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'Genetic Engineering' Will Fight Disease

By David Perlman
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Scientists from the University of California and the University of Washington reported here yesterday they are carrying the revolutionary technique of "genetic engineering" into the fight against human disease.

They are working swiftly toward the development of hybrid bacteria that can act as vaccines against deadly forms of diarrhea, and they are creating artificial genes to yield hormones for the treatment of diabetes.

This progress report on the fast-moving field of genetic engineering came from Dr. Herbert W. Boyer, associate professor of biochemistry and chief of the genetics division at UC Medical Center here, and from Dr. Stanley Falkow, professor of microbiology and genetics at the University of Washington in Seattle at a UC campus meeting.

In their discussion they also described how another research group has successfully bred a strain of genetically-altered bacteria that can be used for many crucial laboratory experiments without endangering human beings at all.

And they reported that new guidelines have now been completed to impose strict controls over this whole area of research so that public hazards are minimized.

For nearly four years now, researchers in America and Europe have been devising intricate biochemical methods for transferring fragments of genes from the cells of one species of organism into the cells of totally different species.

The work stemmed from the discovery of a unique class of natural chemicals that can cut the circular genetic molecule, known as DNA, into separate fragments. Each of these chemicals, called restriction enzymes, works like a special kind of scissors. They snip the DNA at specific points so that specific bits of genetic material governing known hereditary characteristics can be glued together with other DNA molecular fragments to create hybrid organisms.

The new organisms, principally bacteria, can then be "cloned," or reproduced in massive numbers, so that they all carry identical sets of the hybrid genes.

While this extraordinary step forward in genetics research offers great promise for the mass-production of hormones and other essential biologic materials — and for the understanding of genetic mechanisms at the molecular level — there are many dangers too.

The biggest hazard stems from some of the research where genetic material from bacteria or viruses may be combined in the laboratory with genes from higher organisms — insects, for example, or toads, or even sub-human primates.

The problem here is that these genetically "transformed" bacteria and viruses might escape from the laboratory, spread into the human population, and cause outbreaks of unknown diseases or widespread resistance to antibiotics.

In an unprecedented move by the scientific community, the researchers themselves declared a temporary moratorium on their more hazardous experiments two years ago. Then at Asilomar last year they convened an international meeting to start writing guidelines to govern their work.

Some scientists, both in the field and outside it, are deeply worried about the potential hazards and have urged a longer moratorium on research or much more rigid curbs on the work than those written into the now-completed guidelines.

Yesterday Boyer and Falkow expressed confidence in those guidelines, which have now been completed, and said they impose appropriately strong safety requirements on genetic engineering laboratories while protecting freedom of inquiry for the researchers.

At the same time, the two scientists reported, Dr. Roy Curtiss at the University of Alabama has succeeded in breeding a strain of common bacteria that will self-destruct almost at once if they should escape from the laboratory and threaten to invade the human gut.

The bacteria are known as Escherischia coli, and they are normally found by the millions in everyone's digestive tract. They are widely used in genetics experiments and even the most common laboratory strains pose little danger to humans.

Curtiss's specially-bred version — which he has named E. coli 1776 in honor of the bicentennial — is even less hazardous Falkow reported. The probability of the 1776 germ surviving without its required supply of laboratory-provided nutrients is barely one in a million, Falkow said.

Boyer and Falkow are now working together in a genetic engineering project aimed at altering the bacteria that cause various types of diarrhea — including the highly lethal, contagious diarrhea that kills infants in hospital epidemics.

The scientists are creating hybrid forms of these bacteria in which the capacity to cause disease is destroyed, while the germs retain their ability to confer immunity against the virulent natural strains of the same organisms.

Boyer also reported yesterday that his laboratory group is learning to engineer other types of hybrid bacteria that produce a valuable and rare hormone called somatostatin.

This hormone, first isolated from sheep brains at the Salk Institute in 1973, is now being produced synthetically by drug companies at a cost of $30,000 for a meager half-gram. It is being tried experimentally at UC as a supplement to insulin in curbing the severe complications of diabetes, but a half-gram of somatostatin is barely enough for a single diabetic patient for less than a year.

Boyer's laboratory effort — if it proves successful — would use hybrid bacteria containing the hormone-producing gene as biological factories to yield large quantities of the material at extremely low cost.

Millions of Rats Killed

Dakar, Senegal

More than two million rats have been killed in a campaign to eliminate the rodents that have been devastating food supplies in Senegal, Mali and Mauritania, officials said yesterday. But they said the poison used to kill the rats sometimes makes the plants inedible.

About 700 tons of poison have been distributed in an international campaign to destroy the rats that proliferated after rainfall came to relieve a disastrous drought in the sub-Sahara region. Authorities reported that there have been no ill effects on humans from the rat poison.

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