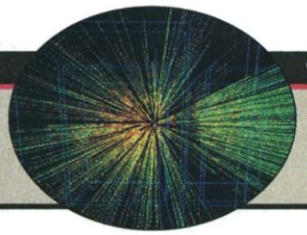

949 Hints of quark-gluon plasma

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959 Monkey shortage hits AIDS research

The cost of formula is also a serious barrier, especially in Kenya, which taxes formula so heavily that a 1-month supply costs $1000.

Many AIDS researchers believe that the best hope of thwarting HIV lies in the development of a vaccine. But Oxford University's Rupert Kaul presented some unexpected findings from another study in Kenya that suggest researchers may need to rethink some fundamental precepts about what might constitute a working vaccine.

Kaul collaborated with investigators from the University of Kenya and the University of Manitoba who have been studying a group of Kenyan sex workers since 1984. About 15% of the 1900 women have remained uninfected by HIV, despite having an average of five clients per day and as many as 70 unprotected exposures to the virus each year. But Kaul reported that 10 of these women who took a 2-month break from sex work became infected when they returned. Kaul stressed that it's "not unexpected" that some of these women would become infected, noting that the 3-year cutoff they use to define someone as exposed but uninfected is "purely arbitrary." What is odd, though, is that they became infected after taking a break from high-risk sex. "That's the most fascinating thing I've heard in months," said NIAID's Fauci.

While fascinating, the findings are nonetheless difficult to interpret. One possible explanation is that repeated exposure to the virus is needed to maintain whatever immunological barrier is protecting the women. If so, a vaccine may need to be given repeatedly. Another possibility under investigation is that these women developed antibodies to the foreign, or "allo," white blood cells in semen. Because HIV also has pieces of human white blood cells on its surface, which the virus picks up from every cell it infects, these alloantibodies might block the virus from infecting the women's cells. Perhaps when the women stopped sex work, these antibody levels fell, rendering the women more vulnerable to HIV.

The research tilt toward Africa and other developing regions will surely intensify during the next year, and not only because that's where HIV is hitting the hardest. This summer, some 10,000 AIDS researchers are expected to travel to Durban, South Africa, for the 13th World AIDS conference, which, in another sign of the times, will be the first one held in a developing country.

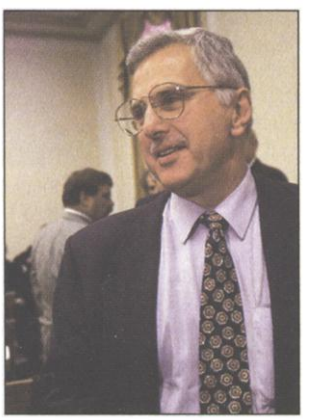
–JON COHEN

CREDIT: RICK KOZAK

SCIENTIFIC ADVICE

Academies Get Together To Tackle the Big Issues

BERN, SWITZERLAND—While heads of state and business leaders were capturing the headlines at last week's World Economic Forum in snowy Davos, an unheralded group of science academy leaders quietly gathered behind the scenes. Their goal: to take some crucial steps toward creating a new mechanism for providing impartial scientific advice to international organizations.



Internationalizing. NAS president Bruce Alberts.

The proposed new body, tentatively called the InterAcademy Council (IAC), would in some ways be an international version of the U.S. National Research Council, which sets up scientific committees to advise the U.S. government. Similarly, the United Nations or World Bank could ask the IAC to appoint international panels of leading researchers to address global issues such as the effect of genetically modified plants on agriculture, the threat of emerging infectious diseases, how to protect threatened ecosystems, and how to bridge the information divide between the world's rich and poor.

Participants in last week's meetings in Davos and Zurich—which included the presidents of a dozen of the world's national science academies and several other officials—told *Science* that such a global science advisory body could be approved by mid-May. "We easily reached a general agreement on a plan after spending about 20 hours together," says biochemist Bruce Alberts, president of the U.S. National Academy of Sciences, who had proposed such an international body last spring.

