pose a threat, and the U.S. Department of Energy (DOE) will provide initial funding of roughly $40 million over the next 2 years to track them down. Lending extra urgency to the initiative—which will be organized and managed by the International Atomic Energy Agency (IAEA) in Vienna, Austria—are revelations about the legacy of a secret Soviet research program to spray radioactive cesium on agricultural fields.

Because there are "literally millions" of radiological sources that could be used in a dirty bomb, "it is crucial to focus limited resources on those that could pose the most dangerous potential terrorist threat," says Matthew Bunn of Harvard University's Belfer Center for Science and International Affairs. "Russian openness on data about how many sources of what types were produced, and where they went, will be crucial to success."


**The hunt is on.** These hot Georgian generators raised dirty-bomb fears.

Vague fears that a terrorist might try to concoct a dirty bomb from radiological materials and conventional explosives gained a measure of credibility last week, when the U.S. government trumpeted the news that it had foiled an alleged al Qaeda plot to steal radioactive materials from an undisclosed U.S. facility. Far more worrisome to many observers, however, is the possibility that terrorists could obtain stray radioactive materials in former Soviet republics. The magnitude of this threat is unknown, mainly because Russia has not been forthcoming about the Soviet nuclear legacy out of fears that it could be held liable for materials outside its borders after the Soviet Union dissolved, says IAEA's Abel Julio González. At the same time, the U.S. government has focused on the threat posed by former Soviet fissile materials.

But the demands for better information grew urgent after the 11 September attacks. "The U.S. got very nervous" about radiological sources, says Kenneth Luongo, executive director of the Russian American Nuclear Security Advisory Council in Washington, D.C. According to Bunn, DOE launched a series of classified studies on the impact of potential radiological terrorist attacks and assessments of which materials posed the most serious threats. Ratcheting up anxiety levels was the recent discovery of Soviet-made thermoelectric generators packed with strontium-90 that IAEA and the Republic of Georgia recovered last February near the breakaway Abkhazia region (*Science*, 1 February, p. 777).

A newly recognized threat could come from loose cesium chloride. The radioactive form of this salt has a variety of uses, including sterilizing medical supplies, and is kept under strict control because it is manufactured as a talcumlike powder that's easy to disperse. González told *Science* that IAEA has learned from reliable Russian sources that the Soviet Union ran a secret program in which farmers spread radioactive cesium chloride powder on their fields. Experts speculate that the purpose of the program, code named Gamma Kolos (*kolos* is Russian for "ear," as in ear of corn), was to see if the powder would alter germination rates or induce beneficial mutations in corn. At least four trucks packed with the substance turned up recently in Moldova, a tiny and impoverished former Soviet republic, and recent photos of similar trucks have surfaced in the Republic of Georgia. The cesium-137 in each truck has an activity of about 3500 curies—"a very significant amount," notes González.

As scary as that sounds, Bunn and others warn that stepped-up efforts to track down radiological sources should not come at the expense of securing "hotter" fissile materials that could be used to create far more devastating nuclear bombs. "Radiological terrorism could be expensive to clean up, but it would not mean tens of thousands of people dead and the heart of a major city incinerated in a flash," Bunn says. But the dirty bombs are easier to produce—and the threat is finally being taken seriously. **–RICHARD STONE**

GERMANY

## Gruss Takes Max Planck Helm

**HALLE AN DER SAALE, GERMANY**—Peter Gruss's honeymoon period as president of Germany's premier research organization, the Max Planck Society (MPG), could not have been shorter. He spent his first full day on the job waiting to hear whether he would have to rein in the organization's budget. But discussions on Monday between the federal and state governments eased what Gruss called his "first worry": The society got a 3% budget increase. MPG was spared, at least for now, from the nationwide belt-tightening that most German agencies are expecting in response to the sluggish economy.

