at several—but not all—U.S. departments by the end of this year.

One shortcoming in the Wellcome guidelines, contends microbial geneticist Herbert Arst of Imperial College in London, is their lack of strong provisions for protecting whistleblowers and ensuring that universities don't conduct cursory "whitewash inquiries" of misconduct allegations. Terry defends Wellcome's whistleblower section, explaining that its wording is limited partly by the U.K.'s strict libel laws, which make it easier for accused parties to win a defamation case.

Such concerns could be addressed in final guidelines set to go into effect in the fall of 2002. In addition to providing comments on the existing draft, due next month, the trust has asked organizations to describe how they deal with misconduct allegations. Oxford University's 2-year-old integrity code, for example, offers a relatively broad definition of misconduct and a set of procedures to pursue allegations. According to Wellcome, sanctions against a researcher found guilty of misconduct could range from a letter of reprimand to barring the individual from receiving trust funds "for a given period."

The Wellcome guidelines could trigger a rush among U.K. research outfits to follow suit, predicts Drummond Rennie, deputy editor of *The Journal of the American Medical Association*. Nor are the guidelines intended solely for biomedical scientists: "We're hoping that this also can become the template for guidelines in other fields of science," says Terry. In addition, Britain's research councils are weighing whether to require universities to adhere to "good practice" as outlined by the Medical Research Council. Although Wellcome does not have the power of a government agency, it does wield a sword of Damocles over universities and research institutes hesitant to enforce its planned rules: the threat of making them ineligible for Wellcome grants. **–ROBERT KOENIG**

MATERIALS SCIENCE

Silicon Lights the Way To Faster Data Flow

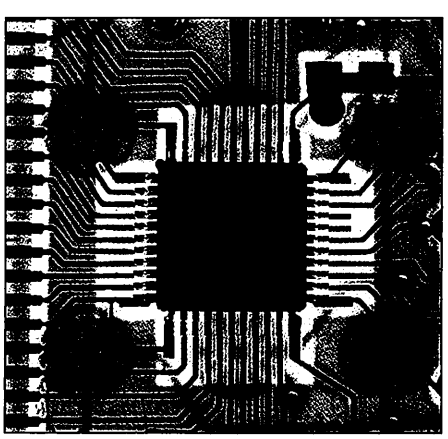
Computer engineers can design souped-up chips capable of performing billions of calculations per second. But their wizardry will be in vain unless they can also speed the flow of information between chips and other computer components. One way to do that is to replace today's sluggish metal wires with higher speed optical connections, using special semiconductors to convert electrical signals to a staccato of light pulses. Unfortunately, the best light-emitting semiconductors, such as gallium arsenide (GaAs), are hard to integrate with silicon, and the ideal material for the job—silicon itself—has been a poor light emitter.

Now Australian researchers have taken a big step toward making silicon shine. In this week's issue of *Nature*, physicist Martin Green and colleagues at the University of New South Wales in Sydney report a 100-fold boost in the efficiency of silicon-based light-emitting diodes (LEDs) using a trick for making solar cells. The devices still aren't as bright as ones made of GaAs. But there appears to be plenty of room for improvement. "If it can interact with transistors and memory, it would probably be really important," says Daniel Radack, who oversees advanced computing issues for the Defense Advanced Research Projects Agency in Arlington, Virginia.

Silicon, it turns out, does only a mediocre job of both absorbing and emitting light. For solar cells, which absorb light and convert it to electricity, the result is that much of the light that hits a cell passes right through the material. In recent years, Green and his colleagues have found that texturing the top and bottom surfaces of the cells causes light to bounce around inside the cell so it can be absorbed. The best light-absorbing semiconductors are also the best light emitters, Green says, giving him the idea that texturing silicon could improve the efficiency of silicon LEDs as well.

An LED works like a solar cell in reverse. Negatively charged electrons and positively charged "holes" are injected into the device. When they collide, they give off photons—in this case of infrared light—with wavelengths similar to the ones used in optical communications.

Silicon is actually pretty good at getting these charges to combine: About 10% of the injected charges produce photons. The problem is that usually only about 0.01% to 0.1% of the photons ever get out; the rest just create unwanted heat. To improve matters, Green's team created an array of pyramid-shaped wells on the silicon's top



Bottleneck. Chips could communicate better if light beams replaced sluggish wires.

