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EDITORIAL

The Science and Politics of AIDS

'Identifying HIV was the critical first step in defining the cause of AIDS, but, as Robert Koch so elegantly pointed out more than a century ago, showing that a particular infectious agent causes a specific disease can be an arduous process. This process is especially complicated when exposure to the agent is followed by an incubation period of months or even years before symptoms appear. Such is the case with AIDS.'

S. B. Prusiner
Science, 2002, **298**, 1726

'Despite its spectacular birthday the HIV-AIDS hypothesis has remained entirely unproductive to this date: There is as yet no anti-HIV-AIDS vaccine, no effective prevention and not a single AIDS patient has ever been cured – the hallmarks of a flawed hypothesis.'

P. Duesberg, C. Koehnlein and D. Rasnick
J. Biosci., 2003, **28**, 383

'Most tellingly – and tragically – many haemophiliacs who have been treated with clotting factors that were derived from large numbers of unscreened donated blood samples have developed antibodies to the virus and eventual AIDS. Duesberg continues to ignore or misinterpret these and many other facts about the virus.'

Christopher Wills
Plagues, Harper Collins, London, 1996, p. 225

Acquired immune deficiency syndrome (AIDS) entered the medical literature in 1981, with a description of immunodeficiency in homosexual men in the United States. Two years later the causative agent, a retrovirus, the human immunodeficiency virus (HIV) was identified by Luc Montagnier and his colleagues at the Pasteur Institute in Paris and Robert Gallo and his colleagues at the National Institutes of Health, USA. In an extraordinary essay commemorating World Aids Day, Stanley Prusiner, the 1997 Nobel laureate for his work in prions, notes that the discovery of the cause of AIDS 'ranks as a great scientific discovery'. But Prusiner goes on to note:

'However, I became disturbed by the rancor that seemed to engulf Montagnier and Gallo at each stage in the acquisition of new knowledge about this terrible disease' (*Science*, 2002, **298**, 1726). In a remarkable effort at peace keeping, Prusiner and the editors of *Science* put together a set of three essays in the 29 November 2002 issue of the journal. The first, authored by Montagnier, provides 'a history of HIV discovery' but notes: 'We still do not understand the origins of the AIDS epidemic; the slow destruction of the immune system by factors in addition to HIV ... the importance of cofactors in AIDS progression and virus transmission; and the nature of the HIV reservoir that resists triple drug therapy'. In the following piece, Gallo traces the 'early years of HIV/AIDS', in which many retroviral researchers jumped from cancer research to the emerging problem of AIDS. In the final essay, Gallo and Montagnier coauthor a view of the future, which begins with a frightening assertion: 'With close to 70 million people already infected with HIV and more than 20 million dead, AIDS is one of the great pandemics in medical history'. The discoverers of the AIDS virus conclude with many homilies directed at the developing world: 'There needs to be a strong political will on the part of the governments of developing nations and generous financial contributions from the developed world, conveyed through a United Nations organization, such as WHO or UNESCO, in coordination with UNAIDS. It is also important that developing countries themselves participate financially. We suggest that the amount of funding from developing countries for AIDS projects should be deducted from their national debts to developed countries' (*Science*, 2002, **298**, 1730). As Prusiner notes, in his introduction to this unique retrospective, the 'codiscoverer status' accorded to Montagnier and Gallo was 'a political solution ... to resolve the dispute over patent rights covering the blood test for HIV'. Prusiner and *Science*, thus, seem to have successfully negotiated the end of the first AIDS war.

How did an infectious disease that first appeared in the hospitals of San Francisco and New York, transform in about two decades into a major burden for the Third World? In marking the passage of exactly 20 years after the identification of HIV, *Nature Medicine* in its July

