



**Feature**

## *Debating Point*

### **Political Refutation of a Scientific Theory: the Case of Polio Vaccines and The Origin of AIDS**

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Scientific theories are supposed to be judged on the basis of objective factors such as compatibility with facts, consistency, cogency of arguments, falsifiability, elegance and scope. When political factors influence theory, this is seen as improper. Some famous examples are the Soviet government's support for Lysenkoism and the influence of racism on the 'science' of phrenology. If we broaden the meaning of 'political factors' to include the exercise of power generally, then the funding of research by vested interests such as the tobacco industry or the quest for prizes and glory by individual scientists can be included.

It is valuable to investigate cases where power seems to have been influential in assessing a scientific theory, because it can alert us to be critical of the processes involved and to develop alternative procedures. Here, I describe the way in which a particular theory, that AIDS originated from contaminated polio vaccines, has been dealt with. The theory is significant in itself, but the point of this article is not to argue for (or against) it. Rather, it is to highlight the ways that the exercise of power—in this case, editorial prerogative and legal action—can shape consensus about a theory even though a serious scientific assessment has never been made.

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The standard theory of AIDS is that HIV was transmitted to humans from monkeys or chimpanzees carrying SIV, simian immunodeficiency virus. There are many different variants of SIV, two of which could have led to the main variants of HIV, namely HIV-1 and HIV-2. The method of transmission is unknown, but is generally thought to have occurred in Africa when a hunter, in butchering a monkey, got some of its blood in a cut, when a human ate undercooked monkey meat, or when a monkey bit a human. Depending on one's assessment of the genetic diversity of HIV over time, this transmission might have occurred only a few decades ago or, alternatively, hundreds or thousands of years ago. In the latter case, AIDS is thought to have been restricted to remote African villages until recent decades when trade and international travel led to the current pandemic.

Many alternative theories have been proposed, including that AIDS is the inadvertent or intentional product of biological warfare experiments and that HIV is neither necessary nor sufficient to cause AIDS. Here, only one particular theory is examined: that AIDS arose from contaminated polio vaccines used in Africa from 1957 to 1959.

Polio vaccines are cultured on monkey kidneys, so contamination of a batch of vaccine by an SIV is a possibility. There is a precedent: in the 1950s and early 1960s millions of doses of polio vaccine were contaminated by a simian virus, SV-40 [1]. The vaccine alleged to be the origin of AIDS was given to hundreds of thousands of people in central and west Africa from 1957 to 1959. These locations later had some of

the world's highest levels of HIV infection. The timing is also right, since the earliest known cases of AIDS date from the 1960s; the earliest HIV-positive blood sample was collected in Kinshasa in 1959. At the time, there was no way of testing for the presence of SIVs, which were only discovered in the 1980s. Another factor adds plausibility to the theory: the vaccine was given to many infants less than a month old, in an extra high dose. Since the immune systems of infants are not fully developed, this is an excellent way to help a virus jump the species barrier.

The possibility that polio vaccines could be responsible for AIDS was suggested by a few authors in the 1980s [2]. Louis Pascal wrote the first full exposition of the theory, mentioning all the above points and more [3]. The theory achieved wide visibility through an article by Tom Curtis published in 1992, who developed ideas by Blaine Elswood discovered independently of Pascal [4]. Elswood and Stricker authored the first comprehensive treatment published in a scientific journal [5]. As well, there have been numerous newspaper and magazine articles about the theory.

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*'Pascal's theory has been rejected out of hand'*

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These authors argue not that the theory is necessarily correct but that it is worth taking seriously. There are a number of ways to investigate it. One is to test stocks of polio vaccine for the presence of SIV. Another is to scrutinise records of and interview workers in early polio vaccination campaigns in Africa. Another is to test blood samples in Africa from the 1950s and earlier: if HIV is found, this undermines the theory. Another is to test many more troops of monkeys and chimpanzees for SIVs, to determine if there is one more closely similar to HIV-1.

