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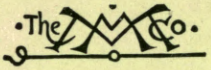

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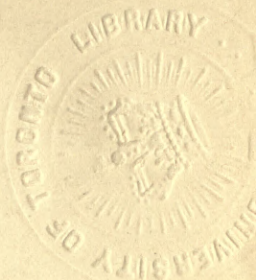

BY
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PREFACE

The science of eugenics consists of a foundation of biology and a superstructure of sociology. Galton, its founder, emphasized both parts in due proportion. Until recently, however, most sociologists have been either indifferent or hostile to eugenics, and the science has been left for the most part in the hands of biologists, who have naturally worked most on the foundations and neglected the superstructure. Although we are not disposed to minimize the importance of the biological part, we think it desirable that the means of applying the biological principles should be more carefully studied. The reader of this book will, consequently, find only a summary explanation of the mechanism of inheritance. Emphasis has rather been laid on the practical means by which society may encourage the reproduction of superior persons and discourage that of inferiors.

We assume that in general, a eugenically superior or desirable person has, to a greater degree than the average, the germinal basis for the following characteristics: to live past maturity, to reproduce adequately, to live happily and to make contributions to the productivity, happiness, and progress of society. It is desirable to discriminate as much as possible between the possession of the germinal basis and the observed achievement, since the latter consists of the former plus or minus environmental influence. But where the amount of modification is too obscure to be detected, it is advantageous to take the demonstrated achievement as a tentative measure of the germinal basis. The problem of eugenics is to make such legal, social and economic adjustments that (1) a larger proportion of superior persons will have children than at present, (2) that the average number of offspring of each superior person will be greater than at present, (3) that the most inferior persons will have no children, and finally that (4) other inferior persons will

have fewer children than now. The science of eugenics is still young and much of its program must be tentative and subject to the test of actual experiment. It is more important that the student acquire the habit of looking at society from a biological as well as a sociological point of view, than that he put his faith in the efficacy of any particular mode of procedure.

The essential points of our eugenics program were laid down by Professor Johnson in an article entitled "Human Evolution and its Control" in the *Popular Science Monthly* for January, 1910. Considerable parts of the material in the present book have appeared in the *Journal of Heredity*. Helpful suggestions and criticism have been received from several friends, in particular Sewall Wright and O. E. Baker of the United States Department of Agriculture.

PAUL POPENOE.

WASHINGTON, *June*, 1918.

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THE Great War has caused a vast destruction of the sounder portion of the belligerent peoples and it is certain that in the next generation the progeny of their weaker members will constitute a much larger proportion of the whole than would have been the case if the War had not occurred. Owing to this immeasurable calamity that has befallen the white race, the question of eugenics has ceased to be merely academic. It looms large whenever we consider the means of avoiding a stagnation or even decline of our civilization in consequence of the losses the War has inflicted upon the more valuable stocks. Eugenics is by no means tender with established customs and institutions, and once it seemed likely that its teachings would be left for our grandchildren to act on. But the plowshare of war has turned up the tough sod of custom, and now every sound new idea has a chance. Rooted prejudices have been leveled like the forests of Picardy under gun fire. The fear of racial decline provides the eugenist with a far stronger leverage than did the hope of accelerating racial progress. It may be, then, that owing to the War eugenic policies will gain as much ground by the middle of this century as without it they would have gained by the end of the century.

This book could not have been written ten years ago because many of the data it relies on were not then in existence. In view of inquiries now going on, we may reasonably hope that ten years hence it will be possible to make a much better book on the subject. But I am sure that this book is as good a presentation as can be made of eugenics at its present stage of development. The results of all the trustworthy observations and experiments have been taken into account, and the testing of human customs and institutions in the light of biological principles tallies well with the sociology of our times.

I cannot understand how any conscientious person, dealing in a large way with human life, should have the hardihood to ignore eugenics. This book should command the attention not only of students of sociology, but, as well, of philanthropists, social workers, settlement wardens, doctors, clergymen, educators, editors, publicists, Y. M. C. A. secretaries and industrial engineers. It ought to lie at the elbow of law-makers, statesmen, poor relief officials, immigration inspectors, judges of juvenile courts, probation officers, members of state boards of control and heads of charitable and correctional institutions. Finally, the thoughtful ought to find in it guidance in their problem of mating. It will inspire the superior to rise above certain worldly ideals of life and to aim at a family success rather than an individual success.

EDWARD ALSWORTH ROSS.

The University of Wisconsin
Madison, Wisconsin
July 1918.

APPLIED EUGENICS

APPLIED EUGENICS

CHAPTER I

NATURE OR NURTURE?

At the First Race Betterment Conference held at Battle Creek, Mich., many methods were suggested by which it was believed that the people of America might be made, on the average, healthier, happier, and more efficient. One afternoon the discussion turned to the children of the slums. Their condition was pictured in dark colors. A number of eugenists remarked that they were in many cases handicapped by a poor heredity. Then Jacob Riis—a man for whom every American must feel a profound admiration—strode upon the platform, filled with indignation.

"We have heard friends here talk about heredity," he exclaimed. "The word has rung in my ears until I am sick of it. Heredity! Heredity! There is just one heredity in all the world that is ours—we are children of God, and there is nothing in the whole big world that we cannot do in His service with it."

It is probably not beyond the truth to say that in this statement Jacob Riis voiced the opinion of a majority of the social workers of this country, and likewise a majority of the people who are faithfully and with much self-sacrifice supporting charities, uplift movements, reform legislation, and philanthropic attempts at social betterment in many directions. They suppose that they are at the same time making the race better by making the conditions better in which people live.

It is widely supposed that, although nature may have distributed some handicaps at birth, they can be removed if the body is properly warmed and fed and the mind properly exercised. It is further widely supposed that this improvement in the condition of the individual will result in his production of better

infants, and that thus the race, gaining a little momentum in each generation, will gradually move on toward ultimate perfection.

There is no lack of efforts to improve the race, by this method of direct change of the environment. It involves two assumptions, which are sometimes made explicitly, sometimes merely taken for granted. These are:

1. That changes in a man's surroundings, or, to use the more technical biological term, in his nurture, will change the nature that he has inherited.

2. That such changes will further be transmitted to his children.

Any one who proposes methods of race betterment, as we do in the present book, must meet these two popular beliefs. We shall therefore examine the first of them in this chapter, and the second in Chapter II.

Galton adopted and popularized Shakespere's antithesis of *nature* and *nurture* to describe a man's inheritance and his surroundings, the two terms including everything that can pertain to a human being. The words are not wholly suitable, particularly since nature has two distinct meanings,—human nature and external nature. The first is the only one considered by Galton. Further, nurture is capable of subdivision into those environmental influences which do not undergo much change,—e. g., soil and climate,—and those forces of civilization and education which might better be described as culture. The evolutionist has really to deal with the three factors of germ-plasm, physical surroundings and culture. But Galton's phrase is so widely current that we shall continue to use it, with the implications that have just been outlined.

The antithesis of nature and nurture is not a new one; it was met long ago by biologists and settled by them to their own satisfaction. The whole body of experimental and observational evidence in biology tends to show that the characters which the individual inherits from his ancestors remain remarkably constant in all ordinary conditions to which they may be subjected. Their constancy is roughly proportionate

to the place of the animal in the scale of evolution; lower forms are more easily changed by outside influence, but as one ascends to the higher forms, which are more differentiated, it is found more and more difficult to effect any change in them. Their characters are more definitely fixed at birth.[1]

It is with the highest of all forms, Man, that we have now to deal. The student in biology is not likely to doubt that the differences in men are due much more to inherited nature than to any influences brought to bear after birth, even though these latter influences include such powerful ones as nutrition and education within ordinary limits.

But the biological evidence does not lend itself readily to summary treatment, and we shall therefore examine the question by statistical methods.[2] These have the further advantage of being more easily understood; for facts which can be measured and expressed in numbers are facts whose import the reader can usually decide for himself: he is perfectly able to determine, without any special training, whether twice two does or does not make four. One further preliminary remark: the problem of nature vs. nurture can not be solved in general terms; a moment's thought will show that it can be understood only by examining one trait at a time. The problem is to decide whether the differences between the people met in everyday life are due more to inheritance or to outside influences, and these differences must naturally be examined separately; they can not be lumped together.

To ask whether nature in general contributes more to a man than nurture is futile; but it is not at all futile to ask whether the differences in a given human trait are more affected by differences in nature than by differences in nurture. It is easy

[1] See Woods, Frederick Adams, "Laws of Diminishing Environmental Influences," *Popular Science Monthly*, April, 1910, pp. 313–336; Huxley, J. S., *The Individual in the Animal Kingdom*, Cambridge and New York, 1912. Pike, F. H., and Scott, E. L., "The Significance of Certain Internal Conditions of the Organism in Organic Evolution," *American Naturalist*, Vol. XLIX, pp. 321–359, June, 1915.

[2] There is one line of experiment which is simple and striking enough to deserve mention—namely, ovarian transplantation. A description of this is given in Appendix A.

to see that a verdict may be sometimes given to one side, sometimes to the other. Albinism in animals, for instance, is a trait which is known to be inherited, and which is very slightly affected by differences of climate, food supply, etc. On the other hand, there are factors which, although having inherited bases, owe their expression almost wholly to outside influences. Professor Morgan, for example, has found a strain of fruit flies whose offspring in cold weather are usually born with supernumerary legs. In hot weather they are practically normal. If this strain were bred only in the tropics, the abnormality would probably not be noticed; on the other hand, if it were bred only in cold regions, it would be set down as one characterized by duplication of limbs. The heredity factor would be the same in each case, the difference in appearance being due merely to temperature.

Mere inspection does not always tell whether some feature of an individual is more affected by changes in heredity or changes in surroundings. On seeing a swarthy man, one may suppose that he comes of a swarthy race, or that he is a fair-skinned man who has lived long in the desert. In the one case the swarthiness would be inheritable, in the other not. Which explanation is correct, can only be told by examining a number of such individuals under critical conditions, or by an examination of the ancestry. A man from a dark-skinned race would become little darker by living under the desert sun, while a white man would take on a good deal of tan.

The limited effect of nurture in changing nature is in some fields a matter of common observation. The man who works in the gymnasium knows that exercise increases the strength of a given group of muscles for a while, but not indefinitely. There comes a time when the limit of a man's hereditary potentiality is reached, and no amount of exercise will add another millimeter to the circumference of his arm. Similarly the handball or tennis player some day reaches his highest point, as do runners or race horses. A trainer could bring Arthur Duffy in a few years to the point of running a hundred yards in $9\frac{3}{5}$ seconds, but no amount of training after that could clip off another fifth

of a second. A parallel case is found in the students who take a college examination. Half a dozen of them may have devoted the same amount of time to it—may have crammed to the limit—but they will still receive widely different marks. These commonplace cases show that nurture has seemingly some power to mold the individual, by giving his inborn possibilities a chance to express themselves, but that nature says the first and last word. Francis Galton, the father of eugenics, hit on an ingenious and more convincing illustration by studying the history of twins.[1]

There are, everyday observation shows, two kinds of twins—ordinary twins and the so-called identical twins. Ordinary twins are merely brothers, or sisters, or brother and sister, who happen to be born two at a time, because two ova have developed simultaneously. The fact that they were born at the same time does not make them alike—they differ quite as widely from each other as ordinary brothers and sisters do. Identical twins have their origin in a different phenomenon—they are believed to be halves of the same egg-cell, in which two growing-points appeared at a very early embryonic stage, each of these developing into a separate individual. As would be expected, these identical twins are always of the same sex, and extremely like each other, so that sometimes their own mother can not tell them apart. This likeness extends to all sorts of traits:—they have lost their milk teeth on the same day in one case, they even fell ill on the same day with the same disease, even though they were in different cities.

Now Galton reasoned that if environment really changes the inborn character, then these identical twins, who start life as halves of the same whole, ought to become more unlike if they were brought up apart; and as they grew older and moved into different spheres of activity, they ought to become measurably dissimilar. On the other hand, ordinary twins, who start dissimilar, ought to become more alike when brought up in the

[1] Galton, Francis, *Inquiries into Human Faculty*, 1907 edition, pp. 153–173. This volume of Galton's, which was first published in 1883, has been reissued in Everyman's Library, and should be read by all eugenists.

same family, on the same diet, among the same friends, with the same education. If the course of years shows that identical twins remain as like as ever and ordinary twins as unlike as ever, regardless of changes in conditions, then environment will have failed to demonstrate that it has any great power to modify one's inborn nature in these traits.

With this view, Galton collected the history of eighty pairs of identical twins, thirty-five cases being accompanied by very full details, which showed that the twins were really as nearly identical, in childhood, as one could expect to find. On this point, Galton's inquiries were careful, and the replies satisfactory. They are not, however, as he remarks, much varied in character. "When the twins are children, they are usually distinguished by ribbons tied around the wrist or neck; nevertheless the one is sometimes fed, physicked, and whipped by mistake for the other, and the description of these little domestic catastrophes was usually given by the mother, in a phraseology, that is sometimes touching by reason of its seriousness. I have one case in which a doubt remains whether the children were not changed in their bath, and the presumed A is not really B, and *vice versa*. In another case, an artist was engaged on the portraits of twins who were between three and four years of age; he had to lay aside his work for three weeks, and, on resuming it, could not tell to which child the respective likeness he had in hand belonged. The mistakes become less numerous on the part of the mother during the boyhood and girlhood of the twins, but are almost as frequent as before on the part of strangers. I have many instances of tutors being unable to distinguish their twin pupils. Two girls used regularly to impose on their music teacher when one of them wanted a whole holiday; they had their lessons at separate hours, and the one girl sacrificed herself to receive two lessons on the same day, while the other one enjoyed herself from morning to evening. Here is a brief and comprehensive account: 'Exactly alike in all, their schoolmasters could never tell them apart; at dancing parties they constantly changed partners without discovery; their close resemblance is scarcely diminished by age.'

FOUR BABY GIRLS AT ONCE

FIG. 1.—These quadruplet daughters were born to Mr. and Mrs. F. M. Keys, Hollis, Okla., on July 4, 1915, and were seven months old when the photograph was taken. Up to that time they had never had any other nourishment than their mother's milk. Their weights at birth were as follows (reading from left to right): Roberta, 4 pounds; Mona, 4½ pounds; Mary, 4¼ pounds; Leota, 3¾ pounds. When photographed, Roberta weighed 16 pounds and each of the others weighed 16¼. Their aunt vouches for the fact that the care of the four is less trouble than a single baby often makes. The mother has had no previous plural births, although she has borne four children prior to these. Her own mother had but two children, a son and a daughter, and there is no record of twins on the mother's side. The father of the quadruplets is one of twelve children, among whom is one pair of twins. It is known that twinning is largely due to inheritance, and it would seem that the appearance of these quadruplets is due to the hereditary influence of the father rather than the mother. If this is the case, then the four girls must all have come from one egg-cell, which split up at an early stage. Note the uniform shape of the mouth, and the ears, set unusually low on the head.

"The following is a typical schoolboy anecdote:

"'Two twins were fond of playing tricks, and complaints were frequently made; but the boys would never own which was the guilty one, and the complainants were never certain which of the two it was. One head master used to say he would never flog the innocent for the guilty, and the other used to flog them both.'

"No less than nine anecdotes have reached me of a twin seeing his or her reflection in the looking-glass, and addressing it in the belief that it was the other twin in person.

"Children are usually quick in distinguishing between their parent and his or her twin; but I have two cases to the contrary. Thus, the daughter of a twin says:

"'Such was the marvelous similarity of their features, voice, manner, etc., that I remember, as a child, being very much puzzled, and I think, had my aunt lived much with us, I should have ended by thinking I had two mothers!'

"In the other case, a father who was a twin, remarks of himself and his brother:

"'We were extremely alike, and are so at this moment, so much so that our children up to five and six years old did not know us apart.'

"Among my thirty-five detailed cases of close similarity, there are no less than seven in which both twins suffered from some special ailment or had some exceptional peculiarity. Both twins are apt to sicken at the same time in no less than nine out of the thirty-five cases. Either their illnesses, to which I refer, were non-contagious, or, if contagious, the twins caught them simultaneously; they did not catch them the one from the other."

Similarity in association of ideas, in tastes and habits was equally close. In short, their resemblances were not superficial, but extremely intimate, both in mind and body, while they were young; they were reared almost exactly alike up to their early manhood and womanhood.

Then they separated into different walks of life. Did this change of the environment alter their inborn character? For

the detailed evidence, one should consult Galton's own account; we give only his conclusions:

In many cases the resemblance of body and mind continued unaltered up to old age, notwithstanding very different conditions of life; in others a severe disease was sufficient to account for some change noticed. Other dissimilarity that developed, Galton had reason to believe, was due to the development of inborn characters that appeared late in life. He therefore felt justified in broadly concluding "that the only circumstance, within the range of those by which persons of similar conditions of life are affected, that is capable of producing a marked effect on the character of adults, is illness or some accident which causes physical infirmity. The twins who closely resembled each other in childhood and early youth, and were reared under not very dissimilar conditions, either grow unlike through the development of natural [that is, inherited] characteristics which had lain dormant at first, or else they continue their lives, keeping time like two watches, hardly to be thrown out of accord except by some physical jar."

Here was a distinct failure of nurture to modify the inborn nature. We next consider the ordinary twins who were unlike from the start. Galton had twenty such cases, given with much detail. "It is a fact," he observes, "that extreme dissimilarity, such as existed between Jacob and Esau, is a no less marked peculiarity of twins of the same sex than extreme similarity." The character of the evidence as a whole may be fairly conveyed by a few quotations:

(1) One parent says: "They have had *exactly the same nurture* from their birth up to the present time; they are both perfectly healthy and strong, yet they are otherwise as dissimilar as two boys could be, physically, mentally, and in their emotional nature."

(2) "I can answer most decidedly that the twins have been perfectly dissimilar in character, habits, and likeness from the moment of their birth to the present time, though they were nursed by the same woman, went to school together, and were never separated until the age of thirteen."

(3) "They have never been separated, never the least differently treated in food, clothing, or education; both teethed at the same time, both had measles, whooping cough, and scarlatina at the same time, and neither has had any other serious illness. Both are and have been exceedingly healthy, and have good abilities, yet they differ as much from each other in mental cast as any one of my family differs from another."

(4) "Very dissimilar in mind and body; the one is quiet, retiring, and slow but sure; good-tempered, but disposed to be sulky when provoked;—the other is quick, vivacious, forward, acquiring easily and forgetting soon; quick-tempered and choleric, but quickly forgiving and forgetting. They have been educated together and never separated."

(5) "They were never alike either in mind or body, and their dissimilarity increases daily. The external influences have been identical; they have never been separated."

(6) "The two sisters are very different in ability and disposition. The one is retiring, but firm and determined; she has no taste for music or drawing. The other is of an active, excitable temperament; she displays an unusual amount of quickness and talent, and is passionately fond of music and drawing. From infancy, they have been rarely separated even at school, and as children visiting their friends, they always went together."

And so on. Not a single case was found in which originally dissimilar characters became assimilated, although submitted to exactly the same influences. Reviewing the evidence in his usual cautious way, Galton declared, "There is no escape from the conclusion that nature prevails enormously over nurture, when the differences of nurture do not exceed what is commonly to be found among persons of the same rank in society and in the same country."

This kind of evidence was a good start for eugenics but as the science grew, it outgrew such evidence. It no longer wanted to be told, no matter how minute the details, that "nature prevails enormously over nurture." It wanted to know exactly how much. It refused to be satisfied with the statement that a certain quantity was large; it demanded that it be measured

or weighed. So Galton, Karl Pearson and other mathematicians devised means of doing this, and then Professor Edward L. Thorndike of Columbia University took up Galton's problem again, with more refined methods.

The tool used by Professor Thorndike was the coefficient of correlation, which shows the amount of resemblance or association between any two things that are capable of measurement, and is expressed in the form of a decimal fraction somewhere between 0 and the unit 1. Zero shows that there is no constant resemblance at all between the two things concerned,—that they are wholly independent of each other, while 1 shows that they are completely dependent on each other, a condition that rarely exists, of course.[1] For instance, the correlation between the right and left femur in man's legs is .98.

Professor Thorndike found in the New York City schools fifty pairs of twins of about the same age and measured the closeness of their resemblance in eight physical characters, and also in six mental characters, the latter being measured by the proficiency with which the subjects performed various tests. Then children of the same age and sex, picked at random from the same schools, were measured in the same way. It was thus possible to tell how much more alike twins were than ordinary children in the same environment.[2]

"If now these resemblances are due to the fact that the two members of any twin pair are treated alike at home, have the same parental models, attend the same school and are subject in general to closely similar environmental conditions, then

[1] What is said here refers to positive correlations, which are the only kind involved in this problem. Correlations may also be negative, lying between 0 and —1; for instance, if we measured the correlation between a man's lack of appetite and the time that had elapsed since his last meal, we would have to express it by a negative fraction, the minus sign showing that the greater his satiety, the less would be the time since his repast. The best introduction to correlations is Elderton's *Primer of Statistics* (London, 1912).

[2] Dr. Thorndike's careful measurements showed that it is impossible to draw a hard and fast line between identical twins and ordinary twins. There is no question as to the existence of the two kinds, but the ordinary twins may happen to be so nearly alike as to resemble identical twins. Accordingly, mere appearance is not a safe criterion of the identity of twins. His researches were published in the *Archives of Philosophy, Psychology and Scientific Methods*, No. 1, New York, 1905.

THE EFFECT OF NURTURE IN CHANGING NATURE

FIG. 2.—Corn of a single variety (Leaming Dent) grown in two plots: at the left spaced far apart in hills, at the right crowded. The former grows to its full potential height, the latter is stunted. The size differences in the two plots are due to differences in environment, the heredity in both cases being the same. Plants are much more susceptible to nutritional influences on size than are mammals, but to a less degree nutrition has a similar effect on man. Photograph from A. F. Blakeslee.

(1) twins should, up to the age of leaving home, grow more and more alike, and in our measurements the twins 13 and 14 years old should be much more alike than those 9 and 10 years old. Again (2) if similarity in training is the cause of similarity in mental traits, ordinary fraternal pairs not over four or five years apart in age should show a resemblance somewhat nearly as great as twin pairs, for the home and school condition of a pair of the former will not be much less similar than those of a pair of the latter. Again, (3) if training is the cause, twins should show greater resemblance in the case of traits much subject to training, such as ability in addition or multiplication, than in traits less subject to training, such as quickness in marking off the A's on a sheet of printed capitals, or in writing the opposites of words."

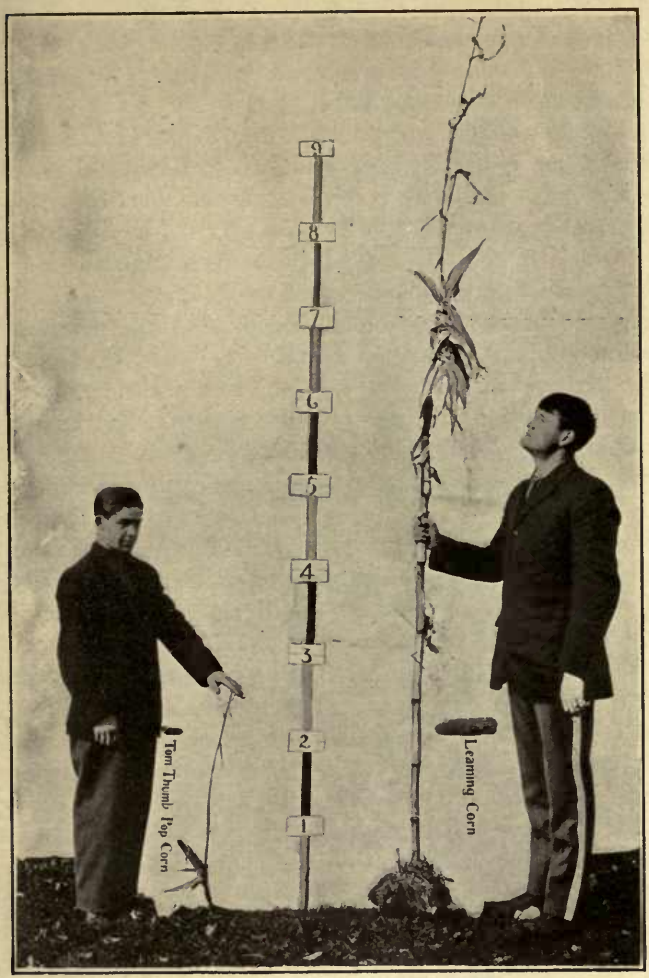
The data were elaborately analyzed from many points of view. They showed (1) that the twins 12–14 years old were not any more alike than the twins 9–11 years old, although they ought to have been, if environment has great power to mold the character during these so-called "plastic years of childhood." They showed (2) that the resemblance between twins was two or three times as great as between ordinary children of the same age and sex, brought up under similar environment. There seems to be no reason, except heredity, why twins should be more alike. The data showed (3) that the twins were no more alike in traits subject to much training than in traits subject to little or no training. Their achievement in these traits was determined by their heredity; training did not measurably alter these hereditary potentialities.

"The facts," Professor Thorndike wrote, "are easily, simply and completely explained by one simple hypothesis; namely, that the nature of the germ-cells—the conditions of conception—cause whatever similarities and differences exist in the original natures of men, that these conditions influence mind and body equally, and that in life the differences in modification of mind and body produced by such differences as obtain between the environments of present-day New York City public school children are slight."

"The inferences," he says, "with respect to the enormous importance of original nature in determining the behavior and achievements of any man in comparison with his fellows of the same period of civilization and conditions of life are obvious. All theories of human life must accept as a first principle the fact that human beings at birth differ enormously in mental capacities and that these differences are largely due to similar differences in their ancestry. All attempts to change human nature must accept as their most important condition the limits set by original nature to each individual."

Meantime other investigators, principally followers of Karl Pearson in England, were working out correlation coefficients in other lines of research for hundreds of different traits. As we show in more detail in Chapter IV, it was found, no matter what physical or mental trait was measured, that the coefficient of correlation between parent and child was a little less than .5 and that the coefficient between brother and brother, or sister and sister, or brother and sister, was a little more than .5. On the average of many cases the mean "nature" value, the coefficient of direct heredity, was placed at .51. This gave another means of measuring nurture, for it was also possible to measure the relation between any trait in the child and some factor in the environment. A specific instance will make this clearer.

Groups of school children usually show an appalling percentage of short-sightedness. Now suppose it is suggested that this is because they are allowed to learn to read at too early an age. One can find out the age at which any given child did learn to read, and work out the coefficient of correlation between this age and the child's amount of myopia. If the relation between them is very close—say .7 or .8—it will be evident that the earlier a child learns to read, the more short-sighted he is as he grows older. This will not prove a relation of cause and effect, but it will at least create a great suspicion. If on the contrary the correlation is very slight, it will be evident that early reading has little to do with the prevalance of defective vision among school children. If investigators similarly work out all the other correlations that can be suggested, finding



HEIGHT IN CORN AND MEN

FIG. 3.—An unusually short and an unusually tall man, photographed beside extreme varieties of corn which, like the men, owe their differences in height indisputably to heredity rather than to environment. No imaginable environmental differences could reverse the positions of these two men, or of these two varieties of corn, the heredity in each case being what it is. The large one might be stunted, but the small one could not be made much larger. Photograph from A. F. Blakeslee.

whether there is any regular relation between myopia and overcrowding, long hours of study, general economic conditions at home, general physical or moral conditions of parents, the time the child spends out of doors, etc., and if no important relation is found between these various factors and myopia, it will be evident that no factor of the environment which one can think of as likely to cause the trouble really accounts for the poor eyesight of school children.

This has actually been done,[1] and none of the conditions enumerated has been found to be closely related to myopia in school children. Correlations between fifteen environmental conditions and the goodness of children's eyesight were measured, and only in one case was the correlation as high as .1. The mean of these correlations was about .04—an absolutely negligible quantity when compared with the common heredity coefficient of .51.

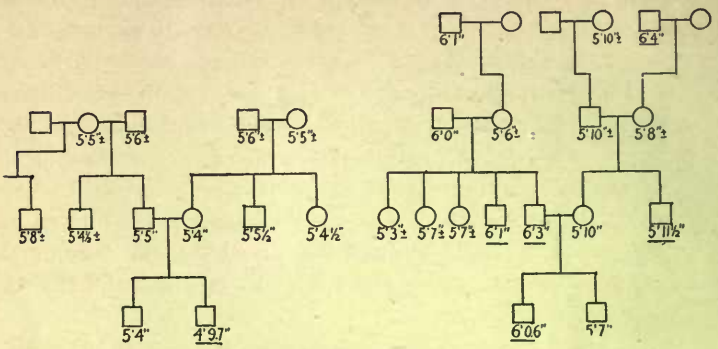
Does this prove that the myopia is rather due to heredity? It would, by a process of exclusion, if every conceivable environmental factor had been measured and found wanting. That point in the investigation can never be reached, but a tremendously strong suspicion is at least justified. Now if the degree of resemblance between the prevalence of myopia in parents and that in children be directly measured, and if it be found that when the parent has eye trouble the child also has it, then it seems that a general knowledge of heredity should lead to the belief that the difficulty lies there, and that an environmental cause for the poor vision of the school child was being sought, when it was all the time due almost entirely to heredity. This final step has not yet been completed in an adequate way,[2] but the evidence, partly analogical, gives every

[1] *A First Study of the Inheritance of Vision and the Relative Influence of Heredity and Environment on Sight.* By Amy Barrington and Karl Pearson. Eugenics Laboratory (London), Memoir Series V.

[2] Dr. James Alexander Wilson, assistant surgeon of the Opthalmic Institute, Glasgow, published an analysis of 1,500 cases of myopia in the *British Medical Journal*, p. 395, August 29, 1914. His methods are not above criticism, and too much importance should not be attached to his results, which show that in 58% of the cases heredity can be credited with the myopia of the patient. In 12% of the cases it was due to inflammation of the cornea (keratitis) while in the remaining 30% no heredi-

reason to believe in the soundness of the conclusion stated, that in most cases the schoolboy must wear glasses because of his heredity, not because of overstudy or any neglect on the part of his parents to care for his eyes properly during his childhood.

The extent to which the intelligence of school children is



WHY MEN GROW SHORT OR TALL

FIG. 4.—Pedigree charts of the two men shown in the preceding illustration. Squares represent men and circles women; figures underlined denote measurement in stocking feet. It is obvious from a comparison of the ancestry of the two men that the short one comes from a predominantly short family, while the tall one gains his height likewise from heredity. The shortest individual in the right-hand chart would have been accounted tall in the family represented on the left. After A. F. Blakeslee.

dependent on defective physique and unfavorable home environment is an important practical question, which David Heron of London attacked by the methods we have outlined. He wanted to find out whether the healthy children were the most intelligent. One is constantly hearing stories of how the intelligence of school children has been improved by some treatment which improved their general health, but these stories are rarely presented in such a way as to contribute evidence of scientific value. It was desirable to know what exact measurement would

tary influence could be proved, but various reasons made him feel certain that in many cases it existed. The distribution of myopia by trades and professions among his patients is suggestive: 65% of the cases among school children showed myopic heredity; 63% among housewives and domestic servants; 68% among shop and factory works; 60% among clerks and typists; 60% among laborers and miners. If environment really played an active part, one would not expect to find this similarity in percentages between laborers and clerks, between housewives and schoolteachers, etc.

show. The intelligence of all the children in fourteen schools was measured in its correlation with weight and height, conditions of clothing and teeth, state of nutrition, cleanliness, good hearing, and the condition of the cervical glands, tonsils and adenoids. It could not be found that mental capacity was closely related to any of the characters dealt with.[1] The particular set of characters measured was taken because it happened to be furnished by data collected for another purpose; the various items are suggestive rather than directly conclusive. Here again, the correlation in most cases was less than .1, as compared with the general heredity correlation of .5.

The investigation need not be limited to problems of bad breeding. Eugenics, as its name shows, is primarily interested in "good breeding;" it is particularly worth while, therefore, to examine the relations between heredity and environment in the production of mental and moral superiority.

If success in life—the kind of success that is due to great mental and moral superiority—is due to the opportunities a man has, then it ought to be pretty evenly distributed among all persons who have had favorable opportunities, provided a large enough number of persons be taken to allow the laws of probability full play. England offers a good field to investigate this point, because Oxford and Cambridge, her two great universities, turn out most of the eminent men of the country, or at least have done so until recently. If nothing more is necessary to ensure a youth's success than to give him a first-class education and the chance to associate with superior people, then the prizes of life ought to be pretty evenly distributed among the graduates of the two universities, during a period of a century or two.

This is not the case. When we look at the history of England, as Galton did nearly half a century ago, we find success in life to an unexpected degree a family affair. The distinguished father is likely to have a distinguished son, while the son of two

[1] *The Influence of Unfavourable Home Environment and Defective Physique on the Intelligence of School Children*. By David Heron. Eugenics Laboratory (London), Memoir Series No. VIII.

"nobodies" has a very small chance of becoming distinguished. To cite one concrete case, Galton found [1] that the son of a distinguished judge had about one chance in four of becoming himself distinguished, while the son of a man picked out at random from the population had about one chance in 4,000 of becoming similarly distinguished.

The objection at once occurs that perhaps social opportunities might play the predominant part; that the son of an obscure man never gets a chance, while the son of the prominent man is pushed forward regardless of his inherent abilities. This, as Galton argued at length, can not be true of men of really eminent attainments. The true genius, he thought, frequently succeeds in rising despite great obstacles, while no amount of family pull will succeed in making a mediocrity into a genius, although it may land him in some high and very comfortable official position. Galton found a good illustration in the papacy, where during many centuries it was the custom for a pope to adopt one of his nephews as a son, and push him forward in every way. If opportunity were all that is required, these adopted sons ought to have reached eminence as often as a real son would have done; but statistics show that they reached eminence only as often as would be expected for nephews of great men, whose chance is notably less, of course, than that of sons of great men, in whom the intensity of heredity is much greater.

Transfer the inquiry to America, and it becomes even more conclusive, for this is supposed to be the country of equal opportunities, where it is a popular tradition that every boy has a chance to become president. Success may be in some degree a family affair in caste-ridden England; is it possible that the past history of the United States should show the same state of affairs?

Galton found that about half of the great men of England had distinguished close relatives. If the great men of America have fewer distinguished close relatives, environment will be able to make out a plausible case: it will be evident that in

[1] *Hereditary Genius; an Inquiry into its Laws and Consequences.* London, 1869.

this continent of boundless opportunities the boy with ambition and energy gets to the top, and that this ambition and energy do not depend on the kind of family he comes from.

Frederick Adams Woods has made precisely this investigation.[1] The first step was to find out how many eminent men there are in American history. Biographical dictionaries list about 3,500, and this number provides a sufficiently unbiased standard from which to work. Now, Dr. Woods says, if we suppose the average person to have as many as twenty close relatives—as near as an uncle or a grandson—then computation shows that only one person in 500 in the United States has a chance to be a near relative of one of the 3,500 eminent men—provided it is purely a matter of chance. As a fact, the 3,500 eminent men listed by the biographical dictionaries are related to each other not as one in 500, but as one in five. If the more celebrated men alone be considered, it is found that the percentage increases so that about one in three of them has a close relative who is also distinguished. This ratio increases to more than one in two when the families of the forty-six Americans in the Hall of Fame are made the basis of study. If all the eminent relations of those in the Hall of Fame are counted, they average more than one apiece. Therefore, they are from five hundred to a thousand times as much related to distinguished people as the ordinary mortal is.

To look at it from another point of view, something like 1% of the population of the country is as likely to produce a man of genius as is all the rest of the population put together,—the other 99%.

This might still be due in some degree to family influence, to the prestige of a famous name, or to educational advantages afforded the sons of successful men. Dr. Woods' study of the royal families of Europe is more decisive.[2]

[1] Woods, Frederick Adams, "Heredity and the Hall of Fame," *Popular Science Monthly*, May, 1913.

[2] Woods, Frederick Adams, *Mental and Moral Heredity in Royalty*, New York, 1906. See also "Sovereigns and the Supposed Influence of Opportunity," *Science*, n. s., XXXIX, No. 1016, pp. 902–905, June 19, 1914, where Dr. Woods answers some criticisms of his work.

In the latter group, the environment must be admitted—on the whole—to be uniformly favorable. It has varied, naturally, in each case, but speaking broadly it is certain that all the members of this group have had the advantage of a good education, of unusual care and attention. If such things affect achievement, then the achievements of this class ought to be pretty generally distributed among the whole class. If opportunity is the cause of a man's success, then most of the members of this class ought to have succeeded, because to every one of royal blood, the door of opportunity usually stands open. One would expect the heir to the throne to show a better record than his younger brothers, however, because his opportunity to distinguish himself is naturally greater. This last point will be discussed first.

Dr. Woods divided all the individuals in his study into ten classes for intellectuality and ten for morality, those most deficient in the qualities being put in class 1, while the men and women of preëminent intellectual and moral worth were put in class 10. Now if preëminent intellect and morality were at all linked with the better chances that an inheritor of succession has, then heirs to the throne ought to be more plentiful in the higher grades than in the lower. Actual count shows this not to be the case. A slightly larger percentage of inheritors is rather to be found in the lower grades. The younger sons have made just as good a showing as the sons who succeeded to power; as one would expect if intellect and morality are due largely to heredity, but as one would not expect if intellect and morality are due largely to outward circumstances.

Are "conditions of turmoil, stress and adversity" strong forces in the production of great men, as has often been claimed? There is no evidence from facts to support that view. In the case of a few great commanders, the times seemed particularly favorable. Napoleon, for example, could hardly have been Napoleon had it not been for the French revolution. But in general there have been wars going on during the whole period of modern European history; there have always been opportunities for a royal hero to make his appearance; but often the

country has called for many years in vain. Circumstances were powerless to produce a great man and the nation had to wait until heredity produced him. Spain has for several centuries been calling for genius in leadership in some lines; but in vain. England could not get an able man from the Stuart line, despite her need, and had to wait for William of Orange, who was a descendant of a man of genius, William the Silent. "Italy had to wait fifty years in bondage for her deliverers, Cavour, Garibaldi and Victor Emmanuel."

"The upshot of it all," Dr. Woods decides, "is that, as regards intellectual life, environment is a totally inadequate explanation. If it explains certain characters in certain instances, it always fails to explain many more, while heredity not only explains all, or at least 90%, of the intellectual side of character in practically every instance, but does so best when questions of environment are left out of discussion."

Despite the good environment almost uniformly present, the geniuses in royalty are not scattered over the surface of the pedigree chart, but form isolated little groups of closely related individuals. One centers in Frederick the Great, another in Queen Isabella of Spain, a third in William the Silent, and a fourth in Gustavus Adolphus. Furthermore, the royal personages who are conspicuously low in intellect and morality are similarly grouped. Careful study of the circumstances shows nothing in the environment that would produce this grouping of genius, while it is exactly what a knowledge of heredity leads one to expect.

In the next place, do the superior members of royalty have proportionately more superior individuals among their close relatives, as was found to be the case among the Americans in the Hall of Fame? A count shows at once that they do. The first six grades all have about an equal number of eminent relatives, but grade 7 has more while grade 8 has more than grade 7, and the geniuses of grade 10 have the highest proportion of nearer relatives of their own character. Surely it cannot be supposed that a relative of a king in grade 8 has on the average a much less favorable environment than a relative of a king in

grade 10. Is it not fair, then, to assume that this relative's greater endowment in the latter case is due to heredity?

Conditions are the same, whether males or females be considered. The royal families of Europe offer a test case because for them the environment is nearly uniformly favorable. A study of them shows great mental and moral differences between them, and critical evidence indicates that these differences are largely due to differences in heredity. Differences of opportunity do not appear to be largely responsible for the achievements of the individuals.

But, it is sometimes objected, opportunity certainly is responsible for the appearance of much talent that would otherwise never appear. Take the great increase in the number of scientific men in Germany during the last half century, for example. It can not be pretended that this is due to an increased birth-rate of such talent; it means that the growth of an appreciation of scientific work has produced an increased amount of scientific talent. J. McKeen Cattell has argued this point most carefully in his study of the families of one thousand American men of science (*Popular Science Monthly*, May, 1915). "A Darwin born in China in 1809," he says, "could not have become a Darwin, nor could a Lincoln born here on the same day have become a Lincoln had there been no Civil War. If the two infants had been exchanged there would have been no Darwin in America and no Lincoln in England." And so he continues, urging that in the production of scientific men, at least, education is more important than eugenics.

This line of argument contains a great deal of obvious truth, but is subject to a somewhat obvious objection, if it is pushed too far. It is certainly true that the exact field in which a man's activities will find play is largely determined by his surroundings and education. Young men in the United States are now becoming lawyers or men of science, who would have become ministers had they been born a century or two ago. But this environmental influence seems to us a minor one, for the man who is highly gifted in some one line is usually, as all the work of differential psychology shows, gifted more than the average in

many other lines. Opportunity decides in just what field his life work shall lie; but he would be able to make a success in a number of fields. Darwin born in America would probably not have become the Darwin we know, but it is not to be supposed that he would have died a "mute, inglorious Milton": it is not likely that he would have failed to make his mark in some line of human activity. Dr. Cattell's argument, then, while admissible, can not properly be urged against the fact that ability is mainly dependent on inheritance.

