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

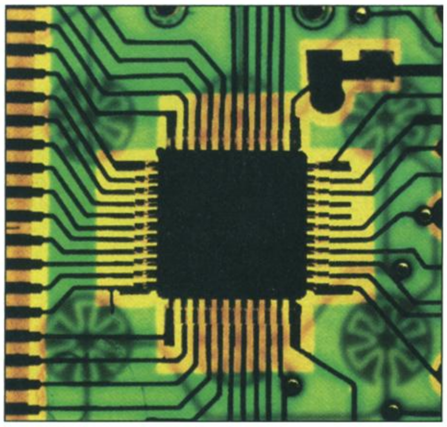
Computer engineers can design souped-up chips capable of performing billions of calculations per second. But their wizardry will be in vain unless they can also speed the flow of information between chips and other computer components. One way to do that is to replace today's sluggish metal wires with 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

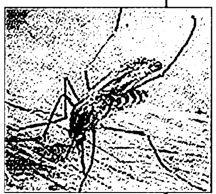


Bottleneck. Chips could communicate better if light beams replaced sluggish wires.

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

surface and a mirrorlike flat bottom surface. The combination helped newly created photons bounce around inside the device until they could find an escape route, raising the efficiency to more than 1%.

The next step for the team is to convert the silicon LED's steady stream of light into a series of pulses that can encode information, by connecting the LED to a device called a modulator. Then both devices will be placed directly onto a silicon computer chip. –ROBERT F. SERVICE

ECOLOGY

African Elephant Species Splits in Two

As the largest land mammal, elephants should be hard to miss. But scientists have apparently overlooked an entire species. On page 1473, a team of geneticists and elephant experts describe new molecular evidence showing that forest- and savanna-dwelling elephants, currently lumped together in a single species called *Loxodonta africana*, each merits its own species name.

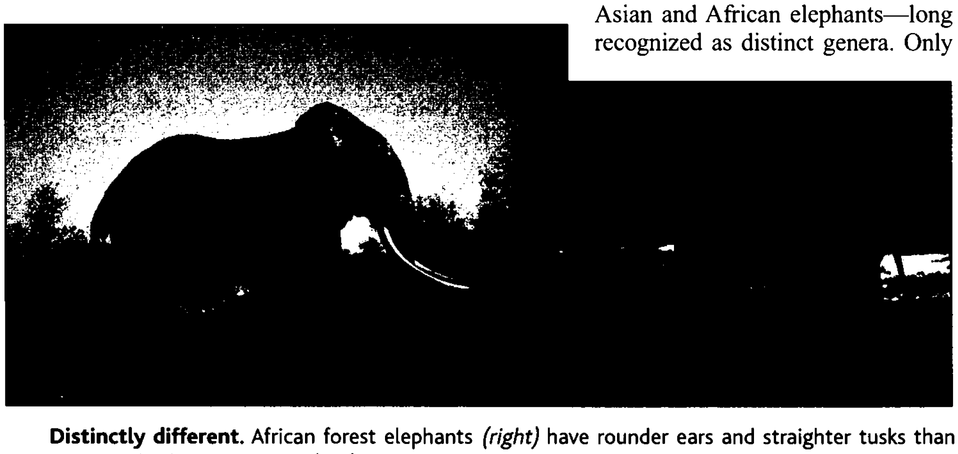
For more than 100 years, scientists have argued about the distinctiveness of forest elephants. The shy creatures are difficult to spot in their thick forest habitat, and only one is in captivity in the Paris Zoo. But those fortunate enough to have seen both them and their better known savanna-dwelling cousins note that the difference is striking. Forest elephants are not only smaller, but they also have straighter, longer tusks and round, as opposed to pointed, ears. "If you see a forest elephant for the first time, you think, 'Wow, what is that?,' " says team member Nicholas Georgiadis, a biologist at the Mpala Research Center in Nanyuki, Kenya.

