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Recombinant DNA

In 1973 new opportunities in genetic research had become apparent. Enzymes had been discovered that permitted splitting and recombining DNA at highly specific sites. The new techniques facilitated the preparation of comparatively large quantities of specific genes. More than 90 percent of the recombinant DNA work involved use of the K-12 strain of *Escherichia coli*, a nonpathogen. However, some of the molecular biologists early became concerned lest the new technique be misused. In particular, some feared that unusual pathogenic forms of K-12 might be created. Accordingly, the scientists imposed on themselves a moratorium on certain types of recombinant DNA research.

The scientists, however, underestimated the publicity dynamite in DNA. They did not foresee what the media could do with a topic laden with emotion. They did not foresee that public alarm could lead toward what some have called frightening legislation. The clamor reached a peak earlier this year. During the growth phase, a small band of scientists were alone in trying to avoid excessive regulation of their research.

During the past few months there has been a remarkable shift and crystallization of opinion. Suddenly the molecular biologists have become nearly unanimous in opposing features of the new federal legislation. They have been joined by a large contingent of allies not engaged in recombinant DNA research. These include the National Academy of Sciences and most of the biological community. The American Society for Microbiology, whose membership is especially capable of evaluating the risks of use of K-12, has taken a leadership role. Its former president, H. O. Halvorson, has been active and effective in a campaign directed at Congress. Seldom has Capitol Hill received so many letters and visitations from scientists. In consequence, action on legislation is temporarily in abeyance.

Mere concerted action of biological scientists would not alone have been effective. What has changed the atmosphere has been the emergence of a large amount of information about K-12. Some of this had been accumulated over decades. Some comes as a result of experience during the past several years of working with K-12 containing recombinant DNA. Much of this information was summarized in a 13-page letter dated 14 April 1977 from Roy Curtiss III of the University of Alabama to Donald Fredrickson, director of the National Institutes of Health. Dr. Curtiss was one of the scientists who had originally sounded warnings about recombinant DNA research. After years of thorough and painstaking study, he had reluctantly convinced himself that the dangers, if any, were minimal.

During June a broadly knowledgeable interdisciplinary group of about 50 met at Falmounth, Massachusetts, to plan further experiments aimed at evaluating the safety problems. In the course of the meeting, evidence about the extent of hazards of K-12 was presented. In a letter to Dr. Fredrickson dated 14 July 1977, the chairman of the group, Dr. Sherwood L. Gorbach, of Tufts University School of Medicine, wrote as follows:

> The participants arrived at unanimous agreement that *E. coli* K-12 cannot be converted into an epidemic pathogen by laboratory manipulations with DNA inserts. On the basis of extensive studies already completed, it appears that *E. coli* K-12 does not implant in the intestinal tract of man. There is no evidence that non-transmissible plasmids can be spread from *E. coli* K-12 to other host bacteria within the gut.* Finally, extensive studies in the laboratory to induce virulence in *E. coli* K-12 by insertion of known plasmids and chromosomal segments coding for virulence factors, using standard bacterial genetic techniques, have proven unsuccessful in producing a fully pathogenic strain.

Public fears may yet overcome scientific judgment, and what many scientists believe to be bad legislation may be enacted. However, the relevant committee chairmen and their staffs are now fully aware of the new information about K-12. During and after the current congressional recess a modified version of the legislation may emerge.—PHILIP H. ABELSON

*Both Gorbach and Curtiss feel that more experimental evidence should be accumulated on this point.