We need not stop with the conclusion that equality of training or opportunity is unable to level the inborn differences between men. We can go even farther, and produce evidence to show that equality of training *increases the differences* in results achieved.

This evidence is obtained by measuring the effects of equal amounts of exercise of a function upon individual differences in respect to efficiency in it. Suppose one should pick out, at random, eight children, and let them do problems in multiplication for 10 minutes. After a number of such trials, the three best might average 39 correct solutions in the 10 minutes, and the three poorest might average 25 examples. Then let them continue the work, until each one of them has done 700 examples. Here is equality in training; does it lead to uniform results?

Dr. Starch made the actual test which we have outlined and found that the three best pupils gained on the average 45 in the course of doing 700 examples; while the three poorest gained only 26 in the same course of time.

Similar tests have been made of school children in a number of instances, and have shown that equality of training fails to bring about equality of performance. All improve to some extent; but those who are naturally better than their comrades usually become better still, when conditions for all are the same. E. L. Thorndike gives[1] the following tabular statement of a test he conducted:

[1] *Educational Psychology*, Vol. III, p. 306. Starch's results are also quoted from Thorndike.

THE EFFECT OF EQUAL AMOUNTS OF PRACTICE UPON INDIVIDUAL DIFFERENCES IN THE MENTAL MULTIPLICATION OF A THREE-PLACE BY A THREE-PLACE NUMBER

				Amount done per unit of time			*Percentage of correct figures in answers*		
			Hours of Practice	*First 5 Examples*	*Last 5 or 10 Examples*	*Gain*	*First 5 Examples*	*Last 5 or 10 Examples*	*Gain*
Initial highest five individuals			5.1	85	147	61	70	78	18
" next five "			5.1	56	107	51	68	78	10
" " six "			5.3	46	68	22	74	82	8
" " six "			5.4	38	46	8	58	70	12
" " five "			5.2	31	57	26	47	67	20
" " one individual			5.2	19	32	13	100	82	−18

Similar results have been obtained by half a dozen other experimenters, using the tests of mental multiplication, addition, marking A's on a printed sheet of capitals, and the like. It would be a mistake to conclude too much from experiments of such restricted scope; but they all agree in showing that if every child were given an equal training, the differences in these traits would nevertheless be very great.

And although we do not wish to strain the application of these results too far, we are at least justified in saying that they strongly indicate that inborn mediocrity can not be made into a high grade of talent by training. Not every boy has a chance to distinguish himself, even if he receives a good education.

We are driven back to the same old conclusion, that it is primarily inborn nature which causes the achievements of men and women to be what they are. Good environment, opportunity, training, will give good heredity a chance to express itself; but they can not produce greatness from bad heredity.

These conclusions are familiar to scientific sociologists, but they have not yet had the influence on social service and practical attempts at reform which they deserve. Many popular writers continue to confuse cause and effect, as for example

H. Addington Bruce, who contributed an article to the *Century Magazine*, not long ago, on "The Boy Who Goes Wrong." After alleging that the boy who goes wrong does so because he is not properly brought up, Mr. Bruce quotes with approval the following passage from Paul Dubois, "the eminent Swiss physician and philosopher:

"If you have the happiness to be a well-living man, take care not to attribute the credit of it to yourself. Remember the favorable conditions in which you have lived, surrounded by the relatives who loved you and set you a good example; do not forget the close friends who have taken you by the hand and led you away from the quagmires of evil; keep a grateful remembrance for all the teachers who have influenced you, the kind and intelligent school-master, the devoted pastor; realize all these multiple influences which have made you what you are. Then you will remember that such and such a culprit has not in his sad life met with these favorable conditions; that he had a drunken father or a foolish mother, and that he has lived without affection, exposed to all kinds of temptation. You will then take pity upon this disinherited man, whose mind has been nourished upon malformed mental images, begetting evil sentiments such as immoderate desire or social hatred."

Mr. Bruce indorses this kind of talk when he concludes, "The blame for the boy who goes wrong does not rest with the boy himself, or yet with his remote ancestors. It rests squarely with the parents who, through ignorance or neglect, have failed to mold him aright in the plastic days of childhood."

Where is the evidence of the existence of these plastic days of childhood? If they exist, why do not ordinary brothers become as much alike as identical twins? How long are we to be asked to believe, on blind faith, that the child is putty, of which the educator can make either mediocrity or genius, depending on his skill? What does the environmentalist *know* about these "plastic days"? If a boy has a drunken father or foolish mother, does it not suggest that there is something wrong with his pedigree? With such an ancestry, we do not expect him to turn out brilliantly, no matter in what home he is brought up.

If a boy has the kind of parents who bring him up well; if he is, as Dr. Dubois says, surrounded by relatives who love him and set him a good example, we at once have ground for a suspicion that he comes of a pretty good family, a stock characterized by a high standard of intellectuality and morality, and it would surprise us if such a boy did not turn out well. But he turns out well because what's bred in the bone will show in him, if it gets any kind of a chance. It is his nature, not his nurture, that is mainly responsible for his character.

CHAPTER II

MODIFICATION OF THE GERM-PLASM

Every living creature was at some stage of its life nothing more than a single cell. It is generally known that human beings result from the union of an egg-cell and a sperm-cell, but it is not so universally understood that these germ-cells are part of a continuous stream of germ-plasm which has been in existence ever since the appearance of life on the globe, and which is destined to continue in existence as long as life remains on the globe.

The corollaries of this fact are of great importance. Some of them will be considered in this chapter.

Early investigators tended naturally to look on the germ-cells as a product of the body. Being supposedly products of the body, it was natural to think that they would in some measure reproduce the character of the body which created them; and Darwin elaborated an ingenious hypothesis to explain how the various characters could be represented in the germ-cell. The idea held by him, in common with most other thinkers of his period, is still held more or less unconsciously by those who have not given particular attention to the subject. Generation is conceived as a direct chain: the body produces the germ-cell which produces another body which in turn produces another germ-cell, and so on.

But a generation ago this idea fell under suspicion. August Weismann, professor of zoölogy in the University of Freiburg, Germany, made himself the champion of the new idea, about 1885, and developed it so effectively that it is now a part of the creed of nearly every biologist.

Weismann caused a general abandonment of the idea that the germ-cell is produced by the body in each generation, and popularized the conception of the germ-cell as a product of a stream of undifferentiated germ-plasm, not only continuous but

(potentially at least) immortal. The body does not produce the germ-cells, he pointed out; instead, the germ-cells produce the body.

The basis of this theory can best be understood by a brief consideration of the reproduction of very simple organisms.

"Death is the end of life," is the belief of many other persons than the Lotus Eaters. It is commonly supposed that everything which lives must eventually die. But study of a one-celled animal, an Infusorian, for example, reveals that when it reaches a certain age it pinches in two, and each half becomes an Infusorian in all appearance identical with the original cell. Has the parent cell then died? It may rather be said to survive, in two parts. Each of these daughter cells will in turn go through the same process of reproduction by simple fission, and the process will be continued in their descendants. The Infusorian can be called potentially immortal, because of this method of reproduction.

The immortality, as Weismann pointed out, is not of the kind attributed by the Greeks to their gods, who could not die because no wound could destroy them. On the contrary, the Infusorian is extremely fragile, and is dying by millions at every instant; but if circumstances are favorable, it *can* live on; it is not inevitably doomed to die sooner or later, as is Man. "It dies from accident often, from old age never."

Now the single-celled Infusorian is in many respects comparable with the single-celled germ of the higher animals. The analogy has often been carried too far; yet it remains indisputable that the germ-cells of men reproduce in the same way—by simple fission—as the Infusorian and other one-celled animals and plants, and that they are organized on much the same plan. Given favorable circumstances, the germ-cell should be expected to be equally immortal. Does it ever find these favorable circumstances?

The investigations of microscopists indicate that it does—that evolution has provided it with these favorable circumstances, in the bodies of the higher animals. Let us recall in outline the early history of the fertilized germ-cell, the *zygote*

formed by the union of ovum and spermatozoön. These two unite to form a single cell, which is essentially the same, physiologically, as other germ-cells. It divides in two similar cells; these each divide; the resulting cells again divide, and so the process continues, until the whole body—a fully developed man,—has been produced by division and redivision of the one zygote.

But the germ-cell is obviously different from most of the cells that make up the finished product, the body. The latter are highly differentiated and specialized for different functions—blood cells, nerve cells, bone cells, muscle cells, and so on, each a single cell but each adapted to do a certain work, for which the original, undifferentiated germ-cell was wholly unfit. It is evident that differentiation began to take place at some point in the series of divisions, that is to say, in the development of the embryo.

Th. Boveri, studying the development of a threadworm, made the interesting discovery that this differentiation began at the first division. Of the two daughter-cells produced from the zygote, one continued dividing at a very slow rate, and without showing any specialization. Its "line of descent" produced only germ-cells. The products of division of the other daughter-cell began to differentiate, and soon formed all the necessary kinds of cells to make up the body of the mature worm. In this body, the cells from the first daughter-cell mentioned were inclosed, still undifferentiated: they formed the germ-cells of the next generation, and after maturity were ready to be ejected from the body, and to form new threadworms.

Imagine this process taking place through generation after generation of threadworms, and one will realize that the germ-plasm was passed on directly from one generation to the next; that in each generation it gave rise to body-plasm, but that it did not at any time lose its identity or continuity, a part of the germ-plasm being always set aside, undifferentiated, to be handed on to the next generation.

In the light of this example, one can better understand the definition of germ-plasm as "that part of the substance of the

parents which does not die with them, but perpetuates itself in their offspring." By bringing his imagination into play, the reader will realize that there is no limit to the backward continuity of this germ-plasm in the threadworm. Granted that each species has arisen by evolution from some other, this germ-cell which is observed in the body of the threadworm, must be regarded as part of what may well be called a stream of germ-plasm, that reaches back to the beginning of life in the world. It will be equally evident that these is no foreordained limit to the forward extension of the stream. It will continue in some branch, as long as there are any threadworms or descendants of threadworms in the world.

The reader may well express doubt as to whether what has been demonstrated for the threadworm can be demonstrated for the higher animals, including man. It must be admitted that in many of these animals conditions are too unfavorable, and the process of embryology too complicated, or too difficult to observe, to permit as distinct a demonstration of this continuity of the germ-plasm, wherever it is sought. But it has been demonstrated in a great many animals; no facts which impair the theory have been discovered; and biologists therefore feel perfectly justified in generalizing and declaring the continuity of germ-plasm to be a law of the world of living things.

Focusing attention on its application to man, one sees that the race must represent an immense network of lines of descent, running back through a vast number of different forms of gradually diminishing specialization, until it comes to a point where all its threads merge in one knot—the single cell with which it may be supposed that life on this globe began. Each individual is not only figuratively, but in a very literal sense, the carrier of the heritage of the whole race—of the whole past, indeed. Each individual is temporarily the custodian of part of the "stuff of life"; from an evolutionary point of view, he may be said to have been brought into existence, primarily to pass this sacred heritage on to the next generation. From Nature's standpoint, he is of little use in the world, his existence is scarcely justified, unless he faithfully discharges this trust, passing on to the future

the "Lamp of Life" whose fire he has been created to guard for a short while.

Immortality, we may point out in passing, is thus no mere *hope* to the parent: it is a *real possibility*. The death of the huge agglomeration of highly specialized body-cells is a matter of little consequence, if the germ-plasm, with its power to reproduce not only these body-cells, but the mental traits—indeed, we may in a sense say the very soul—that inhabited them, has been passed on. The individual continues to live, in his offspring, just as the past lives in him. To the eugenist, life everlasting is something more than a figure of speech or a theological concept—it is as much a reality as the beat of the heart, the growth of muscles or the activity of the mind.

This doctrine of the continuity of germ-plasm throws a fresh light on the nature of human relationships. It is evident that the son who resembles his father can not accurately be called a "chip of the old block." Rather, they are both chips off the same block; and aside from bringing about the fusion of two distinct strains of germ-plasm, father and mother are no more responsible for endowing the child with its characters except in the choice of mate, than is the child for "stamping his impress" on his parents. From another point of view, it has been said that father and son ought to be thought of as half-brothers by two different mothers, each being the product of the same strain of paternal germ-plasm, but not of the same strain of maternal germ-plasm. Biologically, the father or mother should not be thought of as the *producer* of a child, but as the trustee of a stream of germ-plasm which produces a child whenever the proper conditions arise. Or as Sir Michael Foster put it, "The animal body is in reality a vehicle for ova or sperm; and after the life of the parent has become potentially renewed in the offspring, the body remains as a cast-off envelope whose future is but to die." Finally to quote the metaphor of J. Arthur Thomson, one may "think for a moment of a baker who has a very precious kind of leaven; he uses much of this in baking a large loaf; but he so arranges matters by a clever contrivance that part of the original leaven is always carried on unaltered, carefully preserved

for the next baking. Nature is the baker, the loaf is the body, the leaven is the germ-plasm, and each baking is a generation."

When the respective functions and relative importance, from a genetic point of view, of germ-plasm and body-plasm are understood, it must be fairly evident that the natural point of attack for any attempt at race betterment which aims to be fundamental rather than wholly superficial, must be the germ-plasm rather than the body-plasm. The failure to hold this point of view has been responsible for the disappointing results of much of the sociological theory of the last century, and for the fact that some of the work now carried on under the name of race betterment is producing results that are of little or no significance to true race betterment.

On the other hand, it must be fairly evident, from the pains which Nature has taken to arrange for the transmission of the germ-plasm from generation to generation, that she would also protect it from injury with meticulous care. It seems hardly reasonable to suppose that a material of this sort should be exposed, in the higher animals at least, to all the vicissitudes of the environment, and to injury or change from the chance of outward circumstances.

In spite of these presumptions which the biologist would, to say the least, consider worthy of careful investigation, the world is full of well-intentioned people who are anxious to improve the race, and who in their attempts to do so, wholly ignore the germ-plasm. They see only the body-plasm. They are devoted to the dogma that if they can change the body (and what is here said of the body applies equally to the mind) in the direction they wish, this change will in some unascertainable way be reproduced in the next generation. They rarely stop to think that man is an animal, or that the science of biology might conceivably have something to say about the means by which his species can be improved; but if they do, they commonly take refuge, deliberately or unconsciously, in the biology of half a century ago, which still believed that these changes of the body could be so impressed on the germ-plasm as to be continued in the following generation.

Such an assumption is made to-day by few who have thoroughly studied the subject. Even those who still believed in what is conventionally called "the inheritance of acquired characteristics" would be quick to repudiate any such application of the doctrine as is commonly made by most of the philanthropists and social workers who are proceeding without seeking the light of biology. But the idea that these modifications are inherited is so wide-spread among all who have not studied biology, and is so much a part of the tradition of society, that the question must be here examined, before we can proceed confidently with our program of eugenics.

The problem is first to be defined.

It is evident that all characters which make up a man or woman, or any other organism, must be either germinal or acquired. It is impossible to conceive of any other category. But it is frequently hard to say in which class a given character falls. Worse still, many persons do not even distinguish the two categories accurately—a confusion made easier by the quibble that *all* characters must be acquired, since the organism starts from a single cell, which possesses practically none of the traits of the adult.

What we mean by an inborn character is one whose expression is due to something which is present in the germ-plasm; one which is inherent and due to heredity. An acquired character is simply a modification, due to some cause external to the germ-plasm acting on an inborn character. In looking at an individual, one can not always say with certainty which characters are which; but with a little trouble, one can usually reach a reliable decision. It is possible to measure the variation in a given character in a group of parents and their children, in a number of different environments; if the degree of resemblance between parent and offspring is about the same in each case, regardless of the different surroundings in which the children may have been brought up, the character may properly be called germinal. This is the biometric method of investigation. In practice, one can often reach a decision by much simpler means: if the character is one that appears at

birth, e. g., skin color, it is usually safe to assume that it is a germinal character, unless there is some evident reason for deciding otherwise, as in the case of a child born with some disease from which the mother had been suffering for the previous few months. In general, it is more difficult to decide whether a mental trait is germinal, than whether a physical one is; and great care should be used in classification.

To make the distinction, one ought to be familiar with an individual from birth, and to have some knowledge of the conditions to which he was exposed, in the period between conception and birth,—for of course a modification which takes place during that time is as truly an acquired character as one that takes place after parturition. Blindness, for example, may be an inborn defect. The child from conception may have lacked the requisites for the development of sight. On the other hand, it may be an acquired character, due to an ill-advised display of patriotism on July 4, at some time during childhood; or even to infection at the moment of birth. Similarly small size may be an inborn character, due to a small-sized ancestry; but if the child comes of a normal ancestry and is stunted merely because of lack of proper care and food, the smallness is an acquired character. Deafness may be congenital and inborn, or it may be acquired as the result, say, of scarlet fever during childhood.

Now the inborn characters (excepting modifications *in utero*) are admittedly heritable, for inborn characters must exist potentially in the germ-plasm. The belief that acquired characters are also inherited, therefore, involves belief that in some way the trait acquired by the parent is incorporated in the germ-plasm of the parent, to be handed on to the child and reappear in the course of the child's development. The impress on the parental *body* must in some way be transferred to the parental *germ-plasm;* and not as a general influence, but as a specific one which can be reproduced by the germ-plasm.

This idea was held almost without question by the biologists of the past, from Aristotle on. Questionings indeed arose from time to time, but they were vague and carried no weight, until

a generation ago several able men elaborated them. For many years, it was the question of chief dispute in the study of heredity. The last word has not yet been said on it. It has theoretical bearings of immense importance; for our conception of the process of evolution will be shaped according to the belief that acquired characters are or are not inherited. Herbert Spencer went so far as to say, "Close contemplation of the facts impresses me more strongly than ever with two alternatives—either that there has been inheritance of acquired characters, or there has been no evolution." But its practical bearings are no less momentous. Again to quote Spencer: "Considering the width and depth of the effects which the acceptance or non-acceptance of one or the other of these hypotheses must have on our views of life, the question, Which of them is true? demands beyond all other questions whatever the attention of scientific men. A grave responsibility rests on biologists in respect of the general question, since wrong answers lead, among other effects, to wrong belief about social affairs and to disastrous social actions."

Biologists certainly have not shirked this "grave responsibility" during the last 30 years, and they have, in our opinion, satisfactorily answered the general question. The answer they give is not the answer Herbert Spencer gave.

But the popular mind frequently lags a generation behind, in its grasp of the work of science, and it must be said that in this case the popular mind is still largely under the influence of Herbert Spencer and his school. *Whether they know it or not*, most people who have not made a particular study of the question still tacitly assume that the acquirements of one generation form part of the inborn heritage of the next, and the present social and educational systems are founded in large part on this false foundation. Most philanthropy starts out unquestioningly with the assumption that by modifying the individual for the better, it will thereby improve the germinal quality of the race. Even a self-styled eugenist asks, "Can prospective parents who have thoroughly and systematically disciplined themselves, physically, mentally and morally, transmit to their offspring

the traits or tendencies which they have developed?" and answers the question with the astounding statement, "It seems reasonable to suppose that they have this power, it being simply a phase of heredity, the tendency of like to beget like."

The right understanding of this famous problem is therefore fraught with the most important consequences to eugenics. The huge mass of experimental evidence that has been accumulated during the last quarter of a century has, necessarily, been almost wholly based on work with plants and lower animals. Even though we can not attempt to present a general review of this evidence, for which the reader must consult one of the standard works on biology or genetics, we shall point out some of the considerations underlying the problem and its solution.

In the first place, it must be definitely understood that we are dealing only with specific, as distinguished from general, transmission. As the germ-cells derive their nourishment from the body, it is obvious that any cause profoundly affecting the latter might in that way exercise an influence on the germ-cells; that if the parent was starved, the germ-cells might be ill-nourished and the resulting offspring might be weak and puny. There is experimental evidence that this is the case; but that is not the inheritance of an acquired character. If, however, a white man tanned by long exposure to the tropical sun should have children who were brunettes, when the family stock was all blond; or if men whose legs were deformed through falls in childhood should have children whose legs, at birth, appeared deformed in the same manner; then there would be a distinct case of the transmission of an acquired characteristic. "The precise question," as Professor Thomson words it, "is this: Can a structural change in the body, induced by some change in use or disuse, or by a change in surrounding influence, affect the germ-cells in such a *specific* or representative way that the offspring will through its inheritance exhibit, even in a slight degree, the modification which the parent acquired?" He then lists a number of current misunderstandings, which are so widespread that they deserve to be considered here.

(1) It is frequently argued (as Herbert Spencer himself sug-

gested) that unless modifications are inherited, there could be no such thing as evolution. Such pessimism is unwarranted. There *is* abundant explanation of evolution, in the abundant supply of germinal variations which every individual presents.

(2) It is common to advance an *interpretation* of some observation, in support of the Lamarckian doctrine, as if it were a *fact*. Interpretations are not facts. What is wanted are the facts; each student has a right to interpret them as he sees fit, but not to represent his interpretation as a fact. It is easy to find structural features in Nature which *may be interpreted* as resulting from the inheritance of acquired characters; but this is not the same as to say and to prove that they *have resulted* from such inheritance.

(3) It is common to beg the question by pointing to the transmission of some character that is not proved to be a modification. Herbert Spencer cited the prevalence of short-sightedness among the "notoriously studious" Germans as a defect due to the inheritance of an acquired character. But he offered no evidence that this is an acquirement rather than a germinal character. As a fact, there is reason to believe that weakness of the eyes is one of the characteristics of that race, and existed long before the Germans ever became studious—even at a time when most of them could neither read nor write.

(4) The reappearance of a modification may be mistaken for the transmission of a modification. Thus a blond European family moves to the tropics, and the parents become tanned. The children who grow up under the tropical sun are tanned from infancy; and after the grandchildren or great-grandchildren appear, brown from childhood, some one points to the case as an instance of permanent modification of skin-color. But of course the children at the time of birth are as white as their distant cousins in Europe, and if taken back to the North to be brought up, would be no darker than their kinsmen who had never been in the tropics. Such "evidence" has often been brought forward by careless observers, but can deceive no one who inquires carefully into the facts.

(5) In the case of diseases, re-infection is often mistaken for

transmission. The father had pneumonia; the son later developed it; ergo, he must have inherited it. What evidence is there that the son in this case did not get it from an entirely different source? Medical literature is heavily burdened with such spurious evidence.

(6) Changes in the germ-cells *along with* changes in the body are not relevant to this discussion. The mother's body, for example, is poisoned with alcohol, which is present in large quantities in the blood and therefore might affect the germ-cells directly. If the children subsequently born are consistently defective it is not an inheritance of a body character but the result of a direct modification of the germ-plasm. The inheritance of an acquired modification of the body can only be proved if some particular change made in the parent is inherited as such by the child.

(7) There is often a failure to distinguish between the possible inheritance of a particular modification, and the possible inheritance of indirect results of that modification, or of changes correlated with it. This is a nice but crucial point on which most popular writers are confused. Let us examine it through a hypothetical case. A woman, not herself strong, bears a child that is weak. The woman then goes in for athletics, in order better to fit herself for motherhood; she specializes on tennis. After a few years she bears another child, which is much stronger and better developed than the first. "Look," some one will say, "how the mother has transmitted her acquirement to her offspring." We grant that her improved general health will probably result in a child that is better nourished than the first; but that is a very different thing from heredity. If, however, the mother had played tennis until her right arm was overdeveloped, and her spine bent; if these characteristics were nowhere present in the ancestry and not seen in the first child; but if the second child were born with a bent spine and a right arm of exaggerated musculature, we would be willing to consider the case on the basis of the inheritance of an acquired character. We are not likely to have such a case presented to us.

To put the matter more generally, it is not enough to show that *some* modification in the parent results in *some* modification in the child. For the purposes of this argument there must be a similar modification.

(8) Finally, data are frequently presented, which cover only two generations—parent and child. Indeed, almost all the data alleged to show the inheritance of acquired characteristics are of this kind. They are of little or no value as evidence. Cases covering a number of generations, where a *cumulative* change was visible, would be of weight, but on the rare occasions when they are forthcoming, they can be explained in some other way more satisfactorily than by an appeal to the theory of Lamarck.[1]

If the evidence currently offered to support a belief in the inheritance of acquired characters is tested by the application of these "misunderstandings," it will at once be found that most of it disappears; that it can be thrown out of court without further formality. The Lamarckian doctrine is now held mainly by persons who have either lacked training in the evaluation of evidence, or have never examined critically the assumptions on which they proceed. Medical men and breeders of plants or animals are to a large extent believers in Lamarckism, but the evidence (if any) on which they rely is always susceptible of explanation in a more reasonable way. It must not be forgotten that some of the ablest intellects in the world have been assidously engaged in getting at the truth in the case, during the last half-century; and it is certainly worthy of consideration that not in a single case has the transmission of an acquired body

[1] Jean Baptiste Lamarck, a French naturalist, born in 1744, was one of the pioneers in the philosophical study of evolution. The theory (published in 1809) for which he is best known is as follows: "Changes in the animal's surroundings are responded to by changes in its habits." "Any particular habit involves the regular use of some organs and the disuse of others. Those organs which are used will be developed and strengthened, those not used diminished and weakened, and the changes so produced will be transmitted to the offspring, and thus progressive development of particular organs will go on from generation to generation." His classical example is the neck of the giraffe, which he supposes to be long because, for generation after generation, the animals stretched their necks in order to get the highest leaves from the trees.

character ever been proved beyond dispute. Those who still hold a belief in it (and it is fair to say that some men of real ability are among that number) too often do so, it is to be feared, because it is necessary for the support of some theoretical doctrine which they have formulated. Certainly there are few men who can say that they have carefully examined the evidence in the case, and accept Lamarckism because the evidence forces them to do so. It will be interesting to review the various classes of alleged evidence, though we can cite only a few cases from the great number available (most of them, however, dealing with plants or lower animals).

Nearly all the evidence adduced can be put in one of these four classes:

(1) Mutilations.
(2) Diseases.
(3) Results of use or disuse.
(4) Physico-chemical effects of environment.

The case in regard to mutilations is particularly clear cut and leaves little room for doubt. The noses and ears of oriental women have been pierced for generations without number, yet girls are still born with these parts entire. Circumcision offers another test case. The evidence of laboratory experiments (amputation of tails) shows no inheritance. It may be said without hesitation that mutilations are not heritable, no matter how many generations undergo them.

(2) The transmissibility of acquired diseases is a question involved in more of a haze of ignorance and loose thinking. It is particularly frequent to see cases of uterine infection offered as cases of the inheritance of acquired characters. To use the word "heredity" in such a case is unjustified. Uterine infection has no bearing whatever on the question.

Taking an historical view, it seems fairly evident that if diseases were really inherited, the race would have been extinct long ago. Of course there are constitutional defects or abnormalities that are in the germ-plasm and are heritable: such is the peculiar inability of the blood to coagulate, which marks "bleeders" (sufferers from hemophilia, a highly hereditary

"disease). And in many cases it is difficult to distinguish between a real germinal condition of this sort, and an acquired disease.

The inheritance of an acquired disease is not only inconceivable, in the light of what is known about the germ-plasm, but there is no evidence to support it. While there is most decidedly such a thing as the inheritance of a tendency to or lack of resistance to a disease, it is not the result of incidence of the disease on the parent. It is possible to inherit a tendency to headaches or to chronic alcoholism; and it is possible to inherit a lack of resistance to common diseases such as malaria, smallpox or measles; but actually to inherit a zymotic disease as an inherent genetic trait, is impossible,—is, in fact, a contradiction of terms.

(3) When we come to the effects of use and disuse, we reach a much debated ground, and one complicated by the injection of a great deal of biological theorizing, as well as the presence of the usual large amount of faulty observation and inference.

It will be admitted by every one that a part of the body which is much used tends to increase in size, or strength, and similarly that a part which is not used tends to atrophy. It is further found that such changes are progressive in the race, in many cases. Man's brain has steadily increased in size, as he used it more and more; on the other hand, his canine teeth have grown smaller. Can this be regarded as the inheritance of a long continued process of use and disuse? Such a view is often taken, but the Lamarckian doctrine seems to us just as mystical here as anywhere else, and no more necessary. Progressive changes can be satisfactorily accounted for by natural selection; retrogressive changes are susceptible of explanation along similar lines. When an organ is no longer necessary, as the hind legs of a whale, for instance, natural selection no longer keeps it at the point of perfection. Variation, however, continues to occur in it. Since the organ is now useless, natural selection will no longer restrain variation in such an organ, and degeneracy will naturally follow, for of all the variations that occur in the organ, those tending to loss are more numerous than those tending to

addition. If the embryonic development of a whale's hind leg be compared to some complicated mechanical process, such as the manufacture of a typewriter, it will be easier to realize that a trivial variation which affected one of the first stages of the process would alter all succeeding stages and ruin the final perfection of the machine. It appears, then, that progressive degeneration of an organ can be adequately explained by variation with the removal of natural selection, and that it is not necessary or desirable to appeal to any Lamarckian factor of an unexplainable and undemonstrable nature.

The situation remains the same, when purely mental processes, such as instincts, are considered. Habit often repeated becomes instinctive, it is said; and then the instinct thus formed by the individual is passed on to his descendants and becomes in the end a racial instinct. Most psychologists have now abandoned this view, which receives no support from investigation. Such prevalence as it still retains seems to be largely due to a confusion of thought brought about by the use of the word "instinctive" in two different senses,—first literally and then figuratively.

A persistent attempt has been made in America during recent years, by C. L. Redfield, a Chicago engineer, to rehabilitate the theory of the inheritance of the effects of use and disuse. He has presented it in a way that, to one ignorant of biology, appears very exact and plausible; but his evidence is defective and his interpretation of his evidence fallacious. Because of the widespread publicity, Mr. Redfield's work has received, we discuss it further in Appendix B.

Since the importance of hormones (internal secretions) in the body became known, it has often been suggested that their action may furnish the clue to some sort of an inheritance of modifications. The hormone might conceivably modify the germ-plasm but if so, it would more likely be in some wholly different way.

In general, we may confidently say that there is neither theoretical necessity nor adequate experimental proof for belief that the results of use and disuse are inherited.

(4) When we come to consider whether the effects of the environment are inherited, we attack a stronghold of sociologists and historians. Herbert Spencer thought one of the strongest pieces of evidence in this category was to be found in the assimilation of foreigners in the United States. "The descendants of the immigrant Irish," he pointed out, "lose their Celtic aspect and become Americanised. . . . To say that 'spontaneous variation,' increased by natural selection, can have produced this effect, is going too far." Unfortunately for Mr. Spencer, he was basing his conclusions on guesswork. It is only within the last few months that the first trustworthy evidence on the point has appeared, in the careful measurements of Hrdlička who has demonstrated that Spencer was quite wrong in his statement. As a fact, the original traits persist with almost incredible fidelity. (Appendix C.)

In 1911, Franz Boas of Columbia University published measurements of the head form of children of immigrants [1] which purported to show that American conditions caused in some mysterious manner a change in the shape of the head. This conclusion in itself would have been striking enough, but was made more startling when he announced that the change worked both ways: "The East European Hebrew, who has a very round head, becomes more long-headed; the south Italian, who in Italy has an exceedingly long head, becomes more short-headed"; and moreover this potent influence was alleged to be a subtle one "which does not affect the young child born abroad and growing up in American environment, but which makes itself felt among the children born in America, even a short time after the arrival of the parents in this country." Boas' work was naturally pleasing to sociologists who believe in the reality of the "melting-pot," and has obtained widespread acceptance in popular literature. It has obtained little acceptance among his fellow-anthropologists, some of whom allege that it is unsound because of the faulty methods by which the measurements were made and the incorrect standards used for comparison.

[1] Boas, F., *Changes in Body Form of Descendants of Immigrants*, 1911.

The many instances quoted by historians, where races have changed after immigration, are to be explained in most cases by natural selection under new conditions, or by interbreeding with the natives, and not as the direct result of climate. Ellsworth Huntington, the most recent and careful student of the effect of climate on man,[1] finds that climate has a great deal of influence on man's energy, but as far as inherited traits in general are concerned, he is constantly led to remark how little heredity is capable of being changed.

Most members of the white race have little toes that are partly atrophied, and considerably deformed. In many cases one of the joints has undergone ankylosis—that is, the bones have coalesced. It is confidently alleged that this is due to the inheritance of the effects of wearing tight shoes through many centuries. When it is found that the prehistoric Egyptians, who knew not tight shoes, suffered from the same defect in a similar degree, one's confidence in this kind of evidence is much diminished.

The retrogression of the little toe in man is probably to be explained like the degeneration of the hind leg of the whale, as a result of the excess of deteriorating variations which, when not eliminated by natural selection, lead to atrophy. Since man began to limit the use of his feet to walking on the ground, the little toe has had much less value to him.

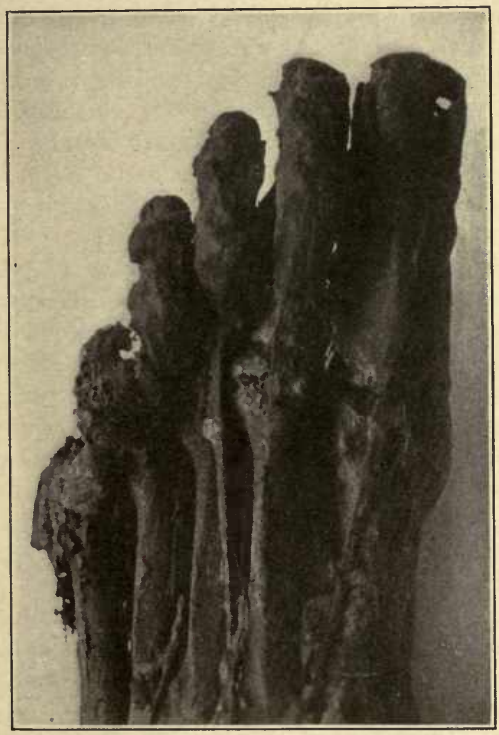
The feet of Chinese women offer another illustration along this line. Although they have been tightly bound for many generations, no deformity is apparent in the feet of girl babies.

Breeders are generally of the opinion that good care and feed bestowed on their stock produce results in succeeding generations. This is in a way true, but it is due merely to the fact that the offspring get better nourishment and therefore a better start in life. The changes in breeds, the increase in milk yield, and similar facts, often explained as due to inheritance of acquired characters, are better explained as the results of selection, sometimes conscious, sometimes quite unconscious.

[1] *Civilization and Climate.* By Ellsworth Huntington, Yale University Press, 1916.

BOUND FOOT OF A CHINESE WOMAN

FIG. 5.—For centuries the feet of upper class women, and many lower class women, in China have been distorted in this manner; but their daughters have perfect feet when born.



DEFECTIVE LITTLE TOE OF A PREHISTORIC EGYPTIAN

FIG. 6.—The above illustration shows the foot of a prehistoric Egyptian who is estimated to have lived about 8000 B. C. The last joint of the little toe had entirely disappeared, and careful dissection leaves no doubt that it was a germinal abnormality, such as is occasionally seen today, and not the result of disease. It is, therefore, evident that the degeneration of man's little toe must be ascribed to some more natural cause than the wearing of shoes for many generations. Photograph from Dr. Gorgy Sobhy, School of Medicine, Cairo.

The question of inherited immunity to diseases, as the result of vaccination or actual illness from them, has appeared in the controversy in a number of forms, and is a point of much importance. It is not yet clear, partly because the doctors disagree as to what immunity is. But there is no adequate evidence that an immunity to anything can be created and transmitted through the germ-plasm to succeeding generations.

In short, no matter what evidence we examine, we must conclude that inheritance of acquired bodily characters is not a subject that need be reckoned with, in applied eugenics.

On the other hand, there is a possible indirect influence of modifications, which may have real importance in man. If the individual is modified in a certain way, in a number of generations, even though such a modification is not transmitted to his descendants, yet its continued existence may make possible the survival of some germinal variation bearing in the same direction, which without the protecting influence of the pre-existing modification, would have been swamped or destroyed.

Finally, it should be borne in mind that even if physical and mental characters acquired during a man's lifetime are not transmitted, yet there is a sort of transmission of acquired characters which has been of immense importance to the evolution of the race. This is the so-called "inheritance" of the environment; the passing on from one generation to the next of the achievements of the race, its accumulated social experience; its civilization, in short. It is doubtful whether any useful end is gained by speaking of this continuance of the environment as "heredity;" it certainly tends to confuse many people who are not used to thinking in biological terms. Tradition is the preferable term.

There is much to be said in favor of E. B. Poulton's definition, —"Civilization in general is the sum of those contrivances which enable human beings to advance independently of heredity." Whatever wisdom, material gain, or language is acquired by one generation may be passed on to the next. As far as the environment is concerned, one generation stands on the shoul-

ders of its predecessor. It might simplify the task of eugenics if the same could be said of biological heredity. But it can not. Each generation must "start from scratch."

In August Weismann's words, the development of a function in offspring begins at the point where it *began* in his parents, not at the point where it *ended* in them. Biological improvement of the race (and such improvement greatly fosters all other kinds) must be made through a selective birth-rate. There is no short-cut by way of euthenics, merely.

We must now consider whether there is any direct way of impairing good heredity. It is currently believed that there are certain substances, popularly known as "racial poisons," which are capable of affecting the germ-plasm adversely and permanently in spite of its isolation and protection. For example, the literature of alcoholism, and much of the literature of eugenics, abounds with statements to the effect that alcohol *originates* degeneracy in the human race.

The proof or disproof of this proposition must depend in the last analysis on direct observation and carefully controlled experiments. As the latter cannot be made feasibly on man, a number of students have taken up the problem by using small animals which are easily handled in laboratories. Many of these experiments are so imperfect in method that, when carefully examined, they are found to possess little or no value as evidence on the point here discussed.

Hodge, Mairet and Combemale, for example, have published data which convinced them that the germ-plasm of dogs was injured by the administration of alcohol. The test was the quality of offspring directly produced by the intoxicated animals under experiment. But the number of dogs used was too small to be conclusive, and there was no "control": hence these experiments carry little weight.

Ovize, Fêrê and Stockard have shown that the effect of alcohol on hen's eggs is to produce malformed embryos. This, however, is a case of influencing the development of the individual, rather than the germ-plasm. Evidence is abundant that individual development can be harmed by alcohol, but

the experiments with eggs are not to the point of our present purpose.

Carlo Todde and others have carried out similar experiments on cocks. The conclusions have in general been in favor of injury to the germ-plasm, but the experiments were inadequate in extent.

Laitinen experimented on rabbits and guinea pigs, but he used small doses and secured only negative results.

Several series of experiments with rats indicate that if the dosage is large enough, the offspring can be affected.

Nice, using very small numbers of white mice, subjected them not only to alcohol, but to caffein, nicotin, and tobacco smoke. The fecundity of all these sets of mice was higher than that of the untreated ones used as control; all of them gained in weight; of 707 young, none was deformed, none stillborn, and there was only one abortion. The young of the alcoholized mice surpassed all others in growth. The dosage Nice employed was too small, however, to give his experiment great weight.

At the University of Wisconsin, Leon J. Cole has been treating male rabbits with alcohol and reports that "what appear to be decisive results have already been obtained. In the case of alcoholic poisoning of the male the most marked result has been a lessening of his efficiency as a sire, the alcohol apparently having had some effect on the vitality of his spermatozoa." His experiment is properly planned and carried out, but so far as results have been made public, they do not appear to afford conclusive evidence that alcohol originates degeneracy in offspring.

The long-continued and carefully conducted experiment of Charles R. Stockard at the Cornell Medical College is most widely quoted in this connection. He works with guinea-pigs. The animals are intoxicated daily, six days in the week, by inhaling the fumes of alcohol to the point where they show evident signs of its influence; their condition may thus be compared to that of the toper who never gets "dead drunk" but is never entirely sober. Treatment of this sort for a period as long as three years produces no apparent bad effect on the individuals;

they continue to grow and become fat and vigorous, taking plenty of food and behaving in a normal manner in every particular. Some of them have been killed from time to time, and all the tissues, including the reproductive glands, have been found perfectly normal. "The treated animals are, therefore, little changed or injured so far as their behavior and structure goes. Nevertheless, the effects of the treatment are most decidedly indicated by the type of offspring to which they give rise, whether they are mated together or with normal individuals."

Before the treatment is begun, every individual is mated at least once, to demonstrate its possibility of giving rise to sound offspring. The crucial test of the influence of alcohol on the germ-cells is, of course, the mating of a previously alcoholized male with a normal, untreated female, in a normal environment.

When the experiment was last reported,[1] it had covered five years and four generations. The records of 682 offspring produced by 571 matings were tabulated, 164 matings of alcoholized animals, in which either the father, mother, or both were alcoholic, gave 64, or almost 40%, negative results or early abortions, while only 25% of the control matings failed to give full-term litters. Of the 100 full-term litters from alcoholic parents 18% contained stillborn young and only 50% of all the matings resulted in living litters, while 47% of the individuals in the litters of living young died soon after birth. In contrast to this record 73% of the 90 control matings gave living litters and 84% of the young in these litters survived as normal, healthy animals.

