# SCIENCE

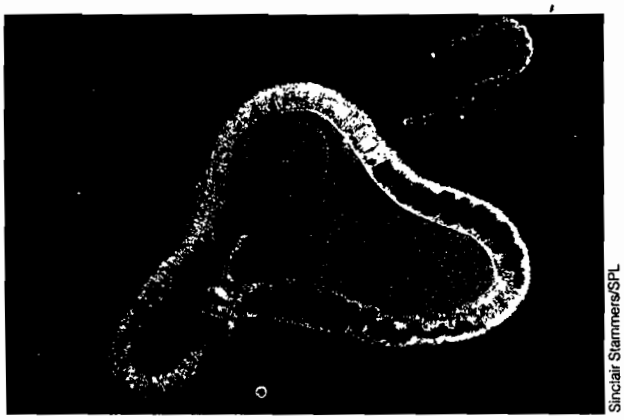
# HIV and African parasite may be linked

**Debora MacKenzie, Brussels**

FRENCH scientists have discovered an intriguing connection between a parasite and HIV. The parasite, which causes schistosomiasis, a disease widespread in Africa, and HIV, the virus that causes AIDS, appear to produce a similar protein. The discovery, to be published in this month's *Journal of Experimental Medicine*, could give clues to the origin and epidemiology of AIDS.

André Capron, of the Pasteur Institute in Lille, France, and his colleagues, work on both schistosomiasis and HIV. Schistosomes are tiny, multicellular parasites that spend part of their lives in snails, and are spread to humans in fresh water. Each year, schistosomiasis, also called bilharzia, kills 800 000 people. Two hundred million people are disabled because of the disease.

Capron's team wanted to know which proteins on schistosomes are recognised by antibodies in the blood of animals with schistosomiasis. This would show which surface proteins are most effective in inducing immunity to the parasite, and which might work as vaccines.



Sinclair Stammers/SPL

*Schistosomes, tiny multicellular parasites that are spread to humans in water, share a surface protein with the AIDS virus*

As a control, to measure the random binding of proteins to the antibodies, the scientists exposed the anti-schistosome antibodies to a protein from HIV, virion infective factor (VIF). They used this partly because it would not be expected to bind specifically to the anti-schistosome antibodies, and partly because Capron was intrigued by similarities between schistosomiasis and AIDS; he wanted to see if, by chance, there were molecular similarities.

The team was amazed to find that antibodies from schistosome-infected animals bind specifically to VIF. They went on to find that antibodies to VIF recognised schistosomes. A monoclonal antibody, directed specifically against one part of VIF (the C-terminal), binds specifically to a protein on schistosomes. Antibodies from humans with schistosomiasis, but without HIV, bind to VIF in the test tube. Antibodies from humans with HIV, but no schistosomiasis, bind to schistosomes.

VIF is a regulatory protein produced by HIV when it replicates in cells. It appears to be important for enabling the virus to infect cells. The schistosome protein recognised by anti-VIF antibodies also appears to be important for infection by schistosomes. Monoclonal antibodies against VIF protected rats against schistosomiasis. Capron's group has now purified the protein from schistosomes that binds antibodies to VIF, and is sequencing the gene that codes for it, to see how similar the protein is to VIF.

The discovery, says Capron, has two major implications. One is for the function of VIF and the similar protein in schistosomes. "Parasites express very highly conserved functional proteins," says Capron. That is, the proteins they express have changed very little over evolution. The way in which the newly discovered surface protein functions in schistosomes may reveal how the same sequence regulates infection by HIV. Such functions may be easier to study in schistosomes, says Capron, because they are well understood and easier to manipulate than retroviruses.

The second and most intriguing implication is for the origins of HIV, and the possible interactions between the two infections. Some of the earliest evidence of HIV comes from Zaire and Burundi. These countries also have the highest rates of schistosomiasis, which has been established among humans in Africa for thousands of years, according to Capron. Most people exposed to HIV in Africa have already been exposed to schistosomes, and the results suggest that they might, in consequence, have some immunological ability to recognise HIV. Whether this reduces or exacerbates HIV infection, says Capron, can only be guessed at without better epidemiological data.

It is possible that schistosomes have only recently become infected by HIV themselves, and are merely expressing a viral protein. Capron says recent work in Japan shows that schistosomes can incorporate genes from retroviruses. But because antibodies against the protein can block schistosome infection, Capron thinks the protein is likely to be native to the parasite, and have some functional importance. It may also be speculated that the virus picked up the gene for this particular infective protein from schistosomes.

The protein has become a new candidate for a schistosomiasis vaccine, alongside other proteins, for which Capron hopes to begin a series of trials in humans. □