Observers had already predicted that flat

## ScienceScope

**France's High Flyer** French conservatives are riding high after their crushing victory in France's 16 June legislative elections. So it's not surprising that Prime Minister Jean-Pierre Raffarin reached for the stars in choosing a new science chief. Claudie Haigneré, Europe's only woman astronaut and a veteran of missions to the Mir and international space stations, has been tapped as minister of research and new technologies. She replaces interim research chief François Loos and will report to philosopher Luc Ferry, who was earlier named head of a "superministry" for youth, education, and research.

The appointment puts Haigneré "in a key position to shape the future of Europe's science and technology," says Antonio Rodotà, director-general of the European Space Agency. But French researchers say it's too early to know whether Haigneré—a doctor and neuroscientist who commanded a Soyuz space capsule on its return from Mir in 1999—will be able to pilot France's research effort out of its current financial doldrums. Indeed, some scientists say they are keeping a closer eye on newly appointed finance minister Francis Mer. The former steel industry executive is a well-known advocate of research and development spending. Says the head of one major research institute: "I am not too worried about the new government—at least not yet."

**Thinking Ahead** Congress hasn't yet finished work on the 2003 budget, but the Bush Administration is already thinking about adding some "life" to its 2004 request. The White House budget office late last month released its annual budget guidance to research agencies, and "molecular-level understanding of life processes" is one of six areas—and the only new idea—identified as a priority.

Agency officials are just beginning to work out what the bioscience initiative might look like, who would be involved, and how much it might cost. "We're in the brainstorming phase," says one National Institutes of Health researcher. The other priorities are continuations of current multiagency initiatives, ranging from homeland defense and nanotechnology to information technology and climate change.

Whatever plan emerges later this summer, the White House insists it must be "relevant" to national needs, have measurable performance criteria, and be funded through a competitive process.

CREDITS: (TOP TO BOTTOM) IAEA; ESA/CNES

nodes for T cells. Three months after implantation, the researchers determined that the mice had relatively healthy immune systems, although they produced half as many T cells as normal mice. But when the researchers dug around the kidney to find the thymus, they saw nothing. They suggest that the cells differentiated and produced a range of T cells but then died off. Blackburn believes that 500 cells might be below the critical mass needed to sustain a thymus; the group reports finding full thymuses in mice that had received larger implants. Blackburn's work will be published in the June issue of *Immunity*; the Monash team's results appear in the 17 June online edition of *Nature Immunology*.

Still to be proven, however, is that the thymic stem cell exists. If MTS20/24 cells are largely homogeneous, that would bolster the case that the long-sought thymic stem cell exists and is among them. But the thymic cells huddled in the original implanted cluster might have been more diverse than they appeared. If so, more than a single cell type might be needed to grow a new thymus. Howard Petrie, an immunologist at Memorial Sloan-Kettering Cancer Center in New York City, also questions whether all the cells in the Monash thymus arose from the original cluster; they might have recruited others from the recipient's body. Still, Petrie and others embrace the therapeutic potential of stimulating the thymus in those with weak immune systems—an enormous population that includes the elderly, patients undergoing chemotherapy, and people with immune diseases, including AIDS.

–JENNIFER COUZIN

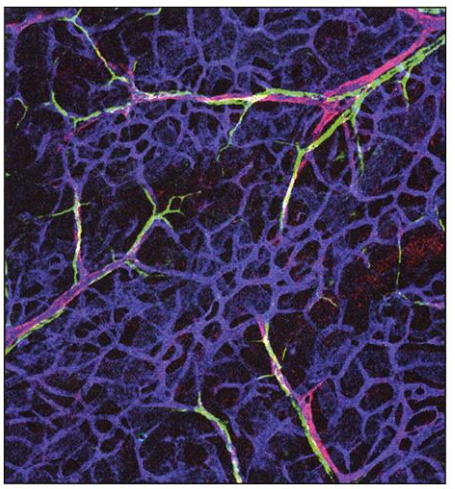
DEVELOPMENTAL BIOLOGY

## Nerves Tell Arteries to Make Like a Tree

By the time an embryo's heart beats for the first time, an extensive tree of arteries is already in place. Its delicate branches—which will ultimately stretch tens of thousands of kilometers in a full-grown human—ensure that no bit of tissue goes wanting for oxygen and nutrients.