Despite the differences between savanna and forest elephants, most biologists had assumed that the two populations readily mix on the edges of forests. At best, forest elephants were designated as a subspecies, *Loxodonta africana cyclotis*. But when Georgiadis and his collaborators analyzed the DNA of the elephants, the results indicated that the two populations are as genetically distinct as lions are from tigers. Indeed, the researchers propose two separate species names: *Loxodonta africana* for the savanna elephants and *Loxodonta cyclotis* for the forest dwellers. "The morphological evidence has been very, very strong," says conservation biologist Samuel Wasser of the University of Washington, Seattle. "When you see the genetic data, it seems almost a no-brainer."

The team bases its claim on data from an extensive collection of tissue samples from 195 animals in 21 different elephant populations. Georgiadis spent 8 years collecting the samples, shooting needlelike darts into free-ranging elephants. The darts collected a plug of skin and then fell to the ground, enabling Georgiadis to retrieve them after the startled elephant ran away. The project was originally designed to collect genetic signatures so that ivory samples could be traced to their elephant populations—a goal other geneticists are pursuing. A preliminary analysis of the mitochondrial genes suggested significant differences between forest and savanna dwellers (*Science*, 7 March 1997, p. 1418), a finding that piqued Georgiadis's interest, but a more robust test with nuclear genes was needed to cinch the case, he says.

To pursue the question, Georgiadis teamed up with researchers at the National Cancer Institute (NCI) in Frederick, Maryland, to measure the genetic variation between the populations. Alfred Roca, a postdoc at NCI, with geneticists Stephen O'Brien and Jill Pecon-Slattery, sequenced portions of four nuclear genes, a total of 1732 nucleotides, from each of the samples. The researchers focused on the noncoding intron regions of the genes, which are not subject to natural selection; this makes them more reliable indicators of the random genetic changes that occur over time.

The team pegged the genetic distance between forest and savanna samples as more than half as large as the distance between Asian and African elephants—long recognized as distinct genera. Only one of the populations showed the type of genetic mixing that could come from interbreeding, and that apparently happened several generations ago. To O'Brien, that means that crossbreeding between the two populations "does occur once in a while, but not very often."



Distinctly different. African forest elephants *(right)* have rounder ears and straighter tusks than savanna-dwelling elephants *(left)*.

The new genetic evidence has implications for conservation, says Georgiadis. Instead of assuming that 500,000 elephants exist in Africa, "there are many fewer than that of each kind, and they're both much more endangered than we presumed," he says. Researchers estimate that up to one-third of African elephants are forest dwellers.

Ivory from forest elephants is especially prized for its hardness and sometimes pinkish hue. Wasser cautions that conservation organizations must be alert: The current international regulations list only *Loxodonta africana* as protected. If the law is not changed quickly to reflect a new species name, an inadvertent loophole might leave the vulnerable forest elephant even more at risk. –GRETCHEN VOGEL

VIROLOGY

Finally, a Handle on The Hantaviruses

A group of U.S. Army virologists has found by accident what researchers had been seeking for decades: an animal model to study hantaviruses, a fearsome group of rodent-borne pathogens that cause disease and death across the globe. In a paper accepted by the journal *Virology*, they report that Syrian hamsters get sick and die when injected with a hantavirus from South America—and that the animals' disease looks strikingly like hantavirus pulmonary syndrome (HPS), one lethal manifestation of the infection in humans.

The report, from a group at the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) in Fort Detrick, Maryland, means that researchers at last have a way to study how one member of the family sickens and kills—and how the disease can be stopped. "I'm impressed," says Heinz Feldmann, a virologist at the Canadian Science Centre for Human and Animal Health in Winnipeg. "This will definitely speed up vaccine and drug development." Virologist Stuart Nichol of the U.S. Centers for Disease Control and Prevention in Atlanta hails the study as "a major breakthrough for the field."

The hantavirus family grabbed world headlines in 1993 when an outbreak occurred in the Four Corners area of the southwestern United States. The culprit, now called Sin Nombre virus, is one of several hantaviruses that cause HPS throughout North and South America. No specific

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