For years the two population geneticists had been studying the genetics of aboriginal populations in an attempt to reconstruct the movements of early peoples, whom they bred with, and how they were related. But the research was handicapped because the "old style" genetic markers, such as the ABO blood group antigens, were "cumbersome and awkward to work with," says Kidd. These markers are used to compare how people vary at specific spots along their chromosomes, thereby creating genotypes or distinctive genetic "fingerprints."

What's more, there simply weren't very many of these markers around. Says King: "Ten years ago, you could determine the genotype of perhaps 50 loci [along the chromosomes]. That was the end of the story." Indeed, for that reason, Cavalli-Sforza and Kidd essentially stopped their phylogenetic studies in the early 1970s. "We ran out of data," says Kidd.

But by 1984, recalls Kidd, the new molecular tools coming on line promised to transform the field. He and Cavalli-Sforza were particularly excited by the new genetic markers, or DNA polymorphisms, that were being developed at the University of Utah and elsewhere. Not only did they provide a much more direct measure of genetic variation than the older methods, but they would soon be available in unprecedented numbers. "What's changed," says Kidd, "is the availability of thousands of genetic markers, scattered around the genome."

The irony was that just as the new markers and other techniques were becoming available, the populations Cavalli-Sforza and Kidd wanted to study were disappearing. What they needed to do, the two decided, was to collect DNA samples from members of indigenous groups immediately and preserve them. That could be done by collecting blood and then inducing the white cells to grow permanently in culture. Cavalli-Sforza and Anne Bowcock at Stanford and Kidd's team at Yale began that year, establishing cell lines from two groups of African Pygmies, whom Cavalli-Sforza had studied since the early 1960s, and others.

They have continued ever since, working on a shoe string. Says Kidd: "Both Luca and I have been frustrated by the difficulty of getting grants for this kind of work." Indeed, they have not mounted any special expeditions, which would be costly, but rather have persuaded anthropologist friends to collect blood samples for them, often meeting them at Kennedy Airport and rushing the samples off to the lab. So far, the Stanford and Yale teams have established permanent cell lines from individuals in 13 of the 250 populations the researchers identified on their 1984 flight. Clearly, they would need international help to complete the project.

Meanwhile, Wilson at Berkeley was pioneering the use of a new technique—the direct sequencing of mitochondrial, as opposed to nuclear, DNA—to study aboriginal populations in Africa and elsewhere. This led him to, among other things, his controversial theory about mitochondrial Eve. While pursuing these studies, Wilson also came up with essentially the same idea that Cavalli-Sforza and Kidd had. And by the late 1980s, Cavalli-Sforza and Wilson, who had earlier been on opposite sides of a heated debate on human origins, had begun

Yanomami People Threatened

Just 3 years ago, the Yanomami people were the largest group of native Amazonians still living in relative isolation in the jungles of Brazil. Almost 10,000 of them inhabited 125 villages, spread throughout a 94,191-square-kilometer region near the border of Venezuela. There they hunted and thrived in the tropical forest much as their ancestors had for thousands of years before them. But today, the Yanomami are a threatened people. According to anthropologists who have just returned from a fact-finding mission to Brazil, they will become extinct in the next decade if the Brazilian government does not move to protect them.

The warning is part of a hard-hitting report released this week—timed to coincide with Brazilian President Fernando Collor's visit to Washington—by the American Anthropological Association. Earlier this year, the association had taken the unprecedented step of sending a special commission of anthropologists to check out reports of the devastation of the Yanomami. What they found shocked even those prepared for the worst: Malaria and other diseases are killing the Yanomami at a rate of 13% per year and have thinned their ranks to 8000 already. As a result of the rampant malaria, fertility is near zero, and those people who have survived are sick and starving. "It's a desperate situation. A lot of villages have no more children and old people," says University of Chicago anthropologist Terence Turner, chair of the special commission.

What has visited this plague upon the Yanomami? The report lays the blame squarely at the feet of the Brazilian government, saying that it has failed to honor the Brazilian constitution, which guarantees Yanomami land rights, as well as its own promises to protect the indigenous people of the Amazon. Although the government had taken steps in the mid-1980s to turn the Yanomami territory into a special refuge, it later reneged on that promise and opened much of the region to miners of gold and the tin ore cassiterite.

In the gold rush that followed, as many as 40,000 miners invaded the region, using high-powered hoses and mercury to blast gold out of the soil. The mercury and soil runoff polluted the rivers and streams where the Yanomami fish, while the noise scared off the wildlife they hunted. Worse yet, the pools of stagnant water from the mining operations became breeding grounds for malaria-carrying mosquitoes. "Brazilian policies and economic activities have turned the land of the Yanomami into a death camp for its own people," says the report.

But there are some signs of hope. The report notes that President Collor, who assumed office in 1990, announced in April that he would revoke earlier decrees that had expropriated most of the land of the Yanomami. But he stopped short of giving the Yanomami legal title to the land, in favor of allowing the government to study the issue for 6 months. The anthropologists question the need for further study, as does the Environmental Defense Fund, which released a report of its own this week decrying the Brazilian government's policies on the Yanomami and other environmental issues. But Jose Goldemberg, Brazilian secretary for science and technology, said that the extra time was needed to figure out how much land to include in the reserve. The original Yanomami territory comprises 40% of the state of Roraima, which is home to about 500,000 other people, many of whom would have to be displaced for the reserve.

At press time, the anthropologists and environmentalists were hoping to meet with Collor during his Washington visit to discuss their report, which calls for the immediate return of the land to the Yanomami, the expulsion of miners from the region, and the provision of adequate medical supplies. No less is at stake than the future of one of the oldest Native American cultures.

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