"The mating records of the descendants of the alcoholized guinea pigs, although they themselves were not treated with alcohol, compare in some respects even more unfavorably with the control records than do the above data from the directly alcoholized animals." The records of the matings in the second filial generation "are still worse, higher mortality and more pronounced deformities, while the few individuals which have

[1] *American Naturalist*, L., pp. 65–89, 144–178, Feb. and Mar., 1916.

survived are generally weak and in many instances appear to be quite sterile even though paired with vigorous, prolific, normal mates."

We do not minimize the value of this experiment, when we say that too much weight has been popularly placed on its results. Compare it with the experiment with fowls at the University of Maine, which Raymond Pearl reports.[1] He treated 19 fowls with alcohol, little effect on the general health being shown, and none on egg production. From their eggs 234 chicks were produced; the average percentage of fertility of the eggs was diminished but the average percentage of hatchability of fertile eggs was increased. The infant mortality of these chicks was smaller than normal, the chicks were heavier when hatched and grew more rapidly than normal afterwards. No deformities were found. "Out of 12 different characters for which we have exact quantitative data, the offspring of treated parents taken as a group are superior to the offspring of untreated parents in 8 characters," in two characters they are inferior and in the remaining two there is no discernible difference. At this stage Dr. Pearl's experiment is admittedly too small, but he is continuing it. As far as reported, it confirms the work of Professor Nice, above mentioned, and shows that what is true for guinea pigs may not be true for other animals, and that the amount of dosage probably also makes a difference. Dr. Pearl explains his results by the hypothesis that the alcohol eliminated the weaker germs in the parents, and allowed only the stronger germs to be used for reproduction.

Despite the unsatisfactory nature of much of the alleged evidence, we must conclude that alcohol, when given in large enough doses, may sometimes affect the germ-plasm of some lower animals in such a way as to deteriorate the quality of their offspring. This effect is probably an "induction," which does not produce a permanent change in the bases of heredity, but will wear away in a generation or two of good surroundings. It must be remembered that although the second-generation treated males of Dr. Stockard's experiment produced defective

[1] *Proc. Am. Philos. Soc.* LV, pp. 243–259, 1916.

offspring when mated with females from similarly treated stock, they produced normal offspring when mated with normal females. The significance of this fact has been too little emphasized in writings on "racial poisons." If a normal mate will counteract the influence of a "poisoned" one, it is obvious that the probabilities of danger to any race from this source are much decreased, while if only a small part of the race is affected, and mates at random, the racial damage might be so small that it could hardly be detected.

There are several possible explanations of the fact that injury is found in some experiments but not in others. It may be, as Dr. Pearl thinks, that only weak germs are killed by moderate treatment, and the strong ones are uninjured. And it is probable (this applies more particularly to man) that the body can take care of a certain amount of alcohol without receiving any injury therefrom; it is only when the dosage passes the "danger point" that the possibility of injury appears. As to the location of this limit, which varies with the species, little is known. Much more work is needed before the problem will be fully cleared up.

Alcohol has been in use in parts of the world for many centuries; it was common in the Orient before the beginning of historical knowledge. Now if its use by man impairs the germplasm, then it seems obvious that the child of one who uses alcohol to a degree sufficient to impair his germ-plasm will tend to be born inferior to his parent. If that child himself is alcoholic, his own offspring will suffer still more, since they must carry the burden of two generations of impairment. Continuing this line of reasoning over a number of generations, in a race where alcohol is freely used by most of the population, one seems unable to escape from the conclusion that the effects of this racial poison, if it be such, must necessarily be cumulative. The damage done to the race must increase in each generation. If the deterioration of the race could be measured, it might even be found to grow in a series of figures representing arithmetical progression.

It seems impossible, with such a state of affairs, that a race in

which alcohol was widely used for a long period of time, could avoid extinction. At any rate, the races which have used alcohol longest ought to show great degeneracy—unless there be some regenerative process at work constantly counteracting this cumulative effect of the racial poison in impairing the germ-plasm.

Such a proposition at once demands an appeal to history. What is found in examination of the races that have used alcohol the longest? Have they undergone a progressive physical degeneracy, as should be expected?

By no means. In this particular respect they seem to have become stronger rather than weaker, as time went on; that is, they have been less and less injured by alcohol in each century, as far as can be told. Examination of the history of nations which are now comparatively sober, although having access to unlimited quantities of alcohol, shows that at an earlier period in their history, they were notoriously drunken; and the sobriety of a race seems to be proportioned to the length of time in which it has had experience of alcohol. The Mediterranean peoples, who have had abundance of it from the earliest period recorded, are now relatively temperate. One rarely sees a drunkard among them, although many individuals in them would never think of drinking water or any other non-alcoholic beverage. In the northern nations, where the experience of alcohol has been less prolonged, there is still a good deal of drunkenness, although not so much as formerly. But among nations to whom strong alcohol has only recently been made available—the American Indian, for instance, or the Eskimo—drunkenness is frequent wherever the protecting arm of government does not interfere.

What bearing does this have on the theory of racial poisons?

Surely a consideration of the principle of natural selection will make it clear that alcohol is acting as an instrument of racial purification through the elimination of weak stocks. It is a drastic sort of purification, which one can hardly view with complacency; but the effect, nevertheless, seems clear cut.

To demonstrate the action of natural selection, we must first demonstrate the existence of variations on which it can act.

This is not difficult in the character under consideration—namely, the greater or less capacity of individuals to be attracted by alcohol, to an injurious degree.

As G. Archdall Reid has pointed out,[1] men drink for at least three different reasons: (1) to satisfy thirst. This leads to the use of a light wine or a malt liquor. (2) To gratify the palate. This again usually results in the use of drinks of low alcohol content, in which the flavor is the main consideration. (3) Finally, men drink "to induce those peculiar feelings, those peculiar frames of mind" caused by alcohol.

Although the three motives may and often do coexist in the same individual, or may animate him at different periods of life, the fact remains that they are quite distinct. Thirst and taste do not lead to excessive drinking; and there is good evidence that the degree of concentration and the dosage are important factors in the amount of harm alcohol may do to the individual. The concern of evolutionists, therefore, is with the man who is so constituted that the mental effects of alcohol acting directly on the brain are pleasing, and we must show that there is a congenital variability in this mental quality, among individuals.

Surely an appeal to personal experience will leave little room for doubt on that point. The alcohol question is so hedged about with moral and ethical issues that those who never get drunk, or who perhaps never even "take a drink," are likely to ascribe that line of conduct to superior intelligence and great self-control. As a fact, a dispassionate analysis of the case will show that why many such do not use alcoholic beverages to excess is because intoxication has no charm for them. He is so constituted that the action of alcohol on the brain is distasteful rather than pleasing to him. In other cases it is variation in controlling satisfaction of immediate pleasures for later greater good.

Some of the real inebriates have a strong will and a real desire

[1] Dr. Reid is the author who has most effectively called attention to this relation between alcohol and natural selection. Those interested will find a full treatment in his books, *The Present Evolution of Man*, *The Laws of Heredity*, and *The Principles of Heredity*.

to be sober, but have a different mental make-up, vividly described by William James:[1] "The craving for drink in real dipsomaniacs, or for opium and chloral in those subjugated, is of a strength of which normal persons can have no conception. 'Were a keg of rum in one corner of the room, and were a cannon constantly discharging balls between me and it, I could not refrain from passing before that cannon in order to get that rum. If a bottle of brandy stood on one hand, and the pit of hell yawned on the other, and I were convinced I should be pushed in as surely as I took one glass, I could not refrain.' Such statements abound in dipsomaniacs' mouths." Between this extreme, and the other of the man who is sickened by a single glass of beer, there are all intermediates.

Now, given an abundant and accessible supply of alcohol to a race, what happens? Those who are not tempted or have adequate control, do not drink to excess; those who are so constituted as to crave the effects of alcohol (once they have experienced them), and who lack the ability to deny themselves the immediate pleasure for the sake of a future gain, seek to renew these pleasures of intoxication at every opportunity; and the well attested result is that they are likely to drink themselves to a premature death.

Although it is a fact that the birth-rate in drunkard's families may be and often is larger than that of the general population,[2] it is none the less a fact that many of the worst drunkards leave no or few, offspring. They die of their own excesses at an early age; or their conduct makes them unattractive as mates; or they give so little care to their children that the latter die from neglect, exposure or accident. As these drunkards would tend to hand down their own inborn peculiarity, or weakness for alcohol, to their children, it must be obvious that their death results in a smaller proportion of such persons in the next generation. In other words, natural selection is at work again here, with

[1] *Principles of Psychology*, ii, p. 543.

[2] Leon J. Cole points out that this may be due in considerable part to less voluntary restriction of offspring on the part of those who are often under the influence of alcohol.

alcohol as its agent. By killing off the worst drunkards in each generation, nature provides that the following generation shall contain fewer people who lack the power to resist the attraction of the effect of alcohol, or who have a tendency to use it to such an extent as to injure their minds and bodies. And it must be obvious that the speed and efficacy of this ruthless temperance reform movement are proportionate to the abundance and accessibility of the supply of alcohol. Where the supply is ample and available, there is certain to be a relatively high death-rate among those who find it too attractive, and the average of the race therefore is certain to become stronger in this respect with each generation. Such a conclusion can be abundantly justified by an appeal to the history of the Teutonic nations, the nations around the Mediterranean, the Jews, or any race which has been submitted to the test.

There seems hardly room for dispute on the reality of this phase of natural selection. But there is another way in which the process of strengthening the race against the attraction and effect of alcohol may be going on at the same time. If the drug does actually injure the germ-plasm, and set up a deterioriation, it is obvious that natural selection is given another point at which to work. The more deteriorated would be eliminated in each generation in competition with the less deteriorated or normal; and the process of racial purification would then go on the more rapidly. The fact that races long submitted to the action of alcohol have become relatively resistant to it, therefore, does not in itself answer the question of whether alcohol injures the human germ-plasm.

The possible racial effect of alcoholization is, in short, a much more complicated problem than it appears at first sight to be. It involves the action of natural selection in several important ways, and this action might easily mask the direct action of alcohol on the germ-plasm, if there be any measurable direct result.

No longer content with a long perspective historical view, we will scrutinize the direct investigations of the problem which have been made during recent years. These investigations have

in many cases been widely advertised to the public, and their conclusions have been so much repeated that they are often taken at their face value, without critical examination.

It must be borne in mind that the solution of the problem depends on finding evidence of degeneracy or impairment in the offspring of persons who have used alcohol, and that this relation might be explainable in one or more of three ways:

(1) It may be that alcoholism is merely a symptom of a degenerate stock. In this case the children will be defective, not because their parents drank, but because their parents were defective—the parents' drinking being merely one of the symptoms of their defect.

(2) It may be that alcohol directly poisons the germ-plasm, in such a way that parents of sound stock, who drink alcoholic beverages, will have defective offspring.

(3) It may be that the degeneracy observed in the children of drunkards (for of course no one will deny that children of drunkards are frequently defective) is due solely to social and economic causes, or other causes in the environment: that the drunken parents, for instance, do not take adequate care of their children, and that this lack of care leads to the defects of the children.

The latter influence is doubtless one that is nearly always at work, but it is wholly outside the scope of the present inquiry, and we shall therefore ignore it, save as it may appear incidentally. Nor does it require emphasis here; for the disastrous social and economic effects of alcoholism are patent to every observer. We find it most convenient to concentrate our attention first on the second of the questions above enumerated: to ask whether there is any good evidence that the use of alcoholic beverages by men and women really does originate degeneracy in their offspring.

To get such evidence, one must seek an instance that will be crucial, one that will leave no room for other interpretations. One must, therefore, exclude consideration of cases where a mother drank before child birth. It is well-known that alcohol can pass through the placenta, and that if a prospective mother drinks, the percentage of alcohol in the circulation of the unborn

child will very soon be nearly equal to that in her own circulation. It is well established that such a condition is extremely injurious to the child; but it has nothing directly to do with heredity. Therefore we can not accept evidence of the supposed effect of alcohol on the fertilized egg-cell, at any stage in its development, because that is an effect on the individual, not on posterity. And the only means by which we can wholly avoid this fallacy is to give up altogether an attempt to prove our case by citing instances in which the mother was alcoholic. If this is not done, there will always be liability of mistaking an effect of pre-natal nutrition for a direct injury to the germ-plasm.

But if we can find cases where the mother was of perfectly sound stock, and non-alcoholic; where the father was of sound stock, but alcoholic; and where the offspring were impaired in ways that can be plausibly attributed to an earlier injury to the germ-plasm by the father's alcohol; then we have evidence that must weigh heavily with the fair-minded.

An interesting case is the well-known one recorded by Schweighofer, which is summarized as follows: "A normal woman married a normal man and had three sound children. The husband died and the woman married a drunkard and gave birth to three other children; one of these became a drunkard; one had infantilism, while the third was a social degenerate and a drunkard. The first two of these children contracted tuberculosis, which had never before been in the family. The woman married a third time and by this sober husband again produced sound children."

Although such evidence is at first sight pertinent, it lacks much of being convincing. Much must be known about the ancestry of the drunken husband, and of the woman herself, before it can be certain that the defective children owe their defect to alcoholism rather than to heredity.

We can not undertake to review all the literature of this subject, for it fills volumes, but we shall refer to a few of the studies which are commonly cited, by the believers in the racial-poison character of alcohol, as being the most weighty.

Taav Laitinen of Helsingfors secured information from the

parents of 2,125 babies, who agreed to weigh their infants once a month for the first eight months after birth, and who also furnished information about their own drinking habits. His conclusion is that the average weight of the abstainer's child is greater at birth, that these children develop more rapidly during the first eight months than do the children of the moderate drinker, and that the latter exceed in the same way the children of the heavier drinker. But a careful analysis of his work by Karl Pearson, whose great ability in handling statistics has thrown light on many dark places in the alcohol problem, shows [1] that Professor Laitinen's statistical methods were so faulty that no weight can be attached to his conclusions. Furthermore, he appears to have mixed various social classes and races together without distinction; and he has made no distinction between parents, one of whom drank, and parents, both of whom drank. Yet, this distinction, as we have pointed out, is a critical one for such inquiries. Professor Laitinen's paper, according to one believer in racial poisons, "surpasses in magnitude and precision all the many studies of this subject which have proved the relation between drink and degeneracy." As a fact, it proves nothing of the sort as to race degeneracy.

Again, T. A. MacNicholl reported on 55,000 American school children, from 20,147 of whom he secured information about the parents' attitude to alcoholic drinks. He found an extraordinarily large proportion (58%) of deficient and backward children in the group. But the mere bulk of his work, probably, has given it far more prestige than it deserves; for his methods are careless, his classifications vague, his information inadequate; he seems to have dealt with a degenerate section of the population, which does not offer suitable material for testing the question at issue; and he states that many of the children

[1] For a review of the statistical problems involved, see Karl Pearson. An attempt to correct some of the misstatements made by Sir Victor Horsley, F. R. S., F. R. C. S., and Mary D. Sturge, M. D., in their criticisms of the Galton Laboratory Memoir: *First Study of the Influence of Parental Alcholism*, etc.; and Professor Pearson's various popular lectures, also *A Second Study of the Influence of Parental Alcoholism on the Physique and Intelligence of Offspring*. By Karl Pearson and Ethel M. Elderton. Eugenics Laboratory Memoir Series XIII.

drank and smoked,—hence, any defects found in them may be due to their own intemperance, rather than that of their parents. In short, Dr. MacNicholl's data offer no help in an attempt to decide whether alcoholism is an inheritable effect.

Another supposed piece of evidence which has deceived a great many students is the investigation of Bezzola into the distribution of the birth-rate of imbeciles in Switzerland. He announced that in wine-growing districts the number of idiots conceived at the time of the vintage and carnival is very large, while at other periods it is almost *nil*. The conclusion was that excesses of drunkenness occurring in connection with the vintage and carnival caused this production of imbeciles. But aside from the unjustified assumptions involved in his reasoning, Professor Pearson has recently gone over the data and shown the faulty statistical method; that, in fact, the number of imbeciles conceived at vintage-time, in excess of the average monthly number, was only three in spite of the large numbers! Bezzola's testimony, which has long been cited as proof of the disastrous results of the use of alcohol at the time of conception, must be discarded.

Demme's plausible investigation is also widely quoted to support the belief that alcohol poisons the germ-plasm. He studied the offspring of 10 drunken and 10 sober pairs of parents, and found that of the 61 children of the latter, 50 were normal, while of the 57 progeny of the drunkards, only nine were normal. This is a good specimen of much of the evidence cited to prove that alcohol impairs the germ-plasm; it has been widely circulated by propagandists in America during recent years. Of course, its value depends wholly on whether the 20 pairs of parents were of sound, comparable stock. Karl Pearson has pointed out that this is not the case. Demme selected his children of drunkards by selecting children who came to his hospital on account of imperfect development of speech, mental defect, imbecility or idiocy. When he found families in which such defective children occurred, he then inquired as to their ancestry. Many of these children, he found, were reduced to a condition approaching epilepsy, or actually epileptic, because

they themselves were alcoholic. Obviously such material can not legitimately be used to prove that the use of alcohol by parents injures the heredity of their children. The figures do not at all give the proof we are seeking, that alcohol can so affect sound germ-plasm as to lead to the production of defective children.

Dr. Bertholet made a microscopic examination of the reproductive glands of 75 chronic male alcoholics, and in 37 cases he found them more or less atrophied, and devoid of spermatozoa. Observing the same glands in non-alcoholics who had died of various chronic diseases, such as tuberculosis, he found no such condition. His conclusion is that the reproductive glands are more sensitive to the effects of alcohol than any other organ. So far as is known to us, his results have never been discredited; they have, on the contrary, been confirmed by other investigators. They are of great significance to eugenics, in showing how the action of natural selection to purge the race of drunkards is sometimes facilitated in a way we had not counted, through reduced fertility due to alcohol, as well as through death due to alcohol. But it should not be thought that his results are typical, and that all chronic alcoholists become sterile: every reader will know of cases in his own experience, where drunkards have large families; and the experimental work with smaller animals also shows that long-continued inebriety is compatible with great fecundity. It is probable that extreme inebriety reduces fertility, but a lesser amount increases it in the cases of many men by reducing the prudence which leads to limited families.

In 1910 appeared the investigation of Miss Ethel M. Elderton and Karl Pearson on school children in Edinburgh and Manchester.[1] Their aim was to take a population under the same environmental conditions, and with no discoverable initial

[1] *A First Study of the Influence of Parental Alcoholism on the Physique and Intelligence of Offspring.* By Ethel M. Elderton and Karl Pearson. Eugenics Laboratory Memoir Series X. Harald Westergaard, who reëxamined the Elderton-Pearson data, concludes that considerable importance is to be attached to the selective action of alcohol, the weaklings in the alcoholic families having been weeded out early in life.

differentiation, and inquire whether the temperate and intemperate sections had children differing widely in physique and mentality. Handling their material with the most refined statistical methods, and in an elaborate way, they reached the conclusion that parental alcoholism does not markedly affect the physique or mentality of the offspring *as children*. Whether results might differ in later life, their material did not show. Their conclusions were as follows:

"(1) There is a higher death-rate among the offspring of alcoholic than among the offspring of sober parents. This appears to be more marked in the case of the mother than in the case of the father, and since it is sensibly higher in the case of the mother who has drinking bouts [periodical sprees] than of the mother who habitually drinks, it would appear to be due very considerably to accidents and gross carelessness and possibly in a minor degree to toxic effect on the offspring.

"Owing to the greater fertility of alcoholic parents, the net family of the sober is hardly larger than the net family of the alcoholic. [It should be remembered that the study did not include childless couples.]

"(2) The mean weight and height of the children of alcoholic parents are slightly greater than those of sober parents, but as the age of the former children is slightly greater, the correlations when corrected for age are slightly positive, i. e., there is slightly greater height and weight in the children of the sober."

"(3) The wages of the alcoholic as contrasted with the sober parent show a slight difference compatible with the employers' dislike for an alcoholic employee, but wholly inconsistent with a marked mental or physical inferiority in the alcoholic parent.

"(4) The general health of the children of alcoholic parents appears on the whole slightly better than that of sober parents. There are fewer delicate children, and in a most marked way cases of tuberculosis and epilepsy are less frequent than among the children of sober parents. The source of this relation may be sought in two directions; the physically strongest in the community have probably the greatest capacity and taste for alcohol. Further the higher death rate of the children of al-

coholic parents probably leaves the fittest to survive. Epilepsy and tuberculosis both depending upon inherited constitutional conditions, they will be more common in the parents of affected offspring, and probably if combined with alcohol, are incompatible with any length of life or size of family. If these views be correct, we can only say that parental alcoholism has no marked effect on filial health.

"(5) Parental alcoholism is not the source of mental defect in offspring.

"(6) The relationship, if any, between parental alcoholism and filial intelligence is so slight that even its sign can not be determined from the present material.

"(7) The normal visioned and normal refractioned offspring appear to be in rather a preponderance in the families of the drinking parents, the parents who have 'bouts' give intermediate results, but there is no substantial relationship between goodness of sight and parental alcoholism. Some explanation was sought on the basis of alcoholic homes driving the children out into the streets. This was found to be markedly the case, the children of alcoholic parents spending much more of their spare time in the streets. An examination, however, of the vision and refraction of children with regard to the time they spent in- and out-of-doors, showed no clear and definite result, the children who spent the whole or most of their spare time in the streets having the most myopia and also most normal sight. It was not possible to assert that the outdoor life was better for the sight, or that the better sight of the offspring of alcoholic parentage was due to the greater time spent outdoors.

"(8) The frequency of diseases of the eye and eyelids, which might well be attributed to parental neglect, was found to have little, if any, relation to parental alcoholism.

"To sum up, then no *marked* relation has been found between the intelligence, physique or disease of the offspring and the parental alcoholism in any of the categories mentioned. On the whole the balance turns as often in favor of the alcoholic as of the non-alcoholic parentage. It is needless to say that we do not attribute this to the alcohol but to certain physical and possibly

mental characters which appear to be associated with the tendency to alcohol."

Of the many criticisms made of this work, most are irrelevant to our present purpose, or have been satisfactorily met by the authors. It must be said, however, that as the children examined were all school children, the really degenerate offspring of alcoholics, if any such existed, would not have been found, because they would not have been admitted to the school. Further, it is not definitely known whether the parents' alcoholism dated from before or after the birth of the child examined. Then, the report did not exactly compare the offspring of drinkers and non-drinkers, but classified the parents as those who drank, and those who were sober; the latter were not, for the most part, teetotalers, but merely persons whose use of alcohol was so moderate that it exercised no visible bad influence on the health of the individual or the welfare of the home. Something can be said on both sides of all these objections; but giving them as much weight as one thinks necessary, the fact remains that the Elderton-Pearson investigation failed to demonstrate any racial poisoning due to alcohol, in the kind of cases where one would certainly have expected it to be demonstrated, if it existed.

Much more observation and measurement must be made before a generalization can be safely drawn, as to whether alcohol is or is not a racial poison, in the sense in which that expression is used by eugenists. It has been shown that the evidence which is commonly believed to prove beyond doubt that alcohol does injure the germ-plasm, is mostly worthless. But it must not be thought that the authors intend to deny that alcohol is a racial poison, where the dosage is very heavy and continuous. If we have no good evidence that it is, we equally lack evidence on the other side. We wish only to suggest caution against making rash generalizations on the subject which lack supporting evidence and therefore are a weak basis for propaganda.

So far as immediate action is concerned, eugenics must proceed on the basis that there is no proof that alcohol as ordinarily consumed will injure the human germ-plasm. To say

this is not in any way to minify the evil results which alcohol often has on the individual, or the disastrous consequences to his offspring, euthenically. But nothing is to be gained by making an assumption of "racial poisoning," and acting on that assumption, without evidence that it is true; and the temperance movement would command more respect from genetics if it ceased to allege proof that alcohol has a directly injurious effect on the race, by poisoning the human germ-plasm, when no adequate proof exists.

How, then, can one account for the immense bulk of cases, some of which come within everyone's range of vision, where alcoholism in the parent is associated with defect in the offspring? By a process of exclusion, we are driven to the explanation already indicated: that alcoholism may be a symptom, rather than a cause, of degeneracy. Some drunkards are drunkards, because they come of a stock that is, in a way, mentally defective; physical defects are frequently correlated in such stocks; naturally the children inherit part or all of the parental defects including, very likely, alcoholism; but the parent's alcoholism, we repeat, must not be considered the *cause* of the child's defect. The child would have been defective in the same way, regardless of the parent's beverage.

It follows, then, as a practical consequence for eugenics, that in the light of present knowledge any campaign against alcoholic liquors would be better based on the very adequate ground of physiology and economics, than on genetics. From the narrowest point of view of genetics, the way to solve the liquor problem would be, not to eliminate drink, but to eliminate the drinker: to prevent the reproduction of the degenerate stocks and the tainted strains that contribute most of the chronic alcoholics. We do not mean to advocate this as the only proper basis for the temperance campaign, because the physiological and economic aspects are of sufficient importance to keep up the campaign at twice the present intensity.[1] But it is desirable to have the eugenic aspect of the matter clearly

[1] Prohibition would have some *indirect* eugenic effects, which will be discussed in Chapter XVIII.

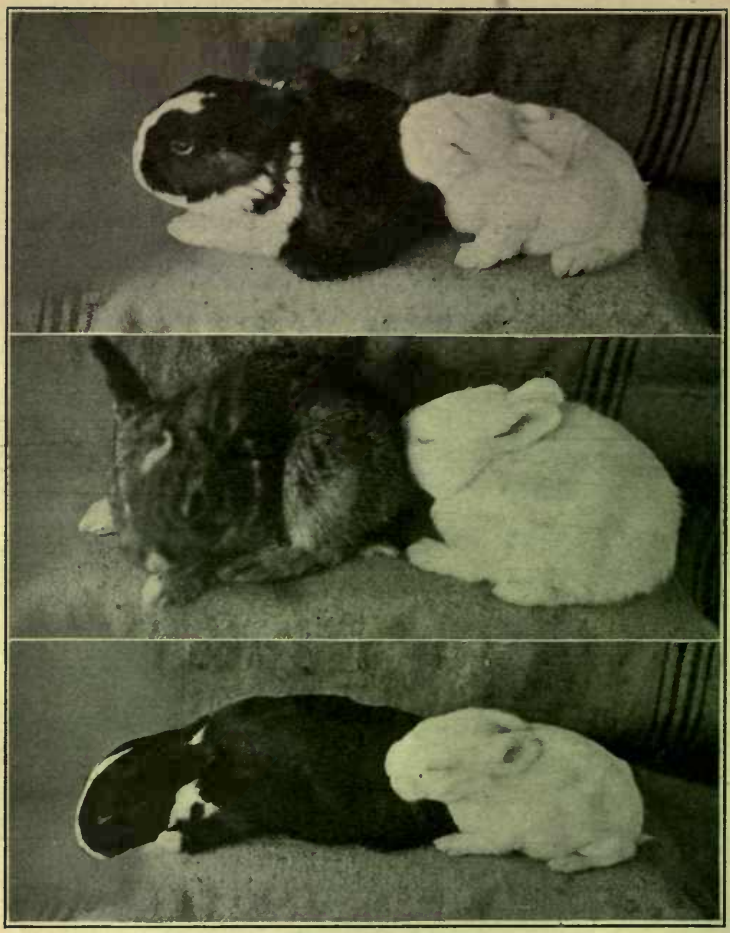
understood, and to point out that in checking the production of defectives in the United States, eugenics will do its share, and a big share, toward the solution of the drink problem, which is at the same time being attacked along other and equally praiseworthy lines by other people.

A number of other substances are sometimes credited with being racial poisons.

The poison of *Spirochæte pallida,* the microörganism which causes syphilis, has been widely credited with a directly noxious effect on the germ-plasm, and the statement has been made that this effect can be transmitted for several generations. On the other hand, healthy children are reported as being born to cured syphilitics. Further evidence is needed, taking care to eliminate cases of infection from the parents. If the alleged deterioration really occurs, it will still remain to be determined if the effect is permanent or an induction, that is, a change in the germ-cells which does not permanently alter the nature of the inherited traits, and which would disappear in a few generations under favorable conditions.

The case against lead is similar. Sir Thomas Oliver, in his *Diseases of Occupation,* sums up the evidence as follows:

"Rennert has attempted to express in statistical terms the varying degrees of gravity in the prognosis of cases in which at the moment of conception both parents are the subjects of lead poisoning, also when one alone is affected. The malign influence of lead is reflected upon the fetus and upon the continuation of the pregnancy 94 times out of 100 when both parents have been working in lead, 92 times when the mother alone is affected, and 63 times when it is the father alone who has worked in lead. Taking seven healthy women who were married to lead workers, and in whom there was a total of 32 pregnancies, Lewin (Berlin) tells us that the results were as follows: 11 miscarriages, one stillbirth, 8 children died within the first year after their birth, four in the second year, five in the third year and one subsequent to this, leaving only two children out of 32 pregnancies as likely to live to manhood. In cases where women have had a series of miscarriages so long as their



EFFECT OF LEAD AS A "RACIAL POISON"

FIG. 7.—That lead poisoning can affect the germ plasm of rabbits is indicated by experiments conducted by Leon J. Cole at the University of Wisconsin. With reference to the above illustration, Professor Cole writes: "Each of the photographs shows two young from the same litter, in all cases the mother being a normal (nonpoisoned) albino. In each of the litters the white young is from an albino father which received the lead treatment, while the pigmented offspring is from a normal, honozygous, pigmented male. While these are, it is true, selected individuals, they represent what tend to be average, rather than extreme, conditions. The albino male was considerably larger than the pigmented male; nevertheless his young average distinctly smaller in size. Note also the brighter expression of the pigmented young."

husbands worked in lead, a change of industrial occupation on the part of the husband restores to the wives normal child-bearing powers." The data of Constantin Paul, published as long ago as 1860, indicated that lead exercised an injurious effect through the male as well as the female parent. This sort of evidence is certainly weak, in that it fails to take into account the possible effects of environment; and one would do well to keep an open mind on the subject. In a recent series of careful experiments at the University of Wisconsin, Leon J. Cole has treated male rabbits with lead. He reports: "The 'leaded' males have produced as many or more offspring than normal fathers, but their young have averaged smaller in size and are of lowered vitality, so that larger numbers of them die off at an early age than is the case with those from untreated fathers."

There is, then, a suspicion that lead is a racial poison, but no evidence as yet as to whether the effect is permanent or in the nature of an induction.

This concludes the short list of substances for which there has been any plausible case made out, as racial poisons. Gonorrhea, malaria, arsenic, tobacco, numerous other substances have been mentioned from time to time, and even ardently contended by propagandists to be racial poisons, but in the case of none of them, so far as we know, is there any evidence to support the claim. And as has been shown, in the case of the three chief so-called racial poisons, alcohol, syphilis and lead, the evidence is not great. We are thus in a position to state that, from the eugenists' point of view, the *origination* of degeneracy, by some direct action of the germ-plasm, is a contingency that hardly needs to be reckoned with. Even in case the evidence were much stronger than it is, the damage done may only be a physiological or chemical induction, the effects of which will wear off in a few generations; rather than a radical change in the hereditary constituents of the germ-plasm. The germ-plasm is so carefully isolated and guarded that it is almost impossible to injure it, except by treatment so severe as to kill it altogether; and the degeneracy with which eugenists are called on to deal is a

degeneracy which is running along from generation to generation and which, when once stopped by the cessation of reproduction, is in little danger of being originated anew through some racial poison.

Through these facts, the problem of race betterment is not only immensely simplified, but it is clearly shown to be more a matter for treatment by the biologist, acting through eugenics, than for the optimistic improver of the environment.

There is another way in which it is widely believed that some such result as a direct influence of the germ-plasm can be produced: that is through the imaginary process known as maternal impression, pre-natal influence, etc. Belief in maternal impressions is no novelty. In the book of Genesis [1] Jacob is described as making use of it to get the better of his tricky father-in-law. Some animal breeders still profess faith in it as a part of their methods of breeding: if they want a black calf, for instance, they will keep a white cow in a black stall, and express perfect confidence that her offspring will resemble midnight darkness. It is easy to see that this method, if it "works," would be a potent instrument for eugenics. And it is being recommended for that reason. Says a recent writer, who professes on the cover of her book to give a "complete and intelligent summary of all the principles of eugenics":

"Too much emphasis can not be placed upon the necessity of young people making the proper choice of mates in marriage; yet if the production of superior children were dependent upon that one factor, the outlook would be most discouraging to prospective fathers and mothers, for weak traits of character are to be found in all. But when young people learn that by a conscious endeavor to train themselves, they are thereby training their unborn children, they can feel that there is some hope

[1] Chapter XXX, verses 31–43. A knowledge of the pedigree of Laban's cattle would undoubtedly explain where the stripes came from. It is interesting to note how this idea persists: a correspondent has recently sent an account of seven striped lambs born after their mothers had seen a striped skunk. The actual explanation is doubtless that suggested by Heller in the *Journal of Heredity*, VI, 480 (October, 1915), that a stripe is part of the ancestral coat pattern of the sheep, and appears from time to time because of reversion.

and joy in parentage; that it is something to which they can look forward with delight and even rapture; then they will be inspired to work hard to attain the best and highest that there is in them, leading the lives that will not only be a blessing to themselves, but to their succeeding generation."

The author of this quotation has no difficulty in finding supporters. Many physicians and surgeons, who are supposed to be trained in scientific methods of thought, will indorse what she says. The author of one of the most recent and in many respects admirable books on the care of babies, is almost contemptuous in her disdain for those who think otherwise:

"Science wrangles over the rival importance of heredity and environment, but we women know what effects prenatal influence works on children." "The woman who frets brings forth a nervous child. The woman who rebels generally bears a morbid child." "Self-control, cheerfulness and love for the little life breathing in unison with your own will practically insure you a child of normal physique and nerves."

Such statements, backed up by a great array of writers and speakers whom the layman supposes to be scientific, and who think themselves scientific, can not fail to influence strongly an immense number of fathers and mothers. If they are truly scientific statements, their general acceptance must be a great good.

But think of the misplaced effort if these widespread statements are false!

Is there, or is there not, a short cut to race betterment? Everyone interested in the welfare of the race must feel the necessity of getting at the truth in the case; and the truth can be found only by rigorously scientific thought.

Let us turn to the observed facts. This sample is taken from the health department of a popular magazine, quite recently issued:

"Since birth my body has been covered with scales strikingly resembling the surface of a fish. My parents and I have expended considerable money on remedies and specialists without deriving any permanent benefit. I bathe my entire body with

hot water daily, using the best quality of soap. The scales fall off continually. My brother, who is younger than myself, is afflicted with the same trouble, but in a lesser degree. My sister, the third member of the family, has been troubled only on the knees and abdomen. My mother has always been quite nervous and susceptible to any unusual mental impression. She believes that she marked me by craving fish, and preferring to clean them herself. During the prenatal life of my brother, she worried much lest she might mark him in the same way. In the case of my sister she tried to control her mind." [1]

Another is taken from a little publication which is devoted to eugenics.[2] As a "horrible example" the editor gives the case of Jesse Pomeroy, a murderer whom older readers will remember. His father, it appears, worked in a meat market. Before the birth of Jesse, his mother went daily to the shop to carry a luncheon to her husband, and her eyes naturally fell upon the bloody carcases hung about the walls. Inevitably, the sight of such things would produce bloody thoughts in the mind of the unborn child!

These are extreme cases; we quote from a medieval medical writer another case that carries the principle to its logical conclusion: A woman saw a Negro,—at that time a rarity in Europe. She immediately had a sickening suspicion that her child would be born with a black skin. To obviate the danger, she had a happy inspiration—she hastened home and washed her body all over with warm water. When the child appeared, his skin was found to be normally white—except between the fingers

[1] Such a skin affection, known as icthyosis, xerosis or xeroderma, is usually due to heredity. Davenport says it "is especially apt to be found in families in which consanguineous marriages occur and this fact, together with the pedigrees [which he studied], suggests that it is due to the absence of some factor that controls the process of cornification of the skin. On this hypothesis a normal person who belongs to an affected family may marry into a normal family with impunity, but cousin marriages are to be avoided." See Davenport, C. B., *Heredity in Relation to Eugenics*, p. 134. New York, 1911.

[2] Its eugenics is to be effected through the mental exertion of mothers. And we have lately been in correspondence with a western attorney who is endeavoring to form an association of persons who will agree to be the parents of "willed" children. By this means, he has calculated (and sends a chart to prove it) that it will require only four generations to produce the Superman.

and toes, where it was black. His mother had failed to wash herself thoroughly in those places!

Of course, few of the cases now credited are as gross as this, but the principle involved remains the same.

We will take a hypothetical case of a common sort for the sake of clearness: the mother receives a wound on the arm; when her child is born it is found to have a scar of some sort at about the same place on the corresponding arm. Few mothers would fail to see the result of a maternal impression here. But how could this mark have been transmitted? This is not a question of the transmission of acquired characters through the germ-plasm, or anything of that sort, for the child was already formed when the mother was injured. One is obliged, therefore, to believe that the injury was in some way transmitted through the placenta, the only connection between the mother and the unborn child; and that it was then reproduced in some way in the child.

Here is a situation which, examined in the cold light of reason, puts a heavy enough strain on the credulity. Such an influence can reach the embryo only through the blood of the mother. Is it conceivable to any rational human being, that a scar, or what not, on the mother's body can be dissolved in her blood, pass through the placenta into the child's circulation, and then gather itself together into a definite scar on the infant's arm?

There is just as much reason to expect the child to grow to resemble the cow on whose milk it is fed after birth, as to expect it to grow to resemble its mother, because of prenatal influence, as the term is customarily used, for once development has begun, the child draws nothing more than nourishment from its mother.

Of course we are accustomed to the pious rejoinder that man must not expect to understand all the mysteries of life; and to hear vague talk about the wonder of wireless telegraphy. But wireless telegraphy is something very definite and tangible—there is little mystery about it. Waves of a given frequency are sent off, and caught by an instrument attuned to the same frequency. How any rational person can support a belief in

maternal impressions by such an analogy, if he knows anything about anatomy and physiology, passes comprehension.

Now we are far from declaring that a reason can be found for everything that happens. Science does not refuse belief in an observed fact merely because it is unexplainable. But let us examine this case of maternal impressions a little further. What can be learned of the time element?

Immediately arises the significant fact that most of the marks, deformities and other effects which are credited to prenatal influence must on this hypothesis take place at a comparatively late period in the antenatal life of the child. The mother is frightened by a dog; the child is born with a dog-face. If it be asked when her fright occurred, it is usually found that it was not earlier than the third month, more likely somewhere near the sixth.

But it ought to be well known that the development of all the main parts of the body has been completed at the end of the second month. At that time, the mother rarely does more than suspect the coming of the child, and events which she believes to "mark" the child, usually occur after the fourth or fifth month, when the child is substantially formed, and it is impossible that many of the effects supposed to occur could actually occur. Indeed, it is now believed that most errors of development, such as lead to the production of great physical defects, are due to some cause within the embryo itself, and that most of them take place in the first three or four weeks, when the mother is by no means likely to influence the course of embryological development by her mental attitude toward it, for the very good reason that she knows nothing about it.

Unless she is immured or isolated from the world, nearly every expectant mother sees many sights of the kind that, according to popular tradition, cause "marks." Why is it that results are so few? Why is it that women doctors and nurses, who are constantly exposed to unpleasant sights, have children that do not differ from those of other mothers?

Darwin, who knew how to think scientifically, saw that this is the logical line of proof or disproof. When Sir Joseph Hooker,

time thus spent wasted, but worse, for they might have employed it in ways that really would have benefited the child—in open-air exercise, for instance.

To recapitulate, the facts are:

(1) That there is, before birth, no connection between mother and child, by which impressions on the mother's mind or body could be transmitted to the child's mind or body.

(2) That in most cases the marks or defects whose origin is attributed to maternal impression, must necessarily have been complete long before the incident occurred which the mother, after the child's birth, ascribes as the cause.

(3) That these phenomena usually do not occur when they are, and by hypothesis ought to be, expected. The explanations are found after the event, and that is regarded as causation which is really coincidence.

Prenatal care as a euthenic measure is of course not only legitimate but urgent. The embryo derives its entire nourishment from the mother; and its development depends wholly on its supply of nourishment. Anything which affects the supply of nourishment will affect the embryo in a general, not a particular way. If the mother's mental and physical condition be good, the supply of nourishment to the embryo is likely to be good, and development will be normal. If, on the other hand, the mother is constantly harassed by fear or hatred, her physical health will suffer, she will be unable properly to nourish her developing offspring, and it may be its poor physical condition when born, indicates this.

