The end of the AIDS coverup: scientific aspects of the threat

by John Grauerholz, M.D., F.C.A.P.

Dr. Grauerholz is medical director of EIR*'s Biological Holocaust Task Force. This speech was delivered Aug. 31 to a conference of the International Caucus of Labor Committees in Crystal City, Virginia.*

Since the first reported cases of unusual cancers and infections among previously healthy homosexual men in 1981, evidence has accumulated that the human race is now facing a worldwide pandemic with the potential to kill off the majority of the world population over the next two to three decades. One manifestation of that pandemic, the Acquired Immunodeficiency Syndrome (AIDS), has already afflicted over 24,000 Americans since 1981 and over 13,000 of these have already died, for a cumulative mortality of 55%. The individual case fatality rate for this condition, now recognized as one potential consequence of infection with a new virus, known as the Human Immunodeficiency Virus (HIV), or HTLV-III/LAV, is 100%, with no evidence that any person manifesting the full-blown syndrome has ever recovered and survived.

In the state of California, where Proposition 64 to add AIDS and the condition of being an AIDS virus carrier to the list of diseases covered by provisions of the state health code, over 5,500 cases of full-blown AIDS have been reported since 1981, and senior health officials have estimated that a half-million persons in the state are carriers of the virus. At a conference in Martinique, in January 1986, it was estimated that at least 1.75 million Americans were infected carriers of the virus, based on seroepidemiologic studies (tests for the presence of antibodies to the virus). With a doubling time of eight months for the number of infected individuals, the present situation is that at least 4 million individuals in the United States are infected virus carriers. Since there is growing evidence that 25 to 30% of infected individuals may carry the virus without developing antibodies, and are capable of transmitting the virus and infecting other people, these seroepidemiologic studies grossly understate the extent of the problem.

In southern Florida, and the adjacent Caribbean, there is an explosion of AIDS cases. This involves all the Caribbean islands, and not just Haiti, which is the most highly publicized case.

In Belle Glade, and a number of other rural and urban slum areas in southern Florida, AIDS cases and virus infection are spreading under conditions of tropical sanitary collapse. Belle Glade, with a population of 20,000 inhabitants, has over 100 cases of AIDS and 70 cases of tuberculosis clustered in two depressed neighborhoods covering a total area of 10 blocks. 10% of the general population attending the public health clinic has antibodies to the AIDS virus, indicating that they are infected carriers, and 40% of this population has antibodies to one or more viruses which are primarily transmitted by insects (arboviruses or arthropod-borne viruses). This is one of the highest levels of exposure to arboviruses anywhere in the world, and some of these viruses, such as Maguari virus, have never previously been reported in the United States, but are endemic to the depressed areas of the Caribbean.

In northern South America, Brazil has reported over 1,000 cases of AIDS, primarily from urban centers, such as Sao Paolo and Rio de Janeiro. Seroepidemiologic studies indicate levels of infection in the population comparable to those in the United States. In Venezuela, one-third of malaria cases in a remote mining district, with no so-called "risk factors," tested positive for exposure to the AIDS virus by three different tests, all considered to be more accurate than the standard screening test.

In Europe, the disease, and the presence of serologically detectable infection, is widespread in Italy, Germany, Spain, Switzerland, France, Denmark, and Britain. Senior health officials estimate that at least 20,000 Britons are infected with the virus and that AIDS will kill 5,000 persons a year in Britain by 1990, exceeding the toll from road-traffic accidents. In West Germany there are an estimated 400,000 infected individuals.

As far back as mid-1985, it was estimated that between 10 million and 30 million Africans in nine Central African nations were infected by the AIDS virus. In spite of initial

skepticism, and systematic attempts by the World Health Organization to suppress this data, it is now evident that a biological holocaust, spearheaded by widespread infection with the AIDS virus, is now unfolding in Central Africa, and spreading to the rest of the continent.

The most conservative estimate, based on serological studies, is that 10% of the general population of Central Africa is infected with the virus, and that hundreds of thousands are dying of the consequences of that infection. In contrast to the United States, where less than 1% of AIDS cases occur among children, in Central Africa 15-22% of cases occur among children. In addition, other studies from Africa show high rates of antibody positivity among children in remote areas of Zaire and clustering of cases among adults and children in a single household. In a study reported at the Brussels symposium on African AIDS, 27% of the spouses of AIDS victims were antibody negative virus carriers.

