

Scientists fear outcome of genetic engineering

By GAIL MITCHELL

The potential for misuse of knowledge has always been nightmarish. But with the recent developments in genetics, the threat of disaster has never been so real.

For the first time in the history of nuclear science, research workers concerned with molecular biology called a halt to their studies for fear of the consequences.

For the first time scientists are questioning their common, and generally unspoken assumption, that the acquisition of knowledge is always an absolute good, requiring no justification or ethical sanction.

More than 200 eminent scientists recently concluded an conference at Davos, Switzerland, on the dangers and projected future benefits of genetic engineering.

Researchers realized their latest achievement—the cracking of genetic codes—opened the way to designing new bacteria which are potentially more dangerous to mankind than the atomic bomb.

In 1953 at Cambridge University, Dr. James Watson and Dr. Francis Crick discovered the pattern of all life forms is determined by a double-helical molecule of deoxyribonucleic acid (DNA). Genes are molecules

of DNA, units of heredity.

Since then, scientists have found ways of cutting the long molecules into shorter pieces and recombining them. These splicings are then incorporated into bacteria to create new microorganisms whose potential for causing disease in plants, animals and man is unknown.

In 1969 when three biologists at Harvard Medical School announced to the world they had succeeded in isolating a pure gene from a bacterium, it was not without some misgivings. Although they felt their discovery could be used to cure such hereditary diseases as hemophilia, they warned of the dangers of government misuse of the technique. They feared they were unleashing on the world the same kind of mixed blessing as nuclear power.

They were not alone in their fears. Soon after the announcement Maurice Wilkins, 1963 winner of the Nobel Prize for medicine, warned that the isolation of the gene could lead to the development of a major germ weapon. "It is the kind of thing you cannot trust society with," he said.

Again in 1972, Australian microbiologist and Nobel laureate Sir MacFarlane Burnet said he would, if he could, stop all experimental efforts to manipulate the genes of viruses that inflict grave illness or death in people. The danger, he said, was the inadvertent creation in the laboratory of sub-species of a devastating virus against which humans would have no immunological defences.

"The possibility for good in these experiments are trivial improvements in vaccines, and not worth the risk," Burnet said.

Despite the past warnings from scientists in the field, not until this summer was some kind of positive action taken to look at the potential consequences of genetic engineering.

In July, 11 American researchers, including Watson, declared they were halting certain experiments in genetic manipulation of bacteria. Their reason: if they do not stop, they may accidentally loose upon the world new forms of life—semi-synthetic organisms that could cause epidemics, resist control by antibiotics and perhaps

increase the incidence of cancer.

In a letter published in *Science* magazine—the magazine of the American Association for the Advancement of Science—and in *Nature*, its British counterpart, they urged colleagues around the world to stop experimentation with bacteria whose biological properties can not be predicted in advance.

The group, chaired by Paul Berg, chairman of the Stanford University department of biochemistry, is buying time to consider hazards before rapidly developing research grows too large to be controlled.

According to Berg, the embargo is "the first I know of in our field. It is also the first time I know of that anyone has had to stop and think about an experiment in terms of its social impact and potential hazard."

Many are pessimistic about the embargo's possibilities. One U.S. National Institute of Health scientist says, "Anyone who wants will go ahead and do it." Although, he adds, the technique requires a moderate degree of sophistication at the present, it will be a "high school project in a couple of years."

Others are uncertain whether the ban will be observed by countries interested in the new techniques's considerable potential for biological warfare. For example, many millions of dollars were invested at the U.S. Army's biological laboratory at Fort Detrick, Maryland in trying to improve on the lethality of viruses and bacteria harmful to man.

Controversy already surrounds every proposal put forth at the conference in Switzerland.

Scientists at the University of British Columbia have gone ahead in the application of genetics to the management of insect pests, offering benefits to

agricultural and public health care. Their colleagues at Sussex University in Britain have developed new strains of nitrogen-producing bacteria that could cut down the need for fertilizer.

Industry is attracted by the prospects of new processes for the synthetic production of drugs such as insulin.

If some of the fast-reproducing deadly organisms were to escape from the laboratory in the course of experiments they could produce plagues that would make the Black Death of medieval Europe look trite, for there would be little hope for control.

Dangerous materials have been known to escape from laboratories. Only recently, smallpox escaped from Porton Down, Britain's top security micro-biological research laboratory.

Although the problems are comparable to those associated with nuclear fallout in that it affects everyone, John Kendrew, deputy director of the British Medical Research Council's Laboratory of Molecular Biology, thinks it's worse.

"...in my opinion our present problem is even more difficult. For early nuclear research was contained within a governmental military framework while gene transfer can be done by competent people in any lab at any place. And for some of the work to be carried out behind a cloak of military or commercial secrecy would be doubly dangerous."

Many scientists would like to see the establishment, through the world conference on genetic engineering to be held early next year, of an authoritative international body to advise specialists on aspects of research in the field.



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