Introduction

SYMPOSIUM ON GENETIC IMPLICATIONS
OF DEMOGRAPHIC TRENDS

By Invitation of the Committee on Arrangements
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Chairman, James V. Neel

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Editorial Note: In the program as presented at the Autumn Meeting of the Academy in
Ann Arbor, Michigan, October 23-25, 1967, the authors and titles read as follows:

FREDERICK SEITZ, National Academy of Sciences, Washington, D. C.: Introductory
Remarks.

JAMES F. CROW, University of Wisconsin, Madison, Wisconsin: Gene Pools and Rates of
Genetic Change under Selection.

DUDLEY KIRK, Population Council, New York, New York: Patterns of Survival and

WILLIAM J. SCHULL, University of Michigan, Ann Arbor, Michigan: Hirado, Japan: A
Case Study in Genetic Demography.

JAMES V. NEEL and NAPOLEON A. CHAGNON, University of Michigan, Ann Arbor, Michigan: The
Demography of Primitive Man.

WALTER BODMER, Stanford University School of Medicine, Palo Alto, California: Some
Problems in Utilizing Demographic Data for Genetic Purposes.

In the published papers which follow, the names of several co-authors have been added to
one of the papers and some of the titles have been altered in order to designate more specifically
the character of the material presented.

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INTRODUCTORY REMARKS
BY FREDERICK SEITZ
NATIONAL ACADEMY OF SCIENCES, WASHINGTON, D.C.

The nineteenth century, in addition to being that in which science came of age in the sense that some branches of science, most notably chemistry and physics, contributed to technology at long last in a major innovative way, was also the century in which man began to gain a profound perspective into the scientific sense of his own relationship to nature. This perspective began to emerge when he first achieved some inkling of the truth concerning the vast age of the earth, granting that the period of relatively exact dating lay ahead in the next century. Still further, he began to appreciate the extent to which he is an intimate part of nature and indeed of the natural scene about him rather than a creature apart from nature. Darwin's formulation of a theory of evolution provided a major thrust for the new outlook; however, the process of filling in the detailed framework of paleontology was also crucial.

Even since Darwin, now more than a century ago, it has been natural to inquire about the relative attributes of the various families of man and to ask how the complexities faced by the different branches of our species have affected these attributes. These obviously are topics of great interest—indeed, one might even add, of great import. Moreover, it is clear that, as part of the process of gaining as much universal wisdom as possible, we should encourage all the sound research into these subjects that interest, resources, and talents can muster. The subject matter is obviously exceedingly complex, since the history and genetics of man are intricate and our tools for investigation are relatively primitive. Moreover, it is quite evident that it will be a long time before we can hope to gain significant and reliable insights which will provide us with a rational picture of the different varieties of man and his attributes, let alone anything that might be called a workable, practical one with a scientific base.

In the meantime, the subject naturally attracts the attention of many of those who are concerned with the social problems associated with interactions between the families of man. Such problems range from matters concerning the conflicts of bordering nations of closely kindred peoples who have slightly different genetical mixes and who may be glaring at one another across national borders to situations like that in South Africa or in our American cities, where there is conflict between groups having, at least in certain respects, significant differences in genetic makeup.

One of the great difficulties encountered in a situation like this, in which the available scientific framework is exceedingly primitive in relation to the complex issues under discussion, is that speculation tends to outrun sound knowledge and quasi-scientific views tend to occupy the position that more exact knowledge normally would. One is reminded of the stanza from the World War I song “Mademoiselle from Armentieres” which began “The French they are a funny race.” This field has attracted so much emotional attention that even distinguished physical scientists have been known to jump into it with both feet, seemingly heedless of opinions or hazards.
This reminds me of an incident which occurred two years ago during a business trip to Africa. On one very exciting day of this journey I had the good fortune to spend the morning at Olduvai Gorge with Dr. Louis Leakey, who showed me the treasures of that ravine with its million-year exposure, including the places where he had found the remains of ancient hominids such as *Zinjanthropus* and *Homo habilis*. Later that day, I flew in a small private plane to the Amboselli Wild Life Park at the foot of Mount Kilimanjaro, passing over magnificent Ngoro-ngoro Crater during the journey. As I sat around the campfire that night chatting about Olduvai Gorge and man's ancient forebear or cousin, *Australopithecus*, with the pilot and several others who joined us there, I found deep interest in this ancient man who occupied such an important part of the story of human evolution. Those present were all of the light-skinned variety of our species whose ancestral home in recent millenia has been in the northern latitudes—men whose days in equatorial Africa may well be numbered as the new governments there gradually tighten restrictions on residence and employment. Being somewhat better informed about the history of early man in Africa in an amateur way, I did my best to give the story as I knew it. When I came to the end of my tale and looked around the group, it suddenly dawned on me that there was still an unanswered question, as yet unspoken, which was of deep concern to that group, a question which I instantly appreciated through instinct or sixth sense. Finally one of the group brought it to the surface and asked, "Were those early men white or black?" I grimaced inwardly at my own prescience, and gave what I think is the only rational answer, namely, that if I had lived on that equatorial plateau a million years ago, I would have had as much pigment in my skin as possible and am quite sure that *Australopithecus* was heavily pigmented in his exposed areas.

