Biologists launch 'open-source movement'

Carina Dennis, Sydney

An initiative is being established this week with a US$1-million grant from the Rockefeller Foundation, to make research tools more readily available to biologists who could not otherwise afford them.

The Biological Innovation for Open Society (BIOS) initiative will seek to make information and technologies such as plant-breeding tools freely available. It will also provide scientists with better information about what they can access and, its founders hope, establish an international community of interested researchers.

Richard Jefferson is the initiative's leader and chairman of the Center for the Application for Molecular Biology to International Agriculture (CAMBIA), which is a non-profit research institute based in Canberra, Australia. He says BIOS could spur an "open source movement" in biotechnology, analogous to the one that has developed in the computer software industry.

Plant scientists in poor countries often complain that they are shut off from recent advances in agricultural biotechnology because they cannot afford licensing fees.

The initiative's first activities will be to gather a portfolio of research tools that can be used for free and to construct an easy-to-use database of patent information. It will also provide templates of licensing agreements for scientists who want to make their technologies freely available. In turn, users will be obliged to freely release innovations based on these techniques.

Jefferson says that BIOS will encompass all forms of biological innovations, including agricultural and animal-breeding tools, genetic resources, medical treatments and environmental remedies. Its running costs will be covered by funds from sponsors and what he terms "non-compulsory" subscription fees paid by licensees.

Its initial portfolio of research tools will include a new method, developed by CAMBIA, for transferring genes into plants using modified bacterial species. Jefferson hopes to publish the technique shortly and says it will side-step patents held by biotech firm Monsanto on *Agrobacterium tumefaciens*, a bacterium currently used for this purpose. "It's a poster child for the initiative," says Jefferson of the new method.

Much of the initial, one-year Rockefeller grant is being spent on hiring patent and computer specialists to extend CAMBIA's patent database and draw up the licensing templates. IBM is also contributing computer hardware and software in order to help get the initiative off the ground.

Some universities and companies already provide free licences for their technologies to researchers in poor countries. But Jefferson says these efforts are not sufficient to provide the "cooperative environment" that BIOS is setting out to build.

The success of the initiative will require the kind of community groundswell that buoys the open-source software movement, says Robert Zeigler of the Consultative Group on International Agricultural Research, a network of agricultural laboratories.

It will also require a cultural shift at universities, says Yochai Benkler, an information-law specialist at Yale University. "Many universities operate on the assumption that the role of their licensing policies is to maximize revenue," he says.

Although BIOS is expecting some resistance from biotechnology companies, a few of the larger companies have actually expressed support for it. "We have had discussions with BIOS and these will continue," says Ganesh Kishore, vice-president of technology at DuPont in St Louis, Missouri. "I don't view BIOS as a threat: it will be complementary. We need many innovations to build all the products that we want to build." ■

Support sought to investigate sluggish Pioneers

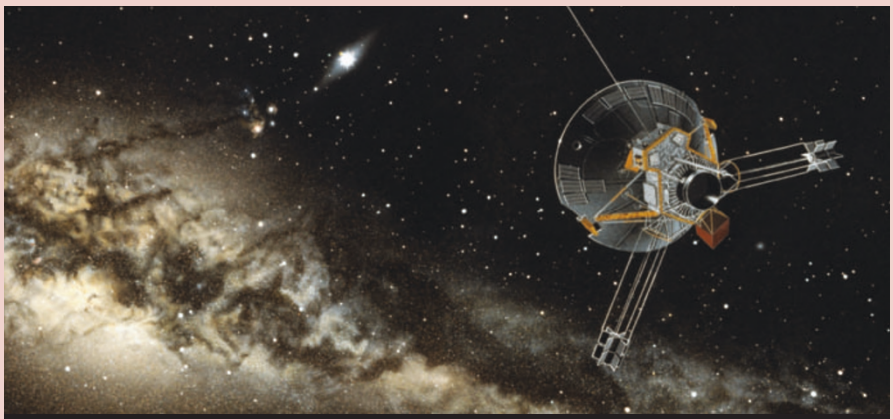
Jim Giles

Physicists are looking at ways to study a tiny but mysterious force acting on a pair of spacecraft at the edge of the Solar System.

