of AIDS infection in the town of Belle Glade, Florida, where many residents live in crowded, squalid conditions—"where 100 insect bites a day are not unusual," says MacLeod.

In 1986 the Centers for Disease Control concluded that sexual contact and shared needles are responsible for the high incidence of AIDS in Belle Glade, not swarms of mosquitoes (*Science*, 24 October 1986, p. 415). During the day-long workshop at OTA, Whiteside and MacLeod were frequently criticized for not publishing any data that could substantiate their claims that insects and cofactors such as malaria play a significant role in AIDS transmission. The two were not to be dissuaded. Their ideas, however, "are shared by very few, if any, workers in the field," says Larry Miike, the OTA official who organized the workshop.

There are two ways in which a blood-sucking insect can spread disease: biologically and mechanically. Biological transmission occurs when an insect ingests blood infected with virus, which then replicates inside the host, eventually finding its way to the insect's salivary glands. Saliva may then be secreted by insects during feeding to keep blood from coagulating. Unlike some particularly nasty viruses—yellow fever, dengue, and encephalitis—there is no evidence to suggest that the AIDS virus replicates inside insects, and thus biological transmission of AIDS is impossible.

It is more difficult to categorically state that mechanical transmission of AIDS does not happen. Mechanical transmission of virus could theoretically occur if a mosquito, for example, was interrupted while feeding on an infected host, then flew to another person and injected a tiny portion of tainted blood. Says Leon Rosen, a virus specialist from the University of Hawaii at Manoa: "The question the layman is asking is 'if you can get AIDS from sharing needles, why can't you get it from mosquitoes, which are just tiny needles?' "

The answer is volume, the scientists say. Biology is quantitative. The proboscis of a mosquito or the mouthparts of a bedbug apparently do not hold enough residual blood to give an infectious dose.

Charles Bailey, an entomologist with the U.S. Army Medical Research Institute of Infectious Diseases in Fort Detrick, Maryland, sketched this scenario: Assume a person infected with AIDS virus had a concentration of 1000 units of free virus per milliliter of blood. Bailey estimates that a mosquito interrupted during feeding on this host could inoculate a second person with approximately 0.0000000001 milliliter of infected blood. "Thus the chances of inoculating a single unit of virus would be 1 in 10 million," Bailey says. "That's what I call a remote possibility."

Such arithmetic, though, can raise as many questions as it answers. "Part of the problem is we don't know how much virus a person must get to be infected," says Thomas Monath of the Center for Infectious Diseases in Fort Collins, Colorado. In fact, researchers are not sure how much virus an AIDS patient has in his blood at different stages of the disease.

Perhaps the most puzzling, and morbidly fascinating, unknown came from Jean Claude Chermann of the Pasteur Institute in Paris. Chermann and his colleagues have found genetic material in African insects that is remarkably similar to that of the AIDS virus. Using nucleic acid probes, Chermann detected HIV-1–related sequences in a number of insects collected in Zaire and the Central African Republic. The genetic material is found in cells in tissue throughout the insects' bodies. It is also found in male mosquitoes as well as females, although male mosquitoes do not feed on blood. More bizarre, insects that are not even blood-sucking species have turned up with genomes having sequences very similar to the AIDS virus, insects such as cockroaches and ant lions.

Chermann is at a loss to explain how the genetic sequences are getting into the insects. Blood-sucking insects could be getting them from infected blood, then passing them to mates and offspring. But cockroaches? "Maybe they are feeding on soiled bandages or sores? I don't know," says Chermann.

Chermann points out that he has found no free virus in the insects and no HIV-related proteins or RNA. The virus is not replicating in the insects, he says.

Most workshop participants agreed that scientists need a better idea of how concentrated the AIDS virus is in infected persons. They also suggested finding good animal models to test the possibility of mechanical transmission of AIDS virus from insects.