Since it clearly is in the interest of scientific knowledge to encourage research in the field of human genetics, the Council of the Academy warmly endorses such work and in fact was pleased to be able to sponsor the symposium in which we will participate today. The Council, however, is equally mindful of the extent to which preliminary or rudimentary facts concerning human genetics can be used to further the goals of those with more than a scientific mission. As a result, our Council has felt called upon to prepare, with the aid of some of our colleagues who are specialists in the field of genetics, the following statement which has special relevance for this field at this time. I should add that those who worked with the Council in preparing this statement were Professor James F. Crow of the University of Wisconsin, Professor James V. Neel of the University of Michigan, and Professor Curt Stern of the University of California at Berkeley.

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**A STATEMENT BY THE COUNCIL OF THE ACADEMY**

The Academy has been urged to take strong measures to reduce the present uncertainty about the relative importance of heredity and environment as causes of human social problems and as causes of racial differences in behavioral traits. It is asked to promote actively the seeking of answers to such questions as: To what extent are urban
slums the result of poor heredity? Is the genetic quality of the human population being seriously eroded by economic and medical advances that have dramatically decreased the death rate, and by differential birth rates in various social, economic, and educational groups? Are genetic factors responsible for significant part of racial differences in educational and economic achievements? Could a eugenics program materially reduce our major social problems? By concentrating on environmental approaches, is society neglecting promising genetic possibilities?

The question has been raised as to whether research in these areas is being carried out as vigorously and intelligently as it should be. Do anthropologists and geneticists have an environmentalist bias that discourages research into the hereditary bases of individual and racial differences in intelligence and ability to adapt to our society? Is this research being seriously impeded by investigators' fears that the results might be unfavorable to some ethnic minorities?

How urgent is it that such questions be answered?

We certainly need to know more about human genetics; as to the desirability of further research, there can be no serious question. Researchers in experimental and human genetics have brought deep insights concerning ourselves and our past. The detailed understanding of the molecular basis of heredity is one of the intellectual triumphs of the twentieth century. New genetic knowledge is already bringing practical benefits in the understanding, prevention, and treatment of genetic diseases. We can expect continued rapid progress in this area.

With complex traits like intelligence the generalities are understood, but the specifics are not. There is general agreement that both hereditary and environmental factors are influential; but there is strong disagreement as to their relative magnitudes—which is another way of saying that the evidence is not conclusive. Furthermore, it is not obvious that really substantial increases in this knowledge will come soon, even if the amount of research were greatly increased. The problem of disentangling hereditary and environmental factors for complex intellectual and emotional traits where many genes may participate, where measurements are often not reproducible, where it is not certain what is being measured, and where subtle environmental factors are involved is extremely difficult. It is unrealistic to expect much progress unless new methods appear.

Even greater difficulties are encountered in any attempt to assess the relative role of heredity and environment in determining racial differences in intellectual and emotional traits. Despite the great number of tests that have been performed on Negro and white populations, it is still not clear whether any differences found are primarily genetic or environmental. For example, there is no scientific basis for a statement that there are or that there are not substantial hereditary differences in intelligence between Negro and white populations. In the absence of some now-unforeseen way of equalizing all aspects of the environment, answers to this question can hardly be more than reasonable guesses. Such guesses can easily be biased, consciously or unconsciously, by political and social views.

It is indeed possible that some studies have not been carried out for fear that the results might not be acceptable to some groups. Many researchers prefer to work in non-controversial areas where public feelings are not involved and where they can work undisturbed. There is, however, a more valid reason that might keep scientists from working in such areas as the separation of hereditary and environmental contributions to com-
plex human behavioral traits and to racial differences in these traits. This is the conviction that none of the current methods can produce unambiguous results. To shy away from seeking the truth is one thing; to refrain from collecting still more data that would be of uncertain meaning but would invite misuse is another.