AIDS cases, and evidence of HIV infection, have been reported from Australia, Japan, Thailand, India, the Philippines, and Poland and other East bloc countries, and from Israel and other Middle East countries. The situation in the Soviet Union is less clear, but there is evidence suggesting that it is not as AIDS-free as the government claims. Thus what appeared as an isolated phenomenon in a few American homosexuals in 1981, has in five years spread around the world.

Transmissibility of the AIDS virus

The human immunodeficiency virus (HIV), also known as HTLV-III/LAV (Human T-cell Lymphotrophic Virus-III/Lymphadenopathy Associated Virus) is a member of the group of viruses known as retroviruses. I will discuss a number of the interesting biological peculiarities of these viruses later in this talk. At this point, I wish to stress that these viruses have been well known to cause diseases in a number of animal species, ranging from the common house cat to sheep, goats, cattle, horses, and monkeys. In all these animals, transmission from infected animals to uninfected animals is by three primary means:

1) vertical transmission from an infected mother to her offspring during pregnancy, or horizontal transmission to the offspring through infected milk during breast feeding;

2) horizontal transmission from one animal to another by salivary contact (licking or the equivalent of kissing), or aerosol transmission of infected respiratory secretions;

3) mechanical transmission of infected blood or serum from one animal to another by bloodsucking insects.

In this light it is difficult to understand any scientific basis for the recent howls of dismay from supposed scientists, such as Dr. Robert Gallo, at the announcement by Dr. Jean-Claude Chermann, of the Pasteur Institute, that evidence for the presence of the AIDS virus had been found in tse-tse flies, lion ants, cockroaches, and mosquitoes, in Zaire and the Central African Republic. These findings, and the earlier findings by researchers in South Africa that HIV could be recovered from the common bedbug one hour after feeding on infected blood, are what anyone familiar with animal retroviruses would expect.

Many scientists have commented on the parallels between the epidemiology of hepatitis-B virus infection and the epidemiology of AIDS virus infection. Numerous studies have documented that biting insects, such as bedbugs, are capable of carrying hepatitis-B virus from, and transmitting it to, persons they bite. The South African scientists, on the basis of the large number of infected children in Africa, where hepatitis-B infection is also common, hypothesized that the common bedbug, which had been documented to transmit hepatitis-B virus, might also transmit the Human Immunodeficiency Virus. They fed bedbugs on infected blood and then recovered the virus from the bugs one hour after the bugs had finished feeding. Since bedbugs are intermittent feeders, that is, they do not fill up on one bite, they would tend to bite people sharing the same bed within a short enough time interval to mechanically transmit virus from one person to the other.

The Pasteur Institute findings are even more disturbing, because the virus was actually cultured from the insect cells themselves. Thus insects are carriers and possible transmitters of the AIDS virus. Prof. Chermann stated, "The fact that the AIDS virus has been found in insects, means that the 'reservoir' for the virus is no longer the T4 lymphocytes alone, as insects have no T4 cells. . . . The fact that only the insects living in endemic areas are contaminated, coheres well with the AIDS epidemiology, which is different in the West than in Africa. The insects could therefore be, in Africa, natural *"reservoirs for the AIDS virus and a possible means of contamination of the disease* [emphasis added]."

Indeed, even Dr. Robert Gallo, who finds the French findings so disturbing, recently published an article in *Science* magazine reporting that the AIDS virus grows even more readily in cells known as monocyte-macrophages, than in the so-called T4 cells. The implications of this finding for the question of transmissibility are as follows:

The monocyte-macrophage is a phagocyte, that is to say a cell which ingests foreign materials such as viruses and bacteria, either destroying them by enzyme digestion, or processing them for presentation to other cells of the immune system, which then react to the antigen which the macrophages have presented to them. The monocyte is the form in which these cells circulate in the bloodstream. When they migrate out of the bloodstream, they are called macrophages. They are especially abundant in the lungs, where they play a major role in eliminating inhaled particles which reach the air sacs of the lungs. Thus if the AIDS virus were aerosolized in small droplets and inhaled into the lungs, the virus would be ingested by the macrophages.

The problem, as Gallo documented in his paper, is that the macrophages do not destroy the virus, but, in fact, the virus reproduces freely inside them, shielded from the rest of the immune system. This is precisely what occurs in the closely related Visna virus of sheep, which spreads by respiratory aerosol transmission under conditions of close crowding.

Salivary transmission of the AIDS virus has in fact been documented in the medical literature, as has maternal-fetal transmission in the uterus, and transmission in breast milk from an infected mother.