None of this has been done. Instead, the theory mostly has been rejected out of hand. Indeed, the impression of many scientists and commentators is that the theory has been refuted. This impression stems mainly from a number of items in *Science* to which there has been no response published in an equally prominent place. In 1992 Hilary Koprowski, one

of the great polio pioneers and the one who developed the vaccine in question, had a letter published in *Science* attacking the theory [6]. No response to this letter was published. That year, the Wistar Institute, where Koprowski worked and which manufactured the vaccine, set up a committee to examine the theory. Its unpublished 8-page report [7] was the subject of commentary in a number of publications, including *Science* [8]. Finally, when in 1993 *Rolling Stone* published an 'Update' [9] about Curtis's earlier article, *Science* reported on this [10].

Koprowski's letter, the Wistar report and *Rolling Stone's* 'Update' hardly provide a refutation of the theory. It is worth looking briefly at a few sample arguments:

- Koprowski argued that whereas most of the vaccinations took place in rural Africa, the highest incidence of HIV infection is in urban areas. This is easy to explain: if the disease started in rural areas, it would still spread faster in urban areas, with their greater levels of risky behaviour, once it reached them. Indeed, this is precisely the argument used by defenders of the conventional theory.
- Koprowski noted that the same pool of the vaccine used in Kinshasa was also used to vaccinate children in Poland, but that Poland has the lowest incidence of AIDS in Europe. But actually only 3000 Poles received vaccine from Lot # 13, the one used in Africa and alleged to have been contaminated. This figure is compatible with the incidence of AIDS in Poland. Moreover, this is the same lot that Albert Sabin found to be contaminated with an unknown virus [11].
- Critics have regularly cited the case of a Manchester sailor who apparently died of AIDS in 1959 and whose tissues were found in 1990 to contain HIV [12]. Such an early case of AIDS weighs against the theory, though it is far from a definitive refutation. Koprowski cited it and the Wistar Committee referred to it as the 'most telling evidence' against the theory. But a later test of the seaman's tissues found no trace of HIV [13], and the original authors have retracted their findings [14]. Thus it is now apparent that this piece of evidence was never as definitive as critics claimed.

- Critics have noted that there is no known SIV that is sufficiently close to HIV-1. This is not a telling argument, since further SIVs continue to be discovered. One has been found that seems similar to HIV-1 [15].
- The Wistar Committee concluded that the theory was extremely unlikely, given that it depends on a series of unlikely events, such as presence of appropriate SIVs in monkey kidneys, contamination of the vaccine, survival of SIV through vaccine processing, and transmission to humans through an oral route. What the Committee did not do, though, is consider the *a priori* probability of the conventional theories such as the cut hunter or monkey bite. There is absolutely no direct evidence of these hypothetical events, and no easy way to explain why SIV should have infected humans this way only within the past few hundred years, given that the activities in question have been occurring for hundreds of thousands of years. In addition, the idea that AIDS could have been present in Africa for centuries is hard to reconcile with the history of turmoil in the continent over this period [16]. The proper way to assess the competing theories is by working out the relative probabilities that they occurred, but this has not been done.
- Some commentators have said that it doesn't really matter how AIDS started, since the main thing is what to do now to stop it. Contrary to this, it can be argued that knowledge of origins is valuable for several reasons. One, noted by the Wistar Committee, is that polio vaccines continue today to be cultured on monkey kidneys, a practice it recommended against. Another is that an iatrogenic origin of AIDS would provide a loud warning about hazards from interspecies transfers of tissues, such as baboon liver transplants.

This is only a taste of the full set of technical arguments about the theory. What can be said, though, is that on the basis of evidence and argument, the theory should not be dismissed out of hand. Yet from the published record, it would appear that there has been little in the way of response to Koprowski's letter and the Wistar Committee report.

This is not for lack of trying. Curtis wrote a reply to Koprowski's letter, but *Science* refused to publish it [17]. In 1994, eminent evolutionary biologist W.D. Hamilton submitted a letter to *Science* responding to Koprowski's letter. After being rejected, he wrote a personal letter to the editor arguing that even if the theory is wrong, it was important that it be openly and fully debated because of the significant implications if it turned out to be correct. After being sent to referees, it was again rejected [18]. These rejections meant that Koprowski's letter appears to stand unchallenged. This is not to mention rejections of articles submitted by Pascal and by Elswood and Stricker to various journals [19].