Yet, it is not proper to say that we know nothing about the inheritance of complex traits, or that the consequences of a genetic program are not at all predictable. Animal experiments have shown that almost any trait can be changed by selection. The immensely successful history of animal and plant breeding, for a long time based on no more complicated principle than "like begets like," shows this. A selection program to increase human intelligence (or whatever is measured by various kinds of "intelligence" tests) would almost certainly be successful in some measure. The same is probably true for other behavioral traits. The rate of increase would be somewhat unpredictable, but there is little doubt that there would be progress.

On the other hand, it is contrary to all evidence that social problems such as poverty, slums, school dropouts, and crime are entirely genetic. There is surely a substantial and perhaps overriding environmental and social component. Therefore, society need not wait for future heredity-environment research in order to attempt environmental improvements, nor will it do so. We can be sure that no amount of genetic research will demonstrate the futility of all attempts at environmental improvements. It should be emphasized that the existence of even a strong hereditary component in any condition, individual or social, does not imply that the condition cannot be cured or ameliorated.

There are two aspects of eugenics that, although not entirely different, are sufficiently distinct to be considered separately. They are:

1. The reduction of the incidence of known inherited diseases. This involves the discovery by medical, chemical, or cytological techniques of persons with a high risk of having children with gross abnormalities, or with severe physical or mental disease. A great deal of human misery, both of parents and of children, can be prevented through genetic counseling. The decisions can be made by the individuals involved; social decisions are ordinarily not needed.

2. Attempts to alter the population genetically for intellectual and emotional traits that vary continuously, or to reverse possibly undesirable effects of differential fertility. To bring about any substantial change in the next generation would require a large change in reproductive patterns. To do this by education, by persuasion, by economic incentives, or by stronger measures would require social decisions that are not lightly made.

It is clear that for many important and complex traits the population could be changed by either genetic or environmental means. They are not mutually exclusive: more likely they are mutually reinforcing.

Heredity-environment uncertainty is not the main reason for avoiding drastic selection measures. The major impediment to eugenic action is not genetic ignorance but rather society's uncertainty about its aims and about the acceptability of the means for attaining them. Even if it were known beyond doubt that the heritability of social maladjustment is very high, would we choose to remedy the situation by eugenic means?

For one thing, our society still severely restricts even the voluntary individual application of some available techniques. Birth control is only gradually becoming legally accepted, especially among the unmarried, long after it has become widely practiced among well-to-do and educated people. Therapeutic abortion is very safe when done under
proper medical conditions, but is forced underground or to other countries, with the consequence that it is available safely only to the privileged. Artificial insemination, although widely practiced, is in such a questionable legal position that no accurate records, even of its frequency, are available. Any program of genetic improvement, even if entirely voluntary, would be seriously impeded by inability to make full use of techniques now known.

Moreover, regardless of the acceptability of the methods and regardless of the success of research in disentangling the role of heredity and environment in complex social traits, society is far from ready to interfere to any significant extent with the reproductive preferences of this generation in order to change the gene pool of the next. On the other hand, environmental measures have widespread immediate social acceptability.

Genetic changes are measured in generations. Whatever genetic deterioration that is occurring as a result of decreased natural selection or by differential birth rates is slow relative to many environmental changes, particularly those associated with technological innovations. Likewise, genetic improvement by any eugenics program that is likely to be accepted in the near future by our society would also be slow.

For these reasons, we question the social urgency of a greatly enhanced program to measure the heritability of complex intellectual and emotional factors. This is not to say that such work should not be done. But we would not, for example, urge that work in other parts of genetics be reduced in order to supply trained personnel to study this area more intensively.

Likewise, we question the social urgency of a crash program to measure genetic differences in intellectual and emotional traits between racial groups. In the first place, if the traits are at all complex, the results of such research are almost certain to be inconclusive. In the second place, it is not clear that major social decisions depend on such information; we would hope that persons would be considered as individuals and not as members of groups.

On the other hand, no promising new approach to answering these questions should be discouraged. While existing methods offer little hope for unambiguous answers, there is always the possibility that new insights will come from an unexpected direction. The history of scientific discovery suggests that the best strategy would be the support of basic research from which such insights may arise.

The papers delivered in this Symposium on the Genetic Implications of Demographic Trends may be expected to provide some of the background material on which the foregoing statement is based.