I have deliberately avoided mentioning homosexual sex, blood transfusions and intravenous drug abuse, as well as heterosexual sex, in order to stress that these are *highly atypical* modes of transmission. Retroviruses produce a lifelong infection and carrier state, characterized by the presence of virus in blood, saliva, and respiratory secretions, breast milk, and various other secretions. Outbreaks of infection and disease occur when environmental conditions favor spread by biting insects, salivary transfer, traumatic contact with exchange of blood, respiratory aerosol, and transfer from mother to child. In the typical case of retrovirus infection, transmission is a function of number of carriers in a population, both as an absolute number and a percentage of the population, and the presence of suitable vectors for blood transfer or prolonged crowding in the presence of infected individuals.

Homosexual anal sex and intravenous drug use with sharing of contaminated needles represent atypical, but highly efficient, methods of transferring contaminated blood and/or other secretions from one infected individual to another. Homosexuals and drug-users, the fast-track transmission routes through bodily contact and direct serum-transfer, affect the potential for transmission to non-homosexual, non-drug-user populations, by means of increasing the number and concentration of AIDS-carriers in a locality. The transmission from existing concentrations of AIDS-carriers to non-infected persons, is, relatively speaking, the slow-track transmission. The question then becomes, what is the rate of transmission through each of the possible types of vectors corresponding to the slow track?

The rate of slow-track transmission must tend to vary most significantly according to environmental factors in the locality. Areas of concentration of insect bites, and of poor sanitation generally, must be suspected to have relatively the highest rates of transmission. To the degree the conditions in the locality converge upon tropical-disease conditions, the environmental factors must be relatively greater. A serious public health research program must address the question of biologically more typical routes of transmission of the AIDS virus now that the atypical, highly efficient routes have provided us with high numbers and concentrations of carriers.

1) **Opportunities and mechanisms of aerosol transmission.** At a certain stage, AIDS infection presents itself in the form of a primary respiratory infection by the AIDS virus. Researchers at the Pasteur Institute demonstrated, over a year ago, that the virus was present in the respiratory secretions of a patient with this infection. For obvious reasons, in this form, AIDS has a potential aerosol transmission in approximately the order of active tuberculosis infection. Activation of tuberculosis is, in fact, one of the best markers for AIDS-related immunosuppression, especially in areas where environmental factors are strongly implicated in AIDS transmission. The question is, is AIDS transmissible in aerosols emitted by victims of pulmonary tuberculosis who have concurrent AIDS lung infection?

2) **Insect-bite transmission.** The first question, is whether an insect which bites an infected person, and then promptly bites a non-infected person, is transmitting infectious virus to the non-infected person. This question has already been answered affirmatively for equine infectious anemia virus (EIAV) and bovine leukemia virus (BLV), two animal retroviruses which share significant genetic relation to the AIDS virus (HIV), as well as a number of other retroviruses. The data from Belle Glade and Venezuela indicate that insect exposure, documented by evidence of exposure to other insect-transmitted diseases, is present in persons with AIDS virus infection who have none of the "fast track" factors for exposure to the virus. The bedbug study casts serious doubt on at least some of the "heterosexual transmission" cases, since people sharing the same bed would share the same bedbugs, as Dr. Caroline MacLeod observed some time ago.

The second question is, whether a biting insect can be a systemic carrier of the AIDS virus and, if so, whether the bite of that insect conveys the AIDS virus efficiently into the system of the person bitten. The implications of this are enormous, since while mechanical transmission would be limited by the ability of the virus to survive the digestive processes of the insect and the rigors of environmental exposure outside the body, systemic infection could persist for the life of the insect. The Pasteur Institute data appear to answer the first part of this question in the affirmative, and, to anyone seriously interested in dealing with the AIDS problem, provide a strong stimulus to seriously address the environmental questions raised above.

The reactions of Drs. Gallo, Jaffee, Francis, et al. are the reactions of bureaucrats and not scientists, the sort of people who shape facts to fit policy, rather than shaping a policy coherent with scientific evidence. Evidence which appears to support the policy will be adduced, evidence which can be twisted to cohere with the policy will be so twisted, evidence which contradicts the policy will be ignored, or suppressed, and those who provide such evidence will be harassed or defamed.

