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And now here is the virus forecast

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The first of four reports (see also [article](#), [article](#) and [article](#)) from the American Association for the Advancement of Science looks at predicting plagues

ON FEBRUARY 18th a glimmer of hope died. The Population Council, a big international charity, announced the results of one of the largest trials yet undertaken of a vaginal microbicide intended to protect the user from infection with HIV, the virus that causes AIDS. It failed. Carraguard, whose principal ingredient is a gel derived from seaweed, proved no more effective than a placebo in an experiment involving 6,000 South African women.

AIDS kills over 2m people a year. A way of stopping it spreading is urgently required. Yet according to Nathan Wolfe, a virologist at the University of California, Los Angeles, things need never have got this bad. If there had been, in the 1970s, a programme searching for unrecognised diseases in Africa then AIDS would have been noticed long before so many people had started dying from it. Microbicides and other interventions could have been tested when only hundreds of thousands were infected, rather than tens of millions. AIDS would still have been horrible, but not nearly as horrible as it has become.

To try to stop this happening again, Dr Wolfe is attempting to create what he calls the Global Viral Forecasting Initiative (GVFI). This is still a pilot project, with only half a dozen sites in Africa and Asia. But he hopes, if he can raise the \$50m he needs, to build it into a planet-wide network that can forecast epidemics before they happen, and thus let people prepare their defences well in advance.

Dr Wolfe outlined his ideas, and the research that has led him to believe they are feasible, to this year's meeting of the American Association for the Advancement of Science (AAAS) in Boston. He began his work nearly a decade ago in Cameroon, in a project reminiscent of the 19th-century animal-collecting expeditions that pushed into the forest to look for new species. Except that his quarry is viruses, not butterflies and birds.

Small-game hunter

Almost all human viruses whose origins are known have come from animals. But it is not simply a matter

of an animal virus suddenly finding humans to be a congenial host, and flourishing as a result. With AIDS, for example, the global epidemic is caused by what was originally a chimpanzee virus. There is, however, a second form of AIDS, caused by a monkey virus. This has not become global. It is pretty much restricted to West Africa. Moreover, there are a further two very rare forms caused by different versions of the chimpanzee virus. These rare forms are examples of what Dr Wolfe calls viral chatter, a term borrowed from intelligence agencies which monitor telephones for the use of certain words or unusual patterns of communication.

His thesis is that there is continual low-level interchange of viruses between species. That is particularly so for people, such as hunters and farmers, who are in constant and often bloody proximity to animals. His hope is that by monitoring this viral chatter he will be able to spot pathogens before they take the second, crucial evolutionary step of being able to transmit themselves from one human to another.

So far, he has concentrated his efforts on a group known as retroviruses, of which HIV is one. He has already found three examples of "foamy viruses" jumping from wild apes and monkeys to Cameroonian hunters. At the moment, no known foamy virus can spread between people. But until the 20th century that was true of the simian equivalents of HIV.

He has also found two new members of a group called HTLV that have moved from monkeys to men. Since HTLV-1, an example of the group discovered several decades ago, has already spread around the world, these cases are particularly noteworthy. HTLV-1 is not as common as HIV, and causes symptoms in only 5-10% of those it infects. But those symptoms can include a fatal leukaemia. And a different type of HTLV might not be so choosy about whom it kills.

Even more worryingly, Dr Wolfe has found many examples of viruses recombining in his Cameroonian hunters. Recombined viruses often have properties present in neither parent. Sometimes these include the ability to jump from human to human. The pandemic version of HIV is the result of such a recombination.

The next stage of the project is to try to gather as complete an inventory as possible of animal viruses, and Dr Wolfe has enlisted his hunters to take blood samples from whatever they catch. He is collaborating with Eric Delwart and Joe DeRisi of the University of California, San Francisco, to screen this blood for unknown viral genes that indicate new species. The GVFI will also look at people, monitoring symptoms of ill health of unknown cause and trying to match these with unusual viruses.

Nor, if Dr Wolfe can raise the money, will the project be confined to tropical forests. Animal markets are next in line. Dr Wolfe is working with Peter Daszak, of the Consortium for Conservation Medicine, to study the so-called wet markets of China where SARS began in 2002. They will inspect the animals sold in them, and test the stallholders and customers for signs of dodgy viruses. Dr Daszak is a co-author of a study published in this week's *Nature* that maps the global "hot spots" of emerging diseases and concludes, as Dr Wolfe has, that the real threat lies in the tropics. That is despite the fact that most new diseases are (as with AIDS) first noticed in rich countries.

If and when the GVFI is running smoothly, Dr Wolfe hopes to see not only what is threatening, but also to identify the general characteristics (if any) that threatening viruses share. If some features are regularly associated with a propensity to become pandemic, then forecasting outbreaks of new viral diseases will become easier and more scientific. At that point, this branch of medicine will be able to make the most important leap of all—from cure to prevention. And then a catastrophe like AIDS will need never happen again.