Further, if the mother experiences a great mental or physical shock, it may so upset her health that her child is not properly nourished, its development is arrested, mentally as well as physically, and it is born defective. H. H. Goddard, for example, tells [1] of a high-grade imbecile in the Training School at Vineland, N. J. "Nancy belongs to a thoroughly normal, respectable family. There is nothing to account for the condition unless one accepts the mother's theory. While it sounds

[1] Goddard, H. H., *Feeblemindedness*, p. 359. New York, the Macmillan Company, 1914.

somewhat like the discarded theory of maternal impression, yet it is not impossible that the fright and shock which the mother received may have interfered with the nutrition of the unborn child and resulted in the mental defect. The story in brief is as follows. Shortly before this child was born, the mother was compelled to take care of a sister-in-law who was in a similar condition and very ill with convulsions. Our child's mother was many times frightened severely as her sister-in-law was quite out of her mind."

It is easily understandable that any event which makes such an impression on the mother as to affect her health, might so disturb the normal functioning of her body that her child would be badly nourished, or even poisoned. Such facts undoubtedly form the basis on which the airy fabric of prenatal culture was reared by those who lived before the days of scientific biology.

Thus, it is easy enough to see the real explanation of such cases as those mentioned near the beginning of this discussion. The mothers who fret and rebel over their maternity, she found, are likely to bear neurotic children. It is obvious (1) that mothers who fret and rebel are quite likely themselves to be neurotic in constitution, and the child naturally gets its heredity from them: (2) that constant fretting and rebellion would so affect the mother's health that her child would not be properly nourished.

When, however, she goes on to draw the inference that "self-control, cheerfulness and love . . . will practically insure you a child normal in physique and nerves," we are obliged to stop. We know that what she says is not true. If the child's heredity is bad, neither self-control, cheerfulness, love, nor anything else known to science, can make that heredity good.

At first thought, one may wish it were otherwise. There is something inspiring in the idea of a mother overcoming the effect of heredity by the sheer force of her own will-power. But perhaps in the long run it is as well; for there are advantages on the other side. It should be a satisfaction to mothers to know that their children will not be marked or injured by un-

toward events in the antenatal days; that if the child's heredity can not be changed for the better, neither can it be changed for the worse.

The prenatal culturists and maternal-impressionists are trying to place on her a responsibility which she need not bear. Obviously, it is the mother who is most nearly concerned with the bogy of maternal impressions, and it should make for her peace of mind to know that it is nothing more than a bogy. It is important for the expectant mother to keep herself in as nearly perfect condition as possible, both physically and mentally. Her bodily mechanism will then run smoothly, and the child will get from her blood the nourishment needed for its development. Beyond that there is nothing the mother can do to influence the development of her child.

There is another and somewhat similar fallacy which deserves a passing word, although it is of more concern to the live-stock breeder than to the eugenist. It is called telegony and is, briefly, this: that conception by a female results in a definite modification of her germ-plasm from the influence of the male, and that this modification will be shown in the offspring she may subsequently bear to a second male. The only case where it is often invoked in the human race is in miscegenation. A white woman has been married to a Negro, for instance, and has borne one or more mulatto offspring. Subsequently, she mates with a white man; but her children by him, instead of being pure white, it is alleged, will be also mulattoes. The idea of telegony, the persistent influence of the first mating, may be invoked to explain this discrepancy.

It is a pure myth. There is no good evidence [1] to support it, and there is abundant evidence to contradict it. Telegony is still believed by many animal breeders, but it has no place in science. In such a case as the one quoted, the explanation is undoubtedly that the supposed father is not the real one; and this explanation will dispose of all other cases of telegony which can not be explained, as in most instances they can be,

[1] For a review of the evidence consult an article on "Telegony" by Dr. Étienne Rabaud in the *Journal of Heredity*, Vol. V, No. 9, pp. 389–400; September, 1914.

by the mixed ancestry of the offspring and the innate tendency of all living things to vary.

Now to sum up this long chapter. We started with a consideration of the germ-plasm, the physical basis of life; pointing out that it is continuous from generation to generation, and potentially immortal; that it is carefully isolated and guarded in the body, so that it is not likely to be injured by any ordinary means.

One of the logical results of this continuity of the germ-plasm is that modifications of the body of the parent, or acquired characters, can hardly be transferred to the germ-plasm and become a part of the inheritance. Further the experimental evidence upholds this position, and the inheritance of acquired body characters may be disregarded by eugenics, which is therefore obliged to concern itself solely with the material already in existence in the germ-plasm, except as that material may be changed by variation which can neither be predicted nor controlled.

The evidence that the germ-plasm can be permanently modified does not warrant the belief; and such results, if they exist at all, are not large enough or uniform enough to concern the eugenist.

Prenatal culture and telegony were found to be mere delusions. There is no justification for hoping to influence the race for good through the action of any kind of external influences; and there is not much danger of influencing it for ill through these external influences. The situation must be faced squarely then: if the race is to be improved, it must be by the use of the material already in existence; by endeavor to change the birth- and death-rates so as to alter the relative proportions of the amounts of good and bad germ-plasm in the race. This is the only road by which the goal of eugenics can be reached.

CHAPTER III

DIFFERENCES AMONG MEN

While Mr. Jefferson, when he wrote into the Declaration of Independence his belief in the self-evidence of the truth that all men are created equal, may have been thinking of legal rights merely, he was expressing an opinion common among philosophers of his time. J. J. Rousseau it was who made the idea popular, and it met with widespread acceptance for many years. It is not surprising, therefore, that the phrase has long been a favorite with the demagogue and the utopian. Even now the doctrine is by no means dead. The American educational system is based largely on this dogma, and much of the political system seems to be grounded on it. It can be seen in the tenets of labor unions, in the practice of many philanthropies—traces may be found almost anywhere one turns, in fact.

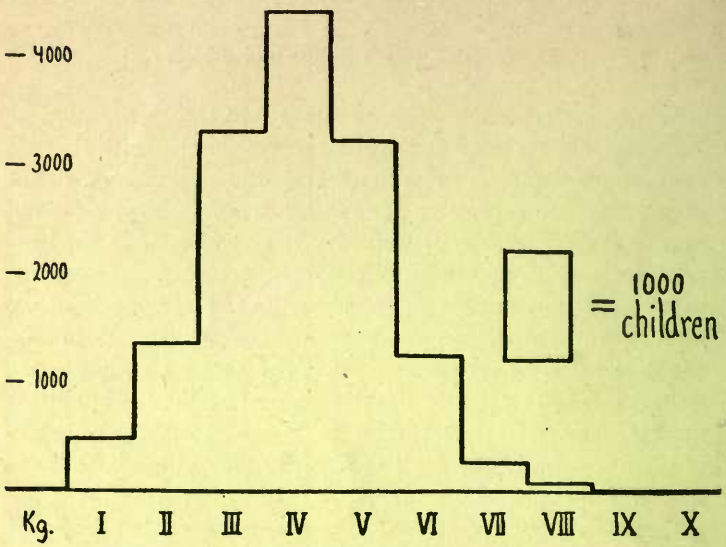
Common enough as applied to mental qualities, the theory of human equality is even more widely held of "moral" qualities. Men are considered to be equally responsible for their conduct, and failure to conform to the accepted code in this respect brings punishment. It is sometimes conceded that men have had differing opportunities to learn the principles of morality; but given equal opportunities, it is almost universally held that failure to follow the principles indicates not inability but unwillingness. In short, public opinion rarely admits that men may differ in their inherent capacity to act morally.

In view of its almost universal and unquestioned, although half unconscious, acceptance as part of the structure of society, it becomes of the utmost importance that this doctrine of human equality should be examined by scientific methods.

Fortunately this can be done with ease. Methods of mental and physical measurement that have been evolved during the

last few decades offer results that admit of no refutation, and they can be applied in hundreds of different places.

It will not be worth while to spend any time demonstrating that all individuals differ, at birth and during their subsequent



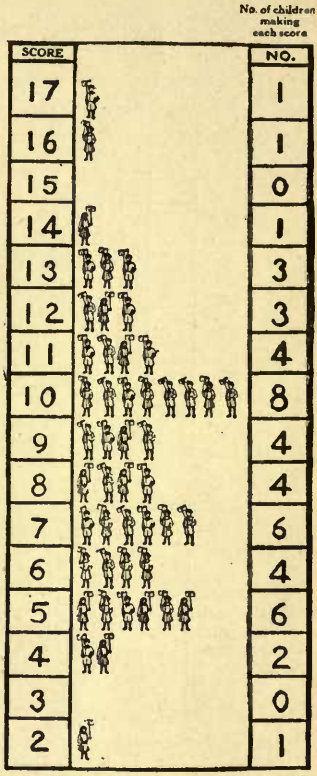
DISTRIBUTION OF 10-YEAR-OLD SCHOOL CHILDREN

FIG. 8.—The graph shows that 10-year-old children in Connecticut (1903) are to be found in every grade, from the first to the eighth. The greatest number is in the fourth grade, and the number who are advanced is just about the same as the number who are retarded.

life, physically. The fact is patent to all. It carries with it as a necessary corollary mental differences, since the brain is part of the body; nevertheless, we shall demonstrate these mental differences independently.

We present in Fig. 8 a graph from E. L. Thorndike, showing the number of 10-year-old children in Connecticut (1903) in each school grade. If the children are all intellectually equal, all the 10-year-olds ought to be in the same grade, or near it. Numerous explanations of their wide distribution suggest themselves; as a working hypothesis one might adopt the suggestion that it is because the children actually differ in innate ability to

the extent here indicated. This hypothesis can be tested by a variety of mental measurements. S. A. Courtis' investigation of the arithmetical abilities of the children in the schools of New York City will be a good beginning. He measured the achievements of pupils in responding to eight tests, which were believed to give a fair idea of the pupil's capacity for solving simple arithmetical problems. The results were, on the average, similar to the result he got in a certain eighth-grade class, whose record is shown in Fig. 9. It is evident that some of the children were good in arithmetic, some were poor in it; the bulk of them were neither good nor bad but half way between, or, in statistical language, mediocre.



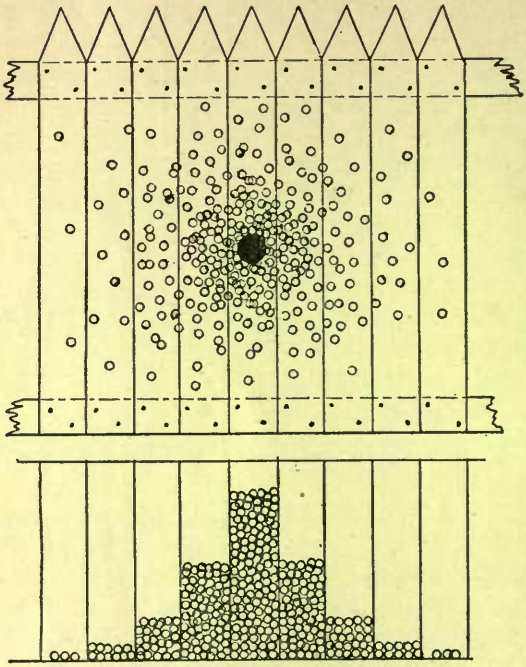
VARIATION IN ABILITY

FIG. 9.—Diagram to show the standing of children in a single class in a New York City school, in respect to their ability in arithmetic. There are wide divergences in the scores they made.

The literature of experimental psychology and anthropology is crammed with such examples as the above. No matter what trait of the individual be chosen, results are analogous. If one takes the simplest traits, to eliminate the most chances for confusion, one finds the same conditions every time. Whether it be speed in marking off all the A's in a printed sheet of capitals, or in putting together the pieces of a puzzle, or in giving a reaction to some certain stimulus, or in making associations between ideas, or drawing figures, or memory for various things, or giving the opposites of words, or discrimination of lifted weights, or success in any one of hun-

dreds of other mental tests, the conclusion is the same. There are wide differences in the abilities of individuals, no two being alike, either mentally or physically, at birth or any time thereafter.

Whenever a large enough number of individuals is tested, these



ORIGIN OF A NORMAL PROBABILITY CURVE

FIG. 10.—When deviations in all directions are equally probable, as in the case of shots fired at a target by an expert marksman, the "frequencies" will arrange themselves in the manner shown by the bullets in compartments above. A line drawn along the tops of these columns would be a "normal probability curve." Diagram by C. H. Popenoe.

differences arrange themselves in the same general form. It is the form assumed by the distribution of any differences that are governed absolutely by chance.

Suppose an expert marksman shoots a thousand times at the center of a certain picket in a picket fence, and that there is no

wind or any other source of constant error that would distort his aim. In the long run, the greatest number of his shots would be in the picket aimed at, and of his misses there would be just as many on one side as on the other, just as many above as below the center. Now if all the shots, as they struck the fence, could drop into a box below, which had a compartment for each picket, it would be found at the end of his practice that the compartments were filled up unequally, most bullets being in that representing the middle picket and least in the outside ones. The intermediate compartments would have intermediate numbers of bullets. The whole scheme is shown in Fig. 10. If a line be drawn to connect the tops of all the columns of bullets, it will make a rough curve or graph, which represents a typical chance

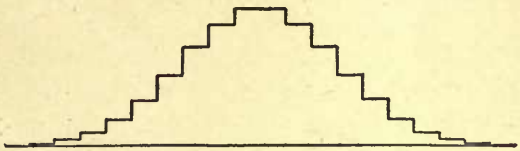


FIG. 11.—The "Chance" or "Probability" Form of Distribution.

distribution. It will be evident to anyone that the distribution was really governed by "chance," i. e., a multiplicity of causes too complex to permit detailed analysis. The imaginary sharpshooter was an expert, and he was trying to hit the same spot with each shot. The deviation from the center is bound to be the same on all sides.

Now suppose a series of measurements of a thousand children be taken in, let us say, the ability to do 18 problems in subtraction in 10 minutes. A few of them finish only one problem in that time; a few more do two, more still are able to complete three, and so on up. The great bulk of the children get through from 8 to 12 problems in the allotted time; a few finish the whole task. Now if we make a column for all those who did one problem, another column beside it for all those who did two, and so on up for those who did three, four and on to eighteen, a line drawn over the tops of the columns make a curve like the above from Thorndike.

Comparing this curve with the one formed by the marksman's spent bullets, one can not help being struck by the similarity. If the first represented a distribution governed purely by chance, it is evident that the children's ability seems to be distributed in accordance with a similar law.

With the limited number of categories used in this example, it would not be possible to get a smooth curve, but only a kind of step pyramid. With an increase in the number of categories, the steps become smaller. With a hundred problems to work out, instead of 18, the curve would be something like this:

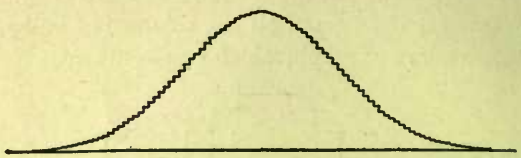
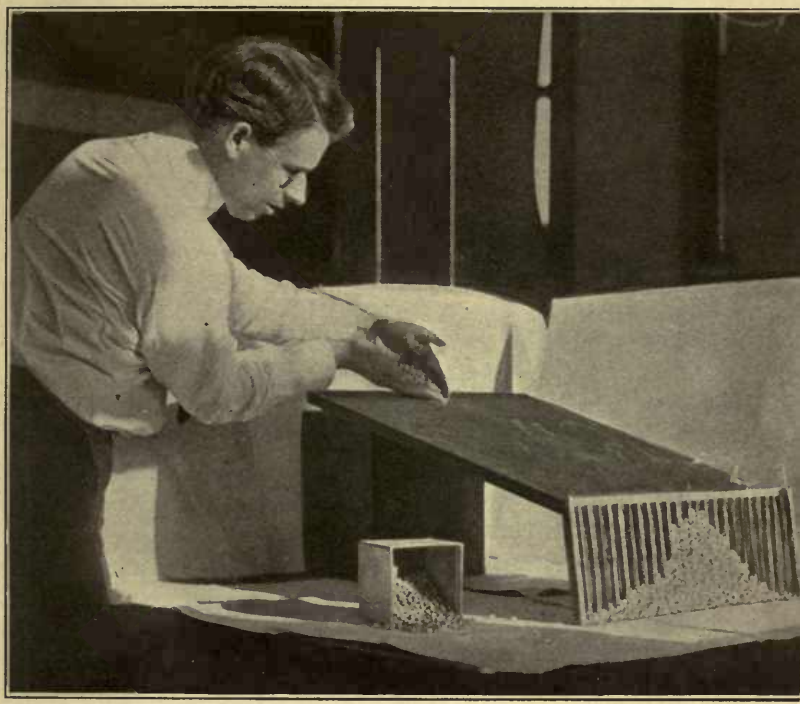


FIG. 12.—Probability curve with increased number of steps.

And with an infinite number, the steps would disappear altogether, leaving a perfectly smooth, flowing line, unmarred by a single step or break. It would be an absolutely *continuous* distribution.

If then, the results of all the tests that have been made on all mental traits be studied, it will be found that human mental ability as shown in at least 95% of all the traits that have been measured, is distributed throughout the race in various degrees, in accordance with the law of chance, and that if one could measure all the members of the species and plot a curve for these measurements, in any trait, he would get this smooth, continuous curve. In other words, human beings are not sharply divided into classes, but the differences between them shade off into each other, although between the best and the worst, in any respect, there is a great gulf.

If this statement applies to simple traits, such as memory for numbers, it must also apply to combinations of simple traits in complex mental processes. For practical purposes, we are therefore justified in saying that in respect of any mental quality,—ability, industry, efficiency, persistence, attentiveness,



NORMAL VARIABILITY CURVE FOLLOWING LAW OF CHANCE

FIG. 13.—The above photograph (from A. F. Blakeslee), shows beans rolling down an in plane and accumulating in compartments at the base which are closed in front by glass. exposure was long enough to cause the moving beans to appear as caterpillar-like objects ho along the board. Assuming that the irregularity of shape of the beans is such that each may jumps toward the right or toward the left, in rolling down the board, the laws of chance lead t expectation that in very few cases will these jumps all be in the same direction, as is demonstrat the few beans collected in the compartments at the extreme right and left. Rather the bean tend to jump in both right and left directions, the most probable condition being that in whic beans make an equal number of jumps to the right and left, as is shown by the large numb cumulated in the central compartment. If the board be tilted to one side, the curve of beans be altered by this one-sided influence. In like fashion a series of factors—either of environme of heredity—if acting equally in both favorable and unfavorable directions, will cause a gro men to form a similar variability curve, when classified according to their relative height.

neatness, honesty, anything you like,—in any large group of people, such as the white inhabitants of the United States, some individuals will be found who show the character in question in a very low degree, some who show it in a very high degree; and there will be found every possible degree in between.

The consequences of this for race progress are significant. Is it desired to eliminate feeble-mindedness? Then it must be borne in mind that there is no sharp distinction between feeble-mindedness and the normal mind. One can not divide sheep from goats, saying "A is feeble-minded. B is normal. C is feeble-minded. D is normal," and so on. If one took a scale of a hundred numbers, letting 1 stand for an idiot and 100 for a genius, one would find individuals corresponding to every single number on the scale. The only course possible would be a somewhat arbitrary one; say to consider every individual corresponding to a grade under seven as feeble-minded. It would have to be recognized that those graded eight were not much better than those graded seven, but the drawing of the line at seven would be justified on the ground that it had to be drawn somewhere, and seven seemed to be the most satisfactory point.

In practice of course, students of retardation test children by standardized scales. Testing a hundred 10-year-old children, the examiner might find a number who were able to do only those tests which are passed by a normal six-year-old child. He might properly decide to put all who thus showed four years of retardation, in the class of feeble-minded; and he might justifiably decide that those who tested seven years (i. e., three years mental retardation) or less would, for the present, be given the benefit of the doubt, and classed among the possibily normal. Such a procedure, in dealing with intelligence, is necessary and justifiable, but its adoption must not blind students, as it often does, to the fact that the distinction made is an arbitrary one, and that there is no more a hard and fast line of demarcation between imbeciles and normals than there is between "rich men" and "poor men."

If a group of soldiers be measured as the children were meas-

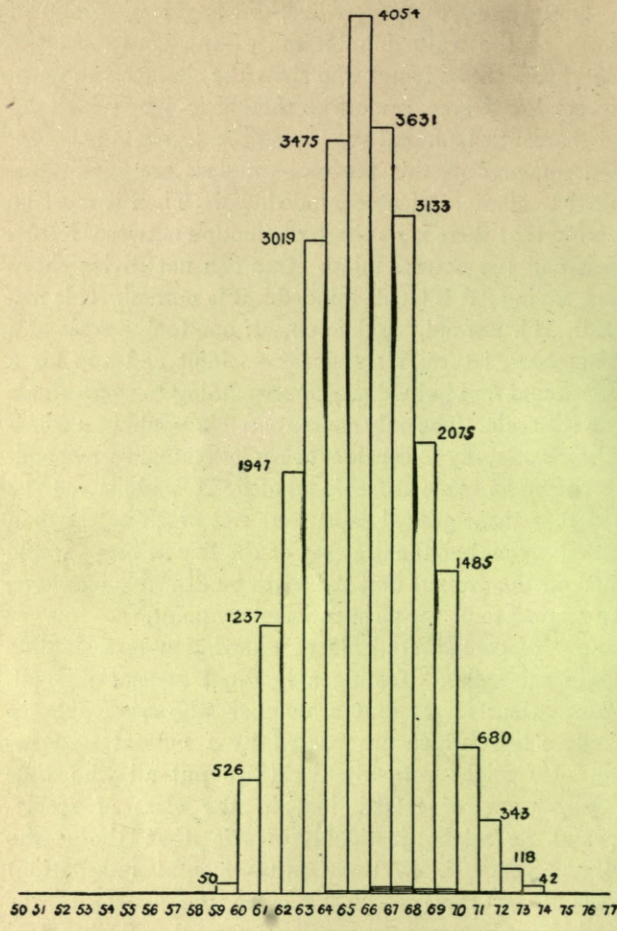
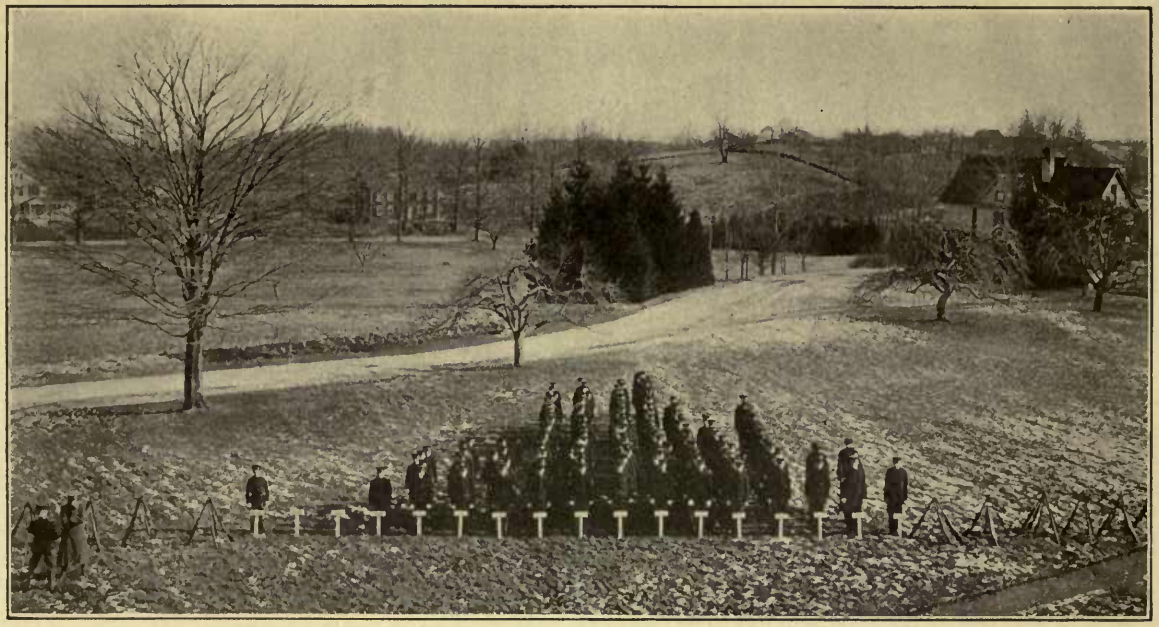


FIG. 15.—Height is one of the stock examples of a continuous character—one o which all grades can be found. As will be seen from the above diagram, every height from considerably under five feet to considerably over six feet can be found in the army, but extreme deviations are relatively rare in proportion to the amount of deviation. The vertical columns represent the total number of individuals of a given height in inches. From Davenport.

ured for arithmetical ability, their height will be distributed in this same curve of probability. Fig. 14 shows the cadets of Connecticut Agricultural College; it is obvious that a line drawn



CADETS ARRANGED TO SHOW NORMAL CURVE OF VARIABILITY

FIG. 14.—The above company of students at Connecticut Agricultural College was grouped according to height and photographed by A. F. Blakeslee. The height of each rank, and the number of men of that height, is shown by the figures underneath the photograph. The company constitutes what is technically known as a "population" grouped in "arrays of variates"; the middle rank gives the median height of the population; the tallest array (5 ft., 8 in.) is the mode. If a line be drawn connecting the upper ends of the rows, the resulting geometric figure will be a "scheme of distribution of variates" or more briefly a "variability curve," such as was shown in several preceding figures. The arrangement of homogeneous objects of any kind in such form as this is the first step in the study of variation by modern statistical methods, and on such study much of the progress of genetics depends.

along the tops of the files would again make the step-pyramid shown in Figures 10, 11 and 13. If a larger number were taken, the steps would disappear and give place to a smooth curve; the fact is well shown in a graph for the heights of recruits to the American Army (Fig. 15).

The investigation in this direction need not be pursued any farther. For the purpose of eugenics, it is sufficient to recognize that great differences exist between men, and women, not only in respect of physical traits, but equally in respect of mental ability.

This conclusion might easily have been reached from a study of the facts in Chapter I, but it seemed worth while to take time to present the fact in a more concrete form as the result of actual measurements. The evidence allows no doubt about the existence of considerable mental and physical differences between men.

The question naturally arises, "What is the cause of these differences?

The study of twins showed that the differences could not be due to differences in training or home surroundings. If the reader will think back over the facts set forth in the first chapter, he will see clearly that the fundamental differences in men can not be due to anything that happens after they are born; and the facts presented in the second chapter showed that these differences can not be due in an important degree to any influences acting on the child prior to birth.

CHAPTER IV

THE INHERITANCE OF MENTAL CAPACITIES

We have come to the climax of the eugenist's preliminary argument; if the main differences between human beings are not due to anything in the environment or training, either of this or previous generations, there can be but one explanation for them.

They must be due to the ancestry of the individual—that is, they must be matters of heredity in the ordinary sense, coupled with the fortuitous variations which accompany heredity throughout the organic world.

We need not limit ourselves, however, to the argument by exclusion, for it is not difficult to present direct evidence that the differences between men are actually inherited by children from parents. The problem, formally stated, is to measure the amount by which the likeness of individuals of like ancestry surpasses the likeness of individuals of different ancestry. After subtraction of the necessary amount for the greater likeness in training, that the individuals of like ancestry will have, whatever amount is left will necessarily represent the actual inheritance of the child from its ancestors—parents, grandparents, and so on.

Obviously, the subtraction for environmental effects is the point at which a mistake is most probable. We may safely start, therefore, with a problem in which no subtraction whatever need be made for this cause. Eye color is a stock example, and a good one, for it is not conceivable that home environment or training would cause a change in the color of brothers' eyes.

The correlation [1] between brothers, or sisters, or brothers and

[1] It will be recalled that the coefficient of correlation measures the resemblance between two variables on a scale between 0 and —1 or +1. If the correlation is zero, there is no constant relation; if it is unity, any change in one must result in a

sisters—briefly, the fraternal resemblance—for eye-color was found by Karl Pearson, using the method described in Chapter I, to be .52. We are in no danger of contradiction if we state with positiveness that this figure represents the influence of ancestry, or direct inheritance, in respect to this particular trait.

Suppose the resemblance between brothers be measured for stature—it is .51; for cephalic index, that is, the ratio of width of skull to length of skull—it is .49; for hair color—it is .59. In all of these points, it will be admitted that no home training, or any other influence except heredity, can conceivably play an important part. We could go on with a long list of such measurements, which biometrists have made; and if they were all summed up it would be found that the fraternal correlation in these traits as to the heritability of which there can be no dispute, is about .52. Here is a good measure, albeit a technical one, of the influence of heredity from the near ancestry. It is possible, too, to measure the direct correlation between a trait in parent and the same trait in offspring; the average of many cases where only heredity can be thought to have had any effect in producing the result, is .49. By the two methods of measurement, therefore, quite comparable results are obtained.

So much work has been done in this subject that we have no hesitation in affirming .5 to represent approximately the average intensity of heredity for physical characters in man. If any well-marked physical character be measured, in which training and environment can not be assumed to have had any part, it will be found, in a large enough number of subjects, that the resemblance, measured on a scale from 0 to 1, is just about one-half of unity. Of course, perfect identity with the parents is not to be expected, because the child must inherit from both parents, who in turn each inherited from two parents, and so on.

So far, it may be said, we have had plain sailing because we have carefully chosen traits in which we were not obliged to make

determinate change in the other; if it is 0.5, it means that when one of the variables deviates from the mean of its class by a given amount, the other variable will deviate from the mean of *its* class by 50% of that amount (each deviation being measured in terms of the variability of its own class, in order that they may be properly comparable.)

any subtraction whatever for the influence of training. But it is evident that not all traits fall in that class.

This is the point at which the inheritance of mental traits has been most often questioned. Probably no one will care to dispute the inheritance of such physical traits as eye-color. But in considering the mind, a certain school of popular pseudo-psychological writers question the reality of mental inheritance, and allege that the proofs which the geneticist offers are worthless because they do not make account of the similarity in environment or training. Of course, it is admitted that some sort of a mental groundwork must be inherited, but extremists allege that this is little more than a clean slate on which the environment, particularly during the early years of childhood, writes its autograph.

We must grant that the analysis of the inheritance of mental traits is proceeding slowly. This is not the fault of the geneticist, but rather of the psychologist, who has not yet been able to furnish the geneticist with the description of definite traits of such a character as to make possible the exhaustive analysis of their individual inheritance. That department of psychology is only now being formed.

We might even admit that no inherited "unit character" in the mind has yet been isolated; but it would be a great mistake to assume from this admission that proof of the inheritance of mental qualities, in general, is lacking.

The psychologists and educators who think so appear either to be swayed by metaphysical views of the mind, or else to believe that resemblance between parent and offspring is the only evidence of inheritance that can be offered. The father dislikes cheese, the son dislikes cheese. "Aha, you think that that is the inheritance of a dislike for cheese," cries the critic, "but we will teach you better." An interesting example of this sort of teaching is furnished by Boris Sidis, whose feelings are outraged because geneticists have represented that some forms of insanity are hereditary. He declaims for several pages [1] in this fashion:

[1] Sidis, Boris, M.A., Ph.D., M.D., "Neurosis and Eugenics," *Medical Review of*

"The so-called scientific method of the eugenists is radically faulty, in spite of the rich display of colored plates, stained tables, glittering biological speculations, brilliant mathematical formulæ and complicated statistical calculations. The eugenists pile Ossa on Pelion of facts by the simple method of enumeration which Bacon and the thinkers coming after him have long ago condemned as puerile and futile. From the savage's belief in sympathetic, imitative magic with its consequent superstitions, omens, and taboos down to the articles of faith and dogmas of the eugenists we find the same faulty, primitive thought, guided by the puerile, imbecile method of simple enumeration, and controlled by the wisdom of the logical *post hoc, ergo propter hoc.*"

Now if resemblance between parent and offspring were, as Dr. Sidis supposes, the only evidence of inheritance of mental traits which the eugenist can produce, his case would indeed be weak. And it is perfectly true that "evidence" of this kind has sometimes been advanced as sufficient by geneticists who should have known better. But this is not the real evidence which genetics offers. The evidence is of numerous kinds, and several lines might be destroyed without impairing the validity of the remainder. It is impossible to review the whole body of evidence here, but some of the various kinds may be indicated, and samples given, even though this involves the necessity of repeating some things we have said in earlier chapters. The reader will then be able to form his own opinion as to whether the geneticists' proofs or the mere assurances of those who have not studied the subject are the more weighty.

1. *The analogy from breeding experiments.* Tame rats, for instance, are very docile; their offspring can be handled without a bit of trouble. The wild rat, on the other hand, is not at all docile.

W. E. Castle, of Harvard University, writes:[1] "We have

Reviews, Vol. XXI, No. 10, pp. 587–594, New York, October, 1915. A psychologist who writes of "some miraculous germ-plasm (chromatin) with wonderful dominant 'units' (Chromosomes)" is hardly a competent critic of the facts of heredity.

[1] In a letter to the *Journal of Heredity*, under date of August 4, 1916.

repeatedly mated tame female rats with wild males, the mothers being removed to isolated cages before the birth of the young. These young which had never seen or been near their father were very wild in disposition in every case. The observations of Yerkes on such rats raised by us indicates that their wildness was not quite as extreme as that of the pure wild rat but closely approached it."

Who can suggest any plausible explanation of their conduct, save that they inherited a certain temperament from their sire? Yet the inheritance of temperament is one of the things which certain psychologists most "view with alarm." If it is proved in other animals, can it be considered wholly impossible in man?

2. *The segregation of mental traits.* When an insane, or epileptic, or feeble-minded person mates with a normal individual, in whose family no taint is found, the offspring (generally speaking) will be mentally sound, even though one parent is not. On the other hand, if two people from tainted stocks marry, although neither one may be personally defective, part of their offspring will be affected.

This production of sound children from an unsound parent, in the first case, and unsound children from two apparently sound parents in the second case, is exactly the opposite of what one would expect if the child gets his unsoundness merely by imitation or "contagion." The difference can not reasonably be explained by any difference in environment or external stimuli. Heredity offers a satisfactory explanation, for some forms of feeble-mindedness and epilepsy, and some of the diseases known as insanity, behave as recessives and segregate in just the way mentioned. There are abundant analogies in the inheritance of other traits in man, lower animals and plants, that behave in exactly the same manner.

If mental defects are inherited, then it is worth while investigating whether mental excellencies may not also be.

3. *The persistence of like qualities regardless of difference in environment.* Any parent with open eyes must see this in his own children—must see that they retained the inherited traits

even when they left home and lived under entirely different surroundings. But the histories of twins furnish the most graphic evidence. Galton, who collected detailed histories of thirty-five pairs of twins who were closely alike at birth, and examined their history in after years, writes: [1] "In some cases the resemblance of body and mind had continued unaltered up to old age, notwithstanding very different conditions of life;" in other cases where some dissimilarity developed, it could be traced to the influence of an illness. Making due allowance for the influence of illness, yet "instances do exist of an apparently thorough similarity of nature, in which such differences of external circumstances as may be consistent with the ordinary conditions of the same social rank and country do not create dissimilarity. Positive evidence, such as this, can not be outweighed by any amount of negative evidence."

Frederick Adams Woods has brought forward [2] a piece of more exact evidence under this head. It is known from many quantitative studies that in physical heredity, the influence of the paternal grandparents and the influence of the maternal grandparents is equal; on the average one pair will contribute no more to the grandchildren than the other. If mental qualities are due rather to early surroundings than to actual inheritance, this equality of grandparental influence is incredible in the royal families where Dr. Woods got his material; for the grandchild has been brought up at the court of the paternal grandfather, where he ought to have gotten all his "acquirements," and has perhaps never even seen his maternal grandparents, who therefore could not be expected to impress their mental peculiarities on him by "contagion." When Dr. Woods actually measured the extent of resemblance to the two sets of grandparents, for mental and moral qualities, he found it to be the same in each case; as is inevitable if they are inherited, but as is incomprehensible if heredity is not largely responsible for one's mental make-up.

4. *Persistence of unlike qualities regardless of sameness in the*

[1] Galton, Francis, *Inquiries into Human Faculty*, p. 167, London, 1907.

[2] Woods, Frederick Adams, *Heredity in Royalty*, New York, 1906.

environment. This is the converse of the preceding proposition, but even more convincing. In the last paragraph but one, we mentioned Galton's study (cited at some length in our Chapter I) of "identical" twins, who are so much alike at birth for the very good reason that they have identical heredity. This heredity was found to be not modified, either in the body or the mind, by ordinary differences of training and environment. Some of Galton's histories [1] of ordinary, non-identical twins were also given in Chapter I; two more follow:

One parent says: "They have been treated exactly alike; both were brought up by hand; they have been under the same nurse and governess from their birth, and they are very fond of each other. Their increasing dissimilarity must be ascribed to a natural difference of mind and character, as there has been nothing in their treatment to account for it."

Another writes: "This case is, I should think, somewhat remarkable for dissimilarity in physique as well as for strong contrast in character. They have been unlike in mind and body throughout their lives. Both were reared in a country house and both were at the same schools until the age of 16."

In the face of such examples, can anyone maintain that differences in mental make-up are wholly due to different influences during childhood, and not at all to differences in germinal make-up? It is not necessary to depend, under this head, on mere descriptions, for accurate measurements are available to demonstrate the point. If the environment creates the mental nature, then ordinary brothers, not more than four or five years apart in age, ought to be about as closely similar to each other as identical twins are to each other; for the family influences in each case are practically the same. Professor Thorndike, by careful mental tests, showed [2] that this is not

[1] *Op. cit.*, pp. 170–171.

[2] Thorndike, E. L., "Measurements of Twins," *Arch. of Philos., Psych. and Sci. Methods*, No. 1, New York, 1905; summarized in his *Educational Psychology*, Vol. III, pp. 247–251, New York, 1914. Measured on a scale where 1 = identity, he found that twins showed a resemblance to each other of about .75, while ordinary brothers of about the same age resembled each other to the extent of about .50 only. The resemblance was approximately the same in both physical and mental traits.

true. The ordinary brothers come from different egg-cells, and, as is known from studies on lower animals, they do not get exactly the same inheritance from their parents; they show, therefore, considerable differences in their psychic natures. Real identical twins, being two halves of the same egg-cell, halve the same heredity, and their natures are therefore much more nearly identical.

Again, if the mind is molded during the "plastic years of childhood," children ought to become more alike, the longer they are together. Twins who were unlike at birth ought to resemble each other more closely at 14 than they did at 9, since they have been for five additional years subjected to this supposedly potent but very mystical "molding force." Here again Professor Thorndike's exact measurements explode the fallacy. They are actually, measurably, less alike at the older age; their inborn natures are developing along predestined lines, with little regard to the identity of their surroundings. Heredity accounts easily for these facts, but they cannot be squared with the idea that mental differences are the products solely of early training.

5. *Differential rates of increase in qualities subject to much training.* If the mind is formed by training, then brothers ought to be more alike in qualities which have been subject to little or no training. Professor Thorndike's measurements on this point show the reverse to be true. The likeness of various traits is determined by heredity, and brothers may be more unlike in traits which have been subjected to a large and equal amount of training. Twins were found to be less alike in their ability at addition and multiplication, in which the schools had been training them for some years, than they were in ability to mark off the A's on a printed sheet, or to write the opposites to a list of words—feats which they had probably never before tried to do.

This same proposition may be put on a broader basis.[1] "In so far as the differences in achievement found amongst a group of men are due to the differences in the quantity and quality

[1] The quotations in this and the following paragraph are from *Thorndike's Educational Psychology*, pp. 304–305, Vol. III.

of training which they had had in the function in question, the provision of equal amounts of the same sort of training for all individuals in the group should act to reduce the differences." "If the addition of equal amounts of practice does not reduce the differences found amongst men, those differences can not well be explained to any large extent by supposing them to have been due to corresponding differences in amount of previous practice. If, that is, inequalities in achievement are not reduced by equalizing practice, they can not well have been caused by inequalities in previous practice. If differences in opportunity cause the differences men display, making opportunity more nearly equal for all, by adding equal amounts to it in each case should make the differences less.

"The facts found are rather startling. Equalizing practice seems to increase differences. The superior man seems to have got his present superiority by his own nature rather than by superior advantages of the past, since, during a period of equal advantage for all, he increases his lead." This point has been tested by such simple devices as mental multiplication, addition, marking A's on a printed sheet of capitals and the like; all the contestants made some gain in efficiency, but those who were superior at the start were proportionately farther ahead than ever at the end. This is what the geneticist would expect, but fits very ill with some popular pseudo-science which denies that any child is mentally limited by nature.

6. *Direct measurement of the amount of resemblance of mental traits in brothers and sisters.* It is manifestly impossible to assume that early training, or parental behavior, or anything of the sort, can have influenced very markedly the child's eye color, or the length of his forearm, or the ratio of the breadth of his head to its length. A measure of the amount of resemblance between two brothers in such traits may very confidently be said to represent the influence of heredity; one can feel no doubt that the child inherits his eye-color and other physical traits of that kind from his parents. It will be recalled that the resemblance, measured on a scale from 0 to 1, has been found to be about 0.5.

Karl Pearson measured the resemblance between brothers and sisters in mental traits—for example, temper, conscientiousness, introspection, vivacity—and found it on the average to have the same intensity—that is, about 0.5. Starch gets similar results in studying school grades.