ScienceScope

North and South The West Nile virus continues to march across the North American continent at a breathtaking pace. This summer it has appeared in many places in the southern U.S. and in southern Canada, and local health authorities everywhere are stepping up surveillance and control efforts. The virus has also claimed its first victim this year, a 71-year-old woman from downtown Atlanta who died on 11 August. Three other elderly people—two in Florida, one in New York City—have fallen ill so far.

West Nile is a mosquito-borne virus that primarily infects birds but can be spread to humans and other mammals. Its first outbreak hit New York City in the summer 2 years ago. Last year it spread north to most states in New England and as far south as North Carolina. Now, the agent has also been found in dead birds in Georgia, Florida, and Louisiana. "It's made a big jump," says virologist Robert Tesh of the University of Texas Medical Branch in Galveston.

Canadian scientists who detected the virus in two dead birds form southern Ontario were still awaiting confirmation from an independent lab at press time. Although mosquito activity dwindles in the northern U.S. and Canada by fall, southern states may also see the disease through the winter, Tesh says. And at the rate the virus is advancing, he adds, "I wouldn't be surprised to see it in Houston by the end of the summer."

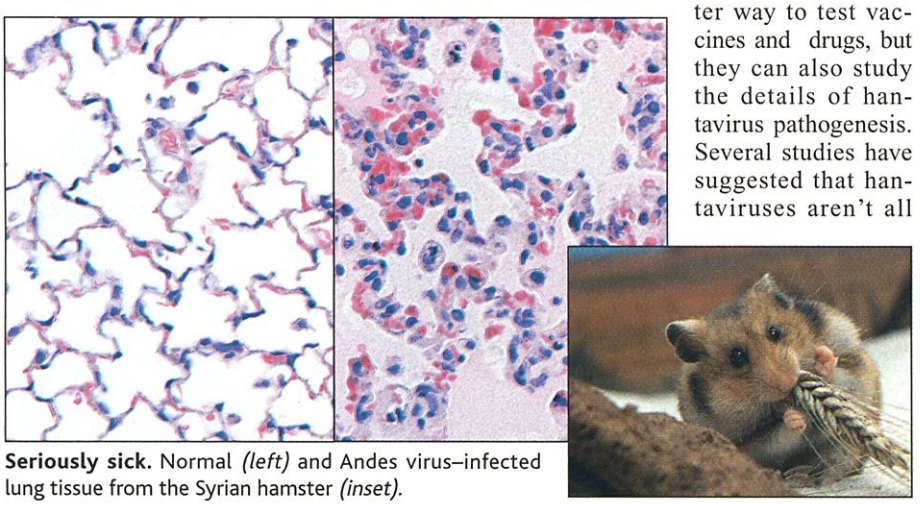
Stemming Research Confusion is rife in the wake of U.S. President George W. Bush's 9 August decision to allow limited stem cell research. Although the National Institutes of Health (NIH) says there are 60 lines of embryonic stem cells in existence, many researchers are skeptical of that number. Only seven of the lines have actually been described in the scientific literature. And *Science*, after conducting its own informal survey, came up with a maximum of 34.

Now the American Association for the Advancement of Science (AAAS, publisher of *Science*) is calling on NIH to let the world know promptly where the cell lines are that can be studied under the new guidelines.

"We believe it is essential that confusion over the actual number available be resolved as soon as possible," says the AAAS statement. "We strongly urge, therefore, that the administration make public immediately the identities of the sources of those stem cell lines." NIH officials say the White House will set up a registry, which lists all cell lines and how to obtain them, but no timetable for its completion has been set.

CREDITS: (TOP TO BOTTOM) USGS NATIONAL WILDLIFE HEALTH CENTER; KELLY HARRIGER/CORBIS

antiviral treatments exist, and usually between one-third and one-half of the victims die. In Europe and Asia, a quartet of different hantaviruses causes tens of thousands of cases yearly of a disease called hemorrhagic fever with renal syndrome (HFRS); mortality rates range from 0.1% to 15%. Hantaan virus, the first of that bunch to be discovered, caused more than 3000 cases of HFRS among United Nations troops during the Korean War between 1951 and 1954; the U.S. Army has had a keen interest in developing hantavirus vaccines ever since.



Seriously sick. Normal *(left)* and Andes virus–infected lung tissue from the Syrian hamster *(inset)*.

But Army researchers and others have been handicapped by the lack of animal models. No matter how many animals they injected with various hantaviruses, they could not produce anything resembling the ravages of either severe HFRS or HPS. For example, two teams have injected monkeys with a European hantavirus called Puumala, but it caused symptoms that would likely be too subtle for a vaccine trial, says USAMRIID team leader Jay Hooper.

