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**SCIENCE & TECHNOLOGY**


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### *What Causes AIDS?*

"Do We Know the Cause(s) of AIDS?" by Robert S. Root-Bernstein, in *Perspectives in Biology and Medicine* (Summer 1990), Culver Hall 403, 1025 E. 57 St., Chicago, Ill. 60637, and "Is the AIDS Virus a Science Fiction?" by Peter H. Duesberg and Bryan J. Ellison, in *Policy Review* (Summer 1990), 214 Mass. Ave. N.E., Washington, D.C. 20002.

The whole world is waiting for a cure for acquired immunodeficiency syndrome (AIDS). Yet medical researchers may have made a fundamental mistake. They may be wrong about its cause.

The generally accepted view in the medical community is that AIDS is caused by human immunodeficiency virus (HIV). But Duesberg and Ellison, Berkeley biologist and doctoral student, respectively, say that dissent is growing. Along with Root-Bernstein, a physiologist at Michigan State, they observe that HIV does not satisfy Koch's Postulates, the standard set of criteria for testing the causes of disease. First, HIV cannot be found in the blood of at least five percent of all AIDS patients tested (and less than half have been tested). Second, HIV is present only in minute quantities. Third, HIV has not been shown to cause disease by itself. It does not cause AIDS when injected into chimpanzees; of several thousand medical personnel accidentally exposed to HIV, only five percent have developed HIV and only one person not known to have other risk factors has developed AIDS.

"Other risk factors" is the critical phrase, for as Root-Bernstein writes, HIV is not the only possible cause of immunosuppression. He identifies seven agents that suppress the human immune system, some of them associated in this country with homosexual behavior: venereal and

other diseases; antibiotics; amyl nitrites and some other "recreational" drugs (not just dirty needles); semen components; blood; anesthetics; and malnutrition. Does it not seem logical, he asks, that since AIDS has more than one manifestation (e.g., pneumonia or wasting syndrome) it would also have more than one cause?

The occurrence of AIDS among infants seems to suggest that risky behavior is not a factor. But in fact, says Root-Bernstein, these unfortunate children are also subject to multiple risk factors through their mothers, and their immune systems are further undermined by premature birth and low birth weight.

There are several possible alternatives to the current wisdom. Among them: HIV may not cause AIDS at all; it may be one of several independent causes; or it may be necessary but not sufficient to cause AIDS. Root-Bernstein seems to lean toward the middle explanation. Duesberg and Ellison believe that HIV plays no role at all in AIDS. In their view, AIDS is in reality more than one disease with more than one cause, "most of which have in common only that they involve risk behavior." If so, AIDS is not transmissible.

All three authors seem to agree on one thing. Basing the entire \$3 billion U.S. budget for AIDS research, treatment, and education on the proposition that HIV is the only possible cause is a tragic mistake.

### *Biotech Mining*

"Mining with Microbes" by Keith H. Debus, in *Technology Review* (Aug.-Sept. 1990), Building W59, MIT, Cambridge, Mass. 02139.

Mining has not changed much since humans first began digging rocks from the earth and smelting them to obtain iron,

gold, and other metals some 6,500 years ago. But biotechnology may soon bring about a revolution in mining, reports De-