One research team is seeking support to investigate flight data from the early stages of the Pioneer 10 and 11 missions, in a bid to understand why the craft are now travelling slightly more slowly than mission planners envisaged. A second, far more ambitious proposal would launch a dedicated space mission to study the effect, which has left the craft hundreds of kilometres closer to the Sun than had been anticipated.

The Pioneer anomaly, as the effect is known, was first detected about eight years after NASA launched the two craft to probe the outer Solar System in 1972 and 1973, respectively. It suggests that an unexpected force — about a hundred million times weaker than gravity's force on the surface of the Earth — has been pulling the craft back towards the Sun.

Many physicists think the slow-down is caused either by some unknown physical change in the craft themselves, increasing their drag, or by errors in the techniques used to track them.



BETTMANN/CORBIS

Crawling craft: Pioneer 10 and its sister probe are travelling more slowly than expected.

But others have suggested that gravitational theory needs to be modified to account for the effect. This view was boosted in 2002, when an investigation into possible causes, led by John Anderson, a physicist at the Jet Propulsion Laboratory (JPL) in Pasadena, California, failed to find an alternative explanation (J. D. Anderson *et al. Phys. Rev. D* 65, 082004; 2002). The team rejected numerous effects, such as possible leaks of heat or gas from the crafts' plutonium thermoelectric generators.

In the absence of a conventional explanation, physicists have produced speculative alternatives. Mordehai Milgrom of the Weizmann Institute of Science near Tel Aviv in Israel, for example, has developed a modified version of classical gravity in which the strength of the gravitational field decreases more slowly than newtonian theory suggests. Milgrom produced his theory to account for discrepancies in the

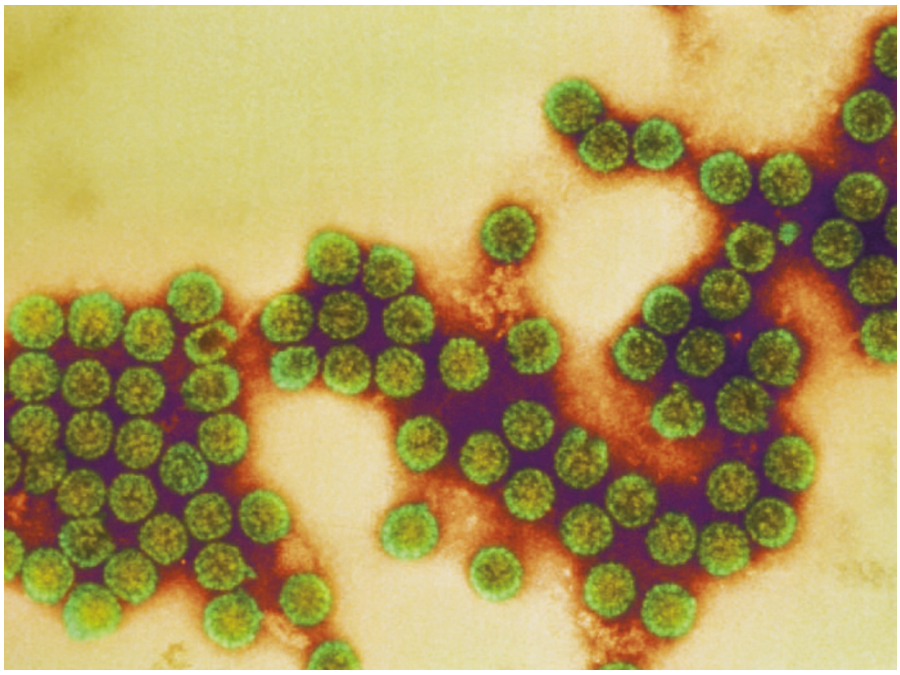
Monkey virus may be cleared of cancer link

Helen Pearson, New York

Laboratory contamination could have lent unwarranted support to the contentious idea that a monkey virus causes certain types of cancer, according to a study published last week.