Professor Pearson writes: [1]

"It has been suggested that this resemblance in the psychological characters is compounded of two factors, inheritance on the one hand and training and environment on the other. If so, one must admit that inheritance and environment make up the resemblance in the physical characters. Now these two sorts of resemblance being of the same intensity, either the environmental influence is the same in both cases or it is not. If it is the same, we are forced to the conclusion that it is insensible, for it can not influence eye-color. If it is not the same, then it would be a most marvelous thing that with varying degrees of inheritance, some mysterious force always modifies the extent of home influence, until the resemblance of brothers and sisters is brought sensibly up to the same intensity! Occam's razor [2] will enable us at once to cut off such a theory. We are forced, I think, literally forced, to the general conclusion that the physical and psychical characters in man are inherited within broad lines in the same manner, and with approximate intensity. The average parental influence is in itself largely a result of the heritage of the stock and not an extraneous and additional factor causing the resemblance between children from the same home."

A paragraph from Edgar Schuster [3] may appropriately be added. "After considering the published evidence a word must be said of facts which most people may collect for themselves. They are difficult to record, but are perhaps more convincing than any quantity of statistics. If one knows well several members of a family, one is bound to see in them likenesses with

[1] *Biometrika*, Vol. III, p. 156.

[2] "William of Occam's Razor" is the canon of logic which declares that it is unwise to seek for several causes of an effect, if a single cause is adequate to account for it.

[3] Schuster, Edgar, *Eugenics*, pp. 150–163, London, 1913.

regard to mental traits, both large and small, which may sometimes be accounted for by example on the one hand or unconscious imitation on the other, but are often quite inexplicable on any other theory than heredity. It is difficult to understand how the inheritance of mental capacity can be denied by those whose eyes are open and whose minds are open too."

Strictly speaking, it is of course true that man inherits nothing more than the capacity of making mental acquirements. But this general capacity is made up of many separate capacities, all of these capacities are variable, and the variations are inherited. Such seems to us to be the unmistakable verdict of the evidence.

Our conclusions as to the inheritance of all sorts of mental capacity are not based on the mere presence of the same trait in parent and child. As the psychological analysis of individual traits proceeds, it will be possible to proceed further with the study of the inheritance of these traits. Some work has been done on spelling, which is particularly interesting because most people, without reflection, would take it for granted that a child's spelling ability depends almost wholly on his training. Professor Thorndike's exposition [1] of the investigation is as follows:

"E. L. Earle ('03) measured the spelling abilities of some 800 children in the St. Xavier school in New York by careful tests. As the children in this school commonly enter at a very early age, and as the staff and methods of teaching remain very constant, we have in the case of the 180 pairs of brothers and sisters included in the 600 children closely similar school training. Mr. Earle measured the ability of any individual by his deviation from the average for his grade and sex, and found the coefficient of correlation between children of the same family to be .50. That is, any individual is on the average 50% as much above or below the average for his age and sex as his brother or sister.

"Similarities of home training might account for this, but any one experienced in teaching will hesitate to attribute much

[1] *Educational Psychology* (1914), Vol. III, p. 235.

efficacy to such similarities. Bad spellers remain bad spellers though their teachers change. Moreover, Dr. J. M. Rice in his exhaustive study of spelling ability ('97) found little or no relationship between good spelling and any one of the popular methods, and little or none between poor spelling and foreign parentage. Cornman's more careful study of spelling ('07) supports the view that ability to spell is little influenced by such differences in school or home training as commonly exist."

This is a very clear-cut case of a definite intellectual ability, differences in which might be supposed to be due almost wholly to the child's training, but which seem, on investigation, to be largely due to heredity.

The problem may be examined in still greater detail. Does a man merely inherit manual skill, let us say, or does he inherit the precise kind of manual skill needed to make a surgeon but not the kind that would be useful to a watchmaker? Is a man born merely with a generalized "artistic" ability, or is it one adapted solely for, let us say, music; or further, is it adapted solely for violin playing, not for the piano?

Galton, in his pioneer studies, sought for data on this question. In regard to English judges, he wrote: "Do the judges often have sons who succeed in the same career, where success would have been impossible if they had not been gifted with the special qualities of their fathers? Out of the 286 judges, more than *one in every nine* of them have been either father, son or brother to another judge, and the other high legal relationships have been even more numerous. There can not, then, remain a doubt but that the peculiar type of ability that is necessary to a judge is often transmitted by descent."

Unfortunately, we can not feel quite as free from doubt on the point as Galton did. The judicial mind, if that be the main qualification for a judge, might be inherited, or it might be the result of training. Such a case, standing alone, is inconclusive.

Galton similarly showed that the sons of statesmen tended to be statesmen, and that the same was true in families of great commanders, literary men, poets and divines. In his list of eminent painters, all the relatives mentioned are painters save

four, two of whom were gifted in sculpture, one in music and one in embroidery. As to musicians, Mendelssohn and Meyerbeer are the only ones in his list whose eminent kinsmen achieved their success in other careers than music.

Havelock Ellis, who likewise studied British men of genius, throws additional light on the subject. "Painters and sculptors," he found, "constitute a group which appears to be of very distinct interest from the point of view of occupational heredity. In social origin, it may be noted, the group differs strikingly in constitution from the general body of men of genius in which the upper class is almost or quite predominant. Of 63 painters and sculptors of definitely known origin, only two can be placed in the aristocratic division. Of the remainder 7 are the sons of artists, 22 the sons of craftsmen, leaving only 32 for all other occupations, which are mainly of lower middle class character, and in many cases trades that are very closely allied to crafts. Even, however, when we omit the trades as well as the cases in which the fathers were artists, we find a very notable predominance of craftsmen in the parentage of painters, to such an extent indeed that while craftsmen only constitute 9.2% among the fathers of our eminent persons generally, they constitute nearly 35% among the fathers of the painters and sculptors. It is difficult to avoid the conclusion that there is a real connection between the father's aptitude for craftsmanship and the son's aptitude for art.

"To suppose that environment adequately accounts for this relationship is an inadmissible theory. The association between the craft of builder, carpenter, tanner, jeweller, watchmaker, woodcarver, ropemaker, etc., and the painter's art is small at best, and in most cases is non-existent."

Arreat, investigating the heredity of 200 eminent European painters, reached results similar to those of Ellis, according to the latter's citation.

Arithmetical ability seems similarly to be subdivided, according to Miss Cobb.[1] She made measurements of the efficiency

[1] Cobb, Margaret V., *Journal of Educational Psychology*, viii, pp. 1–20, Jan., 1917.

with which children and their parents could do problems in addition, subtraction, multiplication and division, and could copy a column of figures. "The measurements made," she writes, "show that if, for instance, a child is much quicker than the average in subtraction, but not in addition, multiplication or division, it is to be expected that one at least of his parents shows a like trait; or if he falls below the average in subtraction and multiplication, and exceeds it in addition and division, again the same will hold true of at least one of his parents." These various kinds of arithmetic appear to be due to different functions of the brain, and are therefore probably inherited independently, if they are inherited at all.

To assume that the resemblance between parent and offspring in arithmetical ability is due to association, training and imitation is not plausible. If this were the case, a class of children ought to come to resemble their teacher, but they do not. Moreover, the child sometimes resembles more closely the parent with whom he has been less associated in daily life.

From such data as these, we conclude that mental inheritance is considerably specialized. This conclusion is in accord with Burris' finding (cited by Thorndike) that the ability to do well in some one high school study is nearly or quite as much due to ancestry as is the ability to do well in the course as a whole.

To sum up, we have reason to believe not only that one's mental character is due largely to heredity, but that the details of it may be equally due to heredity, in the sense that for any particular trait or complex in the child there is likely to be found a similar trait or complex in the ancestry. Such a conclusion should not be pushed to the point of assuming inheritance of all sorts of dispositions that might be due to early training; on the other hand, a survey of the whole field would probably justify us in concluding that any given trait is *more likely than not* to be inherited. The effect of training in the formation of the child's mental character is certainly much less than is popularly supposed; and even for the traits that are most due to training, it must never be forgotten that there are inherited mental bases.

If the reader has accepted the facts presented in this chapter, and our inferences from the facts, he will admit that mental differences between men are at bottom due to heredity, just as physical differences are; that they are apparently inherited in the same manner and in approximately the same degree.

CHAPTER V

THE LAWS OF HEREDITY

We have now established the bases for a practicable eugenics program. Men differ; these differences are inherited; therefore the make-up of the race can be changed by any method which will alter the relative proportions of the contributions which different classes of men make to the following generation.

For applied eugenics, it is sufficient to know that mental and physical differences are inherited; the exact manner of inheritance it would be important to know, but even without a knowledge of the details of the mechanism of heredity, a program of eugenics is yet wholly feasible.

It is no part of the plan of this book to enter into the details of the mechanism of heredity, a complicated subject for which the reader can refer to one of the treatises mentioned in the bibliography at the close of this volume. It may be worth while, however, to outline in a very summary way the present status of the question.

As to the details of inheritance, research has progressed in the last few years far beyond the crude conceptions of a decade ago, when a primitive form of Mendelism was made to explain everything that occurred.[1] One can hardly repress a smile at the simplicity of those early ideas,—though it must be said that some students of eugenics have not yet outgrown them. In

[1] This is not true of the small English school of biometrists, founded by Sir Francis Galton, W. F. R. Weldon and Karl Pearson, and now led by the latter. It has throughout denied or minified Mendelian results, and depended on the treatment of inheritance by a study of correlations. With the progress of Mendelian research, biometric methods must be supplemented with pedigree studies. In human heredity, on the other hand, because of the great difficulties attendant upon an application of Mendelian methods, the biometric mode of attack is still the most useful, and has been largely used in the present book. It has been often supposed that the methods of the two schools (biometry and Mendelism) are antagonistic. They are rather supplementary, each being valuable in cases where the other is less applicable. See Pearl, Raymond, *Modes of Research in Genetics*, p. 182, New York, 1915

those days it was thought that every visible character in man (or in any other organism) was represented by some "determiner" in the germ-plasm; that by suitable matings a breeder could rid a stream of germ-plasm of almost any determiner he wished; and that the corresponding unit character would thereupon disappear from the visible make-up of the individual. Was a family reported as showing a taint, for instance, hereditary insanity? Then it was asserted that by the proper series of matings, it was possible to squeeze out of the germ-plasm the particular concrete *something* of which insanity was the visible expression, and have left a family stock that was perfectly sound and sane.

The minute, meticulous researches of experimental breeders [1] have left such a view of heredity far behind. Certainly the last word has not been said; yet the present hypotheses *work*, whenever the conditions are such as to give a fair chance. The results of these studies have led to what is called the factorial hypothesis of heredity,[2] according to which all the visible characters of the adult are produced by (purely hypothetical) factors in the germ-plasm; it is the factors that are inherited, and they, under proper conditions for development, produce the characters. The great difference between this and the earlier view is that instead of allotting one factor to each character, students now believe that each individual character of the organism is produced by the action of an indefinitely large number of factors,[3] and they

[1] Few people realize what large numbers of plants and animals have been bred for experimental purposes during the last decade; W. E. Castle of Bussey Institution, Forest Hills, Mass., has bred not less than 45,000 rats. In the study of a single character, the endosperm of maize, nearly 100,000 pedigreed seeds have been examined by different students. Workers at the University of California have tabulated more than 10,000 measurements on flower size alone, in tobacco hybrids. T. H. Morgan and his associates at Columbia University have bred and studied more than half a million fruit flies, and J. Arthur Harris has handled more than 600,000 bean-plants at the Carnegie Institution's Station for Experimental Evolution, Cold Spring Harbor, L. I. While facts of human heredity, and of inheritance in large mammals generally, are often grounded on scanty evidence, it must not be thought that the fundamental generalizations of heredity are based on insufficient data.

[2] For a brief account of Mendelism, see Appendix D.

[3] Of course these factors are not of equal importance; some of them produce large

HOW DO YOU CLASP YOUR HANDS?

FIG. 16.—If the hands be clasped naturally with fingers alternating, as shown in the above illustration, most people will put the same thumb—either that of the right or that of the left hand—uppermost every time. Frank E. Lutz showed (*American Naturalist*, xliii) that the position assumed depends largely on heredity. When both parents put the right thumb uppermost, about three-fourths of the children were found to do the same. When both parents put the left thumb upper-most, about three-fifths of the children did the same. No definite ratios could be found from the various kinds of matings. Apparently the manner of clasping hands has no connection with one's right-handedness or left-handedness. It can hardly be due to imitation for the trait is such a slight one that most people have not noticed it before their attention is called to it by the geneticist. Furthermore,

have been further forced to adopt the belief that each individual factor affects an indefinitely large number of characters, owing to the physiological interrelations and correlations of every part of the body.

The sweet pea offers a good illustration of the widespread effects which may result from the change of a single factor. In addition to the ordinary climbing vine, there is a dwarf variety, and the difference between the two seems to be proved, by exhaustive experimental breeding, to be due to only one inherited factor. Yet the action of this one factor not only changes the height of the plant, but also results in changes in color of foliage, length of internodes, size and arrangement of flowers, time of opening of flowers, fertility and viability.

Again, a mutant stock in the fruit fly (Drosophila) has as its most marked characteristic very short wings. "But the factor for rudimentary wings also produces other effects as well. The females are almost completely sterile, while the males are fertile. The viability of the stocks is poor. When flies with rudimentary wings are put into competition with wild flies relatively few of the rudimentary flies come through, especially if the culture is crowded. The hind legs are also shortened. All of these effects are the results of a single factor-difference." To be strictly accurate, then, one should not say that a certain variation affects length of wing, but that its *chief* effect is to shorten the wing.

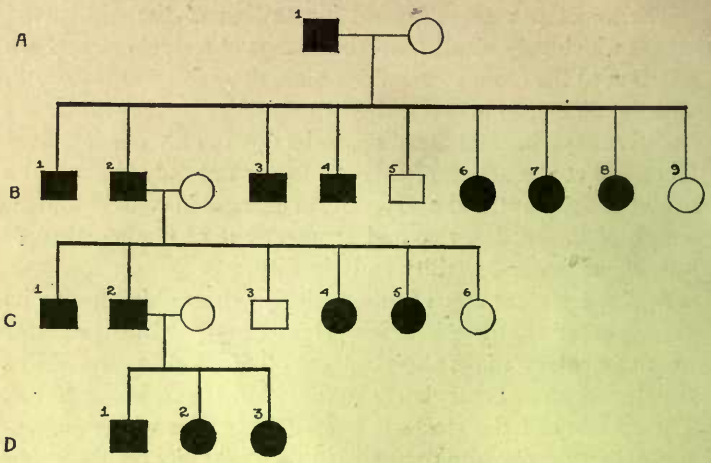
"One may venture to guess," T. H. Morgan says,[1] "that some of the specific and varietal differences that are characteristic of wild types and which at the same time appear to have no survival value, are only by-products of factors whose most im-

changes and some, as far as can be told, are of minor significance. The factors, moreover, undergo large changes from time to time, thus producing mutations; and it is probable small changes as well, the evidence for which requires greater refinements of method than is usual among those using the pedigree method.

[1] *A Critique of the Theory of Evolution*, by Thomas Hunt Morgan, professor of experimental zoölogy in Columbia University. Princeton University Press, 1916. This book gives the best popular account of the studies of heredity in Drosophila. The advanced student will find *The Mechanism of Mendelian Heredity* (New York, 1915), by Morgan, Sturtevant, Müller, and Bridges, indispensable, but it is beyond the comprehension of most beginners.

portant effect is on another part of the organism where their influence is of vital importance."

"I am inclined to think," Professor Morgan continues, "that an overstatement to the effect that each factor may affect the

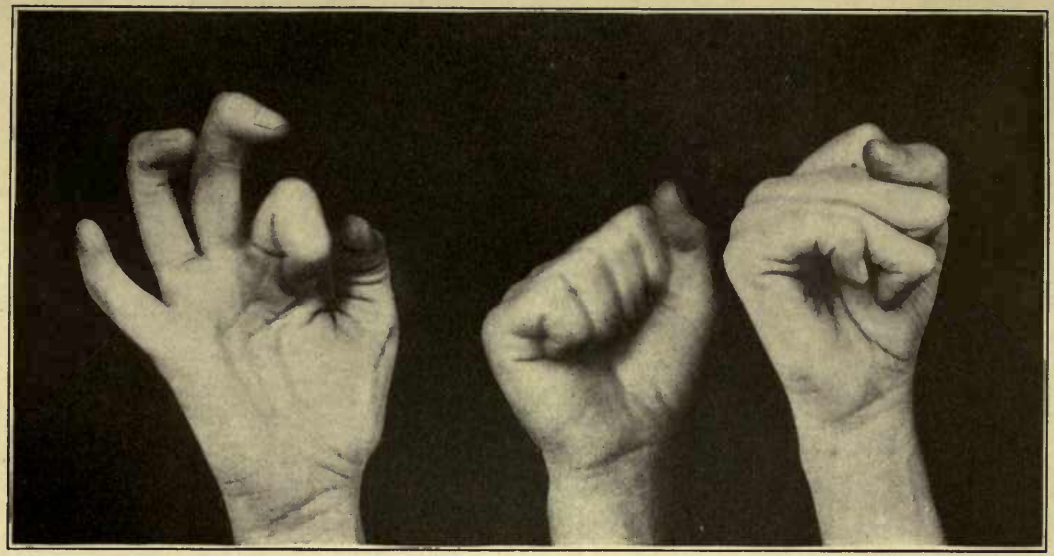


A FAMILY WITH ORTHODACTYLY

FIG. 18.—Squares denote males and circles females, as is usual in the charts compiled by eugenists; black circles or squares denote affected individuals. A_1 had all fingers affected in the way shown in Fig. 17; B_2 had all but one finger affected; C_2 had all but one finger affected; D_2 had all fingers affected; D_3 has all but forefingers affected. The family here shown is a branch, found by F. N. Duncan, of a very large family first described by Harvey Cushing, in which this abnormality has run for at least seven generations. It is an excellent example of an inherited defect due to a single Mendelian factor.

entire body, is less likely to do harm than to state that each factor affects only a particular character. The reckless use of the phrase 'unit character' has done much to mislead the uninitiated as to the effects that a single change in the germ-plasm may produce on the organism. Fortunately the expression 'unit character' is being less used by those students of genetics who are more careful in regard to the implications of their terminology."

One of the best attested single characters in human heredity is brachydactyly, "short-fingerness," which results in a reduction in the length of the fingers by the dropping out of one joint. If one lumps together all the cases where any effect of this sort is



THE EFFECT OF ORTHODACTYLY

FIG. 17.—At the left is a hand with the third, fourth and fifth fingers affected. The middle joints of these fingers are stiff and cannot be bent. At the right the same hand is shown, closed. A normal hand in the middle serves to illustrate by contrast the nature of the abnormality, which appears in every generation of several large families. It is also called symphalangism, and is evidently related to the better-known abnormality of brachydactyly. Photograph from Frederick N. Duncan.

found, it is evident that normals never transmit it to their posterity, that affected persons always do, and that in a mating between a normal and an affected person, all the offspring will show the abnormality. It is a good example of a unit character.

But its effect is by no means confined to the fingers. It tends to affect the entire skeleton, and in a family where one child is markedly brachydactylous, that child is generally shorter than the others. The factor for brachydactyly evidently produces its primary effect on the bones of the hand, but it also produces a secondary effect on all the bones of the body.

Moreover, it will be found, if a number of brachydactylous persons are examined, that no two of them are affected to exactly the same degree. In some cases only one finger will be abnormal; in other cases there will be a slight effect in all the fingers; in other cases all the fingers will be highly affected. Why is there such variation in the results produced by a unit character? Because, presumably, in each individual there is a different set of modifying factors or else a variation in the factor. It has been found that an abnormality quite like brachydactyly is produced by abnormality in the pituitary gland. It is then fair to suppose that the factor which produces brachdactyly does so by affecting the pituitary gland in some way. But there must be many other factors which also affect the pituitary and in some cases probably favor its development, rather than hindering it. Then if the factor for brachydactyly is depressing the pituitary, but if some other factors are at the same time stimulating that gland, the effect shown in the subject's fingers will be much less marked than if a group of modifying factors were present which acted in the same direction as the brachydactyly factor,—to perturb the action of the pituitary gland.

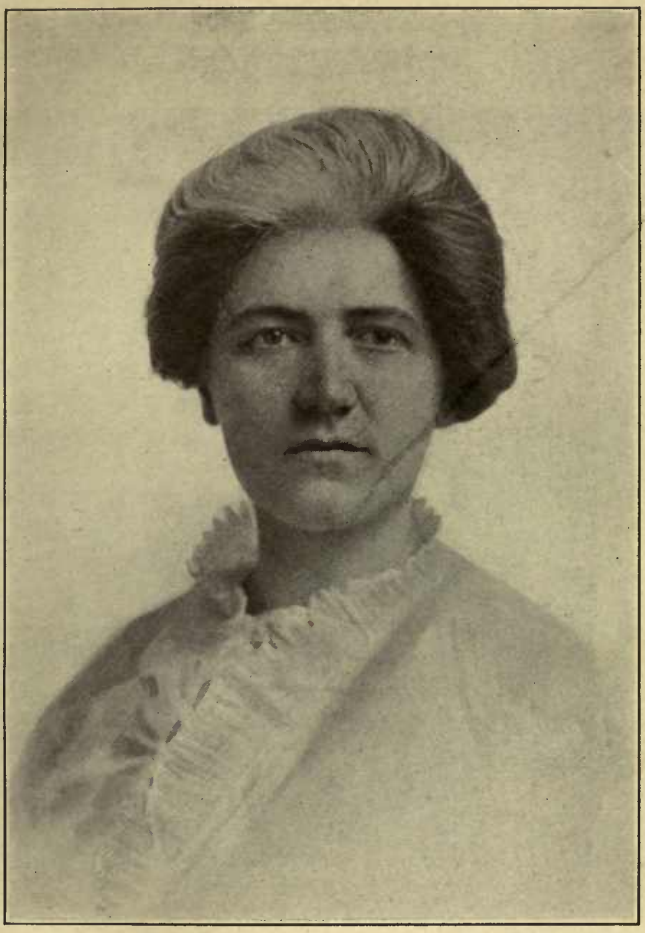
This illustration is largely hypothetical; but there is no room for doubt that every factor produces more than a single effect. A white blaze in the hair, for example, is a well-proved unit factor in man; the factor not only produces a white streak in the hair, but affects the pigmentation of the skin as well, usually resulting in one or more white spots on some part of the body. It is really a factor for "piebaldism."

For the sake of clear thinking, then, the idea of a unit character due to some unit determiner or factor in the germ-plasm must be given up, and it must be recognized that every visible character of an individual is the result of numerous factors, or differences in the germ-plasm. Ordinarily one of these produces a more notable contribution to the end-product than do the others; but there are cases where this statement does not appear to hold good. This leads to the conception of *multiple factors*.

In crossing a wheat with brown chaff and one with white chaff, H. Nilsson-Ehle (1909) expected in the second hybrid generation to secure a ratio of 3 brown to 1 white. As a fact, he got 1410 brown and 94 white, a ratio of 15:1. He interpreted this as meaning that the brown color in this particular variety was due not to one factor, but to two, which were equivalent to each other, and either one of which would produce the same result alone as would the two acting together. In further crossing red wheat with white, he secured ratios which led him to believe that the red was produced by three independent factors, any one of which would produce red either alone or with the other two. A. and G. Howard later corroborated this work,[1] but showed that the three factors were not identical: they are qualitatively slightly different, although so closely similar that the three reds look alike at first sight. E. M. East has obtained evidence from maize and G. H. Shull from shepherd's-purse, which bears out the multiple factor hypothesis.

Apart from multiple factors as properly defined (that is, factors which produce the same result, either alone or together), extensive analysis usually reveals that apparently simple characters are in reality complex. The purple aleurone color of maize seeds is attributed by R. A. Emerson to five distinct factors, while E. Baur found four factors responsible for the red color of snapdragon blossoms. There are, as G. N. Collins

[1] "On the Inheritance of Some Characters in Wheat," A. and G. Howard, *Mem. Dep. of Agr. India*, V:1–46, 1912. This careful and important work has never received the recognition it deserves, apparently because few geneticists have seen it. While the multiple factors in wheat seem to be different, those reported by East and Shull appear to be merely duplicates.



WHITE BLAZE IN THE HAIR

FIG. 19.—The white lock of hair here shown is hereditary and has been traced back definitely through six generations; family tradition derives it from a son of Harry "Hot-Spur" Percy, born in 1403, and fallaciously assigns its origin to "prenatal influence" or "maternal impression." This young woman inherited the blaze from her father, who had it from his mother, who had it from her father, who migrated from England to America nearly a century ago. The trait appears to be a simple dominant, following Mendel's Law; that is, when a person with one of these locks who is a child of one normal and one affected parent marries a normal individual, half of the children show the lock and half do not. Photograph from Newton Miller.

A FAMILY OF SPOTTED NEGROES

FIG. 20.—The piebald factor sometimes shows itself as nothing more than a blaze in the hair (see preceding figure); but it may take a much more extreme form, as illustrated by the above photograph from Q. I. Simpson and W. E. Castle. Mrs. S. A., a spotted mutant, founded a family which now comprises, in several generations, 17 spotted and 16 normal offspring. The white spotting factor behaves as a Mendelian dominant, and the expectation would be equal numbers of normal and affected children. Similar white factors are known in other animals. It is worth noting that all the well attested Mendelian characters in man are abnormalities, no normal character having yet been proved to be inherited in this manner.

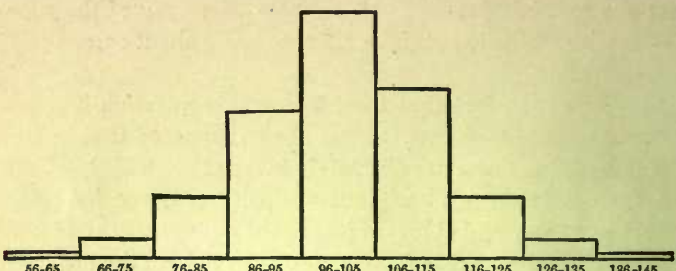
says,[1] "still many gross characters that stand as simple Mendelian units, but few, if any, of these occur in plants or animals that have been subjected to extensive investigation. There is now such a large number of characters which at first behaved as units, but which have since been broken up by crossing with suitable selected material, that it seems not unreasonable to believe that the remaining cases await only the discovery of the right strains with which to hybridize them to bring about corresponding results."

In spite of the fact that there is a real segregation between factors as has been shown, it must not be supposed that factors and their determiners are absolutely invariable. This has been too frequently assumed without adequate evidence by many geneticists. It is probable that just as the multiplicity and interrelation and minuteness of many factors have been the principal discoveries of genetics in recent years that the next few years will see a great deal of evidence following the important lead of Castle and Jennings, as to variation in factors.

Knowing that all the characters of an individual are due to the interaction of numerous factors, one must be particularly slow in assuming that such complex characters as man's mental traits are units, in any proper genetic sense of the word. It will, for instance, require very strong evidence to establish feeble-mindedness as a unit character. No one who examines the collected pedigrees of families marked by feeble-mindedness, can deny that it does appear at first sight to behave as a unit character, inherited in the typical Mendelian fashion. The psychologist H. H. Goddard, who started out with a strong bias against believing that such a complex trait could even *behave* as a unit character, thought himself forced by the tabulation of his cases to adopt the conclusion that it does behave as a unit character. And other eugenists have not hesitated to affirm, mainly on the strength of Dr. Goddard's researches, that this unit character is due to a single determiner in the germ-plasm, which either is or is not present,—no halfway business about it.

[1] "The Nature of Mendelian Units." By G. N. Collins, *Journal of Heredity*, V: 425 ff., Oct., 1914.

How were these cases of feeble-mindedness defined? The definition is purely arbitrary. Ordinarily, any adult who tests much below 12 years by the Binet-Simon scale is held to be feeble-minded; and the results of this test vary a little with the skill of the person applying it and with the edition of the scale used. Furthermore, most of the feeble-minded cases in institu-



DISTRIBUTION OF I Q'S OF 905 UNSELECTED CHILDREN, 5–14 YEARS OF AGE

THE DISTRIBUTION OF INTELLIGENCE

FIG. 23.—Diagram showing the mentality of 905 unselected children, 5 to 14 years of age, who may probably be taken as representative of the whole population. The median or tallest column, about one-third of the whole number, represents those who were normal or, as a statistician would say, mediocre. Their mental ages and chronological ages were practically identical. To the left of these the diminishing columns show the number whose mental ages fell short of their chronological ages. They are the mentally retarded, ranging all the way down to the lowest one-third of one per cent who represent a very low grade of feeble-mindedness. On the other side the mentally superior show a similar distribution. A curve drawn over the tops of the columns makes a good normal curve. "Since the frequency of the various grades of intelligence decreases *gradually* and at no point abruptly on each side of the median, it is evident that there is no definite dividing line between normality and feeble-mindedness, or between normality and genius. Psychologically the mentally defective child does not belong to a distinct type, nor does the genius. . . . The common opinion that extreme deviations below the median are vastly more frequent than extreme deviations above the median seems to have no foundation in fact. Among unselected school children, at least, for every child of any given degree of deficiency there is roughly another child as far above the average as the former is below." Lewis M. Terman, *The Measurement of Intelligence*, pp. 66–67.

tions, where the Mendelian studies have usually been made, come from families which are themselves of a low grade of mentality. If the whole lot of those examined were measured, it would be difficult to draw the line between the normals and the affected; there is not nearly so much difference between the two classes, as one would suppose who only looks at a Mendelian chart.

A HUMAN FINGER-TIP

FIG. 21.—The palms of the hands and soles of the feet are covered with little ridges or corrugations, which are supposed to be useful in preventing the grasp from slipping; whence the name of friction-skin has been given to these surfaces. The ridges are developed into various patterns; the one above is a loop on the left forefinger. The ridges are studded with the openings of the sweat glands, the elevated position of which is supposed to prevent them from being clogged up; further, the moisture which they secrete perhaps adds to the friction of the skin. Friction-skin patterns are inherited in some degree. Photograph by John Howard Payne.

THE LIMITS OF HEREDITARY CONTROL

FIG. 22.—Print of a finger-tip showing a loop-pattern, enlarged about eight times. This is a common type of pattern, and at first glance the reader may think it could be mistaken for one of his own. There are, however, at least sixty-five "ridge characteristics" on the above print, which an expert would recognize and would use for the purpose of identification. If it were found that the first two or three of them noted corresponded to similar characteristics on another print, the expert would have no doubt that the two prints were made by the same finger. In police bureaus, finger-prints are filed for reference with a classification based on the type of pattern, number of ridges between two given points, etc.; and a simple formula results which makes it easy to find all prints which bear a general resemblance to each other. The exact identity or lack of it is then determined by a comparison of such *minutiæ* as the sixty-five above enumerated. While the general outline of a pattern is inherited, these small characters do not seem to be, but are apparently rather due to the stretching of the skin as it grows. Illustration from J. H. Taylor.

It would be well to extend our view by measuring a whole population with one of the standard tests. If the intelligence of a thousand children picked at random from the population be measured, it will prove (as outlined in Chapter III) that some of them are feeble-minded, some are precocious or highly intelligent; and that there is every possible degree of intelligence between the two extremes. If a great number of children, all 10 years old, were tested for intelligence, it would reveal a few absolute idiots whose intelligence was no more than that of the ordinary infant, a few more who were as bright as the ordinary kindergarten child, and so up to the great bulk of normal 10-year-olds, and farther to a few prize eugenic specimens who had as much intelligence as the average college freshman. In other words, this trait of general intelligence would be found distributed through the population in accordance with that same curve of chance, which was discussed and illustrated when we were talking about the differences between individuals.

Now what has become of the unit character, feeble-mindedness? How can one speak of a unit character, when the "unit" has an infinite number of values? Is a *continuous quantity* a *unit?*

If intelligence is due to the inheritance of a vast, but indeterminate, number of factors of various kinds, each of which is independent, knowledge of heredity would lead one to expect that some children would get more of these factors than others and that, broadily speaking, no two would get the same number. All degrees of intelligence between the idiot and the genius would thus exist; and yet we can not doubt that a few of these factors are more important than the others, and the presence of even one or two of them may markedly affect the level of intelligence.

It may make the matter clearer if we return for a moment to the physical. Height, bodily stature, offers a very good analogy for the case we have just been discussing, because it is obvious that it must depend on a large number of different factors, a man's size being due to the sum total of the sizes of a great number of bones, ligaments, tissues, etc. It is obvious that one can be long in the trunk and short in the legs, or vice versa, and

so on through a great number of possible combinations. Here is a perfectly measurable character (no one has ever claimed that it is a genetic "unit character" *in man* although it behaves as such in some plants) as to the complex basis of which all will agree. And it is known, from common observation as well as from pedigree studies, that it is not inherited as a unit: children are never born in two discontinuous classes, "tall" and "short," as they are with color blindness or normal color vision, for example. Is it not a fair assumption that the difference between the apparent unit character of feeble-mindedness, and the obvious non-unit character of height, is a matter of difference in the number of factors involved, difference in the degree to which they hang together in transmission, variation in the factors, and certainly difference in the method of measurement? Add that the line between normal and feeble-minded individuals is wholly arbitrary, and it seems that there is little reason to talk about feeble-mindedness as a unit character. It may be true that there is some sort of an inhibiting factor inherited as a unit, but it seems more likely that feeble-mindedness may be due to numerous different causes; that its presence in one child is due to one factor or group of factors, and in another child to a different one.[1]

It does not fall wholly into the class of blending inheritance, for it does segregate to a considerable extent, yet some of the factors may show blending. Much more psychological analysis must be done before the question of the inheritance of feeble-mindedness can be considered solved. But at present one can say with confidence of this, as of other mental traits, that like tends to produce like; that low grades of mentality usually come from an ancestry of low mentality, and that bright children are usually produced in a stock that is marked by intelligence.

Most mental traits are even more complex in appearance than feeble-mindedness. None has yet been proved to be due to

[1] Dr. Castle, reviewing Dr. Goddard's work (*Journal of Abnormal Psychology*, Aug.–Sept., 1915) concludes that feeble-mindedness is to be explained as a case of multiple allelomorphs. The evidence is inadequate to prove this, and proof would be, in fact, almost impossible, because of the difficulty of determining just what the segregation ratios are.

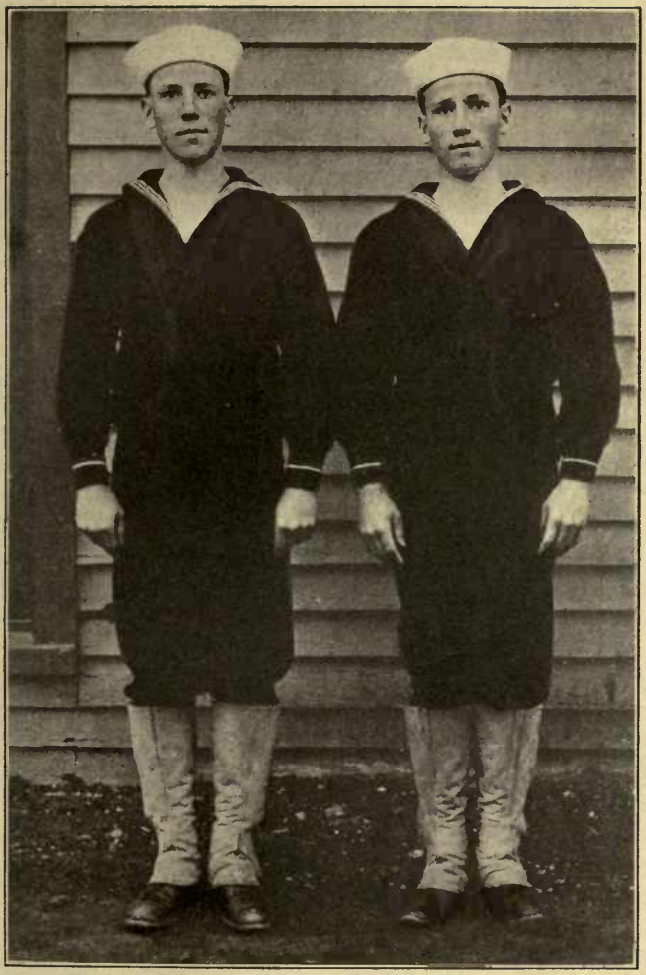


FIG. 24.—The twins whose finger-prints are shown in Fig. 25.

a single germinal difference, and it is possible that none will ever be so demonstrated.

Intensive genetic research in lower animals and plants has shown that a visible character may be due to

1. Independent multiple factors in the germ-plasm, as in the case of wheat mentioned a few pages back.

2. Multiple allelomorphs, that is, a series of different grades of a single factor.

3. One distinct Mendelian factor (or several such factors), with modifying factors which may cause either (a) intensification, (b) inhibition, or (c) dilution.

4. Variation of a factor.

5. Or several or all of the above explanations may apply to one case.

Moreover, the characters of which the origin has been most completely worked out are mostly color characters, whose physiological development seems to be relatively simple. It is probable that the development of a mental character is much more complicated, and therefore there is more likelihood of additional factors being involved.

To say, then, that any mental trait is a unit character, or that it is due to a single germinal difference, is to go beyond both the evidence and the probabilities.

And if mental traits are, in their germinal foundations, not simple but highly complex, it follows that any advice given as to how human matings should be arranged to produce any precise result in the progeny, should be viewed with distrust. Such advice can be given only in the case of a few pathological characters such as color-blindness, night-blindness, or Huntington's Chorea. It is well that the man or woman interested in one of these abnormalities can get definite information on the subject; and Huntington's Chorea, in particular, is a dysgenic trait which can and should be stamped out. But it can not be pretended that any of man's traits, as to whose inheritance prediction can be made with confidence, is of great importance to national eugenics.

In short, a knowledge of heredity shows that attempts to

predict the mode of inheritance of the important human traits (particularly mental traits) are still uncertain in their results. The characters involved are too complex to offer any simple sequences. If two parents have brown eyes, it can not be said that all their children will have brown eyes; still less can it be said that all the children of two musically gifted parents are certain to be endowed with musical talent in any given degree.

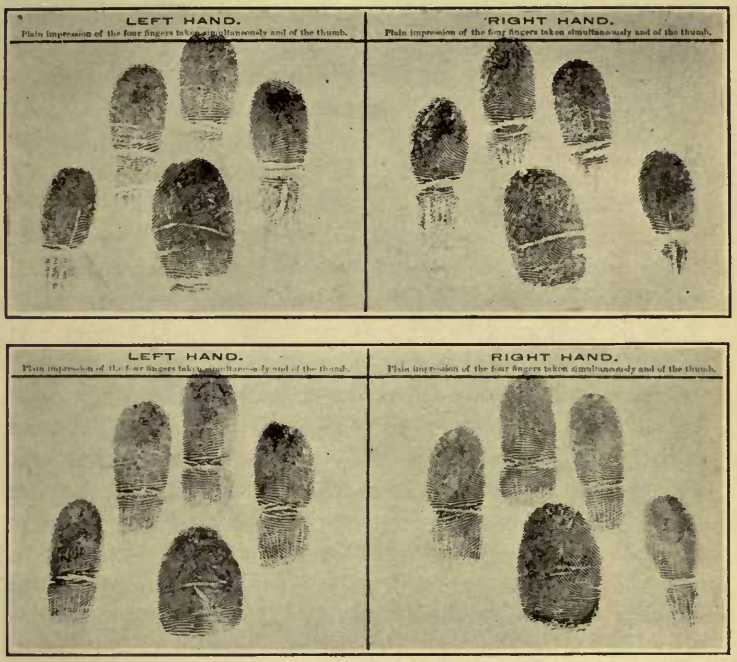
Prediction is possible only when uniform sequences are found. How are such sequences to be found in heredity, if they do not appear when a parent and his offspring are examined? Obviously it is necessary to examine *a large number* of parents and their offspring,—to treat the problem by statistical methods.

But, it may be objected, a uniformity gained by such methods is spurious. It is merely shutting the eyes to the mass of contradictions which are concealed by an apparent statistical uniformity.

This objection would be valid, if the statistical results were used for prediction *in individual cases*. The statistician, however, expressly warns that his conclusions must not be used for such prediction. They are intended to predict only general trends, only average results; and for this purpose they are wholly legitimate. Moreover, evolution itself is a problem of statistics, and therefore the statistical method of studying heredity may offer results of great value to eugenics, even though it can not furnish in individual cases the prediction which would be desirable.