The bottom line is that "casual transmission" by blood-sucking insects, infected saliva, and respiratory aerosols is

Dr. Chermann's report on AIDS-carrying insects

The Pasteur Institute paper, entitled "Infection of Insect Cell Cultures by the HIV Virus, the Agent of AIDS, and Detection of This Virus's Presence in Insects," is actually a scientific "Note" co-authored by Jean-Louis Becker, Uriel Hazan, Marie-Therese Nugeyre, Françoise Rey, Bruno Spire, Françoise Barre-Sinoussi, Alain Georges, Louis Teulières, and Jean-Claude Chermann, presented by Raymond Latarjet. Prof. Jean-Claude Chermann is one of nine scientists listed as co-authors on the Pasteur Institute paper, read to the Paris Academy of Sciences on Aug. 30, 1986, and published in the Comptes-Rendus de l'Academie des Sciences at the end of the first week of September 1986. It was issued under *C.R. Acad. Sc. Paris, t. 303, Serie III, no. 8, 1986.*

The abstract prepared by the authors reads as follows:

The etiological agent of AIDS known as HIV has been shown to bind on different insect cell lines including Drosophila, Mosquito, Ceratitis and its DNA to be integrated in the cellular genome, but no expression of the viral genome was detected in those cells. None of the human lymphocytes markers is expressed at the surface of the insects' cells. HIV proviral DNA has been also found in various insects from Central Africa (Zaire and Central Africa Republic) but not similar insects from the Paris area. These data suggest that insects could be a reservoir or a sector for the AIDS virus.

The conclusion of the paper reads in full:

The demonstration that insect cells, which are deprived of any lymphocyte-type superficial marker, can fix the HIV virus, allows us to state that the CD4 molecule is not the only one which is able to absorb this virus. Furthermore, the fact that insect cells, which have integrated the HIV provirus in their genotype, express no viral activity suggest the presence of intracellular factor(s) which is (are) able to regulate the replication of the virus. Finally, the presence of sequences homologous to the HIV virus in the genotype of insects captured in Zaire or in the Central African Republic, countries which are an endemic zone for the virus, reenforces the idea of the possibility of AIDS transmission through this route and of the constitution of a natural reservoir for the virus, although the epidemiological data do not confirm this thesis.

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the normal way by which most animal retroviruses are transmitted. Studies which purport to show lack of casual transmission on the basis of absence of seroconversion in household contacts are doubly flawed. First, the numbers of individuals is small, and second, the absence of antibodies in individuals carrying the virus is characteristic of household contacts in many cases. A number of studies, including a recent report in the *Journal of the American Medical Association,* document the ability to repeatedly culture HIV over time in persons with no antibodies to the virus.

Consequences of infection with HIV

1) **The development of the full-blown Acquired Immune Deficiency Syndrome (AIDS)** is, of course, one possible consequence of infection with the HIV. This characterized by unusual tumors, such as Kaposi's sarcoma, central nervous system lymphoma and infections by unusual parasites, such as *pneumocystis carinii,* and various fungi, such as *candida albicans* and *cryptococcus*. The most common fatal infection in the United States is a pneumonia caused by the parasite *pneumocystis carinii*. Kaposi's sarcoma in the United States occurs predominantly among homosexual men and causes death by extensive bleeding from the tumors, which are composed of abnormal blood vessels.

In Africa, the Caribbean, and a number of rural and urban slums in the southern United States, regular and atypical tuberculosis are common in AIDS patients and are a major cause of death in these areas. Another manifestation which is especially prominent in Africa is enteropathic AIDS, or "slim disease," a severe wasting illness characterized by intermittent diarrhea, and which is presently epidemic in Uganda and adjacent areas of Tanzania. Eighty percent of AIDS patients will die within two years of onset of clinical symptoms, and few if any have survived five years.

Since the development of a test for antibodies to the AIDS virus in late 1984, testing of the so-called high risk groups has indicated that, at the present time, upwards of 70-80% of such groups as New York City drug addicts and San Francisco homosexuals have been exposed to the virus, as well as 10% or more of the indigent populations of Belle Glade, Florida, Haiti, and Central Africa. Over this period, the prediction of the number of seropositive individuals who will develop frank AIDS has risen from 1% to 5% to 10% to 25% to anywhere between 35% and 75%. In addition, patients who develop lesser AIDS or ARC (AIDS-related complex)

can die from ARC-associated diseases, such as tuberculosis, or progress to frank AIDS. Since the average incubation period may be seven years, or longer, we have not even seen a full cycle of the disease for those infected in the early 1980s. There is no reason why, given the nature of the virus, all infected individuals might ultimately develop AIDS, except that before that time, they might succumb to:

2) **Primary brain disease.** It has now been established that HIV is responsible for a primary degenerative disease of the central nervous system which may, or may not be, associated with AIDS. In these cases, there is progressive dementia (literally loss of one's mind) characterized by initial loss of memory and ability to concentrate, and leading to ultimate mental and physical incapacity and death. Over half of AIDS patients manifest symptoms of this brain degeneration, and there are a growing number of cases of the brain disease being the only manifestation of HIV infection, leading to death without ever developing AIDS or significant immune deficiency. At autopsy the brain is found to be shrunken to from one-third to one-half its normal size. This is again similar to the progessive brain disease of sheep infected with the Visna virus, which is closely related to HIV. Again the nature of the virus is such that, over a long enough period, this brain degeneration would occur in all infected individuals. The infected cell in the brain appears to be related to the monocyte-macrophage we previously discussed, and the characteristic finding in the brain tissue is syncitial giant cells, whose significance I will discuss below.

3) **Primary lung disease.** Another manifestation of HIV infection is the development of a primary infection of the lung by the virus. The lethality of this particular process, by itself, has yet to be established, but it is of significance to the question of transmissibility on two counts. First, the fact that a primary lung infection exists indicates that the lung is capable of being infected by the virus i.e., it is capable of receiving infection. Second, the virus has been demonstrated in respiratory secretions of patients with this disease and hence the capability to transmit infection exists, as noted above.

4) **Cancers other than Kaposi's sarcoma and lymphoma.** Infection with HIV is associated with an increase of other cancers, such as squamous cell carcinoma, a cancer of skin and other epithelial surfaces. These cancers do not appear to be associated with significant immunodeficiency, but may represent either a failure of immune surveillance or a transforming effect of the HIV virus itself.

5) **The unique nature of the lenti-retrovirus HIV.** The last time I discussed the nature of retroviruses in general, I said that these viruses were divided into three classes: oncoviruses (cancer-causing viruses), lentiviruses (slow viruses), and spumiviruses (foamy viruses). I stated that HIV, the AIDS virus, was a member of the lentiviruses, which cause slowly progressive diseases, characterized by destruction of infected cells. I described the retrovirus genetic material as being composed of three genes, gag, pol, and env. The gag gene codes for the protein capsule surrounding the genetic material. The pol gene codes for the enzyme which transcribes the virus RNA into provirus DNA, which can then enter the genetic material of the host cell and establish lifetime infection. This enzyme is the "reverse transcriptase" which characterizes retroviruses as retroviruses. The third gene, the env gene, codes for the outer membrane envelope of the virus.

These distinctions between oncoviruses, lentiviruses and spumiviruses are not absolute. The feline leukemia virus (FeLV) can cause either leukemia, or an immunodeficiency syndrome, Feline AIDS or FAIDS, or asymptomatic infection with a carrier state. The AIDS virus, HIV, contains at least seven genes, including a highly efficient promoter of virus reproduction called TAT, and can function as a lentivirus, a foamy virus, and probably an oncovirus. It has been demonstrated that one mechanism by which HIV can destroy cells is by causing fusion of uninfected cells with infected cells, thus causing the formation of multinucleated giant cells just like the foamy viruses.

There is little question that HIV is an ideal biowarfare agent. It can be disseminated widely before a given carrier becomes ill, unlike the more rapidly fatal diseases like Ebola fever, Marburg fever and Lassa fever, which kill so quickly that widespread transmission is halted by the incapacitation and death of the victim. It evades immune destruction by replicating within protected cells, by changing its immunologic profile, and by destroying the immune system itself. Once infection is established, it persists for life and can cause death in a number of different ways, all of which place substantial drain on the health care system of an affected nation. It is incurable and there are significant technological hurdles in the way of producing a vaccine, although there are promising leads in this direction.

In this regard, infection of human cells with various retroviruses, such as the bovine visna virus, and the demonstration of the alteration of host range of various viruses by culturing in different cells has been reported in the scientific literature since the early 1970s. In addition, other studies from the '70s document the ability to produce new viruses by recombination with either cellular genetic material or the genetic material of another virus infecting the same cell at the same time. Interestingly very little of this work is referenced in the current papers on retroviruses, even by authors who did some of the original research.

Whatever the origins of the Human Immunodeficiency Virus, there can be little doubt of its potential effect. Upwards of 50 million people are probably infected worldwide, and every one of them is under a death sentence. In addition each infected individual is a potential source of infection to others. Any response to this situation, short of a full-scale crash mobilization of our total biomedical research and public health capabilities, will be worse than futile.