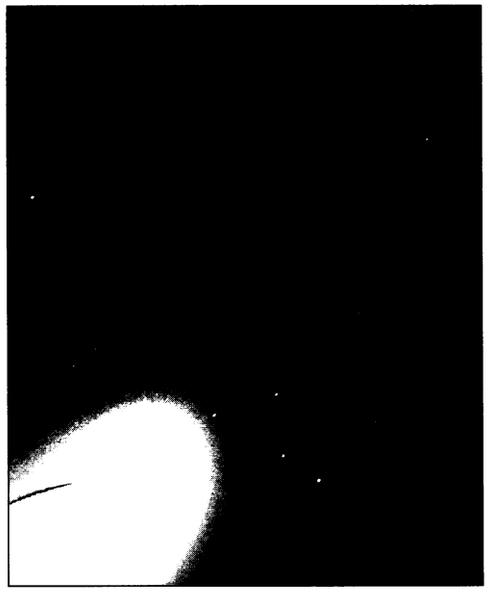
Ever since Newton, astronomers have been calculating the orbits of planets and moons and getting them exactly right. But last week, a team of observers reported that Galatea, a small satellite of the planet Neptune, is a few minutes ahead of schedule. To explain this puzzling haste, astronomers are blaming everything from the gravitational tug of Neptune's mysterious Adams ring to the pull of other, undiscovered moons to an error in the original orbital predictions.

A team led by Claude Roddier of the Institute for Astronomy of the University of Hawaii, Honolulu, learned that the 160-kilometer moon was straying from its orbital timetable on 6 July, when they tracked it down with the 3.6-meter Canada-France-Hawaii Telescope on Mauna Kea. The observations—the first in the 9 years since Galatea was discovered by the Voyager 2 spacecraft—showed that Galatea was 5±1 degrees ahead of its predicted position, or 8.6 minutes ahead of schedule. The difference, they said in an 11 August circular of the International Astronomical Union, is "possibly due to [Galatea's] interaction with Neptune's Adams ring."

The Adams ring, lying a mere 1000 kilometers outside Galatea's orbit, has a strange, arclike appearance, indicating that its dust particles aren't spread evenly around its full circumference. Galatea's gravity is presumably sweeping the particles into clumps, as Carolyn Porco of the Lunar and Planetary Laboratory of the University of Arizona, Tucson, showed in 1991 (*Science*, 30 August 1991, p. 995). But for the ring to pull back strongly enough to affect the satellite's orbit, Porco says, it "would have to have substantial mass." She speculates "that there are bigger bodies within [the arcs], which are the source of the dust that we actually see."

Brian Marsden of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts, isn't so sure that there's a deviation to explain. For Galatea's orbit to accumulate five degrees of drift in 9 years, its half-day period would have to differ from its predicted value by a mere 0.07 second. "My own inclination is that the prediction is off simply because the observations used for it were only [a limited number of images] from Voyager," he says. Porco disagrees. "There were lots of observations of Galatea by Voyager," she says. "I doubt they are in error."

If the prediction isn't at fault, Marsden says, the gravitational effects of other satellites, or of Neptune's own oblate shape, could have skewed Galatea's orbit, as could a perturbation from a small unknown satellite in nearly the same orbit as Galatea. "Perhaps," agrees Porco, "[but] it would have to be small enough to have escaped detection by the Voyager cameras," which, she says, could spot a 6-kilometer object.



NASA

Orbital mystery. Do bright arcs on Neptune's Adams ring hold clues to Galatea's quickness?

She notes, however, that there's a problem even if the Adams ring is to blame. An interaction between satellite and ring could speed up Galatea, but only if the objects and particles in the ring are colliding with one another "because otherwise the gravitational interaction is not 'shared,' so to speak, among all the bodies in the ring." But, Porco adds, "if there are colliding particles, then the arcs wouldn't stick around very long. The net result: a faster Galatea leaves us with a big puzzle, and I wonder if [the new observation] will stand the test of time."