The study tackled a long-standing disagreement in cancer biology about whether simian virus 40 (SV40), which contaminated stocks of polio vaccine in the 1950s and 1960s, could have infected vaccinated patients and triggered a range of chest, bone, brain and blood cancers. In support of this idea, some laboratories have identified fragments of the virus in tumour tissue samples — but others have struggled to repeat their results. The new study, led by pathologist Marc Ladanyi of the Memorial Sloan-Kettering Cancer Center, New York (F. López-Ríos, P. B. Illei, V. Rusch and M. Ladanyi *Lancet* **364,** 1157–1166; 2004), suggests a reason for this discrepancy.

"It's a very major finding and may resolve the controversy," says microbiologist Keerti Shah of the Johns Hopkins Bloomberg School of Public Health in Baltimore, Maryland, who has argued against a link between the virus and cancer. The study suggests that other researchers investigating the question may have inadvertently contaminated their tumour samples with plasmids — pieces of DNA that are widely used in molecular genetics laboratories and that frequently contain hidden fragments of SV40.



CDC/SPL

Simian scapegoat: some still argue that this monkey virus caused cancer through a contaminated vaccine.

Ladanyi and his team searched for the virus in tissue samples of mesothelioma, a type of chest cancer. They used the polymerase chain reaction (PCR) to amplify a small stretch of DNA from the virus, and initially found that it was present in around 60% of their samples. But when they compared the genetic sequence of this region with others in gene databases, they realized that the section was also found in numerous laboratory plasmids.

Ladanyi and his team then carried out a series of detailed experiments showing that the virus DNA they had detected had come from contamination with plasmids, rather than the intact virus. Using genetic sequencing, for example, they showed that the virus fragment present in their samples contained a genetically engineered gap that is only found in plasmids.

Ladanyi believes other laboratories may have overlooked similar contamination in their PCR experiments, because they were unaware that so many plasmids contain sequences from SV40. To back up this argument, the team reanalysed the results of a 2002 study that identified the virus in brain and bone tumours (F. Martini *et al. Cancer* **94,** 1037–1048; 2002). The viral sequences this group had published showed that it too had detected plasmid sequences rather than SV40 itself.

The onus now falls on other laboratories to re-examine their results and rule out contamination, says cancer epidemiologist Eric Engels, who studied the issue at the National Cancer Institute in Bethesda, Maryland. "Laboratories need to take this result seriously," he says.

But others in the field who have detected the virus in their cancer samples stand by their original results. Virologist Janet Butel at the Baylor College of Medicine in Houston, Texas, says that her group has carefully checked its samples for plasmid contamination and can confidently rule it out. "This experiment does not mean all other laboratories are similarly contaminating their samples," she says.

Those on both sides of the argument have other evidence to support their case. If the vaccine caused cancer, there should have been a rise in mesotheliomas or other cancers among those vaccinated decades ago with the virus-contaminated jab. But epidemiological studies have not detected one. On the other hand, hamsters and rats injected with SV40 go on to develop tumours.

Because the two sides are so entrenched, this single study is unlikely to resolve the debate, predicts Chris Wilson, an immunologist at the University of Washington in Seattle. Wilson served on a 2002 National Academies panel that assessed the evidence linking the virus and cancer. Either way, the study highlights the perils of PCR, which is notorious among researchers for producing false results in a variety of situations, even with the most experienced groups. "We know there are pitfalls," says Wilson. "and one has to be extremely diligent to avoid them." ■

motion of galaxies, an effect normally attributed to the presence of dark matter, but physicists have pointed out that it could also account for the Pioneer anomaly.

Anderson now wants to help resolve the uncertainty by reanalysing data from the first decade of the Pioneer missions. Slava Turyshev, a colleague of Anderson's at JPL, estimates that it will cost about US$250,000 to fund the analysis, and a grant application will be submitted to NASA later this year.

Turyshev and colleagues also have a grander plan: a dedicated spacecraft that would follow a similar trajectory to the Pioneer missions in a bid to recreate the anomaly. Their proposal, outlined in Paris on 16 September to an advisory panel of the European Space Agency (ESA), involves launching a spacecraft that would be followed a few kilometres behind by a reflective ball. Lasers on the craft would monitor the distance between the ball and craft, allowing researchers to detect and compensate for any acceleration caused by events on the craft, such as heat leaks.

But the craft would cost at least US$500 million, and sources close to the panel suggest that it will not make the project one of the two priorities that it must convey to ESA next month. ■