While the Davos participants agreed on the general outlines of the IAC, Alberts says remaining details will be hammered out by a working group of academy presidents or their equivalents from France, India, Germany, and Brazil. That group will make its recommendations in Tokyo in May to the steering committee of the InterAcademy Panel on International Issues (IAP), a loose association of about 80 national science academies that holds conferences and issues statements on issues of common interest.

F. Sherwood Rowland, a U.S. Nobelist who co-chairs the IAP and helped set it up in 1995, sees no "major stumbling blocks" in convincing the IAP to agree to the proposed new IAC. But Rowland, who attended the Davos meetings, says some issues remain to be resolved. They include avoiding duplication of effort among the planned IAC, the InterAcademy Panel itself, and the International Council for Science (ICSU), a Paris-based organization of scientific unions and national academies.

At any given time, the IAC would be comprised of representatives from 15 academies. Some larger academies, such as those of the United States, Russia, China, Japan, India, Brazil, and several European countries, would likely be selected for long-term—possibly 10-year—appointments on the council, while smaller academies would be appointed for 3-year terms initially. In general, the intention is to rotate the IAC membership among the 80 or so national science academies that are presently members of the InterAcademy Panel. The council would carry out such functions as naming the expert committees and approving the scope of studies requested by outside organizations. The IAC would have a small permanent secretariat, probably based in a European nation, such as Sweden or Switzerland, with good Third World rapport. "The procedure would be to first study the problems posed to see whether the IAC can form a well-balanced study group ... and then run most of the work via the Internet," said the French academy's president, chemist Guy Ourisson. The goal is for any studies to be turned around relatively quickly, ideally within a few months.

Sudanese mathematician Mohamed Hassan, president of the African Academy of Sciences and executive director of the Third World Academy of Sciences, strongly favors the IAC concept, but he wants to make sure that "the developing world—where most countries either don't have academies or have weak ones—has an adequate level of representation." Biochemist Wieland Gevers, president of South Africa's academy, says he hopes the formation of the IAC will spur smaller academies "to take more active

science-advisory roles in their own countries, rather than just ceremonial roles."

Biochemist Ernst-Ludwig Winnacker, head of Germany's DFG granting agency, thinks the IAC "would be very useful." Winnacker, who attended the Davos meeting, adds: "The question is whether the U.N. or other international organizations would take advantage of it." Whether policy-makers will seek advice on burning scientific questions remains to be seen, but the Davos participants were upbeat. Says Alberts: "We all agreed that the world needs much more advice from scientists." –ROBERT KOENIG

MATERIALS SCIENCE

New Material Promises Chillier Currents

A moth frying on a bug lamp proves, suicidally, that an electrical current heats. But a current can also cool, if it runs through the right stuff. A handful of exotic semiconductors wick away heat while conducting electricity, and heat pumps fashioned from them chill solid-state lasers, radiation detectors, and fancy picnic coolers. Easily miniaturized and free of moving parts, such heat pumps offer clear advantages over mechanical refrigerators.

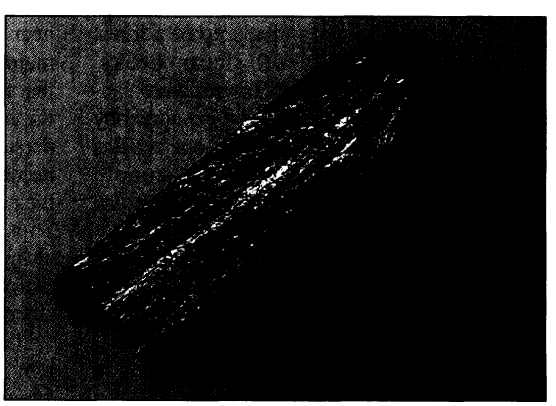
Unfortunately, good thermoelectric materials are few and far between; research labs haven't turned up a promising new one for decades. Now a team led by Mercouri Kanatzidis, a chemist at Michigan State University in East Lansing, may have broken the impasse with a concoction of bismuth, tellurium, and cesium. "This is the first material that suggests we can do as well as or better than the materials we've had for the last 30 years," says Frank DiSalvo, a chemist at Cornell University in Ithaca, New York.