From this standpoint, we return to attack the problem of the relation between parent and offspring. We noted that there is no uniform sequence in a single family, and illustrated this by the case of brown eyes. But if a thousand parents and their offspring be selected and some trait, such as eye-color, or stature, or general intelligence, be measured, a uniformity at once appears in the fact of regression. Its discover, Sir Francis Galton, gives this account of it:

"If the word 'peculiarity' be used to signify the difference between the amount of any faculty possessed by a man, and the average of that possessed by the population at large, then the



FINGER-PRINTS OF TWINS

FIG. 25.—Above are the finger-prints, supplied by J. H. Taylor of the Navy Department, of the two young sailors shown in Fig. 24. The reader might examine them once or twice without seeing any differences. Systematic comparison reveals that the thumbs of the left hands and the middle fingers of the right hands particularly are distinguishable. Finger-prints as a means of identification were popularized by Sir Francis Galton, the founder of eugenics, and their superiority to all other methods is now generally admitted. In addition to this practical usefulness, they also furnish material for study of the geneticist and zoölogist. The extent to which heredity is responsible for the patterns is indicated by the resemblance in pattern in spite of the great variability in this tract.

law of regression may be described as follows: Each peculiarity in a man is shared by his kinsmen, but on the *average* in a less degree. It is reduced to a definite fraction of its amount, quite independently of what its amount might be. The fraction differs in different orders of kinship, becoming smaller as they are more remote. When the kinship is so distant that its effects are not worth taking into account, the peculiarity of the man, however remarkable it may have been, is reduced to zero in his kinsmen. This apparent paradox is fundamentally due to the greater frequency of mediocre deviations than of extreme ones, occurring between limits separated by equal widths."

As to the application of this law, let Galton himself speak: "The Law of Regression tells heavily against the full hereditary transmission of any gift. Only a few out of many children would be likely to differ from mediocrity so widely as their Mid-Parent [i. e., the average of their two parents], allowing for sexual differences, and still fewer would differ as widely as the more exceptional of the two parents. The more bountifully the parent is gifted by nature, the more rare will be his good fortune if he begets a son who is as richly endowed as himself, and still more so if he has a son who is endowed yet more largely. But the law is evenhanded; it levies an equal succession-tax on the transmission of badness as of goodness. If it discourages the extravagant hopes of a gifted parent that his children on the average will inherit all his powers, it not less discountenances extravagant fears that they will inherit all his weakness and disease.

"It must be clearly understood that there is nothing in these statements to invalidate the general doctrine that the children of a gifted pair are much more likely to be gifted than the children of a mediocre pair." To this it should be added that progeny of very great ability will arise more frequently in proportion to the quality of their parents.

It must be reiterated that this is a statistical, not a biological, law; and that even Galton probably goes a little too far in applying it to individuals. It will hold good for a whole population, but not necessarily for only one family. Further, we can afford

to reëmphasize the fact that it in no way prevents the improvement of a race by selection and assortative mating.

Stature is the character which Dr. Galton used to get an exact measurement of the amount of regression. More recent studies have changed the value he found, without invalidating his method. When large numbers are taken it is now abundantly proved that if parents exceed the average stature of their race by a certain amount their offspring will, in general, exceed the racial average by only one-half as much as their parents did. This is due, as Galton said, to the "drag" of the more remote ancestry, which when considered as a whole must represent very nearly mediocrity, statistically speaking.

The general amount of regression in heredity, then, is one-half. If it be expressed as a decimal, .5, the reader will at once note its identity with the coefficient of correlation which we have so often cited in this book as a measure of heredity. In fact, the coefficient of correlation is nothing more than a measure of the regression, and it is probably simpler to think of it as correlation than it is to speak of a Law of Regression, as Sir Francis did.

This correlation or regression can, of course, be measured for other ancestors as well as for the immediate parents. From studies of eye-color in man and coat-color in horses, Karl Pearson worked out the necessary correlations, which are usually referred to as the law of Ancestral Inheritance. Dr. Galton had pointed out, years before, that the contributions of the several generations of individuals probably formed a geometrical series, and Professor Pearson calculated this series, for the two cases mentioned, as:

Parents	Grandparents	G-Grandparents	G-G-Grandparents
.6244	.1988	.0630	.0202 . . . etc.

In other words, the two parents, together, will on the average of a great many cases be found to have contributed a little more than three-fifths of the hereditary peculiarities of any given individual; the four grandparents will be found responsible for a little less than one-fifth, and the eight great-grandparents for about six hundredths, and so on, the contribution of each gener-

ation becoming smaller with ascent, but each one having, in the average of many cases, a certain definite though small influence, until infinity.

It can not be too strongly emphasized that this is a statistical law, not a biological law. It must not be applied to predict the character of the offspring of any one particular mating, for it might be highly misleading. It would be wholly unjustified, for example, to suppose that a certain man got three-tenths of his nature from his father, because the Law of Ancestral Heredity required it: in point of fact, he might get one-tenth or nine-tenths, none or all of a given trait. But, when dealing with a large population, the errors on one side balance the errors on the other, and the law is found, in the cases to which it has been applied, to express the facts.[1]

While, therefore, this Galton-Pearson law gives no advice in regard to individual marriages, it is yet of great value to applied eugenics. In the first place, it crystallizes the vague realization that remote ancestry is of much less importance than immediate ancestry, to an individual, while showing that every generation has a part in making a man what he is. In the second place, it is found, by mathematical reasoning which need not here be repeated, that the type of a population may be quickly changed by the mating of like with like; and that this newly established type may be maintained when not capable of further progress. Regression is not inevitable, for it may be overcome by selection.

To put the matter in a more concrete form, there is reason to think that if for a few generations superior people would marry only people on the average superior in like degree (superior in ancestry as well as individuality), a point would be reached

[1] In strict accuracy, the law of ancestral inheritance must be described as giving means of determining the probable deviation of any individual from the mean of his own generation, when the deviations of some or all of his ancestry from the types of their respective generations are known. It presupposes (1) no assortative mating, (2) no inbreeding and (3) no selection. Galton's own formula, which supposed that the parents contributed $1/2$, the grandparents $1/4$, the great-grandparents $1/8$, the next generation $1/16$, and so on, is of value now only historically, or to illustrate to a layman the fact that he inherits from his whole ancestry, not from his parents alone.

where all the offspring would tend to be superior, mediocrities of the former type being eliminated; and this superiority could be maintained as long as care was taken to avoid mating with inferior. In other words, the Galton-Pearson Law gives statistical support for a belief that eugenic marriages will create an improved breed of men. And this, it seems to us, is the most important implication of that law for eugenics, although it is an implication that is generally ignored.

We do not propose to discuss further the laws of heredity; but it is likely that the reader who has made no other study of the subject may by this time find himself somewhat bewildered. "Can we talk only in generalities?" he may well ask; "Does eugenics know no laws of heredity that will guide me in the choice of a wife? I thought that was the purpose of eugenics!"

We reply: (1) The laws of heredity are vastly complicated in man by the complex nature of most of his characters. The definite way in which some abnormalities are inherited is known; but it has not been thought necessary to include an account of such facts in this work. They are set forth in other books, especially Davenport's *Heredity in Relation to Eugenics*. The knowledge of how such a trait as color-blindness is inherited may be of importance to one man out of a thousand in choosing a wife; but we are taking a broader view of eugenics than this. As far as the great mass of human characters go, they are, in our opinion, due to so many separately inheritable factors that it is not safe to dogmatize about exactly how they will behave in heredity. Such knowledge, desirable as it may be, is not necessary for race progress.

(2) But it is possible, with present knowledge, to say that human traits, mental as well as physical, are inherited, in a high degree. Even before the final details as to the inheritance of all traits are worked out—a task that is never likely to be accomplished—there is ample material on which to base action for eugenics. The basal differences in the mental traits of man (and the physical as well, of course) are known to be due to heredity, and little modified by training. It is therefore possible to raise the level of the human race—the task of eugenics—by getting

that half of the race which is, on the whole, superior in the traits that make for human progress and happiness, to contribute a larger proportion to the next generation than does the half which is on the whole inferior in that respect. Eugenics need know nothing more, and the smoke of controversy over the exact way in which some trait or other is inherited must not be allowed for an instant to obscure the known fact that the level can be raised.

CHAPTER VI

NATURAL SELECTION

Man has risen from the ape chiefly through the action of natural selection. Any scheme of conscious race betterment, then, should carefully examine nature's method, to learn to what extent it is still acting, and to what extent it may better be supplanted or assisted by methods of man's own invention.

Natural selection operates in two ways: (1) through a selective death-rate and (2) through a selective birth-rate. The first of these forms has often been considered the whole of natural selection, but wrongly. The second steadily gains in importance as an organism rises in the scale of evolution; until in man it is likely soon to dwarf the lethal factor into insignificance. For it is evident that the appalling slaughter of all but a few of the individuals born, which one usually associates with the idea of natural selection, will take place only when the number of individuals born is very large. As the reproductive rate decreases, so does the death-rate, for a larger proportion of those born are able to find food and to escape enemies.

When considering man, one realizes at once that relatively few babies or adults starve to death. The selective death-rate therefore must include only those who are unable to escape their enemies; and while these enemies of the species, particularly certain microörganisms, still take a heavy toll from the race, the progress of science is likely to make it much smaller in the future.

The different aspects of natural selection may be classified as follows:

- Natural selection
  - Lethal
    - Sustentative
    - Non-sustentative
  - Reproductive
    - Sexual
    - Fecundal

The lethal factor is the one which Darwin himself most emphasized. Obviously a race will be steadily improved, if the worst stock in it is cut off before it has a chance to reproduce; and if the best stock survives to perpetuate its kind. "This preservation of favourable individual differences and variations, and the destruction of those which are injurious, I have called natural selection, or the survival of the fittest," Darwin wrote; and he went on to show that the principal checks on increase were overcrowding, the difficulty of obtaining food, destruction by enemies, and the lethal effects of climate. These causes may be conveniently divided as in the above diagram, into sustentative and non-sustentative. The sustentative factor has acquired particular prominence in the human species, since Malthus wrote his essay on population—that essay which both Darwin and Wallace confess was the starting point of their discovery of natural selection.

There is a "constant tendency in all animated life to increase beyond the nourishment prepared for it," Malthus declared. "It is incontrovertibly true that there is no bound to the prolific plants and animals, but what is made by their crowding and interfering with each others' means of subsistence." His deduction is well known: that as man tends to increase in geometrical ratio, and can not hope to increase his food-supply more rapidly than in arithmetical ratio, the human race must eventually face starvation, unless the birth-rate be reduced.

Darwin was much impressed by this argument and ever since his time it has usually been the foundation for any discussion of natural selection. Nevertheless it is partly false for all animals, as one of the authors showed [1] some years ago, since a species which regularly eats up all the food in sight is rare indeed; and it is of very little racial importance in the present-day evolution of man. Scarcity of food may put sufficient pressure on him to cause emigration, but rarely death. The importance of Malthus' argument to eugenics is too slight to warrant further discussion.

[1] Johnson, Roswell H., "The Malthusian Principle and Natural Selection," *American Naturalist*, XLVI (1912), pp. 372–376.

When the non-sustentative forms of lethal selection are considered, it is seen very clearly that man is not exempt from the workings of this law. A non-sustentative form of natural selection takes place through the destruction of the individual by some adverse feature of the environment, such as excessive cold, or bacteria; or by bodily deficiency; and it is independent of mere food-supply. W. F. R. Weldon showed by a long series of measurements, for example, that as the harbor of Plymouth, England, kept getting muddier, the crabs which lived in it kept getting narrower; those with the greatest frontal breadth filtered the water entering their gills least effectively, and died.

But, it was objected, man is above all this. He has gained the control of his own environment. The bloody hand of natural selection may fall on crabs: but surely you would not have us think that Man, the Lord of Creation, shares the same fate?

Biologists could hardly think otherwise. Statisticians were able to supply the needed proof. A selective death-rate in man can not only be demonstrated but it can be actually measured.

"The measure of the selective death-rate," says [1] Karl Pearson, to whom this achievement is due, "is extraordinarily simple. It consists in the fact that the inheritance of the length of life between parent and offspring is found statistically to be about one-third of the average inheritance of physical characters in man. This can only be due to the fact that the death of parent or of offspring in a certain number of cases is due to random and not to constitutional causes." He arrived at the conclusion [1] that 60% of the deaths were selective, in the Quaker families which he was then studying. The exact proportion must vary in accordance with the nature of the material and the environment, but as A. Ploetz found at least 60% of the deaths to be selective in the European royal families and nobility, where the

[1] Karl Pearson, *The Groundwork of Eugenics*, p. 25, London, 1912.

[2] "Let p be the chance of death from a random, not a constitutional source, then $1-p$ is the chance of a selective death in a parent and $1-p$ again of a selective death in the case of an offspring, then

$(1-p)^2$ must equal about $^1/_3$, $=.36$, more exactly. $\therefore 1-p=.6$ and $p=.40$. In other words, 60% of the deaths *are selective*."

environment is uniformly good, there is no reason to think that Professor Pearson's conclusion is invalid.

Dr. Ploetz [1] investigated the relation between length of life in parents, and infant mortality, in about 1,000 families including 5,500 children; half of these were from the nobility and half from the peasantry. The results were of the same order in each case, indicating that environment is a much less important factor than many have been wont to suppose. After discussing Professor Pearson's work, he continued:

It seems to me that a simpler result can be reached from our material in the following way. Since the greater child-mortality of each of our classes of children (divided according to the ages at death of their parents) indicates a higher mortality throughout the rest of their lives, the offspring of parents who die young will therefore be eliminated in a higher degree, that is, removed from the composition of the race, than will those whose parents died late. Now the elimination can be non-selective, falling on all sorts of constitutions with the same frequency and degree. In that case it will of course have no connection with selection inside the race. Or it may be of a selective nature, falling on its victims because they differ from those who are not selected, in a way that makes them less capable of resisting the pressure of the environment, and avoiding its dangers. Then we speak of a selective process, of the elimination of the weaker and the survival of the stronger. Since in our examination of the various causes of the difference in infant mortality, in the various age-classes of parents, we found no sufficient cause in the effects of the environment, which necessarily contains all the non-selective perils, but found the cause to be in the different constitutions inherited by the children, we can not escape the conclusion that the differences in infant mortality which we observe indicate a strong process of natural selection.

Our tables also permit us to get an approximate idea of the extent of selection by death among children in the first five years of life. The minimum of infant mortality is reached among those children whose parents have attained 85 years of age. Since these represent the strongest constitutions, the mortality of their children would appear to represent an absolute minimum, made up almost wholly of chance, non-selective, unavoidable deaths. As the number

[1] *Archiv f. Rassen- u. Gesellschafts Biologie*, VI (1909), pp. 33–43.

of children from marriages, both parties to which reached 85 years of age, is so small as to render any safe conclusions impossible, our only recourse is to take the children of the 85-year-old fathers and the children of the 85-year-old mothers, add them together, and strike an average. But we must recognize that the minimum so obtained is nevertheless still too large, because among the consorts of the long-lived fathers and mothers, some died early with the result of increasing the infant mortality. The infant mortality with the 85-year-old fathers and mothers is found to be 11.2%–15.4%, average about 13%. The total child-mortality reaches 31–32%, of which the 13% make about 40%. Accordingly at least 60%, and considering the above mentioned sources of error we may say two-thirds, of the child mortality is selective in character. That accords reasonably well with the 55–74% which Pearson found for the extent of selective deaths in his study.

In general, then, one may believe that more than a half of the persons who die nowadays, die because they were not fit by by nature (i. e., heredity) to survive under the conditions into which they were born. They are the victims of lethal natural selection, nearly always of the non-sustentative type. As Karl Pearson says, "Every man who has lived through a hard winter, every man who has examined a mortality table, every man who has studied the history of nations has probably seen natural selection at work."

There is still another graphic way of seeing natural selection at work, by an examination of the infant mortality alone. Imagine a thousand babies coming into the world on a given day. It is known that under average American conditions more than one-tenth of them will die during the first year of life. Now if those who die at this time are the inherently weaker, then the death-rate among survivors ought to be correspondingly less during succeeding years, for many will have been cut down at once, who might otherwise have lingered for several years, although doomed to die before maturity. On the other hand, if only a few die during the first year, one might expect a proportionately greater number to die in succeeding years. If it is actually found that a high death-rate in the first year of life is associated

with a low death-rate in succeeding years, then there will be grounds for believing that natural selection is really cutting off the weaker and allowing the stronger to survive.

E. C. Snow [1] analyzed the infant mortality registration of parts of England and Prussia to determine whether any such conclusion was justified. His investigation met with many difficulties, and his results are not as clear-cut as could be desired, but he felt justified in concluding from them that "the general result can not be questioned. Natural selection, in the form of a selective death-rate, is strongly operative in man in the early years of life. We assert with great confidence that a high mortality in infancy (the first two years of life) is followed by a correspondingly low mortality in childhood, and vice-versa. . . . Our work has led us to the conclusion that infant mortality *does* effect a 'weeding out' of the unfit."

"Unfitness" in this connection must not be interpreted too narrowly. A child may be "unfit" to survive in its environment, merely because its parents are ignorant and careless. Such unfitness makes more probable an inheritance of low intelligence.

Evidence of natural selection was gathered by Karl Pearson from another source and published in 1912. He dealt with material analogous to that of Dr. Snow and showed "that when allowance was made for change of environment in the course of 50 years, a very high association existed between the deaths in the first year of life and the deaths in childhood (1 to 5 years). This association was such that if the infantile death-rate *increased* by 10% the child death rate *decreased* by 5.3% in males, while in females the *fall* in the child death-rate was almost 1% for every 1% *rise* in the infantile death-rate."

To put the matter in the form of a truism, part of the children born in any district in a given year are doomed by heredity to a premature death; and if they die in one year they will not be alive to die in some succeeding year.

Lately a new mathematical method, which is termed the Variate Difference Correlation method, has been invented and

[1] Snow, E. C., *On the Intensity of Natural Selection in Man*, London, 1911.

gives more accurate results, in such an investigation as that of natural selection, than any hitherto used. With this instrument Professor Pearson and Miss Elderton have confirmed the previous work. Applying it to the registered births in England and Wales between 1850 and 1912, and the deaths during the first five years of life in the same period, they have again found [1] that "for both sexes a heavy death-rate in one year of life means a markedly lower death-rate in the same group in the following year of life." This lessened death-rate extends in a lessened degree to the year following that, but is not by the present method easy to trace further.

"It is difficult," as they conclude, "to believe that this important fact can be due to any other source than natural selection, i. e., a heavy mortality leaves behind it a stronger population."

To avoid misunderstandings, it may be well to add to this review the closing words of the Elderton-Pearson memoir. "Nature is not concerned with the moral or the immoral, which are standards of human conduct, and the duty of the naturalist is to point out what goes on in Nature. There can now be scarcely a doubt that even in highly organized human communities the death-rate is selective, and physical fitness is the criterion for survival. To assert the existence of this selection and measure its intensity must be distinguished from an advocacy of high infant mortality as a factor of racial efficiency. This reminder is the more needful as there are not wanting those who assert that demonstrating the existence of natural selection in man is identical with decrying all efforts to reduce the infantile death-rate." A further discussion of this point will be found in a later chapter.

The conclusion that, of the infants who die, a large number do so through inherent weakness—because they are not "fit" to survive—is also suggested by a study of the causes of death. From a third to a half of the deaths during the first year of life, and particularly during the first month, are due to what may be termed uterine causes, such as debility, atrophy, inanition, or

[1] *Biometrika* Vol. X, pp. 488–506, London, May, 1915.

premature birth. Although in many cases such a death is the result of lack of prenatal care, in still more it must be ascribed to a defect in the parental stock.

In connection with infant mortality, it may be of interest to point out that the intensity of natural selection is probably greater among boys than among girls. There is a steady preponderance of boys over girls at birth (about 105 to 100, in the United States), while among the still-born the proportion is 158 to 100, if the Massachusetts figures for 1891–1900 may be taken as general in application. Evidently a large number of weak males have been eliminated before birth. This elimination continues for a number of years to be greater among boys than among girls, until in the period of adolescence the death-rates of the two sexes are equal. In adult life the death-rate among men is nearly always higher than that among women, but this is due largely to the fact that men pursue occupations where they are more exposed to death. In such cases, and particularly where deaths are due to accident, the mortality may not only be non-selective, but is sometimes contra-selective, for the strongest and most active men will often be those who expose themselves most to some danger. Such a reversal of the action of natural selection is seen on a large scale in the case of war, where the strongest go to the fray and are killed, while the weaklings stay at home to perpetuate *their* type of the race.

A curious aspect of the kind of natural selection under consideration,—that which operates by death without reference to the food-supply,—is seen in the evolution of a wide pelvis in women. Before the days of modern obstetrics, the woman born with an unusually narrow pelvis was likely to die during parturition, and the inheritance of a narrower type of pelvis was thus stopped. With the introduction and improvement of instrumental and induced deliveries, many of these women are enabled to survive, with the necessary consequence that their daughters will in many cases have a similarly narrow pelvis, and experience similar difficulty in childbirth. The percentage of deliveries in which instrumental aid is necessary is thus increasing from generation to generation, and is likely to continue to

increase for some time. In other words, natural selection, because of man's interference, can no longer maintain the width of woman's pelvis, as it formerly did, and a certain amount of reversion in this respect is probably taking place—a reversion which, if unchecked, would necessarily lead after a long time to a reduction in the average size of skull of that part of the human race which frequently uses forceps at childbirth. The time would be long because the forceps permit the survival of some large-headed infants who otherwise would die.

But it must not be supposed that lethal, non-sustentative selection works only through forms of infant mortality. That aspect was first discussed because it is most obvious, but the relation of natural selection to microbic disease is equally widespread and far more striking.

As to the inheritance of disease as such there is little room for misunderstanding: no biologist now believes a disease is actually handed down from parent to child in the germ-plasm. But what the doctors call a diathesis, a predisposition to some given disease, is most certainly heritable—a fact which Karl Pearson and others have proved by statistics that can not be given here.[1] And any individual who has inherited this diathesis, this lack of resistance to a given disease, is marked as a possible victim of natural selection. The extent to which and the manner in which it operates many be more readily understood by the study of a concrete case. Tuberculosis is, as everyone knows, a disease caused directly by a bacillus; and a disease to which immunity can not be acquired by any process of vaccination or inoculation yet known. It is a disease which is not directly inherited as such. Yet every city-dweller in the United States is almost constantly exposed to infection by this bacillus, and autopsies show that most persons have actually been infected at

[1] Pearson, Karl, *Tuberculosis, Heredity and Environment*, London, 1912. Among the most careful contributions to the problem of tuberculosis are those of Charles Goring (*On the Inheritance of the Diathesis of Phthisis and Insanity*, London, 1910), Ernest G. Pope (*A Second Study of the Statistics of Pulmonary Tuberculosis*, London, Dulau & Co.), and W. P. Elderton and S. J. Perry (*A Third Study of the Statistics of Pulmonary Tuberculosis. The Mortality of the Tuberculous and Sanatorium Treatment*), London, 1909. See also our discussion in Chapter I.

some period of life, but have resisted further encroachment. Perhaps a fraction of them will eventually die of consumption; the rest will die of some other disease, and will probably never even know that they have carried the bacilli of tuberculosis in their lungs.

Of a group of men picked at random from the population, why will some eventually die of tuberculosis and the others resist infection? Is it a matter of environment?—are open-air schools, sanitary tenements, proper hygiene, the kind of measures that will change this condition? Such is the doctrine widely preached at the present day. It is alleged that the white plague may be stamped out, if the open cases of tuberculosis are isolated and the rest of the population is taught how to live properly. The problem is almost universally declared to be a problem of infection.

Infection certainly is the immediate problem, but the biologist sees a greater one a little farther back. It is the problem of natural selection.

To prove this, it is necessary to prove (1) that some people are born with less resistance to tuberculosis than others and (2) that it is these people with weak natural resistance who die of phthisis, while their neighbors with stronger resistance survive. The proof of these propositions has been abundantly given by Karl Pearson, G. Archdall Reid and others. Their main points may be indicated. In the first place it must be shown that the morbidity from tuberculosis is largely due to heredity—a point on which most medical men are still uninformed. Measurement of the direct correlation between phthisis in parent and child shows it to be about .5, i. e., what one expects if it is a matter of heredity. This is the coefficient for most physical and mental characters: it is the coefficient for such pathological traits as deafness and insanity, which are obviously due in most cases to inheritance rather than infection.

But, one objects, this high correlation between parent and child does not prove inheritance,—it obviously proves infection. The family relations are so intimate that it is folly to overlook this factor in the spread of the disease.

Very well, Professor Pearson replied, if the relations between parent and child are so intimate that they lead to infection, they are certainly not less intimate between husband and wife, and there ought to be just as much infection in this relationship as in the former. The correlation was measured in thousands of cases and was found to lie around .25, being lowest in the poorer classes and highest in the well-to-do classes.

At first glance this seems partly to confirm the objection—it looks as if there must be a considerable amount of tubercular infection between husband and wife. But when it is found that the resemblance between husband and wife in the matter of insanity is also .25, the objection becomes less formidable. Certainly it will hardly be argued that one of the partners infects the other with this disability.

As a fact, a correlation of .25 between husband and wife, for tuberculosis, is only partly due to infection. What it does mean is that like tends to mate with like—called assortative mating. This coefficient of resemblance between husband and wife in regard to phthisis is about the same as the correlation of resemblance between husband and wife for eye color, stature, longevity, general health, truthfulness, tone of voice, and many other characters. No one will suppose that life partners "infect" each other in these respects. Certainly no one will claim that a man deliberately selects a wife on the basis of resemblance to himself in these points; but he most certainly does so to some extent unconsciously, as will be described at greater length in Chapter XI. Assortative mating is a well-established fact, and there is every reason to believe that much of the resemblance between husband and wife as regards tuberculosis is due to this fact, and not to infection.[1]

[1] While most physicians lay too great stress on the factor of infection, this mistake is by no means universal. Maurice Fishberg, for example (quoted in the *Medical Review of Reviews*, XXII, 8, August, 1916) states: "For many years the writer was physician to a charitable society, having under his care annually 800 to 1,000 consumptives who lived in poverty and want, in overcrowded tenements, having all opportunities to infect their consorts; in fact most of the consumptives shared their bed with their healthy consorts. Still, very few cases were met with in which tuberculosis was found in both the husband and wife. Widows, whose husbands died from phthisis, were only rarely seen to develop the disease."

Again, it is objected that the infection of children is not a family matter, but due to tuberculous cows' milk: how then does it appear equally among the Japanese, where cows are not tuberculous and cow's milk rarely used as an infant food: or among such people as the Esquimaux and Polynesians, who have never seen a cow?

But, it is argued, at any rate bad housing and unsanitary conditions of life will make infection easier and lower the resistance of the individual. Perhaps such conditions may make infection easier, but that is of little importance considering how easy it is for all city dwellers—for the population as a whole. The question remains, will not bad housing cause a greater liability to fatal phthisis? Will not destitution and its attendant conditions increase the probability that a given individual will succumb to the white plague?

Most physicians think this to be the case, but they have not taken the pains to measure the respective rôles, by the exact methods of modern science. S. Adolphus Knopf of New York, an authority on tuberculosis, recognizes the importance of the heredity factor, but says that after this, the most important predisposing conditions are of the nature of unsanitary schools, unsanitary tenements, unsanitary factories and workshops. This may be very true; these conditions may follow after heredity in importance—but how near do they follow? That is a matter capable of fairly accurate measurement, and should be discussed with figures, not generalities.

Taking the case of destitution, which includes, necessarily, most of the other evils specified, Professor Pearson measured the correlation with liability to phthisis and found it to be .02. The correlation for direct heredity—that is, the resemblance between parent and offspring—it will be remembered, is .50. As compared with this, the environmental factor of .02 is utterly insignificant. It seems evident that whether or not one dies from tuberculosis, under present-day urban conditions, depends mainly on the kind of constitution one has inherited.

There is no escape, then, from the conclusion that in any individual, death from tuberculosis is largely a matter of natural

selection. But by taking a longer view, one can actually see the change to which natural selection is one of the contributors. The following table shows the deaths from consumption in Massachusetts, per 10,000 population:

1851–60	39.9
1861–70	34.9
1871–80	32.7
1881–90	29.2
1891–1900	21.4
1901	17.5
1902	15.9

F. L. Hoffman further points out [1] that in Massachusetts, Rhode Island, and Connecticut, 1872–1911, the decline in the death-rate from tuberculosis has been about 50%. "The evidence is absolutely conclusive that actually as well as relatively, the mortality from tuberculosis in what is the most intensely industrial area of America has progressively diminished during the last 40 years."

It will be noted that the great increase in death from consumption in this area began in the decade following 1840, when the large Irish immigration began. The Irish are commonly believed to be particularly susceptible to phthisis. Crowded together in industrial conditions, they rapidly underwent infection, and their weak racial resistance led to a high death-rate. The weak lines of heredity were rapidly cut off; in other words, the intensity of natural selection was great, for a while. The result was to leave the population of these New England states much more resistant, on the average, than it was before; and as the Irish immigration soon slowed down, and no new stocks with great weakness arrived, tuberculosis naturally tended to "burn itself out." This seems to be a partial explanation of the decline in the death-rate from phthisis in New England during the last half century, although it is not suggested that it represents the complete explanation: improved methods of treatment and sanitation doubtless played their part. But

[1] In 9th Trans. of *American Association for the Study and Prevention of Tuberculosis*, p. 117.

that they are the sole cause of the decline is made highly improbable by the low correlation between phthisis and environmental factors, which was mentioned above, and by all the other biometric study of tuberculosis, which has proved that the results ascribed to hygiene, including sanitorium treatment, are to some degree illusory.

That tuberculosis is particularly fatal to the Negro race is well known. Even to-day, after several centuries of natural selection in the United States, the annual death-rate from consumption among Negroes in the registration area is 431.9 per 100,000 population (census of 1900) as compared with 170.5 for the whites; in the cities alone it is 471.0. That overcrowding and climate can not be the sole factors is indicated by the fact that the Negro race has been decimated, wherever it has met tuberculosis. "In the years 1803 and 1810 the British government imported three or four thousand Negroes from Mozambique into Ceylon to form into regiments, and of these in December, 1820, there were left just 440, including the male descendants. All the rest had perished mainly from tuberculosis, and in a country where the disease is not nearly so prevalent as in England." [1] Archdall Reid has pointed out [2] that the American, Polynesian and Australian aborigines, to whom tuberculosis was unknown before the advent of Europeans, and who had therefore never been selected against it, could not survive its advent: they were killed by much smaller infections than would have injured a European, whose stock has been purged by centuries of natural selection.

These racial histories are the most important evidence available to the student of natural selection in man. The conclusion to be drawn from them seems plain. Natural selection, which has in the past never had an opportunity to act upon the Negro race through tuberculosis, is now engaged in hastening, at a relatively rapid rate, the evolution of this race toward immunity from death by tuberculosis. The evolution of the white race

[1] *Geographical and Historical Pathology* (New Sydenham Society, 1883), Vol. III, p. 266.

[2] Reid, G. Archdall, *The Present Evolution of Man*, and *The Laws of Heredity.*

on this line is, as the figures show, going on simultaneously, but having begun centuries earlier, it is not now so rapid. The weakest white stocks were cut off hundreds of years ago, in Great Britain or Europe; those of the black race are only now going. Despite all the efforts of medicine and sanitation, it is likely that the Negro death-rate from phthisis will continue high for some years, until what is left of the race will possess a degree of resistance, or immunity, not much inferior to that of the whites among whom they live. The blacks in North America now must be already more resistant than their ancestors; the mulattoes descended of normal healthy unions should be more resistant than the pure Negroes, although no statistics are available on the point; but were a new immigration to take place from Africa to-day, and the immigrants to be put into villages with their Americanized brethren, the high death-rate would result.

While the Negroes were thus undergoing the radical surgery of natural selection, what was happening to the aborigines of America? The answer of history is unmistakable; they were meeting the same fate, in an even more violent form. Not tuberculosis alone, but small-pox, measles, alcohol and a dozen other importations of the conquerors, found in the aborigines of the New World a stock which had never been selected against these diseases.

It is the custom of sentimentalists sometimes to talk as if the North American Indian had been killed off by the white man. So he was,—but not directly: he was killed off by natural selection, acting through the white man's diseases and narcotics. In 1841 Catlin wrote, "Thirty millions of white men are now scuffling for the goods and luxuries of life over the bones of twelve millions of red men, six millions of whom have fallen victims to small-pox." Small-pox is an old story to the white race, and the death of the least resistant strains in each generation has left a population that is fairly resistant. It was new to the natives of America, and history shows the result. Alcohol, too, counted its victims by the thousand, for the same reason. The process of natural selection among the North American Indians has not yet stopped; if there are a century from now any Indians

left, they will of necessity belong to stocks which are relatively resistant to alcohol and tuberculosis and the other widespread and fatal diseases which were unknown upon this continent before Columbus.

The decrease of natives following the Spanish conquest of tropical America has long been one of the most striking events of history. Popular historians sometimes speak as if most of the native population had been killed off by the cruelty of the conquistadores. Surely such talk could not proceed from those who are familiar with the action of natural selection. It is obvious that when the Spaniard brought the natives together, making them work in mines and assemble in churches, he brought them under conditions especially favorable for infection by the new diseases which he had brought. The aborigines of the New World, up to the time the Spaniards came, had undergone no evolution whatever against these diseases; consequently the evolution began at so rapid a rate that in a few centuries only those who lived in out-of-the-way places remain unscathed.

The same story is repeated, in a survey of the history of the Pacific Islands. Even such a disease as whooping-cough carried off adults by the hundred. Robert Louis Stevenson has left a graphic picture [1] of natural selection at work:

"The tribe of Hapaa," he writes, "is said to have numbered some four hundred when the small-pox came and reduced them by one-fourth. Six months later a woman developed tubercular consumption; the disease spread like fire about the valley, and in less than a year two survivors, a man and a woman, fled from the newly-created solitude. . . . Early in the year of my visit, for example, or late the year before, the first case of phthisis appeared in a household of 17 persons, and by the end of August, when the tale was told me, one soul survived, a boy who had been absent at his schooling."

In Tasmania is another good illustration of the evolution of a race proceeding so rapidly as to be fatal to the race. When

[1] *In the South Seas*, p. 27; quoted by G. Archdall Reid, *The Principles of Heredity* New York, 1905), p. 183. Dr. Reid has discussed the rôle of disease and alcohol in the modern evolution of man more fully than any other writer.

the first English settled on the island, in 1803, the native population consisted of several thousand. Tuberculosis and many other new diseases, and, most of all, alcohol, began to operate on the aborigines, who were attracted to the settlements of the whites. In a quarter of a century there were only a few hundred left. Many, of course, had met violent deaths, but an enlightened perusal of any history of the period,[1] will leave no doubt that natural selection by disease was responsible for most of the mortality. By 1847 the number of native Tasmanians was reduced to 44, who were already unmistakably doomed by alcohol and bacteria. When the last full-blood Tasmanian died in 1876, a new chapter was written in the story of the modern evolution of the human race.

No such stories are told about the white settlements on this continent, even before the days of quarantine and scientific medicine. There is no other adequate explanation of the difference, than that the two races have evolved to a different degree in their resistance to these diseases. It is easily seen, then, that man's evolution is going on, at varying rates of speed, in probably all parts of the human race at the present time.

We do not mean, of course, to suggest that all the natives who have died in the New World since the landing of Columbus, have died because the evolution of their race had not proceeded so far in certain directions as had that of their conquerors. But the proportion of them who were eliminated for that reason is certainly very large. In the more remote parts of South America the process is still going on. Recent press dispatches have carried the account of the University of Pennsylvania's Amazon Expedition, under the direction of William C. Farrabee. In a letter dated March 16, 1916, the leader told of the discovery of the remains of the tribe of Pikipitanges, a once populous tribe of which a chief, six women and two boys alone are left. The tribe had been almost wiped out, Dr. Farabee reported, by an epidemic of *influenza!*

If the aborigines of the New World succumb to the diseases

[1] See, for example, John West's *History of Tasmania*, Vol. II, Launceston, Tasmania, 1852.

of the European, it is not less true that the European succumbs to diseases against which his race has not been selected. The deadliness of yellow fever to Americans in the tropics, and the relative immunity of Negroes, is familiar; so too is the frequently fatal result of the African tropical fevers on the white man, while the natives suffer from them much less, having been made more resistant by centuries of natural selection.

This long discussion may now be summarized. We dealt with lethal selection, that form of natural selection which operates by prematurely killing off the less fit and leaving the more fit to survive and reproduce their kind. It is of course understood that the word "fit" in this connection does not necessarily mean morally or mentally superior, but merely fit for the particular environment. In a community of rascals, the greatest rascal might be the fittest to survive. In the slums of a modern city the Jewish type, stringently selected through centuries of ghetto life, is particularly fit to survive, although it may not be the physical ideal of an anthropologist.

Two forms of lethal selection were distinguished, one depending on starvation and the other on causes not connected with the food supply. Direct starvation is not a factor of importance in the survival of most races during most of the time at the present day so far as the civilized portion of the world is concerned. But disease and the other lethal factors not connected with the food-supply, through which natural selection acts, are still of great importance. From a half to two-thirds of all deaths are of a selective character, even under favorable conditions.

It is also to be noted, however, that with the progress of medicine, and the diminution of unfit material, this kind of natural selection will tend to become less and less widespread. For a long time, natural selection in man has probably done little to cause marked change in his physical or mental characteristics. Man's interference has prevented. In recent centuries natural selection has probably done no more on the whole than keep the race where it was: it is to be feared that it has not even done that. It is doubtful if there is any race to-day which attains the physical and mental average of the Athenians of 2,500 years ago.

Lethal natural selection, then, has been and still is a factor of great importance in the evolution of the race, but at present it is doing little or nothing that promises to further the ideal of eugenics—race betterment.

But lethal natural selection is only half the story. It is obvious that if the constitution of a race can be altered by excess of deaths in a certain class, it can equally be altered by excess of births in a certain class. This is reproductive selection, which may appear in either one of two forms. If the individual leaves few or no progeny because of his failure to mate at the proper time, it is called sexual selection; if, however, he mates, yet leaves few or no progeny (as compared with other individuals), it is called fecundal selection.

Even in man, the importance of the rôle of reproductive selection is insufficiently understood; in the lower animals scientists have tended still more to undervalue it. As a fact, no species ordinarily multiplies in such numbers as to exhaust all the food available, despite the teaching of Malthus and Darwin to the contrary. The rate of reproduction is the crux of natural selection; each species normally has such a reproduction rate as will suffice to withstand the premature deaths and sterility of some individuals, and yet not so large as to press unduly upon the food supply. The problem of natural selection is a problem of the adjustment between reproductive rate and death-rate, and the struggle for subsistence is only one of several factors.

While the reproductive rate must be looked upon as a characteristic which has its adaptations like other characteristics, it has one peculiarity—its increase is always opposed by lethal selection. The chances of life are reduced by reproducing, inasmuch as more danger is entailed by the extra activities of courtship, and later, in bearing and caring for the young, since these duties reduce the normal wariness of individual life. The reproductive rate, therefore, always remains at the lowest point which will suffice for the reproductive needs of the species. For this reason alone the non-sustentative form of selection might be expected to be the predominant kind.

J. T. Gulick and Karl Pearson have pointed out that there is

a normal conflict between natural selection and fecundal selection. Fecundal selection is said by them to be constantly tending to increase the reproductive rate, because fecundity is partly a matter of heredity, and the fecund parents leave more offspring with the same characteristic. Lethal selection, on the contrary, constantly asserts its power to reduce the reproductive rate, because the reproductive demands on the parents reduce their chances of life by interference with their natural ability of self-protection. This is quite true, but the analysis is incomplete, for an increased number of progeny not only decreases the life chances of the parents, but also of the young, by reducing the amount of care they receive.

In short, lethal selection and reproductive selection accomplish the same end—a change in the constitution of the species—by different means; but they are so closely linked together and balanced that any change in the operation of one is likely to cause a change in the operation of the other. This will be clearer when the effect of reproductive selection is studied in man.

Recalling the truism that most human characters have a hereditary basis, it is evident that the constitution of society will remain stable from generation to generation, only if each section of society is reproducing at the same rate as every other (and assuming, for the moment, that the death-rate remains constant). Then if the birth-rate of one part of the population is altered, if it is decreased, for example, the next generation will contain proportionately fewer representatives of this class, the succeeding generation fewer still, and so on indefinitely—unless a selective death-rate is operating at the same time. It is well known not only that the death-rate varies widely in different parts of the population, as was pointed out in the earlier part of this chapter, but that the birth-rate is rarely the same in any two sections of the population. Evidently, therefore, the make-up of society must necessarily be changing from generation to generation. It will be the object of the rest of this chapter to investigate the ways in which it is changing, while in the latter half of the book we shall point out some of the ways in

which it might be changed to better advantage than it is at present.

Sexual selection, or differential success in marrying, will be discussed at some length in Chapter XI; here it may be pointed out that the number who fail to marry is very much greater than one often realizes. It has already been noted that a large part of the population dies before it reaches the age of marriage. Of 1,000 babies born in the United States, only 750 will reach the average age of marriage; in some countries half of the thousand will have fallen by that time. These dead certainly will leave no descendants; but even of the survivors, part will fail to marry. The returns of the thirteenth U. S. census showed that of the males 45–64 years of age, 10% were single, while 11% of the females, 35–44 years old, were single. Few marriages will take place after those ages. Add the number who died unmarried previous to those ages, but after the age of 20, and it is safe to say that at least one-third of the persons born in the United States die (early or late) without having married.