Several participants, though, took the position that further research is not warranted. "Everything we heard was theoretical or parallel. There's no evidence the virus replicates. No evidence it is transmitted mechanically. No evidence it is transmitted biologically. The urgency is not there," says Donald Burke, a virologist with the Walter Reed Army Institute of Research in Washington.

Bailey put it this way: "I'm a medical entomologist. Nothing would enhance my career more than for there to be a link between AIDS and insects. But there is not a shred of evidence to indicate that HIV is being transmitted by insects. Not a hint." ■ **WILLIAM BOOTH**

Some Refuseniks See No *Glasnost*

American scientists returning from visits to the Soviet Union report that some Soviet refuseniks feel that their position has actually deteriorated in the atmosphere generated by General Secretary Mikhail S. Gorbachev's reform initiatives.

Refusenik is the term given Soviet citizens of Jewish background who have applied to emigrate and been refused permission to leave. The refuseniks are said to feel that they no longer receive the support from scientists abroad that they regarded as effective in their behalf. Changes in Soviet law on emigration and travel are also said to have made matters more difficult for some.

Americans returning recently say that refuseniks appear to be receiving differential treatment from the government. Long-term refuseniks, those whose applications for emigration date from the 1970s, continue to be denied visas while many who applied more recently are granted permission to emigrate. A number of scientists, engineers, and others with technical backgrounds are included in the former group.

In the Soviet system that classifies ethnic groups separately, Soviet Jews are the only "nationality" that has been permitted relatively large-scale emigration. Jewish emigration built to a peak in the middle 1970s after U.S.–Soviet détente, but has been tightly restricted in recent years. Comments by Gorbachev have been interpreted as signaling a prospect of increased emigration. Morris Abram, chairman of the National Conference on Soviet Jewry, said recently, however, that although 3092 Jews had been permitted to emigrate so far this year, the number falls far short of the large-scale emigration that Soviet officials indicated would occur.

Changes in the law governing emigration and travel outside the Soviet Union seem to be a mixed bag in respect to liberalization. The new law includes specific provisions for what has previously been handled administratively and that is regarded as a step toward the rule of law.

Physics professor Kurt Gottfried of Cornell, however, says that refuseniks in Moscow told him that "while the new law looks better, it is, de facto, much worse." Gottfried and physicist Andrew M. Sessler of Lawrence Berkeley Laboratory, who are active in the Scientists for Sakharov, Orlov, and Shcharansky (SOS) organization formed by American scientists to promote human rights, visited Moscow in May.

They report that a particular concern for

refuseniks is the law's treatment of applicants for visas with alleged knowledge of state secrets; this continues to be a main reason for denial of permission to emigrate. To receive clearance to leave, a formal declaration is required from an applicant's superior affirming that no state secrets would be compromised. The applicant does not have access to this communication so he or she cannot be certain what it says or even if it has been filed. The period of delay before applicants in this category are permitted to emigrate is said to have been raised from 5 to 10 years to 10 to 15 years.

According to Gottfried and Sessler and other visitors, refuseniks said that harassment, formerly constant and assumed to be officially encouraged, is now not a problem. Would-be emigrés, however, continue to lose their jobs when they apply to leave.

City University of New York physics professor Joseph L. Birman, who returned in late June from a trip to the Soviet Union that included stops at several Soviet cities, described a "diminution of fear" among refuseniks about severe punitive action by Soviet officialdom. He said, however, that the state secrecy criterion is being applied more freely, especially to long-term refuseniks. He said that those turned down for emigration are suffering "an increase by orders of magnitude of anxiety, desperation. They feel stuck there forever," because the current policies may not last and this may be the final opportunity to leave.

Dorothy Hirsch of the Union of Concerned Scientists, a New York–based group active on the Soviet emigration issue and on matters involving scientific freedom, says that reports received by her organization confirm that visas are being withheld from long-term refuseniks. These include Viktor and Irina Brailovsky, cyberneticist and mathematician, respectively; mathematicians Alexander Ioffe and Naum S. Meiman; and cyberneticist Alexander Lerner.