As Kanatzidis and colleagues report on page 1024, the new material (chemical formula $CsBi_4Te_6$) cools nearly as efficiently as the best material currently available. But whereas its decades-old rival conks out at –50° Celsius, the new stuff keeps working to roughly –100°C. It therefore promises to improve the performance of laser diodes, infrared detectors, and other electronic devices that run best cold. Researchers cheered the newcomer's arrival. "Kanatzidis is doing some super work in this field," says Galen Stucky, a chemist at the University of California, Santa Barbara.

Semiconductors come in two breeds, *n*-type and *p*-type. A thermoelectric heat pump consists of a chunk of one butted against a chunk of the other. In the *n*-type, electrical current is carried by negatively charged electrons, which, thanks to an awkward historical convention, are considered to flow in the direction opposite to the current. In the *p*-type, current is carried by positively charged "holes," the shadows of absent electrons, which flow in the same direction as the current. When current flows out of the *n*-type semiconductor and into the *p*-type semiconductor, both the electrons and the holes stream away from the border between the two materials. Like steam whistling out of a teakettle, the fleeing holes and electrons carry away heat, cooling the junction.

Of course, for the heat pump to work, the electrons and holes must usher heat away faster than it can flow back. And that means thermoelectric materials must have high electrical conductivity and low thermal conductivity. It also means each electron or hole must carry a healthy dollop of heat. Unfortunately, the three properties are closely connected and often work against one another. For example, boosting the electrical conductivity too high leaves wimpy electrons and holes that carry only tiny amounts of heat.

Kanatzidis and his team set out to systematically improve upon the best material available, a compound of bismuth, antimony, tellurium, and selenium. The researchers first synthesized a potassium, bismuth, and selenium compound with promising properties. They then tried to replace the potassium and selenium atoms with heavier cesium and tellurium atoms, to make a softer substance that would better damp heat-carrying vibrations. But things didn't go quite as planned. The new material took on a surprising crystal structure, which, however, performed even better than expected. "In some ways, it's a little bit of serendipity," Kanatzidis says. But others credit more than luck. "I don't think this is so much an accident as it is his very clever way of looking at things," Stucky says.



CREDIT: M. KANATZIDIS/MICHIGAN STATE UNIVERSITY

Chilly crystal. The new thermoelectric material carries away heat while it conducts electricity along its needlelike grains.

The new material needs fine-tuning, Kanatzidis says. He and his team have not yet

ScienceScope

Entrepreneurs Wanted Japan's Ministry of Education (Monbusho) hopes that new legislation can achieve what its lobbying could not—spur technology transfer by allowing national university professors to serve as officials of private corporations.

Last year Monbusho officials thought they had government-wide support to exempt professors from the National Civil Service Law, which prevents civil servants from simultaneously holding private sector positions. But the National Personnel Agency refused to allow economist Iwao Nakatani of Hitotsubashi University in Tokyo to accept a seat on the Sony Corp. board of directors (*Science*, 18 June, p. 1905). Nakatani resigned his professorship to join Sony's board, then went back to the university as a part-time lecturer, a position not subject to the regulations. The incident led Prime Minister Keizo Obuchi to set up an intragovernmental study group, which drafted a reform proposal that was presented to legislators this week. "This time, we really have the backing of the entire government," says a Monbusho official.

Molecular biologist Shiro Kanegasaki, who had to retire last year from the University of Tokyo before starting the Effector Cell Institute, sees the proposed law as a boon to entrepreneurs. "A lot of younger bioscience and medical researchers would be quite happy to have a role" in the private sector, he says.

Strength in Numbers In a leap ahead for Dutch science, the Netherlands Organization for Scientific Research has decided to buy a new national supercomputer that will be more powerful than any other in Europe. The $14 million machine, a Scalable Node-1 from hardware producer SGI, has over 1000 parallel processors and is able to perform a trillion calculations per second. That's almost 100 times faster than Holland's current top number cruncher.

Some 120 research groups will use the new machine—due to be up and running in November—to model everything from bone growth to the birth of galaxies. Chemist Evert Jan Baerends of Amsterdam's Free University, who uses supercomputers to model interactions between molecules, says the new machine will be "a big step upward."

Contributors: Dennis Normile and Martin Enserink