2003 issue provides a comprehensive round-up of the status of HIV/AIDS research. Anthony Fauci notes that 'the collective output of the HIV and AIDS research community has been prodigious; more than 125,000 papers related to HIV and AIDS are catalogued in the PubMed database of the National Library of Medicine' (*Nature Medicine*, 2003, **9**, 839). This extraordinary outpouring of biomedical research does not seem to have stemmed the progression of the disease worldwide; the incidence of AIDS is on the decline in the West, but appears on the upsurge in the poor countries. Since HIV infected individuals succumb to a host of opportunistic infections, the populations of the poor countries with a greater burden of infectious disease, might appear to be at great risk. How does a government, in the developing world, obtain accurate figures for the incidence of the disease? For example, in India the National Aids Control Organization (NACO) estimates about 3.97 cases of infection in 2001. However, the US intelligence agencies project figures of 25 million cases by 2010, a growth rate which is not borne out by any reasonable procedure for making realistic estimates. US intelligence reports can, of course, be dismissed as motivated. International agencies also seem to support highly inflated projections (A. S. R. Srinivasa Rao, *J. Biosci.*, 2003, **28**, 367). Epidemiological data based on seroprevalence, the appearance of HIV antibodies, may not correlate with the number of patients who are admitted to hospitals as confirmed AIDS cases. Fauci's article, quoting a UNAIDS report, warns that AIDS incidence is accelerating in 'China, India and parts of eastern Europe and central Asia'. The pattern of the spread of AIDS is clearly distinct from that of other infectious diseases, and may be contrasted with recent experience on the rise and fall of the SARS virus.

In a strange coincidence, even as the AIDS establishment celebrated the two decade old connection between the virus and the disease, *Nature Medicine*, an Indian journal provided the forum for Peter Duesberg to launch yet another attack on the HIV-AIDS connection (P. Duesberg *et al.*, *J. Biosci.*, 2003, **28**, 383). Duesberg, a virologist at the University of California, Berkeley, has long campaigned that HIV does not cause AIDS (*Scientific American*, August 2001, pp. 30–32). Largely discredited by the mainstream AIDS researchers, his views have been controversially supported by South African President Thabo Mbeki, who famously questioned 'the belief that AIDS is epidemic in South Africa and that HIV is its cause'. In his latest assault on the AIDS research establishment, Duesberg argues that recreational drugs and malnutrition may form the basis for the disease and that anti-viral chemotherapy may indeed do more harm than good. Such suggestions are hardly likely to meet with an enthusiastic response, particularly from major pharmaceutical companies which have licensed as many as 20 antiretroviral drugs with the US FDA in the period 1987–2003 (A. S. Fauci, *Nature Medicine*, 2003, **9**, 839).

Duesberg asks provocatively: 'Why is AIDS research not free to investigate non-HIV hypotheses?' His answer, which may strike a chord, in many who pursue lonely and often quixotic approaches in science, points to the influence of 'large government-sponsored research programs that dominate academic research... Such programs favour individual investigators, who contribute to the establishment a maximum of data and a minimum of controversy'. Duesberg, argues that 'the corporate equivalent of the academia's peer review system would be to give General Motors and Ford the authority to review and veto all innovations by less established car-makers competing for the consumer'.

For viral diseases, the desirable goal would be the development of a vaccine. However, HIV has proved to be formidable foe. Indeed, the number of skeptics, who view many of the advanced vaccine research programs with little enthusiasm, has been growing. The recent failure of a vaccine based on a 'genetically engineered version of HIV's surface protein, gp 120', might have been anticipated by its critics. But, in a dangerous sequel the company, VaxGen of California, suggested that its product 'revealed a statistically significant efficacy rate in blacks, Asians and people of mixed race' (*Science*, 2003, **299**, 1495; **300**, 28; *Nature*, 2003, **423**). The corollary of such a conclusion is of import in the Third World; if accepted, a program to test these vaccines with World Bank and international agency support in Africa and Asia will quickly gain momentum. Not only will poor populations become guinea pigs, their governments will add to their debt burdens, paying interest on loans which are used to buy products of limited utility and unreasonable cost.

Despite the unremitting focus on the human immunodeficiency virus, its origins, evolution and transformation into a human pathogen are still a matter of scientific debate. Robin Weiss highlights a general consensus that the two most prevalent strains of the virus, HIV-1 and HIV-2, crossed over to humans from chimpanzees and sooty mangabeys about 60–70 years ago. Weiss goes on to look at HIV infection from an interesting biological perspective. He notes that 'AIDS is characterized by opportunistic infections', which in turn 'exacerbate HIV in a vicious cycle'. He argues that 'high-density immunodeficient populations are arguably unique in the annals of host-parasite evolution'. A large susceptible population may increase zoonoses, the spread of infectious agents from animals to man, by permitting adaptation of viruses, bacteria, fungi and protozoa. Weiss concludes in doomsday fashion: 'The AIDS pandemic compounds the threat from the deliberate or accidental release of new infectious agents' (R. A. Weiss, *Nature Medicine*, 2003, **7**, 887). If a connection can now be drawn between 'bioterrorism' and AIDS, the science and politics of this disease will continue unabated in the foreseeable future.

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