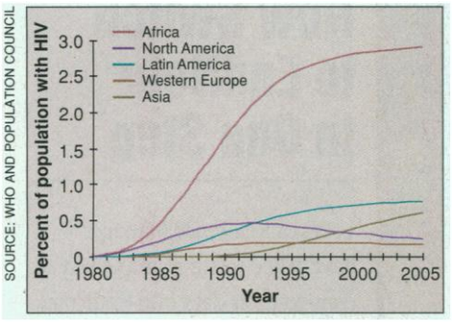
RANDOM SAMPLES

edited by CONSTANCE HOLDEN

Scourge of Africa



No End in Sight. Infection rates plateauing in the West but climbing in poor countries.

It's becoming ever clearer that AIDS is mainly a disease of poor countries. While the epidemic appears to be slowing in North America and Europe, 68% of the newly infected worldwide live in sub-Saharan Africa, said speakers at a recent seminar on HIV/AIDS in developing countries.

Currently, 93% of the 28 million people who are infected with HIV are in developing countries. But for many reasons, chiefly male promiscuity and low condom use, more than two-thirds of those are in sub-Saharan African nations such as Zambia, Zimbabwe, Kenya, and Uganda, reported Peter Way of the U.S. Bureau of the Census.

According to demographer Ron Lee of the University of California, Berkeley, life expectancy in sub-Saharan Africa was up to 70 before the epidemic hit. Now in many places it's under 40. "The great strides [in public health] will be more than wiped out," said Lee. More women than men are now infected, and seroprevalence among pregnant women is as high as 40% in some cities. Children make up 25% of AIDS deaths in Africa. But the most vulnerable of all are adolescent girls, who are often sought out for sex by older men, said John Bongaarts of the Population Council. As a result, they are now being infected at five times the rate for boys.

At the 25 October meeting, sponsored by the National Research Council, Lee said that despite the growth of the epidemic in Africa and Asia, there has been a "plateauing" of prevention efforts. Countries that provide aid are experiencing "donor fatigue," said psychologist Deborah Rugg of the U.S. Centers for Disease Control and Prevention. And although legions of AIDS educators in Africa are visiting bars, brothels, and work sites, she said, "behavior changes have been modest and difficult to achieve."

Pass the Bouquet

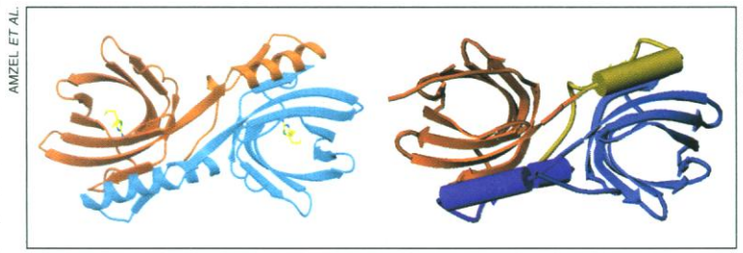
The bouquet of fine wine ... the stench of frightened skunk. It requires serious molecular teamwork for the brain to register odor molecules. The receivers are thousands of nerve endings with receptors sensitive to specific odor molecules. And the quarterbacks are odorant-binding proteins (OBP), which are thought to carry odor molecules across the mucus that blankets the receptors. But there are thousands of odors, and no more than 10 OBPs have been found in any one species, leading scientists to wonder how each manages to escort so many different odors.

Now two teams of structural biologists have gotten closer to the answer with an intimate look at a bovine OBP. Using x-ray crystallography, the researchers determined that there are spaces in OBP that odor molecules slip into—and the structures the two teams describe are "remarkably similar," says L. Mario Amzel, of Johns Hopkins University in Baltimore.

Both groups have determined that an odorant-binding protein forms when two identical subunits (monomers) link together into a dimer. As they connect, they bend in an "embrace," and sections of each monomer swap places, explains Christian Cambillau of the Institute for Structural Biology in Marseilles, France, whose group described the dimer structure in the October *Nature Structural Biology*.

