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Dear ██████████ ██████████

This is in reply to your letter of March 28, 1990, regarding the Human Genome Project.

Let me address what I think are the two basic concerns underlying the unhappiness of some scientists with the genome project--the impression that funds for the project are being taken away from other, more worthwhile, research efforts and that targeted, or goal-directed, research is necessarily inferior to investigator-initiated research.

Many scientists who are strong proponents of investigator-initiated research have become convinced of the merits of the program after closer inspection of the rationale for it. For example, Dr. Bruce Alberts, who has publicly argued against Big Science, chaired the National Research Council Committee that strongly supported a genome project. He was convinced by the arguments in favor of such a program after the committee's considerations and now serves as a member of the NIH Program Advisory Committee on the Human Genome.

With respect to the availability of research funds, I appreciate the concern that is currently being felt in the scientific community. However, the reasons for this situation are manifold and complex and have little to do with the genome project. The increase in the average length of research grants and the very high commitment base due to the large number of grants funded in recent "good" years are two components to the problem, as is the increase in the average cost per research grant. These factors have had significant effects on the funds available for new and competing grants this year; thus, it is erroneous to attribute the current difficulties to the existence of the Human Genome Project.

The FY 1990 appropriation to the National Center for Human Genome Research, the component of the NIH that manages the genome program, is \$59.5 million. Almost half this amount will go for R01 investigator-initiated grants. An additional \$27.9 million is appropriated to the Department of Energy for that agency's program. To date, the programs of both the NIH and the

DOE have been the recipients of new funds. It is by no means certain that, in the absence of a new program such as the Human Genome Program, those funds would have come to the NIH. Indeed, it is more than likely that they would not have.

The House Subcommittee on Appropriations that has responsibility for the NIH also has responsibility for the entire Department of Health and Human Services [excluding Medicare and Social Security], as well as the Departments of Labor and Education. All these programs compete directly with each other for money. In last year's budget negotiations, for example, funds were taken from the NIH at the last minute to support social services. It is therefore plausible to argue that the Human Genome Program has brought additional funds into biological research that otherwise would not have been available. Even when the genome program reaches the recommended steady state level of funding, it is expected to account for less than 2% of the NIH budget, which this year totals \$7.5 billion, including \$743 million for AIDS.

As a result of consideration by a number of committees made up of members of the scientific community (both those who initially supported the idea and those who were opposed), debate (organized and otherwise) at scientific meetings, and airing of the issues in the press, the program today is quite different from that originally proposed (see the enclosed five-year plan for the NIH-DOE program). An integral component of the NIH program is the characterization of the genomes of model organisms, information that will be essential for interpreting the human data. In the early years the program will focus on genomic characterization by genetic and physical mapping. New methods and tools for genomic analysis produced by the program will reduce the cost and increase the efficiency of such research for all investigators.

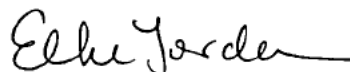
The usefulness of genetic linkage and physical maps in the identification of disease-associated genes is not in dispute. Yet it is unlikely that an improved human-linkage map or extensive physical maps will be developed in the absence of a defined Human Genome Program, as there would be no funding for major efforts of this type through regular NIH programs. The targeting of genes for specific diseases or other phenotypes has proven to be expensive on an individual basis, even in the instances in which it has been successful. It is one of the high expectations that we have for the genome program that by characterizing the genetic composition of the human and other organisms on a concerted, systematic basis, a great deal more information will be produced at an overall lower cost than would be available if the work were done on a gene-by-gene basis.

At this stage, the genome project has not made a commitment to sequencing the entire human genome. Over the course of the next five years, emphasis will be placed on improving existing methods of sequencing and developing new methods that will reduce the cost to a level at which the cost of sequencing large genomes becomes acceptable. Only when the costs are reduced sufficiently will the decision to engage in large-scale sequencing be made. Until that time only pilot projects, focussing on areas of known biological interest, will be undertaken. For many genes, sequence analysis may actually prove to be the most rapid and efficient means of identification. Furthermore, some kinds of genes will only be detectable from the sequence, as there is no biological way of identifying them, e.g., genes in which mutations would be lethal.

Our experience has shown that the genome project is attracting increasing numbers of high-caliber workers, including graduate students and postdoctoral fellows, who find the research to be stimulating and exciting and who are convinced of its ultimate value.

In summary, I believe that the genome project is a robust and vigorous program that will produce a resource which will be of immense use to the biological and biomedical research communities in their pursuit of improved understanding of biological systems and applications of this knowledge to human health problems. As such, it represents an important investment in the future of all biological research and is fully consonant with the mission of NIH.

Sincerely yours,



ELke Jordan, Ph.D.  
Deputy Director  
National Center for  
Human Genome Research

Enclosure

cc:  
Dr. William Raub