–GOVERT SCHILLING

Govert Schilling is an astronomy writer in Utrecht, the Netherlands.

SCIENCE IN SOCIETY

Institute Copes With Genetic Hot Potato

A premature warning about the potential dangers of transgenic potatoes sparked a global media frenzy last week and appears to have ended the career of a food safety expert at the Rowett Research Institute in Aberdeen, Scotland. In a press statement, the institute said it regretted "the release of misleading information about issues of such importance."

The incident is the latest high-profile setback for agricultural biotechnology, which in Europe is still struggling to gain consumer acceptance (*Science*, 7 August, p. 768). Indeed, activists have torn up dozens of trial plots in Europe over the last year, and in a June interview with the *Daily Telegraph*, Prince Charles declared that tinkering with genes for food production "takes mankind into realms that belong to God and God alone."

That was the backdrop for the 10 August British TV show "World in Action," on which Rowett researcher Arpad Pusztai announced findings on rats fed potatoes containing the gene for concanavalin A, or Con A, a compound found in jack beans. Con A is a member of the lectins, a huge family of insecticides that occur naturally in plants. Biotech companies have spliced lectin genes into various crops, to try to get them to resist insect pests. Pusztai warned, however, that rats in his experiments suffered from stunted growth and suppressed immune function. He said more safety research was needed, adding: "If you gave me the choice now, I wouldn't eat it."

Even before the show aired, the institute was flooded with calls from journalists who had received a press release touting Pusztai's comments. In most of the ensuing coverage, reporters failed to distinguish between genetic engineering and the specific use of lectins, making it appear that Pusztai warned against eating anything transgenic.

The publicity alarmed consumer groups and prompted several members of the British Parliament to call for a moratorium on genetically engineered foods. Biotech companies staged a defense.

Facing "a megacrisis that we didn't remotely anticipate," Rowett director Philip James decided to look into the details of Pusztai's experiments himself—only to discover that these were, he says, a "total muddle." The data presented on the TV show were from a trial in which the rats had been fed nontransgenic potatoes, with Con A added later, instead of transgenic potatoes. "I couldn't believe what I was suddenly being told," says James. He says Pusztai's team had also carried out some experiments with transgenic potatoes, but these contained GNA—a different lectin found in snowdrops.

After the discovery, James suspended Pusztai indefinitely. "We immediately sealed the laboratories and took the data, according to the guidelines of the Medical Research Council," says James. He ordered Rowett senior scientist Andrew Chesson, a member of the European Union work group on transgenic food safety, to analyze the data and report to the British Ministry of Agriculture, Fisheries, and Food and to the European Union. James says Pusztai, 68, will retire; he was unavailable for comment. "He's totally overwhelmed, the poor guy," says James.

The incident has left a bitter taste in the mouths of biotech boosters. It "caused a tremendous amount of confusion among consumers, which will take years to undo," claims Anthony Arke of EuropaBio, a Brussels-based biotech association. Even if the studies show that lectin-containing potatoes are harmful to rats, says Arke, that would be little reason for concern, because detecting hazards early on is exactly what experiments like the ones carried out at Rowett are for. Says Arke: "This only proves that the safety assessment procedures are fine."

–MARTIN ENSERINK

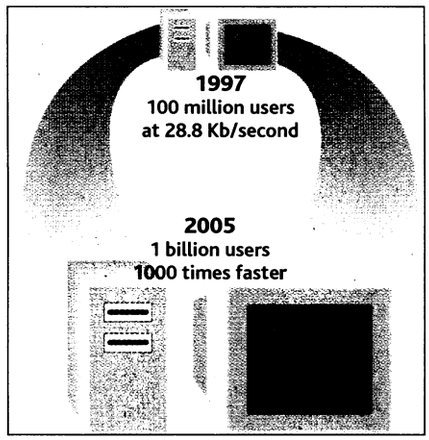
Martin Enserink is a science writer in Amsterdam.