In the November issue of the same journal, Amzel's team goes a step further, describing how they glimpsed an OBP with a molecule in hand, as it were. They observed what appeared to be two odor molecules occupying two roomy cavities in the dimer. Amzel tested the observation by soaking OBP crystals in a solution of odor molecules containing selenium. Because selenium sends a very strong signal in the crystallographic analysis, the researchers were able to determine that it had replaced the original molecule in this cavity, Amzel explains.

With the OBP structure now solved, scientists say the next step will be to determine just how this quarterback calls its play, as it supposedly delivers the right odors to the right receptors.



Odor toters. Two teams found similar structures. Odor molecule (yellow), left.

Four More Years for Osipov

As expected, mathematician Yuri Osipov, president of the Russian Academy of Sciences (RAS), was elected to a second 4-year term at the Academy's annual meeting in Moscow on 29 October. He trounced his only opponent, nuclear physicist and RAS Vice President Evgeny Velikhov, head of Moscow's Kurchatov Institute, with 76% of the vote.

Osipov's candidacy got a boost from the fact that Prime Minister Viktor Chernomyrdin and his deputy in charge of science, Vladimir Fortov, attended the meeting. In a speech to the 1025 assembled academicians, corresponding members, and representatives from RAS institutes, Chernomyrdin announced that he has obtained a loan of 70 million marks ($46 million) from German banks for purchasing research equipment. Chernomyrdin emphasized that he sees basic research as a top government priority. Further, he has promised to pay back all the state's debts to the Academy (last month's election was held a year late because of money shortages) and pledged to personally support efforts to find additional funding for the RAS.

Osipov was praised at the meeting for establishing much better relations between the RAS and the State Committee for Science and Technologies (SCST) than the RAS ever had with its predecessor, the Ministry of Science. "It's common knowledge what efforts Osipov made to have an academy member appointed the SCST chairman," said chemist and RAS official Victor Kabanov, referring to Fortov, who got the job last summer.

Last month's vote was a definitive rejection of proposals by Velikhov that would have concentrated the RAS budget on priority areas of research and limited research support to a cadre of elite scientists. Said

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Gennady Mesyats, head of the RAS Urals Branch, "If the program is fulfilled, this would ruin the Academy."

What Makes Cellulose

Cellulose is as ubiquitous as, well, paper, T-shirts, and trees. But scientists have long been stymied in their efforts to understand how the molecule is made in plants. Now they've identified a pair of candidate genes for the enzyme critical to the process.

Scientists have already found the genes some bacteria use to produce cellulose. Now a group in the United States and Israel, in a study reported in last week's *Proceedings of the National Academy of Sciences*, offer detailed evidence suggesting they have spotted the gene for cellulose synthase, which links glucose molecules into chains to create cellulose in plants.

David Stalker and colleagues from Calgene in Davis, California, with scientists at the Hebrew University in Jerusalem, did their work with cotton plants, making copies of the genes that were active when the cells were producing a lot of cellulose. They then isolated the genes that were active only during cellulose production. Next, they sequenced the cotton genes and compared the sequences to those in the bacterial gene for the cellulose-producing enzyme. They found two cotton genes that resembled the bacterial gene. And when the team generated amino acid chains, or peptides, based on the cotton-gene sequences, they found that the peptides bind a molecule responsible for supplying glucose to the bacterial enzyme—all of which is powerful circumstantial evidence linking the genes with the enzyme.

"It's really one of the first windows that's opened up for getting at the molecular genetics of cellulose synthesis in higher plants," says Richard Blanton, a developmental biologist at Texas Tech University, Lubbock.

Down the road, Stalker and colleagues hope to modify these and other related genes with the aim of encouraging cotton plants to produce longer and stronger fibers.

Rubber Glove Self-Sufficiency

Most of the 1.13 million tons of latex the United States imports each year for manufacturing surgical gloves, catheter tips, condoms, and other products comes from rubber trees grown in Malaysia and Indonesia.