The consideration of those who died before the age of marriage properly comes under the head of lethal selection, but if attention is confined to those who, though reaching the age of marriage, fail to marry, sexual selection still has importance. For instance, it is generally known (and some statistical proof will be given in Chapter XI) that beauty is directly associated with the chance of marriage. The pretty girls in general marry earlier as well in larger percentage; many of the ugly ones will never find mates. Herbert Spencer argued ingeniously that beauty is associated with general mental and moral superiority, and the more exact studies of recent years have tended to confirm his generalization. A recent, but not conclusive, investigation [1] showed beauty to be correlated with intelligence to the extent of .34. If this is confirmed, it offers a good illustration of the action of sexual selection in furthering the progressive evolution of the race. Miss Gilmore, studying a group of normal school graduates, found a direct correlation between intelligence (as judged by class marks) and early marriage after graduation.

[1] See Hollingworth, H. L., *Vocational Psychology*, p. 170, New York, 1916.

Anyone who would take the trouble could easily investigate numerous cases of this sort, which would show the effect of sexual selection in perpetuating desirable qualities.

But sexual selection no longer has the importance that it once had, for nowadays the mere fact of marriage is not a measure of fecundity, to the extent that it once was. In the old days of unlimited fecundity, the early marriage of a beautiful, or intelligent, woman meant a probable perpetuation of her endowments; but at present, when artificial restraint of fertility is so widespread, the result does not follow as a matter of course: and it is evident that the race is little or not at all helped by the early marriage of an attractive woman, if she has too few or no children.

Fecundal selection, then, is becoming the important phase of reproductive selection, in the evolution of civilized races. The differential birth-rate is, as we have often insisted, the all-important factor of eugenics, and it merits careful consideration from all sides.

Such consideration is made difficult by the inadequate vital statistics of the United States (which ranks with Turkey and China in this respect); but there is no doubt that the birth-rate as a whole is low, as compared with that of other countries; although as a whole it is not dangerously low and there is, of course, no necessary evil in a low birth-rate, of itself, if the quality be satisfactory. The U. S. Census tabulation for 1915 gives the following comparison of the number of babies born alive each year, per 1,000 population, in various countries:

Russia in Europe (1909)	44.0
Japan (1911)	34.1
Italy (1913)	31.7
Austria (1912)	31.3
Spain (1913)	30.4
Austria (1913)	28.3
German Empire (1912)	28.3
Holland (1913)	28.1
Denmark (1913)	25.6
Norway (1913)	25.3
United States (registration area only, 1915)	24.9

England and Wales (1913)	24.1
Sweden (1912)	23.8
Switzerland (1913)	23.1
Belgium (1912)	22.6
France (1912)	19.0

The United States birth-rate may, on its face, appear high enough; but its face does not show that this height is due largely to the fecundity of immigrant women. Statistics to prove this are given in Chapter XIII, but may be supplemented here by some figures from Pittsburgh.

Ward 7, in that city, contains the homes of many well-to-do, and contains more representatives of the old American stock than any other ward in the city, having 56.4% of residents who are native born of native parents while the majority of the residents in nearly all the other wards in the city are either themselves foreign-born, or the offspring of foreign-born parents.

Ward 7 has the lowest birth-rate and the lowest rate of net increase of any ward in the city.

With this may be contrasted the sixth ward, which runs along the south bank of the Allegheny river. It is one of the great factory districts of the city, but also contains a large number of homes. Nearly 3,000 of its 14,817 males of voting age are illiterate. Its death-rate is the highest in the city. Almost nine-tenths of its residents are either foreigners or the children of foreigners. Its birth-rate is three times that of the seventh ward.

Taking into account all the wards of the city, it is found that the birth-rate *rises* as one considers the wards which are marked by a large foreign population, illiteracy, poverty and a high death-rate. On the other hand, the birth-rate *falls* as one passes to the wards that have most native-born residents, most education, most prosperity—and, to some extent, education and prosperity denote efficiency and eugenic value. For 27 wards there is a high negative correlation (—.673), between birth-rate and percentage of native-born of native parents in the population. The correlation between illiteracy and net increase [1] is +.731.

[1] Net increase here refers only to the first year of life, and was computed by de-

The net increase of Pittsburgh's population, therefore, is greatest where the percentage of foreign-born and of illiterates is greatest.

The significance of such figures in natural selection must be evident. Pittsburgh, like probably all large cities in civilized countries, breeds from the bottom. The lower a class is in the scale of intelligence, the greater is its reproductive contribution. Recalling that intelligence is inherited, that like begets like in this respect, one can hardly feel encouraged over the quality of the population of Pittsburgh, a few generations hence.

Of course these illiterate foreign laborers are, from a eugenic point of view, not wholly bad. The picture should not be painted any blacker than the original. Some of these ignorant stocks, in another generation and with decent surroundings, will furnish excellent citizens.

But taken as a whole, it can hardly be supposed that the fecund stocks of Pittsburgh, with their illiteracy, squalor and tuberculosis, their high death-rates, their economic straits, are as good eugenic material as the families that are dying out in the more substantial residence section which their fathers created in the eastern part of the city.

And it can hardly be supposed that the city, and the nation, of the future, would not benefit by a change in the distribution of births, whereby more would come from the seventh ward and its like, and fewer from the sixth and its like.

Evidently, there is no difficulty about seeing this form of natural selection at work, and at work in such a way as greatly to change the character of one section of the species. For comparison, some figures are presented from European sources. In the French war budget of 1911 it appears that from 1,000 women between the ages of 15 and 50, in different districts of Paris, the number of yearly births was as follows:

ducting the deaths under one year, in a ward, from the number of births in the same ward for the same year. For details of this study of the Pittsburgh vital statistics, see the *Journal of Heredity*, Vol. VIII, pp. 178–183 (April, 1917).

Very poor	108
Poor	99
Well-to-do	72
Very prosperous	65
Rich	53
Very rich	35

Disregarding the last class altogether, it is yet evident that while the mother in a wealthy home bears two children, the mother in the slums bears four. It is evident then that in Paris at the present time reproductive selection is changing the mental and moral composition of the population at a rapid rate, which can not be very materially reduced even if it is found that the death-rate in the poorer districts is considerably greater than it is on the more fashionable boulevards.

J. Bertillon has brought together [1] in a similar way data from a number of cities, showing the following birth-rates:

	Berlin	*Vienna*	*London*
Very poor quarters	157	200	147
Poor quarters	129	164	140
Comfortable quarters	114	155	107
Very comfortable	96	153	107
Rich	63	107	87
Very rich	47	81	63
Average	102	153	109

Obviously, in all these cases reproductive selection will soon bring about such a change in the character of the population, that a much larger part of it than at present will have the hereditary characteristics of the poorer classes and a much smaller part of it than at present the hereditary characteristics of the well-to-do classes.

David Heron and others have recently studied [1] the relation which the birth-rate in different boroughs of London bears to their social and economic conditions. Using the correlation method, they found "that in London the birth-rate per 1,000

[1] Quoted from Newsholme and Stevenson, *The Decline of Human Fertility*, London, 1906.

[2] Heron, David, *On the Relation of Fertility in Man to Social Status*, London, 1906. The account is quoted from Schuster, Edgar, *Eugenics*, pp. 220-221, London, 1913.

married women, aged 15 to 54, is highest where the conditions show the greatest poverty—namely, in quarters where pawnbrokers abound, where unskilled labor is the principal source of income, where consumption is most common and most deadly, where pauperism is most rife, and, finally, where the greatest proportion of the children born die in infancy. The correlation coefficients show that the association of these evil conditions with the relative number of children born is a very close one; and if the question is put in another way, and the calculations are based on measures of prosperity instead of on measures of poverty, a high degree of correlation is found between prosperity and a low birth-rate.

"It must not be supposed that a high rate of infant mortality, which almost invariably accompanies a high birth-rate, either in London or elsewhere, goes far toward counteracting the effects of the differential birth-rate. Where infant mortality is highest the average number of children above the age of two for each married woman is highest also, and although the chances of death at all ages are greater among the inhabitants of the poorer quarters, their rate of natural increase remains considerably higher than that of the inhabitants of the richer.

"From the detailed study of the figures made by Newsholme and Stevenson, conclusions essentially the same as those of Heron can be drawn. . . . Their first step was to divide the London boroughs into six groups according to the average number of domestic servants for 100 families in each. This is probably as good a measure of prosperity as any other. They then determined the total birth-rate of the population in each group, and arrived at the following figures:

Group	
I.	10 domestic servants for 100 families 34.97
II.	10–20 ..... 38.32
III.	20–30 ..... 25.99
IV.	30–40 ..... 25.83
V.	40–60 ..... 25.11
VI.	Over 60 ..... 18.24

"In order to find out how far the differences shown by these figures are due to differences in the percentage of women who

marry in each group and the age at which they marry, they corrected the figures in such a way as to make them represent what the birth-rates would be in each group, if the proportion of wives of each age to the whole population comprising the group was the same as it is in the whole of England and Wales. The corrected birth-rates thus obtained were as follows:

Group	
I	31.56
II	25.82
III	25.63
IV	25.50
V	25.56
VI	20.45

"It will readily be seen that the effect of the correction has been to reduce the difference between the two extreme groups by about one-third, showing that to this extent it is due to the way in which they differ as to the average age and number of the women who marry. Further, Groups II, III, IV and V have all been brought to about the same level, with a corrected birth-rate about halfway between the highest and the lowest. This shows that there is no gradual decrease in fertility associated with a gradually increasing grade of prosperity, but that three sharply divided classes may be distinguished: a very poor class with a high degree of fertility, to which about a quarter of the population of London belong, a rich class with a low degree of fertility, and a class intermediate in both respects."

"Eugenics is less directly concerned with this side of the question that with the relative rate of increase of the different classes. This may be found for the six groups in the usual way by deducting the death-rate from the birth-rate. The following figures for the rate of natural increase are then obtained:

Group	
I	16.56
II	13.89
III	11.43
IV	13.81
V	10.29
VI	5.79

"The figures show in a manner which hardly admits of any doubt that in London at any rate the inhabitants of the poorest quarters—over a million in number—are reproducing themselves at a much greater rate than the more well-to-do."

A research on similar lines by S. R. Steinmetz [1] in Holland shows that the average number of children in the lowest class families is 5.44. People in industry or small trade, skilled mechanics and professors of theology have five children to the family; in other classes the number is as follows:

Artists	4.30
Well-to-do Commercial Classes	4.27
High Officials	4.00
University Professors (excluding theological)	3.50
23 Scholars and Artists of the first rank	2.60

It is not hard to see that the next generation in Holland is likely to have proportionately fewer gifted individuals than has the present one.

Fortunately, it is very probable that the differential birth-rate is not of such ominous import in rural districts as it is in cities, although some of the tribes of degenerates which live in the country show birth-rates of four to six children per wife.[2] But in the more highly civilized nations now, something like a half of the population lives in urban districts, and the startling extent to which these urban populations breed from the bottom involves a disastrous change in the balance of population within a few generations, unless it is in some way checked.

Just how great the change may be, statistically, has been emphasized by Karl Pearson, who points out that "50% of the married population provide 75% of the next generation," owing to the number of deaths before maturity, the number of celi-

[1] *Ztschft. f. Sozialwissenschaft*, VII (1904), pp. 1 ff.

[2] Two of the best known of these tribes are the "Jukes" and "Nams." "An analysis of the figures of the Jukes in regard to the birth-rate shows that of a total of 403 married Juke women, 330 reproduced one or more children and 73 were barren. The average fecundity, counting those who are barren, is 3.526 children per female. The 330 women having children have an average fecundity of 4.306 as compared with that of 4.025, based on 120 reproducing women in the Nam family."—Estabrook, A. H., *The Jukes in 1915*, p. 51, Washington, Carnegie Institution, 1916.

bates and the number of childless marriages. "The same rule may be expressed in another way: 50% of the next generation is produced by 25% of the married population." At this rate in a few generations the less efficient and socially valuable, with their large families, will overwhelm the more efficient and socially valuable, and their small families.

Fecundal selection is at work to-day on a large scale, changing the character of the population, and from a eugenic point of view changing it for the worse. Fortunately, it is not impossible to arrest this change.

But, it may be objected, is not this change merely "the survival of the fittest?" In a sense, yes; and it is necessary that the more intelligent classes should make themselves "fitter" to survive, by a change of attitude toward reproduction. But the dying-out of the intellectually superior part of the population is a pathological condition, not a part of normal evolution; for barring artificial interference with the birth-rate, fertility has been found to go hand in hand with general superiority. This demonstration is due to F. A. Woods' study [1] of 608 members of the royal families of Europe, among whom, for reasons of state, large families are desired, and among whom there has probably been little restraint on the birth-rate. Averaging the ratings of his individuals from grade I, the mentally and physically very inferior, to grade 10, the mentally and physically very superior, he found that the number of children produced and brought to maturity increased in a fairly direct ratio. His figures are as follows:

BOTH SEXES (AVERAGED)

Grades for virtues.....	1	2	3	4	5	6	7	8	9	10
Average number of adult children.....	1.66	2.86	2.99	2.41	3.44	3.49	3.05	3.03	3.93	3.83

Investigations of Karl Pearson and Alexander Graham Bell [2] show that fecundity and longevity are associated. It follows

[1] Woods, Frederick Adams, *Heredity in Royalty*, New York, 1906.

[2] Beeton, Miss M., Yule, G. U., and Pearson, Karl, *On the Correlation between Duration of Life and the Number of Offspring*, Proc. R. S. London, 67 (1900), pp. 159–171. The material consisted of English and American Quaker families. Dr. Bell's work is based on old American families, and has not yet been published.

that the mentally and morally superior, who are the most fecund, are also the longest-lived; and as this longevity is largely due to inheritance it follows that, under natural conditions, the standard of the stratum of society under consideration would gradually rise, in respect to longevity, in each generation.

Such is probably one of the methods by which the human race has gradually increased its level of desirable characters in each generation. The desirable characters were associated with each other, and also with fecundity. The desirable characters are still associated with each other, but their association with fecundity is now negative. It is in this change that eugenics finds justification for its existence as a propaganda. Its object is to restore the positive correlation between desirable characters and fecundity, on which the progressive evolution of the race depends.

The bearing of natural selection on the present-day evolution of the human race, particularly in the United States of America, must be reviewed in a few closing paragraphs.

Selection by death may result either from inadequate food supply, or from some other lethal factor. The former type, although something of a bugaboo ever since the time of Malthus, has in reality relatively little effect on the human race at present. Non-sustentative lethal selection in man is operating chiefly through zymotic diseases and the bad hygiene of the mentally inferior.

Reproductive selection is increasingly effective and its action is such as to cause grave alarm both through the failure of some to marry properly (sexual selection) and the failure of some to bear enough children, while others bear too many (fecundal selection). It is obvious that the racial result of this process will depend on what kind of people bear and rear the most children; and it has been shown that in general the larger families are in the section of the population that makes fewer contributions to human prosperity and happiness, while those endowed with great gifts, who ought to be transmitting them to their children, are in many cases not even reproducing their own number.

Natural selection raised man from apehood to his present estate. It is still operating on him on a large scale, in several ways, but in none of these ways is it now doing much actually to improve the race, and in some ways, owing to man's own interference, it is rapidly hastening race degeneracy.

CHAPTER VII

ORIGIN AND GROWTH OF THE EUGENICS MOVEMENT

"Eugenics," wrote Francis Galton, who founded the science and coined the name, "is the study of agencies under social control that may improve or impair the racial qualities of future generations, either physically or mentally." The definition is universally accepted, but by its use of the word "study" it defines a pure science, and the present book is concerned rather with the application of such a science. Accepting Galton's definition, we shall for our purposes slightly extend it by saying that applied eugenics embraces all such measures, in use or prospect either individually or collectively, as may improve or impair the racial qualities of future generations of man, either physically or mentally, whether or not this was the avowed purpose.

It is one of the newest of sciences. It was practically forced into existence by logical necessity. It is certainly here to stay, and it demands the right to speak, in many cases to cast the deciding vote, on some of the most important questions that confront society.

The science of eugenics is the natural result of the spread and acceptance of organic evolution, following the publication of Darwin's work on *The Origin of Species by Means of Natural Selection*, in 1859. It took a generation for his ideas to win the day; but then they revolutionized the intellectual life of the civilized world. Man came to realize that the course of nature is regular; that the observed sequences of events can be described in formulas which are called natural laws; he learned that he could achieve great results in plant and animal breeding by working in harmony with these laws. Then the question logically arose, "Is not man himself subject to these same laws?

Can he not use his knowledge of them to improve his own species, as he has been more or less consciously improving the plants and animals that were of most value to him, for many centuries?"

The evolutionist answered both these questions affirmatively. However great may be the superiority of his mind, man is first of all an animal, subject to the natural laws that govern other animals. He can learn to comply with these laws; he can, therefore, take an active share in furthering the process of evolution toward a higher life.

That, briefly, is the scope of the science of eugenics, as its founder, Sir Francis Galton, conceived it. "Now that this new animal, man, finds himself somehow in existence, endowed with a little power and intelligence," Galton wrote 30 years ago, "he ought, I submit, to awake to a fuller knowledge of his relatively great position, and begin to assume a deliberate part in furthering the great work of evolution. He may infer the course it is bound to pursue, from his observation of that which it has already followed, and he might devote his modicum of power, intelligence and kindly feeling to render its future progress less slow and painful. Man has already furthered evolution very considerably, half consciously, and for his own personal advantages, but he has not yet risen to the conviction that it is his religious duty to do so, deliberately and systematically."

But, it may well be asked, how does this sudden need for eugenics arise, when the world has gone along without it for hundreds of millions of years in the past, and the human race has made the great ascent from an ape-like condition in spite of the fact that such a science as eugenics was never dreamed of?

For answer recall that natural selection, which is mainly responsible for bringing man to his present situation, has worked chiefly through a differential death-rate. The less fit die: the more fit survive. In the earlier stages of society, man interfered little with natural selection. But during the last century the increase of the philanthropic spirit and the progress of medicine have done a great deal to interfere with the selective process. In some ways, selection in the human race has almost

ceased; in many ways it is actually reversed, that is, it results in the survival of the inferior rather than the superior. In the olden days the criminal was summarily executed, the weakly child died soon after birth through lack of proper care and medical attention, the insane were dealt with so violently that if they were not killed by the treatment they were at least left hopelessly "incurable" and had little chance of becoming parents. Harsh measures, all of these, but they kept the germ-plasm of the race reasonably purified.

To-day, how is it? The inefficients, the wastrels, the physical, mental, and moral cripples are carefully preserved at public expense. The criminal is turned out on parole after a few years, to become the father of a family. The insane is discharged as "cured," again to take up the duties of citizenship. The feeble-minded child is painfully "educated," often at the expense of his normal brother or sister. In short, the undesirables of the race, with whom the bloody hand of natural selection would have made short work early in life, are now nursed along to old age.

Of course, one would not have it otherwise with respect to the prolongation of life. To expose deformed children as the Spartans did would outrage our moral sentiments; to chloroform the incurable is a proposition that almost every one condemns.

But this philanthropic spirit, this zealous regard for the interests of the unfortunate, which is rightly considered one of the highest manifestations of Christian civilization, has in many cases benefited the few at the expense of the many. The present generation, in making its own life comfortable, is leaving a staggering bill to be paid by posterity.

It is at this point that eugenics comes in and demands that a distinction be made between the interests of the individual and the interests of the race. It does not yield to any one in its solicitude for the individual unfortunate; but it says, "His happiness in life does not need to include leaving a family of children, inheritors of his defects, who if they were able to think might curse him for begetting them and curse society for allowing them to be born." And looking at the other side of the problem, eugenics says to the young man and young woman,

"You should enjoy the greatest happiness that love can bring to a life. But something more is expected of you than a selfish, short-sighted indifference to all except yourselves in the world. When you understand the relation of the individual to the race, you will find your greatest happiness only in a marriage which will result in a family of worthy children. You are temporarily a custodian of the inheritance of the whole past; it is far more disgraceful for you to squander or ruin this heritage, or to regard it as intended solely for your individual, selfish gratification, than it would be for you to dissipate a fortune in money which you had received, or to betray any trust which had been confided to you by one of your fellow men."

Such is the teaching of eugenics. It is not wholly new. The early Greeks gave much thought to it, and with the insight which characterized them, they rightly put the emphasis on the constructive side; they sought to breed better men and women, not merely to accomplish a work of hygiene, to lessen taxes, and reduce suffering, by reducing the number of unfortunates among them. As early as the first half of the sixth century B. C. the Greek poet Theognis of Megara wrote: "We look for rams and asses and stallions of good stock, and one believes that good will come from good; yet a good man minds not to wed an evil daughter of an evil sire, if he but give her much wealth. . . . Wealth confounds our stock. Marvel not that the stock of our folk is tarnished, for the good is mingling with the base." A century later eugenics was discussed in some detail by Plato, who suggested that the state intervene to mate the best with the best, and the worst with the worst; the former should be encouraged to have large families, and their children should be reared by the government, while the children of the unfit were to be, as he says, "put away in some mysterious, unknown places, as they should be." Aristotle developed the idea on political lines, being more interested in the economic than the biological aspects of marriage; but he held firmly to the doctrine that the state should feel free to intervene in the interests of reproductive selection.

For nearly two thousand years after this, conscious eugenic

ideals were largely ignored. Constant war reversed natural selection, as it is doing to-day, by killing off the physically fit and leaving the relatively unfit to reproduce the race; while monasticism and the enforced celibacy of the priesthood performed a similar office for many of the mentally superior, attracting them to a career in which they could leave no posterity. At the beginning of the last century a germ of modern eugenics is visible in Malthus' famous essay on population, in which he directed attention to the importance of the birth-rate for human welfare, since this essay led Darwin and Wallace to enunciate the theory of natural selection, and to point out clearly the effects of artificial selection. It is really on Darwin's work that the modern science of eugenics is based, and it owes its beginning to Darwin's cousin, Francis Galton.

Galton was born in 1822, studied mathematics and medicine, traveled widely, attained fame as an explorer in South Africa, and after inheriting sufficient income to make him independent, settled down in London and gave his time to pioneering experiments in many branches of science. He contributed largely to founding the science of meteorology, opened new paths in experimental psychology, introduced the system of finger prints to anthropology, and took up the study of heredity, publishing in 1865 a series of articles under the title of "Hereditary Talent and Genius," which contained his first utterances on eugenics.

The present generation can hardly understand what a new field Galton broke. Even Darwin had supposed that men do not differ very much in intellectual endowment, and that their differences in achievement are principally the result of differences in zeal and industry. Galton's articles, whose thesis was that better men could be bred by conscious selection, attracted much attention from the scientific world and were expanded in 1869 in his book *Hereditary Genius*.

This was an elaborate and painstaking study of the biographies of 977 men who would rank, according to Galton's estimate, as about 1 to 4,000 of the general population, in respect to achievement. The number of families found to contain more than one eminent man was 300, divided as follows: Judges, 85;

Statesmen, 39; Commanders, 27; Literary, 33; Scientific, 43; Poets, 20; Artists, 28; Divines, 25. The close groupings of the interrelated eminence led to the conclusion that heredity plays a very important part in achievement. The greater success of real sons of great men as compared with adopted sons of great men likewise indicated, he thought, that success is due to actual biological heredity rather than to the good opportunities afforded the scion of the illustrious family. Galton's conclusion was that by selecting from strains that produced eminence, a superior human stock could be bred.

In 1874 he published a similar study of the heredity of 180 eminent English scientists, reëmphasizing the claims of nature over nurture, to use his familiar antithesis. In 1883 he published "Inquiries into the Human Faculty and Its Development," a collection of evolutionary and anthropometric essays where the word Eugenics was first used in a new exposition of the author's views. "Natural Inheritance" appeared in 1889, being the essence of various memoirs published since "Hereditary Genius," dealing with the general biological principles underlying the study of heredity and continuing the study of resemblances between individuals in respect to stature, eye color, artistic faculty and morbid conditions.

Galton's interest in eugenics was not lessened by the abundant criticism he received, and in 1901 he defended "The Possible Improvement of the Human Breed under Existing Conditions of Law and Sentiment" before the Anthropological Society. Three years later he read a paper entitled "Eugenics; Its Definition, Scope and Aims," to the Sociological Society. His program, in brief, was as follows:

1. Disseminate knowledge of hereditary laws as far as surely known and promote their further study.

2. Inquire into birth rates of various strata of society (classified according to civic usefulness) in ancient and modern nations.

3. Collect reliable data showing how large and thriving families have most frequently originated.

4. Study the influences affecting marriage.

5. Persistently set forth the national importance of Eugenics.

The following year, Galton again read a paper before the Society, suggesting the award of certificates of quality to the eugenically fit. He also maintained that marriage customs which are largely controlled by public opinion could be modified for racial welfare through a molding of public sentiment.

In 1904 he founded a Research Fellowship at the University of London to determine, if possible, what the standard of fitness is, and in 1905 a Scholarship was added. Edgar Schuster and Miss E. M. Elderton held these posts until 1907, when Professor Karl Pearson took charge of the research work and, at the resignation of Mr. Schuster, David Heron was appointed Fellow. On Galton's death, January 17, 1911, it became known that through the terms of his will a professorship was founded and Professor Pearson was invited to hold it. His corps of workers constitutes the Galton Eugenics Laboratory staff.

To spread throughout the British Empire such knowledge of eugenics as might be gathered by specialists, the Eugenics Education Society was formed in 1908 with Galton as honorary president. Its field comprises: (1) Biology in so far as it concerns hereditary selection; (2) Anthropology as related to race and marriage; (3) Politics, where it bears on parenthood in relation to civic worth; (4) Ethics, in so far as it promotes ideals that lead to the improvement of social quality; (5) Religion, in so far as it strengthens and sanctifies eugenic duty.

In America the movement got an early start but developed slowly. The first definite step was the formation of an Institute of Heredity in Boston, shortly after 1880, by Loring Moody, who was assisted by the poet Longfellow, Samuel E. Sewall, Mrs. Horace Mann, and other well-known people. He proposed to work very much along the lines that the Eugenics Record Office later adopted, but he was ahead of his time, and his attempt seems to have come to nothing.

In 1883 Alexander Graham Bell, who may be considered the first scientific worker in eugenics in the United States, published a paper on the danger of the formation of a deaf variety of the human race in this country, in which he gave the result of re-

searches he had made at Martha's Vineyard and other localities during preceding years, on the pedigrees of congenitally deaf persons—deaf mutes, as they were then called. He showed clearly that congenital deafness is largely due to heredity, that it is much increased by consanguineous marriages, and that it is of great importance to prevent the marriage of persons, in both of whose families congenital deafness is present. About five years later he founded the Volta Bureau in Washington, D. C., for the study of deafness, and this has fostered a great deal of research work on this particular phase of heredity.

In 1903 the American Breeders' Association was founded at St. Louis by plant and animals breeders who desired to keep in touch with the new subject of genetics, the science of breeding, which was rapidly coming to have great practical importance. From the outset, the members realized that the changes which they could produce in races of animals and plants might also be produced in man, and the science of eugenics was thus recognized on a sound biological basis. Soon a definite eugenics section was formed, and as the importance of this section increased, and it was realized that the name of Breeders' Association was too narrowly construed by the public, the association changed its name (1913) to the American Genetic Association, and the name of its organ from the *American Breeders' Magazine* to the *Journal of Heredity*.

Under the auspices of this association, the Eugenics Record Office was established at Cold Spring Harbor, Long Island, by Dr. C. B. Davenport. It has been mainly supported by Mrs. E. H. Harriman, but has since been taken over by the Carnegie Institution of Washington. It is gathering pedigrees in many parts of the United States, analyzing them and publishing the results in a series of bulletins.

In the last few years, the public has come to take a keen interest in the possibilities of eugenics. This has led some sex hygienists, child welfare workers, and persons similarly engaged, to attempt to capitalize the interest in eugenics by appropriating the name for their own use. We strongly object to any such misuse of the word, which should designate the application of

genetics to the human race. Sex hygiene, child welfare, and other sanitary and sociological movements should stand on their own feet and leave to eugenics the scope which its Greek derivation indicates for it,—the science of good breeding.[1]

In all parts of Europe, the ideas of eugenics have gradually spread. In 1912 the first International Eugenics Congress was held at London, under auspices of the Eugenics Education Society; more than 700 delegates were in attendance.

Germany, Sweden, Switzerland and Austria are united in an International Eugenics Society and the war led to the formation of a number of separate societies in Germany. Hungary has formed an organization of its own, France has its society in Paris, and the Italian Anthropological Society has given much attention to the subject. The Anthropological Society of Denmark has similarly recognized eugenics by the formation of a separate section. The Institut Solvay of Belgium, a foundation with sociological aims, created a eugenics section several years ago; and in Holland a strong committee has been formed. Last of all, Sweden has put a large separate organization in the field.

In the United States the subject has interested many women's clubs, college organizations and Young Men's Christian Associations, while the periodical press has given it a large amount of attention. Public enthusiasm, often ill-guided, has in a few cases outrun the facts, and has secured legislation in some states, which by no means meets the approval of most scientific eugenists.

When we speak of scientific eugenists, it may appear that we

[1] The entire field of race betterment and social improvement is divided between *eugenics*, which considers only germinal or heritable changes in the race; and *euthenics*, which deals with improvement in the individual, and in his environment. Of course, no sharp line can be drawn between the two spheres, each one having many indirect effects on the other. It is important to note, however, that any change in the individual during his pre-natal life is euthenic, not eugenic. Therefore, contrary to the popular idea of the case, the "Better Babies" movement, the agitation for proper care of expectant mothers, and the like, are not *directly* a part of eugenics. The moment of conception is the point at which eugenics gives place to euthenics. Eugenics is therefore the *fundamental* method of human progress, euthenics the *secondary* one; their relations will be further considered in the last chapter of this book.

use the word in an invidious way. We use it deliberately, and by using it we mean to intimate that we do not think enthusiasm is an adequate substitute for knowledge, in anyone who assumes to pass judgment upon a measure as being eugenic or dysgenic—as likely to improve the race or cause its deterioration. Eugenics is a biological science which, in its application, must be interpreted with the help of the best scientific method. Very few social workers, whose field eugenics touches, are competent to understand its bearings without some study, and an appreciation of eugenics is the more difficult for them, because an understanding of it will show them that some of their work is based on false premises. The average legislator is equally unlikely to understand the full import of eugenics, unless he has made a definite effort to do so. All the more honor, then, to the rapidly increasing number of social workers and legislators who have grasped the full meaning of eugenics and are now striving to put it in effect. The agriculturist, through his experience with plants and animals, is probably better qualified than anyone else to realize the practicability of eugenics, and it is accordingly not a matter of mere chance that the science of eugenics in America was built up by a breeders' association, and has found and still finds hundreds of effective advocates in the graduates of the agricultural colleges.

The program of eugenics naturally divides itself in two parts:

(1) Reducing the racial contribution of the least desirable part of the population.

(2) Increasing the racial contribution of the superior part of the population.

The first part of this program is the most pressing and the most easily dealt with; it is no cause for surprise, then, that to many people it has seemed to be the predominant aim of eugenics. Certainly the problem is great enough to stagger anyone who looks it full in the face; although for a variety of reasons, satisfactory statistical evidence of racial degeneracy is hard to get.

Considering only the "institutional population" of the United States, one gets the following figures:

BLIND: total, 64,763 according to census of 1900. Of these,

35,645 were totally blind and 29,118 partly blind. The affection is stated to have been congenital in 4,730 cases. Nineteen per cent of the blind were found to have blind relatives; 4.5% of them were returned as the offspring of cousin marriages.

DEAF: total, 86,515, according to the census of 1900. More than 50,000 of them were deaf from childhood (under 20), 12,609 being deaf from birth. At least 4.5% of the deaf were stated to be offspring of cousin marriages, and 32.1% to have deaf relatives. The significance of this can not be determined unless it is known how many normal persons have deaf relatives (or blind relatives, in considering the preceding paragraph), but it points to the existence of families that are characterized by deafness (or blindness).

INSANE: the census of 1910 enumerated only the insane who were in institutions; they numbered 187,791. The number outside of institutions is doubtless considerable but can not be computed. The institutional population is not a permanent, but mainly a transient one, the number of persons discharged from institutions in 1910 being 29,304. As the number and size of institutions does not increase very rapidly, it would appear probable that 25,000 insane persons pass through and out of institutions, and back into the general population, each year. From this one can get some idea of the amount of neurotic weakness in the population of the United States,—much of it congenital and heritable in character.

FEEBLE-MINDED: the census (1910) lists only those in institutions, who totaled about 40,000. The census experts believe that 200,000 would be a conservative estimate of the total number of feeble-minded in the country, and many psychologists think that 300,000 would be more nearly accurate. The number of feeble-minded who are receiving institutional care is almost certainly not more than 10% or 15% of the total, and many of these (about 15,000) are in almshouses, not special institutions.

PAUPERS: There were 84,198 paupers enumerated in almshouses on January 1, 1910, and 88,313 admitted during the year, which indicates that the almshouse paupers are a rapidly shifting group. This population, probably of several hundred thou-

sand persons, who drift into and out of almshouses, can hardly be characterized accurately, but in large part it must be considered at least inefficient and probably of mentally low grade.

CRIMINALS: The inmates of prisons, penitentiaries, reformatories, and similar places of detention numbered 111,609 in 1910; this does not include 25,000 juvenile delinquents. The jail population is nearly all transient; one must be very cautious in inferring that conviction for an offense against the law indicates lack of eugenic value; but it is worth noting that the number of offenders who are feeble-minded is probably not less than one-fourth or one-third. If the number of inebriates could be added, it would greatly increase the total; and inebriacy or chronic alcoholism is generally recognized now as indicating in a majority of cases either feeble-mindedness or some other defect of the nervous system. The number of criminals who are in some way neurotically tainted is placed by some psychologists at 50% or more of the total prison population.

Add to these a number of epileptics, tramps, prostitutes, beggars, and others whom the census enumerator finds it difficult to catch, and the total number of possible undesirable parents becomes very large. It is in fact much larger than appears in these figures, because of the fact that many people carry defects that are latent and only appear in the offspring of a marriage representing two tainted strains. Thus the feeble-minded child usually if not always has feeble-mindedness in both his father's and mother's ancestry, and for every one of the patent feeble-minded above enumerated, there may be several dozen latent ones, who are themselves probably normal in every way and yet carry the dangerously tainted germ-plasm.

The estimate has frequently been made that the United States would be much better off eugenically if it were deprived of the future racial contributions of at least 10% of its citizens. While literally true this estimate is too high for the group which could be considered for attempts to directly control in a practical eugenics program.

Natural selection, in the early days of man's history, would have killed off many of these people early in life. They would

have been unable to compete with their physically and mentally more vigorous fellows and would have died miserably by starvation or violence. Natural selection's use of the death-rate was a brutal one, but at least it prevented such traits as these people show from increasing in each generation. Eugenists hope to arrive at the same result, not by the death-rate but by the birth-rate. If germinally anti-social persons are kept humanely segregated during their lifetime, instead of being turned out after a few years of institutional life and allowed to marry, they will leave no descendants, and the number of congenital defectives in the community will be notably diminished. If the same policy is followed through succeeding generations, the number of defectives, of those incapable of taking a useful part in society, will become smaller and smaller. One who does not believe that these people hand on their traits to their descendants may profitably consider the famous history of the so-called Juke family, a strain originating among the "finger lakes" of New York, whose history was published by R. L. Dugdale as far back as 1877 and lately restudied by A. H. Estabrook.

"From one lazy vagabond nicknamed 'Juke,' born in 1720, whose two sons married five degenerate sisters, six generations numbering about 1,200 persons of every grade of idleness, viciousness, lewdness, pauperism, disease, idiocy, insanity and criminality were traced. Of the total seven generations, 300 died in infancy; 310 were professional paupers, kept in almshouses a total of 2,300 years; 440 were physically wrecked by their own 'diseased wickedness'; more than half the women fell into prostitution; 130 were convicted criminals; 60 were thieves; 7 were murderers; only 20 learned a trade, 10 of these in state prison, and all at a state cost of over $1,250,000." [1]

[1] The clan has now reached its ninth generation and its present status has been exhaustively studied by A. H. Estabrook (*The Jukes in 1915:* Carnegie Institution of Washington, 1916). He enumerates 2,820 individuals, of whom half are still living. In the early 80's they left their original home and are now scattered all over the country. The change in environment has enabled some of them to rise to a higher level, but on the whole, says C. B. Davenport in a preface to Estabrook's book, they "still show the same feeble-mindedness, indolence, licentiousness and dishonesty, even when not handicapped by the associations of their bad family name and despite the fact of being surrounded by better social conditions." Esta-

How heredity works both ways, is shown by the history of the Kallikak family, published by H. H. Goddard a few years ago.

"At the beginning of the Revolutionary War a young man, known in the history as Martin Kallikak, had a son by a nameless, feeble-minded girl, from whom there have descended in the direct line four hundred and eighty individuals. One hundred and forty-three of these are known to have been feeble-minded, and only forty-six are known to have been normal. The rest are unknown or doubtful. Thirty-six have been illegimate; thirty-three, sexually immoral, mostly prostitutes; twenty-four, alcoholic; three, epileptic; eighty-two died in infancy; three were criminal, and eight kept houses of ill-fame. After the war, Martin Kallikak married a woman of good stock. From this union have come in direct line four hundred and ninety-six, among whom only two were alcoholic, and one known to be sexually immoral. The legitimate children of Martin have been doctors, lawyers, judges, educators, traders, landholders, in short, respectable citizens, men and women prominent in every phase of social life. These two families have lived on the same soil, in the same atmosphere, and in short, under the same general environment, yet the bar sinister has marked every generation of one and has been unknown in the other."

If it were possible to improve or eradicate these defective strains by giving them better surroundings, the nation might easily get rid of this burden. But we have given reasons in Chapter I for believing that the problem can not be solved in that way, and more evidence to the same effect will be present in other chapters of the book.

An understanding of the nature of the problem will show that present methods of dispensing justice, giving charity, dealing with defectives and working for social betterment need careful examination and numerous modifications, if they are not to be ineffectual or merely palliative, or worse still, if they are not to

brook says the clan might have been exterminated by preventing the reproduction of its members, and that the nation would thereby have saved about $2,500,000. It is interesting to note that "out of approximately 600 living feeble-minded and epileptic Jukes, there are only three now in custodial care."

give temporary relief at the cost of greatly aggravating the social disease in the end.

In the past America has given and at present still gives much thought to the individual and little, if any, to posterity. Eugenics does not want to diminish this regard for the individual, but it does insistently declare that the interests of the many are greater than those of the few, and it holds that a statesmanlike policy requires thought for the future as well as the present. It would be hard to find a eugenist to-day who would propose, with Plato, that the infants with bad heredity should be put to death, but their right to grow up to the fullest enjoyment of life does not necessarily include the right to pass on their defective heredity to a long line of descendants, naturally increasing in number in each generation. Indeed a regard for the totality of human happiness makes it necessary that they should not so continue.

While it is the hope of eugenics that fewer defective and antisocial individuals shall be born in the future, it has been emphasized so much that the program of eugenics is likely to be seen in false perspective. In reality it is the less important side of the picture. More good citizens are wanted, as well as fewer bad ones. Every race requires leaders. These leaders appear from time to time, and enough is known about eugenics now to show that their appearance is frequently predictable, not accidental. It is possible to have them appear more frequently; and in addition, to raise the level of the whole race, making the entire nation happier and more useful. These are the great tasks of eugenics. America needs more families like that old Puritan strain which is one of the familiar examples of eugenics:

"At their head stands Jonathan Edwards, and behind him an array of his descendants numbering in 1900, 1,394, of whom 295 were college graduates; 13 presidents of our greatest colleges; 65 professors in colleges, besides many principals of other important educational institutions; 60 physicians, many of whom were eminent; 100 and more clergymen, missionaries, or theological professors; 75 were officers in the army and navy; 60

prominent authors and writers, by whom 135 books of merit were written and published and 18 important periodicals edited; 33 American states and several foreign countries, and 92 American cities and many foreign cities have profited by the beneficent influences of their eminent activity; 100 and more were lawyers, of whom one was our most eminent professor of law; 30 were judges; 80 held public office, of whom one was vice president of the United States; three were United States senators; several were governors, members of Congress, framers of state constitutions, mayors of cities and ministers of foreign courts; one was president of the Pacific Mail Steamship Company; 15 railroads, many banks, insurance companies, and large industrial enterprises have been indebted to their management. Almost if not every department of social progress and of the public weal has felt the impulse of this healthy and long-lived family. It is not known that any one of them was ever convicted of crime."

Every one will agree that the nation needs more families like that. How can it get them? Galton blazed the way in 1865, when he pointed to selective breeding as the effective means. The animal breeder knows what marvels he can accomplish by this means; but it is not practicable to breed human beings in that direct way. Is there any indirect method of reaching the same ends?

