The simulation reflects Conant's theories on what the abbey looked like after its last enlargement, consecrated in 1130, and known as Cluny III. At that time, the abbey would have been full of tapestries and frescos and its capitals and columns would have been colorfully painted, conveying the "feast and all the magnificences of the world," in the words of historian Georges Duby. But few fragments of the decor have survived, so the interior of the electronic abbey is mostly bare and unadorned. A fresco of the Christ in Majesty, copied from a nearby chapel thought to be close in style to Cluny, was included, as was a depiction of the great rose window over the western main entrance, but they have been left deliberately fuzzy to reflect the lack of knowledge about their true appearance. More detail is known about the chancel screen (choir railing) because of the work of art historian David Walsh from Rochester University, who is currently sorting, assembling, and drawing stone fragments from the abbey. He is known to many locals as "the son of Conant."

The marriage of computer science and archeology at Cluny has drawn enthusiastic reviews from historians. Alain Erlande-Brandenburg, curator of the National Museum of the Middle Ages in Paris, says computer specialists ask very precise questions of archeologists, imposing scientifically exacting demands that they did not face before, such as the thickness of the walls, the nature of the soil and the building technology used at the time. "In exchange they give us something we don't have: A visualisation of the volumes, of the lighting, of the atmospheres of places that have disappeared. The images they produce add an important visual element to understanding the purpose and the use of the building." Adds Vingtain: "We are dealing here with concrete applications, rich in potential developments."

–Alexander Dorozynski

Alexander Dorozynski is a science writer based in Paris.

AZT PATENT

Court Favors Drug 'Concept' Over Proof

What kind of help must you give an inventor before you deserve to share in the patent? That thorny question has bedeviled U.S. patent courts for two centuries, and in 1991 it arose again when pharmaceutical giant Burroughs Wellcome launched a patent infringement suit against two rival drug manufacturers over the issue. The companies were trying to market their own generic versions of Burroughs' anti-HIV drug AZT, and they argued that Burroughs couldn't stop them because they had license rights. Those rights were granted to them by the National Institutes of Health (NIH), which was—the two companies claimed—a co-inventor of AZT.

Last week a North Carolina judge decided that even though NIH demonstrated the drug's anti-HIV activity, that wasn't quite inventive enough for patent law. The court ruled that Burroughs held the sole patent rights because the company had conceived of the drug, even before testing it on HIV, as an anti-HIV compound. But the inventorship question won't go away; the generic drugmakers—Barr Laboratories Inc. and Novopharm Inc.—have already announced their intention to ask the U.S. Court of Appeals to hear the case.

The issue here is whether conceiving of an invention is all that's needed for a patent, or whether proving that the invention works also deserves recognition. Barr and Novopharm claim that Burroughs' AZT patent should have included the names of two NIH scientists—National Cancer Institute director Samuel Broder and his colleague Hiroaka Mitsuya—who first screened AZT at Burroughs' request and proved that it worked against HIV. NIH has never pressed any claim on AZT, but officials at the institutes have not been happy with the high price that Burroughs charges for the drug—as much as $2,500 a year—and have been searching for ways to drive down the cost. In Barr NIH thought it had found a lever to do just that. It granted the drugmaker a nonexclusive license in 1991 to any patent rights the institutes might, in theory, have for AZT. The company, which had already been selling generic AZT in Canada at about half the Burroughs price, quickly moved to start U.S. sales. Almost as quickly, Burroughs brought suit against it (*Science*, 7 June 1991, p. 1369). Novopharm, which also sold the drug, was named in the suit as well.

As the case developed, through a pre-trial ordeal that included 541 pleadings, 88 written orders, and dozens of hearings, it boiled down to the issue of who did what when. This is what emerged: In mid-1984, when the scientific community learned that AIDS was caused by a retrovirus, Burroughs scientists began screening compounds for activity against two mouse retroviruses. AZT showed high activity against both of them, so the company's patent committee recommended in January 1985 that Burroughs prepare to file a patent for the drug as an antiretroviral that could be used against HIV. In early February Burroughs sent a number of compounds to Broder for screening against HIV, including a sample of AZT under the code name "Compound S." On 20 February, Broder phoned Burroughs to report that the NIH tests had shown that "Compound S" was effective against HIV. On 16 March, Burroughs filed its first patent application for AZT.

To Judge Malcolm Howard of the U.S. District Court in New Bern, North Carolina, this history clinched Burroughs' case. In his 22 July decision, Howard defined the law as requiring that the inventor merely have a "formulation in mind" of the invention's actual use. Burroughs, the judge said, had thought of AZT as an HIV drug after the mouse retrovirus tests, and before NIH became involved.

Barr had argued that activity against a mouse virus is not sufficiently predictive of activity against HIV to deserve credit as a discovery of a potential AIDS drug. But the judge disagreed. It was enough, he wrote in his decision, simply to have the idea that the drug might work: "For conception to be complete, the law does not require an idea to be proven to actually work." Indeed, the judge found that the creative input of Broder and Mitsuya was essentially nil, ruling that "a party who conducts tests wholly at the direction and instruction of another is merely a technician and not a conceiver."

A Barr official calls this reading of the law "unusual, to say the least" and predicts that the appeals court will reverse it. But independent patent experts don't agree. Stanford law professor John Barton says there is a good deal of precedent for the decision, and he suspects the appeals court will uphold it. "You are permitted to make 'prophetic claims,'" he says. "If you're right, you have a patent." Particularly in the biotech arena, he adds, such crystal ball reading is becoming standard practice. "A lot of patent drafting is how well you can guess what you can do."

While that's certainly true, says Kate Murashige, a patent attorney at the Washington law firm Morrison & Foerster, she also notes that the casebooks are sprinkled with exceptions where courts have awarded patents to those who have proved that an invention works. For example, in 1991 the biotech firm Xoma successfully defended its patent for a monoclonal antibody used to combat toxic shock by contending that while others had used it on animals, Xoma was the first to prove it worked on people. In this case "reducing the invention to practice"—proving that it actually worked in humans—was the real invention. The AZT ruling seems more in line with a traditional reading of the law, Murashige says, but "until there's a clear ruling about which inventions reduce to practice and which don't, this is never going to be resolved." In this murky area, an appeals court decision that makes the distinction clear would be a fine judicial invention indeed.

–Christopher Anderson