But latex from the tree *Hevea braziliensis* contains proteins that cause allergic reactions, sometimes severe, in many individuals—perhaps 7% of people in the United States. Now, after 10 years of development, latex from a desert-growing shrub known as guayule is looking like a non-allergenic, homegrown alternative.

During World War II, the U.S. government flirted with the idea of developing guayule (*Parthenium argentatum*), which resembles sagebrush, as a domestic source of latex for tires. But the project was dropped when the war ended. Now, a half-century later, plant physiologist Katrina Cornish at the U.S. Department of Agriculture research center in Albany, California, has patented a method for churning out high-quality latex from guayule bark. While rubber trees are tapped to obtain the saplike substance, guayule latex is trapped in cells and "won't pour," she says. So the plant has to be ground up and the latex separated by centrifuge.

Several U.S. companies hoping to manufacture hypoallergenic products are vying for exclusive rights to Cornish's patent. And farmers in several southwestern states have expressed interest in growing guayule. But hurdles still remain. A big one, says plant geneticist Dennis Ray of the University of Arizona, Tucson, who has field-tested new lines of hardy, high-yield guayule, is that there are no processing plants for guayule latex. Nonetheless, he predicts domestic guayule production will "happen in the relatively near future."

K. CORNISH

Homegrown. Latex separated into waste (right) and partly purified product (left).

Firming Up a Hubble Constant

A flickering of a distant quasar may have settled a decade-old feud between two camps of astronomers over the true value of the Hubble constant, the rate at which the universe is expanding.

One approach to measuring the ardently sought constant is to compare how long it takes for light from a flickering source to reach Earth along two routes (A and B in the photograph). Light from a quasar (in this case, QSO 0957+561) is bent by the gravity of an intervening galaxy that acts as a lens. Since light takes longer to reach the Earth along one gravity-bent path than the other, the flickers arrive separately. Measuring the time delay between flickers sets the distance to the lensing galaxy. And that, in turn, provides data necessary for formulating the Hubble constant.

Rudolph Schild of the Harvard-Smithsonian Center for Astrophysics and colleagues, who have monitored this quasar with an optical telescope in Arizona for 15 years, measured a time delay of about 405 days between flickers in 1986. But other astronomers, including Schild's colleague William Press, put the same data, plus new radio observations, to a different type of analysis and came up with 540 days.

APACHE POINT OBSERVATORY

Now, a new reliable measurement of the time delay, by a group led by astronomer Edwin Turner of Princeton University, suggests that Schild got it right. In December 1994, they observed an abrupt drop in the brightness of the northern (A) image of the quasar with a 3.5-meter optical telescope at the Apache Point Observatory in New Mexico. Then, last February, they saw the same flicker in the southern (B) image, giving a 420-day time lag. Continued monitoring has enabled them to rule out a 540-day delay altogether, says team member Tomislav Kundic of the California Institute of Technology. In a forthcoming paper in the *Astrophysical Journal*, the team use their observations to obtain a Hubble constant of 63 kilometers per second per megaparsec—very close to the values around which other measurements have been converging.

Baltimore Has His Say

"What is the moral of the saga of Thereza Imanishi-Kari? I believe that the moral is that many perfectly normal aspects of science can appear to be indications of fraud if one approaches the situation with a preconceived notion that fraud has taken place. With that assumption, incomplete record-keeping, idiosyncratic research procedures, the choice of which data are reliable, and the modes of presenting data ... can be made to appear fraudulent, when they are, in fact, indications of the subjective and even creative nature of the research process.

"I do not believe that the fraud police in Washington serve anyone's true interests. Trust is still at the basis of science and always will be. We should encourage trust, not suspicion, and we should be lenient towards ambiguity. In this way, Thereza's exoneration can serve the important role of increasing the effectiveness of science...."

—Excerpts from remarks by David Baltimore, professor of molecular biology and immunology at the Massachusetts Institute of Technology (MIT), at a 28 October colloquium on "Government, the Media, and Scientific Misconduct: The David Baltimore Case in American Political Culture" at MIT.