

Citation Analysis and HIV

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Never before or since has scientific truth been trumpeted so spectacularly as a creation of politics. Standing on the steps of the White House in Washington, D.C. on March 31, 1987, President Ronald Reagan and the French Prime Minister Jacques Chirac announced that both parties in the dispute over the discovery of the AIDS virus, Robert Gallo and Luc Montagnier, were to have equal rights to the patenting and testing of HIV. The principals shook hands, *Nature* (326:435) published a "chronology of AIDS research" agreed to by the two scientists, and one of the most bitter priority conflicts in the history of science was supposedly over.

But have Gallo and Montagnier's peers accepted the Franco-American concordat? Seven years later, the answer is clearly no, according to the results of an intriguing citation study published in the current *Science, Technology, and Human Values* (19:342).

The paper's author is Alison Rawlings of the University of Sydney (Australia), who has examined the patterns of citations to the key papers behind the dispute. Citation analysis is, of course, a contentious technique, as well as a powerful and productive one, and Rawlings pays due regard to its potential shortcomings. However, unlike many practicing scientists, who tend to dismiss this approach, she is well aware that there is now a vast, scholarly literature devoted to the uses of citations and other varieties of "scientometrics."

These studies show that alleged distortions introduced into the system by, for example, cheeky self-citation, have little or no effect on the validity of the process. Some practices, such as the mutual boosting of citations among cosy clubs of conspirators, are little more than folklore. Genuine errors and misattributions occur on such a tiny scale that, quantitatively, they have at most a minor effect on the overall patterns revealed by the data.

So what does citation analysis tell us about the battle over AIDS and its causative virus? There are two primordial papers: "Isolation of a T-lymphotropic retrovirus from a patient at risk for acquired immune deficiency syndrome (AIDS)," by Barré-Sinoussi, Montagnier, and their colleagues at the Pasteur Institute (Paris), appeared in 1983 in *Science* (220:868). "Frequent detection and isolation of cytopathic retroviruses (HTLV-III) from patients with AIDS and at risk for AIDS," by Gallo and his associates at the National Cancer Institute (Bethesda, MD) appeared in 1984 in *Science* (224:500).

Alison Rawlings' analysis, based on figures taken from the *Science Citation Index*, begins by showing

that Montagnier's paper received 31 citations during 1983, whereas the Gallo paper, published in the same month of the following year, received more than four times as many citations over the comparable period of time. In 1985, when both groups published sequences for their respective viruses, the dispute reached a boiling point. This was accompanied by a marked rise in citations to Montagnier's papers at the expense of Gallo's, whose citations peaked in that year and dropped away steeply and consistently thereafter. Although Montagnier's citations began to fall in 1986, their decline was much less marked. By 1991-92, his papers were receiving nearly 100 more citations per year than Gallo's—a reversal of the position in 1983.

Even more revealing are the trends for the two primordial reports alone, cited singly or together. In 1985, the year when shared citations peaked, citations to Gallo's paper began to plummet. They continued to do so through 1987—and leveled off only in 1991. Unexpectedly, however, citations to Montagnier's original paper alone began to rise steadily from 1985 and for the next five years—despite the steady decline in joint citation. By 1989, citations to the Montagnier report alone had become more frequent than citation of the articles together, and this trend has continued ever since.

The citations counted here were not given (as is often the case) for reasons such as critical attacks on the author(s), or as mere adjuncts to the citing of the author's own work. Alison Rawlings' exhaustive scrutiny of the citing papers has shown that their authors incorporated the references to Montagnier and/or Gallo for the specific purpose of crediting the discovery of the AIDS virus.

The pattern is clearly opposite what one might have expected following the 1987 settlement and verdict of equal credit. "Citation counts suggest that from 1983 to the present, the allocation of priority for the discovery of the AIDS virus has witnessed a complete volte-face," Rawlings concludes. "Initially, Gallo's team received most credit for the discovery. Today, Montagnier's team receives more. This stands in contrast to the official line which divides credit equally between the two parties. The official story seems to be forfeiting its sanctity."

Rawlings' analysis does not, of course, provide a definitive answer as to who should be accorded credit for the discovery of HIV. Citation counting could achieve no such thing. What we have here is a vivid reflection of the views of the scientific community as to the truth of the matter. But if (as the sociologists of science tell us) truth is really simply consensual knowledge, then this amounts to the same thing. //