Confronted with these obstacles, the team had to make do with another strategy. Instead of testing whether a vaccine protects against disease, they tested whether it could prevent infection altogether—a much stricter test because it flunks vaccines that let the virus enter the body and replicate but prevent illness.

The team recently started looking into vaccines for Sin Nombre and the Andes virus from South America, which together cause the great majority of HPS cases in the Americas. A key initial step was determining how much virus is needed to infect an unvaccinated animal. When Hooper injected hamsters with Sin Nombre, they became infected but stayed healthy. But after he injected adult Syrian hamsters with Andes virus, something unusual happened. One by one, the animals developed difficulty breathing, and most died within days—just as fast as human victims. Further studies of the hamsters by USAMRIID pathologist Tom Larsen revealed that after an incubation period of about 11 days, the microscopic blood vessels in the animals' lungs became permeable and their lungs and chest cavity rapidly filled with fluid, essentially causing them to drown. All these symptoms closely resemble HPS in humans, says Hooper.

Not only do researchers now have a better way to test vaccines and drugs, but they can also study the details of hantavirus pathogenesis. Several studies have suggested that hantaviruses aren't all that lethal to individual cells, says virologist Clarence Peters of the University of Texas Medical Branch in Galveston. Instead, the human immune system's response may wreak the real havoc. Researchers can now test that theory by blocking or stimulating the suspect immune messengers—studies that could provide new drug leads.

The model does have drawbacks, however. Because it works only with Andes virus (the team is still not sure why), it may not tell researchers much about the HFRS-causing hantaviruses. And the hamster, unlike the mouse, isn't a common lab animal, so researchers lack both an intimate knowledge of its biology and a wealth of reagents to study it. Even so, the dearth of models has been so frustrating that Peters predicts others will jump on the findings.

–MARTIN ENSERINK

CREDITS: (TOP TO BOTTOM) THOMAS LARSEN/USAMRIID; BOB SCHATZ/ANIMALS, ANIMALS; AP PHOTO/UNSCOM

ANIMAL CARE

Coulston Loses NIH Tie, Faces Hard Times

A major U.S. primate facility has lost its permit to house and experiment on federally owned chimpanzees, raising questions about its viability.

In June the National Institutes of Health (NIH) ended its funding of the Coulston Foundation of Alamogordo, New Mexico, after finding a new caretaker, Charles River Laboratories, for 300 chimps housed there (*Science*, 10 September 1999, p. 1649). Later that month NIH officials let lapse a document, called an Animal Welfare Assurance,

ScienceScope

Red Flight NASA engineers are celebrating the success of a prototype plane that one day could swoop over martian dunes and canyons, looking for water and providing a detailed view of the planet's complex surface. The small glider was dropped 9 August from a helium-filled balloon that carried it to an altitude of more than 30,000 meters above the Oregon coast. Designed at the Ames Research Center in Mountain View, California, the glider has a long, straight wing nearly 3 meters long to help it stay aloft high in Earth's atmosphere, an analog to the thin martian atmosphere at low altitudes. Both the recent flight and a low-altitude mission last month by another model met engineering expectations, agency officials say. But don't expect scheduled flights soon; NASA still must develop a craft with wings that could be folded up to fit inside a spacecraft as well as a suitable propeller propulsion system.

Going Nowhere Negotiations over measures to ensure compliance with the 30-year-old Biological and Toxin Weapons Convention have come to an ignominious end. Last month the U.S. delegation at the talks announced its staunch opposition to the measures, set out in a draft treaty protocol (*Science*, 20 July, p. 414). So the representatives from 55 nations instead tried to craft a consensus statement to preserve the current draft protocol as a basis for future discussions.

But even that document landed in the wastebasket in the final minutes of a monthlong negotiating session that ended 18 August. The U.S. delegation objected to language that hinted at its opposition to the protocol. The disagreement doesn't bode well for a November review conference at which treaty states are meant to take stock of potential bioweapons threats that have emerged during the past 5 years. Bioweapons expert Graham Pearson of the United Kingdom's University of Bradford predicts "a lot of recrimination" at that meeting. Others share the pessimism. "I hate to think you can't get countries to act unless a disaster strikes," says Barbara Hatch Rosenberg, chair of the Federation of American Scientists' biological weapons working group.

Contributors: Martin Enserink, Constance Holden, Andrew Lawler, Richard Stone