Decision at Asilomar: Scientists agree to regulate restrict their DNA investigation

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Conference organizers draft proposal

For the first time in history, scientists recently agreed to regulate and in some cases restrict their own investigation in a new and promising field out of moral considerations for the consequences of their research. This historical event took place as molecular biologists from 17 countries met in a secluded resort called Asilomar in Pacific Grove, California, to try and establish guidelines for a promising but potentially dangerous field: genetic engineering.

A few young successful West Coast biologists called the conference together because it became dear to them that they had released a "genie in a bottle" in their discovery of a technique for recombining the genes of totally unrelated organisms, essentially creating new life forms. The danger is that such recombined organisms, being outside the realm of normal evolution, might pose unexpected and perhaps uncontrollable hazards.

The new technique consists of using special enzymes to excise portions of DNA, the spiral molecule upon which genetic information is coded, from a bacterium, plant, or animal. These "snippets" of genetic information are then inserted into living "vehicles," usually viruses or small rings of bacterial DNA called plasmids. The vehicle then inserts its new message into the genetic code of another cell, which then starts expressing the characteristics of the recombined gene.


Paul Berg: molds consensus from disunity

With this technique, man could manipulate evolution more surely and precisely than with breeding or drugs. Theoretically, scientists could replace defective genes with working ones to prevent and cure genetically-linked diseases. They could also insert desired characteristics into plants and animals, such as nitrogen fixation, increased carbohydrate production, insect resistance, and amino acid content in plants; or super weight gain, hardiness, etc. in chickens or other livestock.

One of the most useful features of recombination is what scientists call "amplification." One can, in effect, grow large quantities of a certain gene product, such as antibiotics or essential proteins such as insulin. The result is a "microbial drug machine" which could produce the desired product much faster than traditional extraction processes.

Most exciting to many scientists is that recombination offers a powerful new research and development tool. According to Sydney Brenner of Cambridge University, "Problems people were interested in 100 years ago are starting to be tractable now with these methods." For example, the complete sequencing of genes might be just around the corner.

The dangers, however, are correspondingly great. Conceivably, if doctored forms of a common bacteria were to escape accidently from laboratories, they could spread cancer and other diseases among the general population. Through accident or by purposeful manipulation, genes for cancer or lethal toxin formation could be inserted into common bacteria.

Biological warfare agents and massive epidemics could be created this way.

The original group of scientists, headed by Paul Berg of Stanford University, last summer called for a moratorium on experiments in most areas of genetic engineering until the international meetings, sponsored by the National Academy of Sciences, could be held to devise a blueprint for future research.

Members of the conference, including 86 scientists from the United States and 53 from other countries, decided after four difficult days of deliberation to end their voluntary deferral of some experiments, but decided that some experiments could not be done until better containment techniques could be developed, and that some very risky experiments should not be done at all, even under the highest containment precautions.

The scientists decided that certain experiments can proceed only in very elaborate high containment facilities, only six of which exist in the United States. The work is done in safety cabinets, in rooms with negative pressure and air locks, and personnel must be decontaminated when leaving.

Most of the conference members agreed that combining toxin genes with common bacteria, especially for biological warfare, would be morally indefensible under any circumstances.

One of the most fascinating containment techniques is the genetic development of bacteria designed to "self-destruct" when leaving the test-tube environment in which they were produced. The bacteria could be doctored in such a way that it loses the ability to produce a certain essential amino acid, which must then be supplied in the culture medium for the organism to survive.

The conference could not set up any mechanism for strict enforcement of specific guidelines, but rather it was designed to establish a "moral climate." The most potent force for getting the scientists to agree was their feeling of moral responsibility to protect society even at the expense of their own needs for academic freedom or success.