anemia, and fragile-X syndrome.

•In CF, PCR has replaced "a cumbersome linkage analysis test" for disease carriers, Barathur says, adding that the assay will be used prenatally too. Roche's PCR test, he says, can detect those 80 percent of CF cases resulting from the most common mutation.

•Roche already offers PCR carrier and prenatal tests for sickle-cell anemia.

•Right now, there's no test for fragile-X syndrome, a form of mental retardation that affects one in 1,200 males in the U.S. But Thomas Caskey at Baylor University (Waco, TX) has mapped the gene for it, and Roche is working with him on a test that would diagnose patients, carriers, and fetuses. Barathur expects that test will be ready early next year.

PCR does have its competitors, though. Abbott Laboratories (Abbott Park, IL), industry sources say, is working with a ligase chain-reaction system that first finds its target and then amplifies it, but Abbott won't comment.

Another approach is that of Chiron, which has developed a direct detection system using a proprietary nucleic-acid probe that, Chiron says, is "approximately one-million times more sensitive than present immunodiagnostic tests." Chiron's is a signal amplification system in which synthesized DNA molecules bind to specific sites on the target virus. Chemical techniques make the probe DNA emit light. A luminescence detection system then indicates the amount of virus present. With help from collaborator Daiichi Pure Chemicals (Tokyo), which has made a $20-million commitment to fund development of the technology, Chiron plans to start clinical evaluation next year of probes for blood-borne hepatitis B, hepatitis C, and HIV viruses. **—Mimi Bluestone**

ANOTHER ONE BITES THE DUST

AHP BUYS 60 PERCENT OF GI

NEW YORK—Perhaps more than any other biotechnology company, Genetics Institute (GI, Cambridge, MA) has survived by selling the marketing rights to its products. Indeed, it will receive only royalties on its first three products, which are some of biotechnology's most promising, including erythropoietin (EPO), granulocyte macrophage-colony stimulating factor, and factor VIII.

GI desperately wanted to end such financing. But last March when it lost U.S. marketing rights to EPO in a drawn-out patent battle to Amgen (Thousand Oaks, CA), its stock plummeted from a high this year of $63 to a low of $27. The price drop dashed GI's hopes of public financing, forcing it to cancel an April offer of 1.25 million shares.

So when a suitor with deep pockets, American Home Products (AHP, New York), proposed earlier this autumn, GI accepted. If shareholders approve, AHP will buy 60 percent of GI for $666 million—putting $300 million into GI's coffers—in a deal that values GI at $1.1 billion. "Our number one reason for selling is resources. We need very substantial funds, and we chose this route to obtain them," says Gabriel Schmergel, GI's president and chief executive officer.

GI—along with Genentech (So. San Francisco, CA) and Cetus (Emeryville, CA)—is the third first-tier biotech company bought out in the past year and a half. "All three had weak near-term prospects, coupled with long-term projects," says R. Brandon Fradd, a biotech analyst at Montgomery Securities (San Francisco, CA). In a deal similar to AHP's purchase of GI, Hoffmann-La Roche (Basel, Switzerland) bought 60 percent of Genentech for $2.1 billion in February 1990. Though at the time Genentech boasted two products with annual sales over $100 million, it anticipated research spending putting increasing pressure on earnings, as new products weren't expected for up to three years. Cetus, for its part, was bought out in July by Chiron (Emeryville, CA) for about $660 million in stock. After Cetus failed last year to win marketing approval for its flagship product, interleukin-2, it had little hope of staunching its annual tide of red ink, which in fiscal 1991 totaled $75.2 million.

Montgomery Securities' Fradd sees more drug companies buying more biotech firms. "Ultimately, drug companies may look at buying leading biotech companies, as well as the down and outs, to gain access to innovative products," says Fradd. Like AHP, acquiring drug companies will have strong marketing but weak pipelines, Fradd says, adding that candidates include Rhone-Poulenc Rorer (Fort Washington, PA), Marrion Merrell Dow (Kansas City, MO), and Upjohn (Kalamazoo, MI). Among attractive low-valued biotech companies, he says, are Xoma (Berkeley, CA), Nova Pharmaceutical (Baltimore, MD), Oncogene Science (Manhasset, NY), and T Cell Sciences (Cambridge, MA).

The AHP/GI deal is complex. AHP will pay $50 a share, or about $366 million, for 40 percent of GI's 14.6 million shares of outstanding common stock. It will pay $300 million directly to GI for 9.5 million newly issued common shares, or about $31.60 a share, giving it another 20 percent of GI. And it will acquire an option to buy the remaining 40 percent of GI for $50 to $85 a share until 1996.

The purchase is AHP's first big investment in biotechnology. "It represents a quantum leap towards our goal of becoming a premier company in biotechnology," says John Stafford, AHP's chairman and chief executive officer. AHP—which racked up $6.8 billion in sales last year—will benefit immediately from GI's growing royalty stream. Based largely on royalties from EPO—which Boehringer Mannheim (Mannheim, Germany) sells in Europe and Chugai Pharmaceutical (Tokyo) sells in Japan—GI chalked up six-month revenues this year of $26.3 million, up 33 percent from $17.7 million in the same period last year. GI, in fact, expects to report its first quarterly profit in this year's third quarter and remain profitable thereafter.

Longer term, AHP will benefit from GI's pipeline, one of biotechnology's richest. "We expect it to yield exceptional new products beginning in the mid-1990s," says AHP's Stafford. Pipeline products that GI retains U.S. marketing rights to include:

•Bone morphogenetic protein-2 (BMP-2) is the lead compound in a family of proteins that stimulate cartilage and bone growth. BMPs could substitute for existing bone-graft materials and treat bone loss from periodontal disease and certain cancers. GI and Yamanouchi Pharmaceutical (Tokyo), which is funding BMP development, have set up a joint venture in Japan to market the products.

•Interleukin-11 treats platelet depletion, which causes bleeding in patients undergoing chemotherapy and bone-marrow transplantion. Schering-Plough (Madison, NJ) owns rights to the product in Europe, Africa, and South America.

•Macrophage-colony stimulating factor (M-CSF), a blood-cell growth factor, is in clinical trials against cancer, infectious diseases, and cholesterol. M-CSF is licensed to Schering-Plough in Europe and Morinaga Milk Industries (Tokyo) in the Far East.

Many observers see the deal benefiting GI, too. It will hire at least 125 new employees, up from 600 now, to work on its products. And not only will AHP "probably do little to interfere but, ultimately, its marketing expertise could prove useful," says Montgomery Securities' Fradd. **—B.J. Spalding**