INFORMATION TECHNOLOGY

Report Urges U.S. to Take the Long View

A White House advisory panel on information technology is urging President Clinton to turn back the clock and recreate the funding strategies that nurtured the Internet and other developments that now fuel the U.S. economy. The panel's overall message, that the United States needs to do more to retain its lead in the field, is expected to prompt top Administration officials to push for more funding in the upcoming 2000 budget request. But its suggestion that the National Science Foundation (NSF) should play the leading role is likely to be more controversial.

Last week, the President's Information Technology Advisory Committee (PITAC), a 26-member panel of prominent computer scientists and industry executives, recommended that the government add $1 billion over 5 years to the estimated $1.5 billion it's now spending each year on information technology (IT) research. The new money would go to revitalize basic research on software, hardware, and computer networks. The committee's interim report also called on the government to revive the large, long-term projects that proved so productive in the 1970s and '80s. "The future great ideas that are not going to pan out for 15 years aren't getting enough support now," says computer scientist Ken Kennedy of Rice University in Houston, Texas, cochair of the panel, the latest of several to call for more federal IT spending (*Science*, 7 August, p. 762).



SOURCE: PITAC

Scaling up. Computer scientists say more basic research is needed to build a bigger, faster Internet.

Economists have estimated that one-third of U.S. economic growth since 1992 has come from the blossoming of the Internet and other computer-related businesses. But the basic research that spawned these profitable technologies was conducted decades ago. Reacting to concerns that government isn't doing enough to keep the country on top, President Clinton last June asked his new science adviser, Neal Lane, to prepare an IT funding plan. The PITAC's recommendations, says panel member Larry Smarr, director of the National Center for Supercomputing Applications at the University of Illinois, Urbana-Champaign, should allow Lane "to hit the ground running" by providing a framework for Lane's report, expected later this year.

In its report, the PITAC warns against a dangerous trend among federal agencies: the funding of small, short-term projects, such as building deadlier missiles or writing better flood-forecasting software, to the detriment of larger, longer term basic studies. The panel estimates that the government spends as little as 5 percent of its IT budget on basic studies lasting more than 5 years. To bolster basic research, committee members would like to see a return to grant-making strategies that once allowed funders, such as the Pentagon's Defense Advanced Research Projects Agency (DARPA), to put dozens of researchers on problems for decades at a time. The DARPA strategy, says the report, gave researchers "enough resources and time to concentrate on the problem rather than on their next proposal. ... It is this spirit that the Committee would like to see reborn and replicated."

In particular, the panel wants to see more research into robust software, faster supercomputers, and "scalable" communications networks able to shoulder the burden of a billion users—a number the Internet is expected to hit by 2005. Private companies, it says, simply aren't able to make the necessary long-term commitments. The committee also wants social scientists to study how the new technologies will shape society.

Whether NSF, the preeminent supporter of single-investigator studies in the nonbiomedical sciences, is up to orchestrating such a revival of large-scale basic research, however, is an open question. Kennedy and others say that the panel picked NSF to dole out up to half of any new funds and to coordinate the overall effort because it was not feasible to create a new agency and because NSF has a broad perspective. "But committee members have a lot of reservations about whether NSF can fulfill this role," Kennedy admits. To succeed, the panel says, NSF must elevate the influence of IT researchers within its ranks and add more computer scientists to its policy-setting National Science Board.

New NSF director Rita Colwell says the agency is ready and willing "to take up the challenge. We are used to looking at the big picture." Juris Hartmanis, who heads the foundation's $295 million computer sciences directorate, agrees that "adjustments may have to be made, but NSF is already managing large projects."

The next step for the committee is a series of meetings with community and federal leaders to flesh out specific funding proposals for a final report to be delivered early next year. While those meetings will come late in the Administration's 2000 budget-making process, Smarr and others hope that they will still influence the president's budget request to Congress next February. "We burned some midnight oil to get [the report] out," he says. "We wanted the budget-makers to hear what the leaders in IT think needs to happen."

–DAVID MALAKOFF