In December 1992 Koprowski sued Curtis and *Rolling Stone* for defamation. This had the immediate effect of discouraging media discussion of the theory. *Rolling Stone* declined to publish Curtis's follow-up story. Many months later, before the case went to court but after *Rolling Stone* had spent some \$500 000 in legal fees, the magazine settled the case by paying Koprowski \$1 and publishing an 'Update', as noted before. Given that it was made under legal and financial pressure, the 'Update' can hardly be considered to have any scientific credibility. Curtis did not agree with the 'Update' but did not have enough money to fight the case on his own.

A number of authors write about the theory as if it has been refuted. Laurie Garrett in *The Coming Plague*, an impressive and popular work, mentions the theory and concludes 'A scientific panel was assembled in the US in 1992–1993 to review available samples of early polio vaccines, as well as the safety and laboratory techniques used by polio pioneers of the late 1950s. After careful study it was concluded that the polio vaccines were HIV free.' She cites Curtis's *Rolling Stone* article and a series of articles in 1992, including reports on the Wistar Committee report, and notes that '*Rolling Stone* later printed an apology' [20]. Actually, no testing of 1950s vaccine stocks for SIV has ever been reported even though the Wistar Committee recommended that this occur. Garrett makes no mention of Koprowski's lawsuit.

Tony Gould, in a history of modern polio, outlines the theory, discusses the Wistar Committee report and finishes his discussion with a

quote from Koprowski's letter to *Science*. He does not mention Koprowski's lawsuit [21].

Arno Karlen in his book *Plague's Progress* discusses the origin of AIDS but does not mention the polio vaccine theory at all. However, his bibliography lists a 1992 news commentary in *Science* mostly critical of Curtis's *Rolling Stone* article and a *New York Times* article reporting on the Wistar Committee report [22].

Robin Weiss gives a much fuller treatment in an article in *Science & Public Affairs*, and is up to date in noting that the Manchester seaman case has been discredited. He also notes that Koprowski sued over Curtis's article. Nevertheless, he concludes with mention of Koprowski's 1992 letter to *Science*, a 'closely reasoned, scientifically argued response' [23].

None of these authors cites Pascal's paper, which has been widely circulated since 1991. None cites the publications by Elswood and Stricker in *Research in Virology* [24] or in *Medical Hypotheses*. None shows awareness of the rejection by *Science* of replies to Koprowski by Curtis and later by Hamilton. Only Weiss mentions Koprowski's lawsuit.

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The theory that AIDS arose from contaminated polio thus appears to a number of commentators to have been refuted, based mainly on Koprowski's letter and on accounts of the Wistar Committee report. The arguments and publications of Pascal, Elswood and Stricker, Hamilton and others seem invisible. The theory has been marginalised in a number of ways, especially by *Science's* refusal to publish replies to Koprowski, by uncritical reporting of the Wistar Committee report, by failure to examine literature outside high circulation sources, and by Koprowski's lawsuit. Ironically, the most widely cited source concerning the theory is not a scientific paper but Curtis's article in *Rolling Stone*.

There is no conspiracy here. No doubt the editor of *Science* justified the rejections of replies to Koprowski in terms of scientific standards, and Koprowski sued because he felt his reputa-

tion was under attack by the *Rolling Stone* article. Rather, what is involved is a complex set of processes that leads to the appearance of refutation of a theory, when actually it has never been fully tested and in fact is now stronger—due to the discrediting of the Manchester sailor case—than it was originally.

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There are several lessons that can be drawn from this saga. One is that lawsuits are an inappropriate way to decide the validity of scientific theories [25]. Another is that mainstream journals cannot be relied upon to provide a full and open treatment of unconventional theories.

Just because a theory has been rebutted and rejected does not mean that the necessary work has been done to properly refute it. A conscientious investigator needs to examine not just the published literature in mainstream and lesser journals but to go behind the scenes to obtain rejected submissions. Finally, it is necessary to actually examine the arguments and evidence. When there are reputations at stake—including, in this case, the reputation of vaccinations as beneficial—then it is especially important to delve into 'non-scientific' factors that may have played a role in acceptance or rejection of a theory.

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