Glasnost is also described as putting strains on relations between refuseniks and dissidents—those who seek increased political or religious liberties in the Soviet Union, but do not necessarily wish to emigrate. Many dissidents have followed physicist Andrei Sakharov in taking a hopeful if cautious view of Gorbachev's initiatives. Others are highly skeptical.

Refuseniks in Moscow told visitors in the spring that a drop-off in the number of American scientists visiting them had made them feel abandoned. The flow of American visitors headed for the Soviet Union has apparently increased sharply, however, with the prospect of there being more U.S. scientists traveling to the Soviet Union than at any time since the 1970s. ■ **JOHN WALSH**

Briefing:

SSC Deadline Extended

The Department of Energy has extended its 3 August deadline for states to submit site proposal packages for the Superconducting Super Collider. An extension was granted until 2 September because of congressionally mandated changes in the selection process.

Under the revised rules, direct financial assistance offered by any state may not be considered in the site selection process. Offers of such assistance may accompany state proposals, but must be contained in a separate envelope that will not be opened until a site has been chosen. States, however, may use their financial resources to enhance proposed SSC sites by providing roads, sewage services, and so forth. ■ **M.C.**

"Greens" Challenge French Gene Research

The first shot in what could become a growing conflict among European countries over the release of genetically engineered organisms into the environment was fired in Strasbourg last week by a group of members of the European Parliament. They demanded an immediate halt to experiments with the nitrogen-fixing bacteria *Rhizobium* being carried out by scientists in France.

The experiments, begun in March, involve the release of a bacterium made resistant to the antibiotic kanamycin as a way of tracing its spread in a field of wheat and alfalfa. They are being conducted by scientists working for the National Institute for Agricultural Research at Dijon.

No formal approval was sought by the scientists involved; nor is it required. Although France has formal procedures for evaluating the risks of genetically altered substances, legal permission is only required for products to be sold commercially. Furthermore, the new committee was only established after the experiments had begun.

Benedict Haerlin, a representative of the German Green Party in the European Parliament, said at a press conference that the experiments should be halted until tighter regulatory procedures have been put into place, warning of the danger of an escape of bacteria.

He added that although the Parliament does not have powers to require changes in the domestic legislation of individual European states, it does have jurisdiction over the experiments in question since they were financed by the European Economic Commission, which is keen to promote the applications of genetic engineering to agricultural crops.

The scientists at Dijon have strongly denied that the experiments pose a significant threat to the environment. They point out that only a very small quantity of the bacteria have been released, and that the fields being used will be chemically sterilized once the experiments have been finished.

France currently has less stringent regulations covering environmental release of genetically altered organisms than some other European countries. Denmark has recently decided to ban all such experiments, and a German Parliamentary Commission has proposed a 5-year moratorium, allowing more information on potential risks to be collected. ■ **D.D.**

France to Boost Research Spending

France's conservative government has decided to take a leaf out of the book of its socialist predecessor and make increased expenditures on research one of its top three priorities in next year's budget, the other two being job creation and international cooperation.

Prime Minister Jacques Chirac announced last week that although the overall increase in public spending between 1987 and 1988 will be kept to 2%—less than the anticipated inflation rate—the budget for civilian research will be increased by 7.7%, to reach a total of $9.2 billion. Military R&D spending is planned to increase even faster, by more than 12%.

The major focus of the increased funds will be on moves to encourage greater research efforts by the private sector, for example by considerably increased tax incentives. Industrially sponsored research is an area in which France lags considerably behind its European partners, and the goal is to double the number of companies benefiting from the R&D tax incentives by 1992.

At the same time, there will be more support for some of France's traditional large technological programs (*grandes programmes*); spending on space research, for example, is planned to grow by 10%.

The new policy coincides with the appointment a few months ago of a new minister for research and higher education, former chemistry professor Jacques Valade, and contrasts with that of Valade's predecessor, Alain Devaquet. He announced in 1986 that although overall R&D spending was to rise by 8% between 1986 and 1987, most of the extra money was being devoted to military research. ■ **D.D.**