How arteries shape themselves into such fine patterns has been an open question. Now a study shows that arteries follow the lead of another of the body's branching specialists: nerves. In the 14 June issue of *Cell*, developmental neurobiologists Yoh-suke Mukouyama and David Anderson of the California Institute of Technology (Caltech) in Pasadena and colleagues report that embryonic nerves form a template that directs the growth of arteries. The team also identifies a molecule released by the nerves that apparently signals the arteries to fall in step.

"This is the most elegant paper I've read in years," says angiogenesis researcher Judah Folkman of Harvard University Medical School and Children's Hospital in Boston. "They answer one question after another."



CREDIT: Y.-S. MUKOUYAMA

**Developmental tango.** Branching arteries (red) follow the lead of neurons (green) in embryonic mouse skin.

Blood vessels and peripheral nerves tend to snuggle closely together. This arrangement has advantages: Arteries supply neurons with oxygenated blood; nerves tell blood vessels when to dilate or contract and help direct immune responses. However, few studies have examined how this relationship develops.

The Caltech researchers labeled nerves and blood vessels in the skin of embryonic mice. They found that arteries, but not veins, align closely with nerves. Snapshots of the skin at several time points revealed that the nerves appear first. Soon after, primitive vessels—which have yet to don the molecular trappings of arteries—align with the nerves. This hinted that the nerves might be calling the shots.

The team then turned to mutant mice lacking a gene important for guiding axons, the long tendrils extending from neuron bodies. Peripheral nerve axons in these mice tend to clump together and have fewer fine branches, and Mukouyama and Anderson's team found that the mice's arteries had the same pattern. Apparently, arteries follow axons even when the axons go astray.

It makes sense that the development of nerves and arteries is linked, says George Yancopoulos, a molecular geneticist at Regeneron Pharmaceuticals in Tarrytown, New York. "It's easy to speculate that if you're going to have two branching systems that integrate into the various tissues of the body, when one system comes up with a solution, it's very economical to have the second system just follow along."

Nerves also appear to secrete a molecule that tells embryonic blood vessels to become arteries in the first place. The team found that

## ScienceScope

**More for Livermore** The Bush Administration this week delivered draft legislation creating the Department of Homeland Security to Congress, which is scrambling to decide how it will oversee the proposed $37 billion addition to the federal bureaucracy. But one element seems clear: The department's scientific and technological activities will be managed at Lawrence Livermore National Laboratory in California —although lab officials emphasize that the lab itself will not be swallowed up by the new department.

"There'll be a separate building on the Livermore campus, with a sign on the door designating it as an office of the new department," explains John Marburger, the president's science adviser. Asked why Livermore was chosen, Marburger says that the Department of Energy weapons lab "has a long history" of being involved in the issue, from the biological, chemical, and nuclear weapons in a potential terrorist's arsenal to the measures needed to thwart their deployment.

Although much of the department's work might be carried out by health and medical agencies, Marburger says he expects the Livermore-based office to manage their budgets. It will also represent science to the rest of the department.

**U.K. Cloning Clash** The on-and-off battle over the United Kingdom's stem cell and cloning research rules is on again. The country's highest court last week said it will allow an antiabortion group to appeal an earlier defeat that opened the door to human therapeutic cloning research.

Last November, the High Court ruled that the Human Fertilization and Embryology Act, passed in 1990 before human cloning seemed possible, applied only to embryos created by fusion of egg and sperm—and not those made by cloning techniques. The decision prompted one doctor to announce that he would attempt human reproductive cloning in the U.K. But after an appeals court overturned that ruling, the House of Lords empowered a government panel to issue licenses for therapeutic cloning research. Now, the Judicial Office of the House of Lords has ruled that the anti-embryo research group ProLife Alliance can challenge the current regulatory system.

A ProLife win would be a setback for researchers, says Anne McLaren, a developmental biologist at the Wellcome/CRC Institute in Cambridge. The case is expected to be heard later this year.

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