crops to grow in totally unsuitable locations. Widespread food shortages resulted when these efforts proved unsuccessful.

Faced with such failures, Mao Zedong turned to a new strategy, the infamous Cultural Revolution. At the insistence of Mao's Red Guards, university professors and researchers were sent to work on the land to be 're-educated', many university departments were closed, and work on human genetics again came to a virtual halt.

Few classically-trained geneticists were able to sustain this triple blow to their discipline. Many left to work in the United States, never to return. Others died in the fields, or moved into other areas of research, such as plant physiology. When the US virologist Howard Temin visited China in 1977, he concluded that genetics played virtually no role in Chinese biology.

One of the few to have survived was the geneticist C. C. Tan (Tan Jiazhen), a student of Li's who was for many years director of the Genetics Institute at Fudan University in Shanghai. Tan, now in his 90s, has been a chief architect of the revival of genetics over the past 20 years — and was the president of last summer's international congress in Beijing.

A survivor's victory

Tan started his research career in the early 1930s, publishing a series of papers, specializing in the genetics of *Drosophila* and ladybirds, between 1932 and 1949. The influence of Lysenko meant that he then published nothing until 1963, with a further ten-year gap after 1966 during the Cultural Revolution. It was only a personal friendship with Mao that allowed him to keep the Shanghai institute open as a lonely outpost of Mendelism.

Today Tan is one of the most fervent supporters of the idea that China needs to establish its position as a leading nation in modern human genetics, and to use its skills in this field to meet the country's social needs and to provide the basis of a competitive presence in the global economy.

Speaking at the opening of the Beijing meeting, for example, Tan described how genetics was an essential tool for addressing two of the most pressing problems facing the country: the need to feed its 1.2 billion population — a staggering 22 per cent of the world's population — and to develop the medical techniques necessary to meet its health needs.

Partly under Tan's leadership, genetics in China has progressed steadily over the past 20 years. Achievements have been particularly marked in plant genetics, where the potential of recombinant DNA techniques has been rapidly absorbed, for example, in work on sequencing the rice genome.

There has also been progress in human genetics. Important 'disease genes' have been identified through studies of the Chinese population — most recently those implicated in liver cancer. Other achievements include the identification of novel mutations associated with haemophilia and non-insulin dependent diabetes, and China now has 30 laboratories involved in human genome research.

According to many Chinese geneticists, however, it has still been something of an uphill task to convince political authorities to support this work. Lysenko cast a long shadow, and the idea of genes as significant factors in helping to determine the fate of individuals has been difficult to accept by many of those brought up to believe such determinancy to be a myth.

Ironically, a Western threat of a different kind has recently become one of the most powerful weapons geneticists have been able to use to press their case for more support — namely that multinational companies have shown intense interest in exploiting China's wealth of genetic resources.

This wealth is based on China's astonishing ethnic diversity — and the fact that many of its ethnic groups have retained their biological identity over centuries. The distinct characteristics of these groups, aided by administrative records that often go back over many centuries, have become a goldmine for population geneticists. Researchers are keen to use family relationships to identify the genetic basis of — and if possible to identify the gene or genes responsible for — particularly prominent physiological symptoms (see box).

Western interest

"This huge population provides a unique resource for isolating disease genes through linkage analysis in large numbers of families," says Zhu Chen, one of the country's leading geneticists and the director of the Shanghai Human Genome Research Centre — the second of the country's two main centres for genome research.

Inevitably, Western researchers are showing great interest in the potential of this vast and unique genetic resource. Numerous

Mining a rich seam of genetic diversity

"The populations of Finland and Iceland have become valuable resources for geneticists because of their relative isolation. In China, we have several Finlands and several Icelands," says Lin He, a neuropsychiatric geneticist at the Shanghai Research Centre of Life Sciences.

With the rapid growth of interest in population genetics in recent years, China has become a gold-mine for such studies. Although 93 per cent of Chinese are from a single ethnic group, the Han, the country also has 55 minority groups. Many of them — such as the Tibetans or the Muslim Uyguts in Xinjiang — live in remote border regions.

Through accidents of geography and history, each group has maintained its cultural — and genetic — identity over hundreds, if not thousands, of years. The result is a unique resource that offers vast potential for the study of the genetic basis of human evolution and diseases.

Chinese researchers, backed by foreign colleagues, are developing the skills to exploit these opportunities. The evolutionary studies are already playing a key role in the international Human Genome Diversity Project. And various groups — watched closely by Western pharmaceutical companies — are studying the genetic basis of diseases from asthma to cancer in minority groups in which the incidence is high.

Many Western researchers are also making full use of the genetic variety available to them to study. But as China's economic development leads to the geographical dispersal of minority groups and more intermarriages, the window of opportunity is closing fast.

"With more and more intermingling between different genetic isolates, the conservation of genome samples is an urgent task," says Zhu Chen, head of the Shanghai Human Genome Centre.

In response, one of the first goals adopted by China's Human Genome Project has been to preserve at least 50 sample genomes from each minority group — as well as genome samples from groups of Han in both the north and south of the country.

Much of this work is concentrated in the south-western province of Yunnan, whose proximity to the foothills of the Himalayas has left it with a wealth of plant, animal and human genetic variety.

Kunming, the capital of the province which boasts 25 ethnic groups, has become a national focal point for the collection of samples through the Institute of Medical Biology of the Chinese Academy of Medical Sciences. "Our key aim is to preserve samples from China's minority groups," says Chu Jiayou, director of the institute.

Parallel work on conserving genome samples from animals and humans is taking place at the Kunming Institute of Biology, part of the Chinese Academy of Sciences. "This is one of the biodiversity hotspots of the world," says Ya-Ping Zhang, head of its laboratory of cellular and molecular evolution, which has collected more than 10,000 genetic samples in the past two years alone. "We have to make a big effort to preserve what would be very difficult to regain if it was lost."