January 25, 1958

Dr. G. Liljestrand, Secretary
The Nobel-Committee for Physiology and Medicine
The Royal Caroline Medical Institute
Stockholm, Sweden

Dear Mr. Secretary:

It is an honor and privilege to be asked by the members of the Nobel-Committee for Physiology and Medicine to propose candidates for the Nobel Prize for Physiology and Medicine in 1958. It is to do so that I send the present letter.

Before coming to Harvard University eight years ago, to devote all of my time and energies to my administrative duties as Dean of the Faculty of Medicine, my professional field was, as you know, Bacteriology and Virology. Partly for the reason that I am accordingly more familiar with the rapid advances that are being made in the field of biology through the study of microorganisms and viruses, but more particularly because I believe there is no area of biology in which fundamental knowledge is being more effectively acquired, I have sought the collaboration of my distinguished colleague, Dr. Bernard David Davis, Professor of Bacteriology and Immunology and Head of the Department at the Harvard Medical School, in articulating for you in nominating candidates for the Nobel Prize our conviction that the thoughts I expressed at the beginning of this sentence are true. Being an important contributor to the expanding field of microbial genetics and metabolism, Professor Davis is furthermore far better equipped to prepare a detailed statement for you than am I. Below, I quote from his statement to which I subscribe fully and enthusiastically as do a number of his other colleagues at Harvard who participated in the preparation of our nomination through discussions with us.

"No area of biology has had a more striking efflorescence in the past 20 years than has microbial genetics. Microorganisms have proved to offer great advantages in approaching experimentally many of the most general problems of biology; a large number of brilliant investigators have been attracted to this field by the possibility of solving such problems through a combination of simple technics and ingeniously designed experiments.

"Among the most significant discoveries in microbial genetics are the following:

"1. Deoxyribonucleic acid (DNA), a material previously considered to have little specificity, has been shown to be the bearer of genetic information in bacteria. This discovery, made by the late O.T. Avery, has led to the widespread present interest of biochemists in the structure of this substance, in its metabolism, and in antimetabolites that interfere with its synthesis. It has since been found that the genetic information

is certain viruses is also carried in their nucleic acid (DNA for bacterial viruses and RNA for plant viruses).

"2. The systematic isolation of microbial mutants blocked in various biosynthetic reactions has had a number of important consequences. (a) It has provided a sharper conception of the function of a gene - that of providing information essential for the synthesis of a corresponding enzyme or other macromolecule. (b) The availability of a wide variety of genetic markers in microbes has made possible genetic studies with much larger populations than could be previously handled. It therefore became possible to study mutations and also recombinations that occurred with extraordinarily low frequency; such studies showed that genetic recombinations, previously observed to occur between genes (defined as functional units), also occur between sites within a gene. (c) The application of microbial mutants to problems of intermediary metabolism has made possible the analysis of a wide variety of biosynthetic pathways, and is now contributing to an analysis of the regulatory mechanisms that control the traffic through these pathways in the cell.

"3. Bacteria, previously considered to exhibit inheritance only by binary fission, have been shown to undergo genetic recombination through cellular contact and also, in certain instances, through "transduction", i.e. passive transfer of various fragments of bacterial DNA by a virus (bacteriophage) moving from a donor cell to a genetically different recipient cell. These developments have interest not only because of the light they throw on the nature of bacteria and viruses, but also because they have made it possible to study genetic problems in bacteria, which offer the experimenter significant advantages over other microorganisms.

"4. Mutation and recombination have also been shown to occur in bacterial and in animal viruses. Recombination in bacterial viruses has made it possible to distinguish mutations that are located only a few nucleotide units apart on a DNA chain. These results provide a substantial basis for the hope that the change in DNA produced by a mutation will soon be defined in chemical terms.

"5. When a bacterium is infected by a temperate phage (one of low virulence) the bacterium will sometimes become lysogenic, i.e., it will carry the genetic potentiality for producing identical phage particles in a future generation. It has been shown that the lysogenic state involves incorporation of the phage DNA into a particular site on the bacterial DNA chain, where it behaves in genetic experiments like one of the cell's genes. Under a suitable stimulus the incorporated phage (prophage) is released as a free DNA particle (vegetative phage). The cell is thereby guided to make more of the same DNA together with the corresponding protein, and these components are then combined and released by cell lysis as complete (infective) phage particles. The demonstration of this cycle breaks down the barrier between a gene and a virus, and this new concept will surely influence studies on the origin of cancer.

"With so many brilliantachievements to consider, one could cite many investigators in this field as appropriate candidates for a Nobel Prize. These would include the following:

"G.W. Beadle, of the California Institute of Technology, who with the collaboration of E.L. Tatum developed the systematic isolation of biochemical mutants of the mold Neurospora and initiated their use to study biosynthetic pathways, and who then provided a firm foundation for the one-gene-one-enzyme hypothesis.

"J. Lederberg, of the University of Wisconsin, who discovered genetic recombination and transduction in bacteria, and the fact that in a lysogenic bacterium the genetic capacity to produce phage strain is located at a specific locus on a bacterial chromosome.

"M. Delbrück, of the California Institute of Technology, who developed the methodology that made it possible to study bacteriophage growth and mutation quantitatively.

"A.D. Hershey, of the Carnegie Institution at Cold Spring Harbor, New York, who discovered genetic recombination in bacteriophage and also the fact that, when a phage infects a bacterium, the phage DNA penetrates and the protein is left outside.

"A. Lwoff, of the Pasteur Institute, who established that the cycle of lysogenic infection by a bacteriophage involves three forms of the virus: infective, vegetative, and prophage.

"The choice in this field is difficult, and it is likely to become increasingly so in future years since the field continues to attract many outstanding investigators. For the seminal value of their work in opening up large new areas, Beadle, Delbrück, and Lederberg would be foremost. For the original and imaginative nature of their discoveries on bacteriophage, we believe Lederberg, Lwoff, and Hershey would be the best choices. Rather than try to narrow the choice further, we should like to recommend that all five of these individuals ultimately receive a Nobel Prize. This would form a suitable background for the inevitable later consideration of the work of Watson and Crick on the structure of DNA and that of Kornberg on its enzymatic synthesis."

Because in the present letter we invite attention to the qualifications of a number of outstanding candidates rather than to those of a single individual, we are taking the liberty of not including the bibliographies of those listed above. It is inconceivable to me, furthermore, that this material is not already available to the members of the Nobel-Committee. Should this not be the case, and should you wish to have this material submitted, we would be happy to prepare it for you here on any or all of the candidates mentioned.

Sincerely yours,

George Packer Berry, M.D.
Dean of the Faculty of Medicine and
Professor of Bacteriology

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