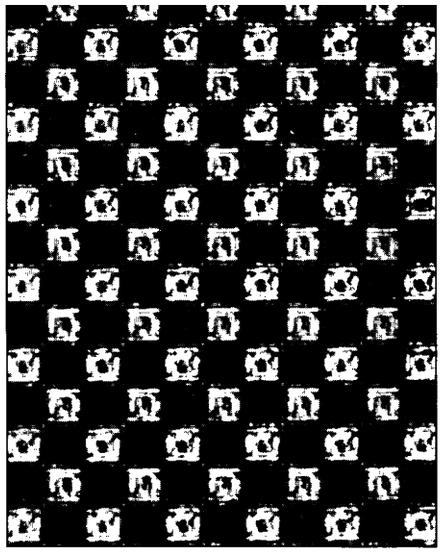

DISPLAYTECH INC.

Chirality on display. A single enantiomer liquid crystal is sensitive enough to read out the 1s and 0s on a computer memory chip.

his colleagues founded in 1986 to develop their materials, has already demonstrated some of that promise. Displaytech's integrated circuit-ferroelectric liquid crystal (IC-FLC), still at the experimental stage, can display pixels just 60 microns on side. "This device is basically a RAM [random access memory chip] with FLC on top," Walba says. "The 1s and 0s written to the RAM by a computer are turned into bright and dark pixels by the FLC."

The growing finesse at making single enantiomers of chiral molecules is also fueling basic research, some of which is coming full circle to the original impetus for enantiochemistry: life's own chiral nature. In an audacious extension of mirror-image chemistry, peptide chemists have been working on making mirror-image forms of naturally occurring proteins and enzymes. They expect that their synthetic enantiomeric biomolecules will catalyze the same reactions as the originals but on the enantiomerically opposite substrates. A question emerges from such work: Might there exist somewhere now, or in the future, inverse biological organisms whose molecular dance of life twists the other way and whose sentient forms greet each other with a shake of left hands?

–Ivan Amato

AIDS

HIV Comes in Five Family Groups

Virologist Gerald Myers looks at the rapidly mutating AIDS virus and sees Darwinian evolution on "fast-forward." So divergent have strains of the virus become that researchers have all but abandoned hope of developing a single vaccine effective against all of them. So, taking a cue from flu vaccine research, Myers has spent the last several years cataloguing known strains of HIV, to determine whether it might be feasible to concoct multiple-strain, cocktail vaccines like those used in flu.

The effort has yielded two surprises. While flu comes in three major families, Myers, director of the HIV sequencing project at Los Alamos National Laboratory, has found that strains of HIV seem to cluster in at least five—and possibly more—distinct families, not just the broad Western and African groupings that researchers have accepted for nearly a decade. "It would be wrong of us to think there are only two types of virus to be confronted by vaccines and antivirals," Myers told geneticists recently at a symposium at Stanford University.

Just as unexpected is Myers' finding that HIV isolates from Gabon seem to fit into all five groups he has identified. This, he told the Stanford symposium, suggests that West-Central Africa—and particularly Gabon—may be the "epicenter or source of AIDS in the world." That conclusion is drawing flak even though Myers' data have not yet been published.

Myers and his team of Los Alamos researchers began collecting sequences of HIV genes in GenBank computers in the mid-1980s, when the sequences first became available. Myers and his co-workers have worked out a genetic family tree with multiple branches for the predominant form of the AIDS virus, HIV-1. The computer analysis traces genetic changes in the *gag* and *env* genes, showing which of the strains are most closely related and likely to have emerged from common ancestors.

Late last year, Myers said, the research team realized that HIV-1 viruses cluster into recognizable "families." Within each family, the AIDS viruses differ from one another by only 10% to 20%—but the five families of viruses differ from one another by at least 30%. Strains from the United States and Europe, among others, fall into the first group; Brazilian and Zairian strains in the second;

"It would be wrong of us to think there are only two types of virus to be confronted by vaccines and antivirals."

–Gerald Myers

Zambian and Somalian strains in the third; Taiwanese strains in the fourth; and strains from Uganda, the Ivory Coast, and Kenya fall in the fifth.

Virologist Howard Temin of the University of Wisconsin, who has followed Myers' research, says these findings are an important contribution to vaccine research. "We need to know what strains are out there to know what vaccines to make," Temin said. If strains of the virus can, indeed, be grouped into broad families, researchers may be able to test candidate vaccines against reference strains from each grouping.

But, despite Nobelist Temin's endorsement, the suggestion that HIV-1 may have originated in Gabon threatens to rekindle an acrimonious, decade-old debate over the origin of the epidemic. Western scientists' contentions that AIDS originated in Africa have repeatedly drawn accusations of racism from African government officials and scientists, and Myers' new claim is already prompting an outcry. And the arguments of the skeptics are not based purely on political correctness.

Most epidemiologists would agree that Gabon, an equatorial country on the Atlantic Coast of Africa, would seem an unlikely place for the epidemic to have started. It has one of the lowest AIDS infection rates among African nations, with about 1.8% of its 1.2 million population infected with the virus. It is bordered on the north by Guinea and Camaroon, with infection rates of less than 5%. But to the east, Gabon is bordered by the Congo, which has an infection rate of 7%. Countries such as Uganda, Zaire, Kenya, and the Ivory Coast have infection rates ranging from 7% to 28% in urban areas, according to U.S. Bureau of the Census statistics. No surprise, then, that Guy Eboumy, a Gabonese diplomat in Washington, challenged Myers' claim, arguing that the AIDS toll in his country does not support the theory. "If the epidemic began in Gabon, I would expect more people to be infected."

The diplomat is supported by AIDS researcher Jay Levy, a professor of medicine at the University of California, San Francisco, who argues that it is unlikely that the virus would spread from Gabon to the Congo without spreading in Gabon first. "Of course, social factors may have prevented the virus from spreading locally so that the infections were exported, but I would find that surprising," Levy told *Science*.

Nevertheless, Chin-Yih Ou, the chief molecular biologist at the Centers for Disease Control's AIDS division, who has supplied Myers with African viruses, said the genetic evidence and the computer analysis, at least so far, appear to back up Myers' claims on the groupings of the virus and on the anomalous position of the Gabon strains. However, he adds a strong note of caution: "We need to sequence more viruses to confirm his findings."

–Steve Sternberg

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