There are, in our opinion, a good many such means, and it is the principal purpose of this book to point them out. The problem of constructive or positive eugenics, naturally divides itself into two parts:

1. To secure a sufficient number of marriages of the superior.
2. To secure an adequate birth-rate from these marriages.

The problem of securing these two results is a complex one, which must be attacked by a variety of methods. It is necessary that superior people first be made to desire marriage and children; and secondly, that it be economically and otherwise possible for them to carry out this desire.

It may be of interest to know how the Germans are attacking the problem, even though some of their measures may be considered ineffective or inadvisable.

At its annual meeting in 1914 the German Society for Race Hygiene adopted a resolution on the subject of applied eugenics. "The future of the German people is at stake," it declares. "The German empire can not in the long run maintain its true nationality and the independence of its development, if it does not begin without delay and with the greatest energy to mold its internal and external politics as well as the whole life of the people in accordance with eugenic principles. Most important of all are measures for a higher reproduction of healthy and able families. The rapidly declining birth-rate of the healthy and able families necessarily leads to the social, economical and political retrogression of the German people," it points out, and then goes on to enumerate the causes of this decline, which it thinks is partly due to the action of racial poisons but principally to the increasing willful restriction of the number of children.

The society recognizes that the reasons for this limitation of the size of families are largely economic. It enumerates the question of expense, considerations of economic inheritance—that is, a father does not like to divide up his estate too much; the labor of women, which is incompatible with the raising of a large family; and the difficulties caused by the crowded housing in the large cities.

In order to secure a posterity sufficient in number and ability, the resolution continues, The German Society for Race Hygiene demands:

1. A back-to-the farm movement.
2. Better housing facilities in the cities.
3. Economic assistance of large families through payment of a substantial relief to married mothers who survive their husbands, and consideration of the number of children in the payment of public and private employees.
4. Abolition of certain impediments to marriage, such as the army regulation forbidding officers to marry before they reach a certain grade.
5. Increase of tax on alcohol, tobacco and luxuries, the proceeds to be used to subsidize worthy families.
6. Medical regulations of a hygienic nature.

7. Setting out large prizes for excellent works of art (novels, dramas, plastic arts) which glorify the ideal of motherhood, the family and simple life.

8. Awakening a national mind ready to undergo sacrifices on behalf of future generations.

In spite of some defects such a program brings out clearly the principle of eugenics,—the substitution of a selective birth-rate for the selective death-rate by which natural selection has brought the race to its present level. Nature lets a multitude of individuals be born and kills off the poorer ones; eugenics proposes to have fewer poor ones and more good ones born in each generation.

Any means which tends to bring about one of those ends, is a part of Applied Eugenics.

By this time the reader will have seen that eugenics has some definite ideals not only as to how the race can be kept from deteriorating further, under the interference with natural selection which civilization entails, but as to how its physical, mental and moral level can actually be raised. He can easily draw his own conclusions as to what eugenics does *not* propose. No eugenist worthy of the name has ever proposed to breed genius as the stockman breeds trotting horses, despite jibes of the comic press to the contrary. But if young people, before picking out their life partners, are thoroughly imbued with the idea that such qualities as energy, longevity, a sound constitution, public and private worth, are primarily due to heredity, and if they are taught to realize the fact that one marries not an individual but a family, the eugenist believes that better matings will be made, sometimes realized, sometimes insensibly.

Furthermore, if children from such matings are made an asset rather than a liability; if society ceases to penalize, in a hundred insidious ways, the parents of large and superior families, but honors and aids them instead, one may justifiably hope that the birth-rate in the most useful and happy part of the population will steadily increase.

Perhaps that is as far as it is necessary that the aim of eugenics should be defined; yet one can hardly ignore the phil-

osophical aspect of the problem. Galton's suggestion that man should assist the course of his own evolution meets with the general approval of biologists; but when one asks what the ultimate goal of human evolution should be, one faces a difficult question. Under these circumstances, can it be said that eugenics really has a goal, or is it merely stumbling along in the dark, possibly far from the real road, of whose existence it is aware but of whose location it has no knowledge?

There are several routes on which one can proceed with the confidence that, if no one of them is the main road, at least it is likely to lead into the latter at some time. Fortunately, eugenics is, paradoxical as it may seem, able to advance on all these paths at once; for it proposes no definite goal, it sets up no one standard to which it would make the human race conform. Taking man as it finds him, it proposes to multiply all the types that have been found by past experience or present reason to be of most value to society. Not only would it multiply them in numbers, but also in efficiency, in capacity to serve the race.

By so doing, it undoubtedly fulfills the requirements of that popular philosophy which holds the aim of society to be the greatest happiness for the greatest number, or more definitely the increase of the totality of human happiness. To cause not to exist those who would be doomed from birth to give only unhappiness to themselves and those about them; to increase the number of those in whom useful physical and mental traits are well developed; to bring about an increase in the number of energetic altruists and a decrease in the number of the anti-social or defective; surely such an undertaking will come nearer to increasing the happiness of the greatest number, than will any temporary social palliative, any ointment for incurable social wounds. To those who accept that philosophy, made prominent by Jeremy Bentham, John Stuart Mill, Herbert Spencer, and a host of other great thinkers, eugenics rightly understood must seem a prime necessity of society.

But can any philosophy dispense with eugenics? Take those to whom the popular philosophy of happiness seems a dangerous goal and to whom the only object of evolution that one is

at present justified in recognizing is that of the perpetuation of the species and of the progressive conquest of nature, the acquiring of an ascendancy over all the earth. This is now as much a matter of self-preservation as it is of progress: although man no longer fights for life with the cave bear and saber-toothed tiger, the microbes which war with him are far more dangerous enemies than the big mammals of the past. The continuation of evolution, if it means conquest, is not a work for dilettantes and Lotos Eaters; it is a task that demands unremitting hard work.

To this newer philosophy of creative work eugenics is none the less essential. For eugenics wants in the world more physically sound men and women *with greater ability in any valuable way*. Whatever the actual goal of evolution may be, it can hardly be assumed by any except the professional pessimist, that a race made up of such men and women is going to be handicapped by their presence.

The correlation of abilities is as well attested as any fact in psychology. Those who decry eugenics on the ground that it is impossible to establish any "standard of perfection," since society needs many diverse kinds of people, are overlooking this fact. Any plan which increases the production of children in able families of *various* types will thereby produce more ability of all kinds, since if a family is particularly gifted in one way, it is likely to be gifted above the average in several other desirable ways.

Eugenics sets up no specific superman, as a type to which the rest of the race must be made to conform. It is not looking forward to the cessation of its work in a eugenic millenium. It is a perpetual process, which seeks only to raise the level of the race by the production of fewer people with physical and mental defects, and more people with physical and mental excellencies. Such a race should be able to perpetuate itself, to subdue nature, to improve its environment progressively; its members should be happy and productive. To establish such a goal seems justified by the knowledge of evolution which is now available; and to make progress toward it is possible.

CHAPTER VIII

DESIRABILITY OF RESTRICTIVE EUGENICS

In a rural part of Pennsylvania lives the L. family. Three generations studied "all show the same drifting, irresponsible tendency. No one can say they are positively bad or serious disturbers of the communities where they may have a temporary home. Certain members are epileptic and defective to the point of imbecility. The father of this family drank and provided little for their support. The mother, though hard working, was never able to care for them properly. So they and their 12 children were frequent recipients of public relief, a habit which they have consistently kept up. Ten of the children grew to maturity, and all but one married and had in their turn large families. With two exceptions these have lived in the territory studied. Nobody knows how they have subsisted, even with the generous help they have received. They drift in and out of the various settlements, taking care to keep their residence in the county which has provided most liberally for their support. In some villages it is said that they have been in and out half a dozen times in the last few years. First one family comes slipping back, then one by one the others trail in as long as there are cheap shelters to be had. Then rents fall due, neighbors become suspicious of invaded henroosts and potato patches, and one after another the families take their departure, only to reappear after a year or two.

"The seven children of the eldest son were scattered years ago through the death of their father. They were taken by strangers, and though kept in school, none of them proved capable of advancement. Three at least could not learn to read or handle the smallest quantities. The rest do this with difficulty. All but two are now married and founding the fourth generation of this line. The family of the fourth son are now county charges.

Of the 14 children of school age in this and the remaining families, all are greatly retarded. One is an epileptic and at 16 can not read or write. One at 15 is in the third reader and should be set down as defective. The remainder are from one to four years retarded.

"There is nothing striking in the annals of this family. It comes as near the lowest margin of human existence as possible and illustrates how marked defect may sometimes exist without serious results in the infringement of law and custom. Its serious menace, however, lies in the certain marriage into stocks which are no better, and the production of large families which continue to exist on the same level of semi-dependency. In place of the two dependents of a generation ago we now find in the third generation 32 descendants who bid fair to continue their existence on the same plane—certainly an enormous multiplication of the initial burden of expense." [1]

From cases of this sort, which represent the least striking kind of bad breeding, the student may pass through many types up to the great tribes of Jukes, Nams, Kallikaks, Zeros, Dacks, Ishmaels, Sixties, Hickories, Hill Folk, Piney Folk, and the rest, with which the readers of the literature of restrictive eugenics are familiar. It is abundantly demonstrated that much, if not most, of their trouble is the outcome of bad heredity. Indeed, when a branch of one of these clans is transported, or emigrates, to a wholly new environment, it soon creates for itself, in many cases, an environment similar to that from which it came. Whether it goes to the city, or to the agricultural districts of the west, it may soon manage to reëstablish the debasing atmosphere to which it has always been accustomed.[2] Those who

[1] Key, Dr. Wilhelmina E., *Feebleminded Citizens in Pennsylvania*, pp. 11, 12, Philadelphia, Public Charities Assn., 1915.

[2] The most recent extensive study of this point is A. H. Estabrook's *The Jukes in 1915* (Carnegie Institution of Washington, 1916). The Jukes migrated from their original home, in the mountains of New York, a generation ago, and are now scattered all over the country. Estabrook tried to learn, at first hand, whether they had improved as the result of new environments, and free from the handicap of their name, which for their new neighbors had no bad associations. In general, his findings seem to warrant the conclusion that a changed environment in itself was of little benefit. Such improvement as occurred in the tribe was rather due

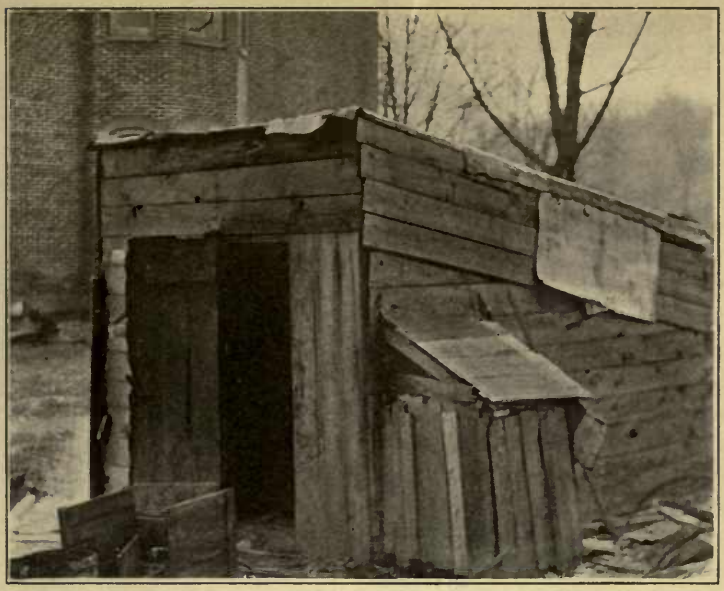


FIG. 26.—To this shanty an elderly man of the "Hickory" family, a great clan of defectives in rural Ohio, brought his girl-bride, together with his two grown sons by a former marriage. The shanty was conveniently located at a distance of 100 feet from the city dump where the family, all of which is feeble-minded, secured its food. Such a family is incapable of protecting either itself or its neighbors, and should be cared for by the state. Photograph from Mina A. Sessions.

A CHIEFTAIN OF THE HICKORY CLAN

FIG. 27.—This is "Young Hank," otherwise known as "Sore-Eyed Hank." He is the eldest son and heir of that Hank Hickory who, with his wife and seven children, applied for admission to their County Infirmary when it was first opened. For generation after generation, his family has been the chief patron of all the charities of its county. "Young Hank" married his cousin and duplicated his father's record by begetting seven children, three of whom (all feeble-minded) are now living. The number of his grandchildren and great-grandchildren is increasing every year, but the total can not be learned from him, for he is mentally incapable of counting even the number of his own children. He is about 70 years of age, and has never done any work except to make baskets. He has lived a wandering life, largely dependent on charity. For the last 25 years he has been partly blind, due to trachoma. He gets a blind pension of $5 a month, which is adequate to keep him supplied with chewing tobacco, his regular mastication being 10 cents a day. Such specimens can be found in many rural communities; if they were segregated in youth both they and the community would be much better off. Photograph from Mina A. Sessions.

see in improvement of the environment the cure for all such plague spots as these tribes inhabit, overlook the fact that man largely creates his own environment. The story of the tenement-dwellers who were supplied with bath tubs but refused to use them for any other purpose than to store coal, exemplifies a wide range of facts.

Although conditions may be worst in the older and more densely populated states, it is probable that there is no state in the union which has not many families, or group of families, of this dependent type, which in favorable cases may attract little notice, but therefore do all the more harm eugenically; in other cases may be notorious as centers of criminality. Half a dozen well-defined areas of this kind have been found in Pennsylvania, which is probably not exceptional in this respect. "These differ, of course, in extent and character and the gravity of the problems they present. In some there is great sexual laxity, which leads to various forms of dependency and sometimes to extreme mental defect. In others alcoholism prevails and the people show a propensity for deeds of violence. All informants, however, practically agreed to the following characterization:

"1. Because of the thefts and depredations and the frequent applications for charitable relief from such sections they constitute a parasitic growth which saps the resources of the self-respecting, self-sustaining contingent of the population.

"2. They furnish an undue proportion of court cases, and are thus a serious expense to county and state.

"3. They are a source of physical decay and moral contamination, and thus menace the integrity of the entire social fabric." [1]

Society has long since admitted that it is desirable to restrict the reproduction of certain classes of gross defectives, and criminals, by the method of segregation. The ground for this is

to marriage with better stock; marriages of this kind were made more possible by the new environment, but the tendency to assortative mating restricted them. It is further to be noted that while such marriages may be good for the Juke family, they are bad for the nation as a whole, because they tend to scatter anti-social traits.

[1] Key, *op. cit.*, p. 7.

sometimes biological, perhaps more often legal, as in the case of the insane and criminal, where it is held that the individual is legally incapacitated from entering into a contract, such as that of marriage. It would be better to have the biological basis of restriction on marriage and reproduction recognized in every case; but even with the present point of view the desired end may be reached.

From an ethical standpoint, so few people would now contend that two feeble-minded or epileptic persons have any "right" to marry and perpetuate their kind, that it is hardly worth while to argue the point. We believe that the same logic would permit two individuals to marry, but deny them the privilege of having children. The reasons for this may be considered under three heads.

1. Biological. Are there cases in which persons may properly marry but may properly be prevented by society from having any offspring, on the ground that such offspring would be undesirable components of the race?

The right of marriage is commonly, and may well be properly, regarded as an inalienable right of the individual, in so far as it does not conflict with the interests of the race. The companionship of two persons between whom true love exists, is beyond all question the highest happiness possible, and one which society should desire and strive to give its every member. On that point there will be no difference of opinion, but when it is asked whether there can be a separation between the comradeship aspect and the reproduction aspect, in marriage, whether any interest of the race can justifiably divorce these two phases, often considered inseparable, protests are at once aroused. In these protests, there is some justice. We would be the last ones to deny that a marriage has failed to achieve its goal, has failed to realize for its participants the greatest possible happiness, unless it has resulted in sound offspring.

That word "sound" is the key to the distinction which must be made. The interests of the race demand sound offspring from every couple in a position to furnish them—not only in the interests of that couple,—interests the importance of which it is

not easy to underestimate—but in the interests of the future of the race, whose welfare far transcends in importance the welfare of any one individual, or any pair of individuals. As surely as the race needs a constant supply of children of sound character, so surely is it harmed by a supply of children of inherently unsound character, physically or mentally, who may contribute others like themselves to the next generation. A recollection of the facts of heredity, and of the fact that the offspring of any individual tend to increase in geometric ratio, will supply adequate grounds for holding this conviction:—that from a biological point of view, every child of congenitally inferior character is a racial misfortune. The Spartans and other peoples of antiquity fully realized this fact, and acted on it by exposing deformed infants. Christianity properly revolted as such an action; but in repudiating the action, it lost sight of the principle back of the action. The principle should have been regarded, and civilized races are now coming back to a realization of that fact—are, indeed, realizing its weight far more fully than any other people has ever done, because of the growing realization of the importance of heredity. No one is likely seriously to argue again that deformed infants (whether their deformity be physical or mental) should be exposed to perish; but the argument that in the interests of the future of the race *they would better not be born*, is one that admits of no refutation.

From a biological point of view, then, it is to the interest of the race that the number of children who will be either defective themselves, or transmit anti-social defects to their offspring, should be as small as possible.

2. The humanitarian aspect of the case is no less strong and is likely, in the present state of public education, to move a larger number of individuals. A visit to the children's ward of any hospital, an acquaintance with the sensitive mother of a feeble-minded or deformed child, will go far to convince anyone that the sum total of human happiness, and the happiness of the parents, would be greater had these children never been born. As for the children themselves, they will in many cases grow up to regret that they were ever brought into the world. We do not

overlook the occasional genius who may be crippled physically or even mentally; we are here dealing with only the extreme defectives, such as the feeble-minded, insane, and epileptic. Among such persons, human happiness would be promoted both now and in the future if the number of offspring were naught.

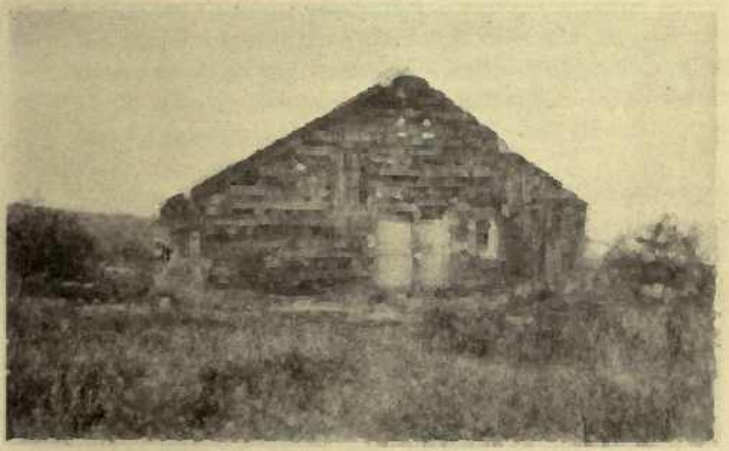
3. There is another argument which may legitimately be brought forward, and which may appeal to some who are relatively insensitive to the biological or even the humanitarian aspects of the case. This is the financial argument.

Except students of eugenics, few persons realize how staggering is the bill annually paid for the care of defectives. The amount which the state of New York expends yearly on the maintenance of its insane wards, is greater than it spends for any other purpose except education; and in a very few years, if its insane population continues to increase at the present rate, it will spend more on them than it does on the education of its normal children. The cost of institutional care for the socially inadequate is far from being all that these people cost the state; but those figures at least are not based on guesswork. The annual cost [1] of maintaining a feeble-minded ward of the state, in various commonwealths, is:

Illinois	$136.50
Indiana	147.49
Minnesota	148.05
Ohio	155.47
Wisconsin	159.77
Kansas	170.16
Michigan	179.42
Kentucky	184.77
California	208.97
Maine	222.99

At such prices, each state maintains hundreds, sometimes thousands, of feeble-minded, and the number is growing each year. In the near future the expenditures must grow much more rapidly, for public sentiment is beginning to demand that

[1] Figures furnished (September, 1917) by the National Committee for Mental Hygiene, 50 Union Square, New York City.



the defectives and delinquents of the community be properly cared for. The financial burden is becoming a heavy one; it will become a crushing one unless steps are taken to make the feeble-minded productive (as described in the next chapter) and an intangible "sinking fund" at the same time created to reduce the burden gradually by preventing the production of those who make it up. The burden can never be wholly obliterated, but it can be largely reduced by a restriction of the reproduction of those who are themselves socially inadequate.

Alike then on biological, humanitarian and financial grounds, the nation would be the better for a diminution in the production of physically, mentally or morally defective children. And the way to secure this diminution is to prevent reproduction by parents whose offspring would almost certainly be undesirable in character.

Granted that such prevention is a proper function of society, the question again arises whether it is an ethically correct procedure to allow these potentially undesirable parents to marry at all. Should they be doomed to perpetual celibacy, or should they be permitted to mate, on condition that the union be childless.

The eugenic interests of society, of course, are equally safeguarded by either alternative. All the other interests of society appear to us to be better safeguarded by marriage than by celibacy. Adding the interests of the individual, which will doubtless be for marriage, it seems to us that there is good reason for holding such a childless marriage ethically correct, in the relatively small number of cases where it might seem desirable.

Though such unions may be ethically justifiable, yet they would often be impracticable; the limits will be discussed in the next chapter.

It is constantly alleged that the state can not interfere with an individual matter of this sort: "It is an intolerable invasion of personal liberty; it is reducing humanity to the level of the barnyard; it is impossible to put artificial restraints on the relations

between the sexes, founded as they are on such strong and primal feelings."

The doctrine of personal liberty, in this extreme form, was enunciated and is maintained by people who are ignorant of biology and evolution; [1] people who are ignorant of the world as it is, and deal only with the world as they think it ought to be. Nature reveals no such extreme "law of personal liberty," and the race that tries to carry such a supposed law to its logical conclusion will soon find, in the supreme test of competition with other races, that the interests of the individual are much less important to nature than the interests of the race. Perpetuation of the race is the first end to be sought. So far as according a wide measure of personal liberty to its members will compass that end, the personal liberty doctrine is a good one; but if it is held as a metaphysical dogma, to deny that the race may take any action necessary in its own interest, at the expense of the individual, this dogma becomes suicidal.

As for "reducing humanity to the level of the barn-yard," this is merely a catch-phrase intended to arouse prejudice and to obscure the facts. The reader may judge for himself whether the eugenic program will degrade mankind to the level of the brutes, or whether it will ennoble it, beautify it, and increase its happiness.

The delusion which so many people hold, that it is impossible to put artificial restraint on the relations between the sexes, is amazing. Restraint is already a *fait accompli.* Every civilized nation already puts restrictions on numerous classes of people, as has been noted—minors, criminals, and the insane, for example. Even though this restriction is usually based on legal, rather than biological grounds, it is nevertheless a re-

[1] This applies even to such an acute thinker as John Stuart Mill, whose ideas were formed in the pre-Darwinian epoch, and whose works must now be accepted with great reserve. Darwin was quite right in saying, "The ignoring of all transmitted mental qualities will, as it seems to me, be hereafter judged as a most serious blemish in the works of Mr. Mill." (*Descent of Man*, p. 98.) A quotation from the *Principles of Political Economy* (Vol. I, p. 389) will give an idea of Mr. Mill's point of view: "Of all the vulgar methods of escaping from the effects of social and moral influences on the mind, the most vulgar is that of attributing diversities of conduct and character to inherent natural differences"!

"MONGOLIAN" DEFICIENCY

FIG. 29.—A common type of feeble-mindedness is accompanied by a face called Mongoloid, because of a certain resemblance to that of some of the Mongolian races as will be noted above. The mother at the left and the father were normal. This type seems not to be inherited, but due to some other influence,—Goddard suggests uterine exhaustion from many too frequent pregnancies.

striction, and sets a precedent for further restrictions, if any precedent were needed.

It is, we conclude, both desirable and possible to enforce certain restrictions on marriage and parenthood. What these restrictions may be, and to whom they should be applied, is next to be considered.

CHAPTER IX

THE DYSGENIC CLASSES

Before examining the methods by which society can put into effect some measure of negative or restrictive eugenics, it may be well to decide what classes of the population can properly fall within the scope of such treatment. Strictly speaking, the problem is of course one of individuals rather than classes, but for the sake of convenience it will be treated as one of classes, it being understood that no individual should be put under restriction with eugenic intent merely because he may be supposed to belong to a given class; but that each case must be investigated on its own merits,—and investigated with much more care than has hitherto usually been thought necessary by many of those who have advocated restrictive eugenic measures.

The first class demanding attention is that of those feeble-minded whose condition is due to heredity. There is reason to believe that at least two-thirds of the feeble-minded in the United States owe their condition directly to heredity,[1] and will transmit it to a large per cent of their descendants, if they have any. Feeble-minded persons from sound stock, whose arrested development is due to scarlet fever or some similar disease of childhood, or to accident, are of course not of direct concern to eugenists.

The number of patent feeble-minded in the United States is probably not less than 300,000, while the number of latent individuals—those carrying the taint in their germ-plasm and capable of transmitting it to their descendants, although the individuals themselves may show good mental development—is necessarily much greater. The defect is highly hereditary in

[1] *Feeblemindedness, its Causes and Consequences.* By H. H. Goddard, director of the Research Laboratory of the Training School at Vineland, New Jersey, for feeble-minded boys and girls. New York, The Macmillan Co., 1914.

nature: when two innately feeble-minded persons marry, all their offspring, almost without exception, are feeble-minded. The feeble-minded are never of much value to society—they never present such instances as are found among the insane, of persons with some mental lack of balance, who are yet geniuses. If restrictive eugenics dealt with no other class than the hereditarily feeble-minded, and dealt with that class effectively, it would richly justify its existence.

But there are other classes on which it can act with safety as well as profit, and one of these is made up by the germinally insane. According to the census of 1910, there are 187,791 insane in institutions in the United States; there are also a certain number outside of institutions, as to whom information can not easily be obtained. The number in the hospitals represented a ratio of 204.3 per 100,000 of the general population. In 1880, when the enumeration of insane was particularly complete, a total of 91,959 was reported—a ratio of 188.3 per 100,000 of the total population at that time. This apparent increase of insanity has been subjected to much analysis, and it is admitted that part of it can be explained away. People are living longer now than formerly, and as insanity is primarily a disease of old age, the number of insane is thus increased. Better means of diagnosis are undoubtedly responsible for some of the apparent increase. But when every conceivable allowance is made, there yet remains ground for belief that the proportion of insane persons in the population is increasing each year. This is partly due to immigration, as is indicated by the immense and constantly increasing insane population of the state of New York, where most immigrants land. In some cases, people who actually show some form of insanity may slip past the examiners; in the bulk of cases, probably, an individual is adapted to leading a normal life in his native environment, but transfer to the more strenuous environment of an American city proves to be too much for his nervous organization. The general flow of population from the country to large cities has a similar effect in increasing the number of insane.

But when all is said, the fact remains that there are several

hundred thousand insane persons in the United States, many of whom are not prevented from reproducing their kind, and that by this failure to restrain them society is putting a heavy burden of expense, unhappiness and a fearful dysgenic drag on coming generations.

The word "insanity," as is frequently objected, means little or nothing from a biological point of view—it is a sort of catch-all to describe many different kinds of nervous disturbance. No one can properly be made the subject of restrictive measures for eugenic reasons, merely because he is said to be "insane." It would be wholly immoral so to treat, for example, a man or woman who was suffering from the form of insanity which sometimes follows typhoid fever. But there are certain forms of mental disease, generally lumped under the term "insanity," which indicate a hereditarily disordered nervous organization, and individuals suffering from one of these diseases should certainly not be given any chance to perpetuate their insanity to posterity. Two types of insanity are now recognized as especially transmissible:—dementia precox, a sort of precocious old age, in which the patient (generally young) sinks into a lethargy from which he rarely recovers; and manic-depressive insanity, an over-excitable condition, in which there are occasional very erratic motor discharges, alternating with periods of depression. Constitutional psychopathic inferiority, which means a lack of emotional adaptability, usually shows in the family history. The common type of insanity which is characterized by mild hallucinations is of less concern from a eugenic point of view.

In general, the insane are more adequately restricted than any other dysgenic class in the community; not because the community recognizes the disadvantage of letting them reproduce their kind, but because there is a general fear of them, which leads to their strict segregation; and because an insane person is not considered legally competent to enter into a marriage contract. In general, the present isolation of the sexes at institutions for the insane is satisfactory; the principal problem which insanity presents lies in the fact that an individual is

frequently committed to a hospital or asylum, kept there a few years until apparently cured, and then discharged; whereupon he returns to his family to beget offspring that are fairly likely to become insane at some period in their lives. Every case of insanity should be accompanied by an investigation of the patient's ancestry, and if there is unmistakable evidence of serious neuropathic taint, such steps as are necessary should be taken to prevent that individual from becoming a parent at any time.

The hereditary nature of most types of epilepsy is generally held to be established,[1] and restrictive measures should be used to prevent the increase of the number of epileptics in the country. It has been calculated that the number of epileptics in the state of New Jersey, where the most careful investigation of the problem has been made, will double every 30 years under present conditions.

In dealing with both insanity and epilepsy, the eugenist faces the difficulty that occasionally people of the very kind whose production he most wishes to see encouraged—real geniuses—may carry the taint. The exaggerated claims of the Italian anthropologist C. Lombroso and his school, in regard to the close relation between genius and insanity, have been largely disproved; yet there remains little doubt that the two sometimes do go together; and such supposed epileptics as Mohammed, Julius Cæsar, and Napoleon will at once be called to mind. To apply sweeping restrictive measures would prevent the production of a certain amount of talent of a very high order. The situation can only be met by dealing with every case on its individual merits, and recognizing that it is to the interests of society to allow some very superior individuals to reproduce, even though part of their posterity may be mentally or physically somewhat unsound.

A field survey in two typical counties of Indiana (1916) showed that there were 1.8 recognizable epileptics per thousand popula-

[1] Probably the word now covers a congeries of defects, some of which may be nongerminal. Epilepsy is so very generally found associated with various other congenital defects, that action should not be delayed.

tion. If these figures should approximately hold good for the entire United States, the number of epileptics can hardly be put at less than 150,000. Some of them are not anti-social, but many of them are.

Feeble-mindedness and insanity were also included in the census mentioned, and the total number of the three kinds of defectives was found to be 19 per thousand in one county and 11.4 per thousand in the other. This would suggest a total for the entire United States of something like one million.

In addition to these well-recognized classes of hopelessly defective, there is a class of defectives embracing very diverse characteristics, which demands careful consideration. In it are those who are germinally physical weaklings or deformed, those born with a hereditary diathesis or predisposition toward some serious disease (e. g., Huntington's Chorea), and those with some gross defect of the organs of special sense. The germinally blind and deaf will particularly occur to mind in the latter connection. Cases falling in this category demand careful scrutiny by biological and psychological experts, before any action can be taken in the interest of eugenics; in many cases the affected individual himself will be glad to coöperate with society by remaining celibate or by the practice of birth control, to the end of leaving no offspring to bear what he has borne.

Finally, we come to the great class of delinquents who have hitherto been made the particular object of solicitude, on the part of those who have looked with favor upon sterilization legislation. The chronic inebriate, the confirmed criminal, the prostitute, the pauper, all deserve careful study by the eugenist. In many cases they will be found to be feeble-minded, and proper restriction of the feebleminded will meet their cases. Thus there is reason to believe that from a third to two-thirds of the prostitutes in American cities are feeble-minded.[1] They should be committed to institutions for the feeble-minded and kept there. It is certain that many of the pauper class, which fills up almshouses, are similarly deficient. Indeed, the census of 1910 discovered that of the 84,198 paupers in institutions on

[1] Goddard, H. H., *Feeble-Mindedness*, pp. 14–16.

the first of January in that year, 13,238 were feeble-minded, 3,518 insane, 2,202 epileptic, 918 deaf-mute, 3,375 blind, 13,753 crippled, maimed or deformed. A total of 63.7% of the whole had some serious physical or mental defect. Obviously, most of these would be taken care of under some other heading, in the program of restrictive eugenics. While paupers should be prohibited from reproduction as long as they are in state custody, careful discrimination is necessary in the treatment of those whose condition is due more to environment than heredity.

In a consideration of the chronic inebriate, the problem of environmental influences is again met in an acute form, aggravated by the venom of controversy engendered by bigotry and self-interest. That many chronic inebriates owe their condition almost wholly to heredity, and are likely to leave offspring of the same character, is indisputable. As to the possibility of "reforming" such an individual, there may be room for a difference of opinion; as to the possibility of reforming his germ-plasm, there can be none. Society owes them the best possible care, and part of its care should certainly be to see that they do not reproduce their kind. As to the borderland cases—and in the matter of inebriety borderland is perhaps bigger than mainland—it is doubtful whether much direct action can be taken in the present state of scientific knowledge and of public sentiment. Education of public opinion to avoid marriage with drunkards will probably be the most effective means of procedure.

Finally, there is the criminal class, over which the respective champions of heredity and environment have so often waged partisan warfare. There is probably no field in which restrictive eugenics would think of interfering, where it encounters so much danger as here—danger of wronging both the individual and society. Laws such as have been passed in several states, providing for the sterilization of criminals *as such*, must be deplored by the eugenist as much as they are by the pseudo-sociologist who "does not believe in heredity"; but this is not saying that there are not many cases in which eugenic action is desirable; for inheritance of a lack of emotional control makes a

man in one sense a "born criminal." [1] He is not, in most respects, the creature which he was made out to be by Lombroso and his followers; but he exists, nevertheless, and no ameliorative treatment given him will be of such value to society as preventing his reproduction.

The feeble-minded who make up a large proportion of the petty criminals that fill the jails, must, of course, be excluded from this discussion except to note that their conviction assists in discovering their defect. They should be treated as feeble-minded, not as criminals.[2] Those who may have been made criminals by society, by their environment, must also be excepted. In an investigation, the benefit of the doubt should be given to the individual. But when every possible concession is made to the influence of environment, the psychiatric study of the individual and the investigation of his family history still show that there are criminals who congenitally lack the inhibitions and instincts which make it possible for others to be useful members of society.[3] When a criminal of this natural type is found, the duty of society is unquestionably to protect itself by cutting off that line of descent.

This, we believe, covers all the classes which are at this time proper subjects for direct restrictive action with eugenic intent;

[1] See the recent studies of C. B. Davenport, particularly *The Feebly Inhibited*, Washington, Carnegie Institution, 1915.

[2] In this connection diagnosis is naturally of the utmost importance. The recent action of Chicago, New York, Boston, and other cities, in establishing psychological clinics for the examination of offenders is a great step in advance. These clinics should be attached to the police department, as in New York, not merely to the courts, and should pass on offenders before, not after, trial and commitment.

[3] As a result of psychiatric study of the inmates of Sing Sing in 1916, it was said that two-thirds of them showed some mental defect. Examination of 100 convicts selected at random in the Massachusetts State Prison showed that 29% were feeble-minded and 11% borderline cases. The highest percentage of mental defectives was found among criminals serving sentence for murder in the second degree, manslaughter, burglary and robbery. (Rossy, C. S., in *State Board of Insanity Bull.*, Boston, Nov., 1915). Paul M. Bowers told the 1916 meeting of the American Prison Association of his study of 100 recidivists, each of whom had been convicted not fewer than four times. Of these 12 were insane, 23 feeble-minded and 10 epileptic, and in each case Dr. Bowers said the mental defect bore a direct causal relation to the crime committed. Such studies argue for the need of a little elementary biology in the administration of justice.

and we repeat that the problem is not to deal with classes as a whole, but to deal with individuals of the kind described, for the sake of convenience, in the above categories. Artificial class names mean nothing to evolution. It would be a crime to cut off the posterity of a desirable member of society merely because he happened to have been popularly stigmatized by some class name that carried opprobrium with it. Similarly it would be immoral to encourage or permit the reproduction of a manifestly defective member of society of the kinds indicated, even though that individual might in some way have secured the protection of a class name that was generally considered desirable. Bearing this in mind, we believe no one can object to a proposal to prevent the reproduction of those feeble-minded, insane, epileptic, grossly defective or hopelessly delinquent people, whose condition can be proved to be due to heredity and is therefore probably transmissible to their offspring. We can imagine only one objection that might be opposed to all the advantages of such a program—namely, that no proper means can be found for putting it into effect. This objection is occasionally urged, but we believe it to be wholly without weight. We now propose to examine the various possible methods of restrictive eugenics, and to inquire which of them society can most profitably adopt.

CHAPTER X

METHODS OF RESTRICTION

The means of restriction can be divided into coercive and non-coercive. We shall discuss the former first, interpreting the word "coercive" very broadly.

From an historical point of view, the first method which presents itself is execution. This has been used since the beginning of the race, very probably, although rarely with a distinct understanding of its eugenic effect; and its value in keeping up the standard of the race should not be underestimated. It is a method the use of which prevents the rectification of mistakes. There are arguments against it on other grounds, which need not be discussed here, since it suffices to say that to put to death defectives or delinquents is wholly out of accord with the spirit of the times, and is not seriously considered by the eugenics movement.

The next possible method is castration. This has practically nothing to recommend it, except that it is effective—an argument that can also be made for the "lethal chamber." The objections against it are overwhelming. It has hardly been advocated, even by extremists, save for those whose sexual instincts are extremely disordered; but such advocacy is based on ignorance of the results. As a fact, castration frequently does not diminish the sexual impulses. Its use should be limited to cases where desirable for therapeutic reasons as well.

It is possible, however, to render either a man or woman sterile by a much less serious operation than castration. This operation, which has gained wide attention in recent years under the name of "sterilization," usually takes the form of vasectomy in man and salpingectomy in woman; it is desirable that the reader should have a clear understanding of its nature.

Vasectomy is a trivial operation performed in a few minutes,

almost painlessly with the use of cocain as a local anæsthetic; it is sometimes performed with no anæsthetic whatever. The patient's sexual life is not affected in any way, save in the one respect that he is sterile.

Salpingectomy is more serious, because the operation can not be performed so near the surface of the body. The sexual life of the subject is in no way changed, save that she is rendered barren; but the operation is attended by illness and expense.

The general advantage claimed for sterilization, as a method of preventing the reproduction of persons whose offspring would probably be a detriment to race progress, is the accomplishment of the end in view without much expense to the state, and without interfering with the "liberty and pursuit of happiness" of the individual. The general objection to it is that by removing all fear of consequences from an individual, it is likely to lead to the spread of sexual immorality and venereal disease. This objection is entitled to some consideration; but there exists a still more fundamental objection against sterilization as a program —namely, that it is sometimes not fair to the individual. Its eugenic effects may be all that are desired; but in some cases its euthenic effects must frequently be deplorable. Most of the persons whom it is proposed to sterilize are utterly unfit to hold their own in the world, in competition with normal people. For society to sterilize the feeble-minded, the insane, the alcoholic, the born criminals, the epileptic, and then turn them out to shift for themselves, saying, "We have no further concern with you, now that we know you will leave no children behind you," is unwise. People of this sort should be humanely isolated, so that they will be brought into competition only with their own kind; and they should be kept so segregated, not only until they have passed the reproductive age, but until death brings them relief from their misfortunes. Such a course is, in most cases, the only one worthy of a Christian nation; and it is obvious that if such a course is followed, the sexes can be effectively separated without difficulty, and any sterilization operation will be unnecessary.

Generally speaking, the only objection urged against segre-

gation is that of expense. In reply, it may be said that the expense will decrease steadily, when segregation is viewed as a long-time investment, because the number of future wards of the state of any particular type will be decreasing every year. Moreover, a large part of the expense can be met by properly organizing the labor of the inmates. This is particularly true of the feeble-minded, who will make up the largest part of the burden because of their numbers and the fact that most of them are not now under state care. As for the insane, epileptic, incorrigibly criminal, and the other defectives and delinquents embraced in the program, the state is already taking care of a large proportion of them, and the additional expense of making this care lifelong, and extending it to those not yet under state control, but equally deserving of it, could probably be met by better organization of the labor of the persons involved, most of whom are able to do some sort of work that will at least cover the cost of their maintenance.

That the problem is less serious than has often been supposed, may be illustrated by the following statement from H. Hastings Hart of the Russell Sage Foundation:

"Of the 10,000 (estimated) mentally defective women of child-bearing age in the state of New York, only about 1,750 are cared for in institutions designated for the care of the feeble-minded, and about 4,000 are confined in insane asylums, reformatories and prisons, while at least 4,000 (probably many more) are at large in the community.

"With reference to the 4,000 feeble-minded who are confined in hospitals for insane, prisons and reformatories and almshouses, the state would actually be the financial gainer by providing for them in custodial institutions. At the Rome Custodial Asylum 1,230 inmates are humanely cared for at $2.39 per week. The same class of inmates is being cared for in the boys' reformatories at $4.66; in the hospitals for insane at $3.90; in the girls' reformatory at $5.47, and in the almshouse at about $1.25. If all of these persons were transferred to an institution conducted on the scale of the Rome Custodial Asylum, they would not only relieve these other institutions of inmates who do not belong

there and who are a great cause of care and anxiety, but they would make room for new patients of the proper class, obviating the necessity for enlargement. The money thus saved would build ample institutions for the care of these people at a much less per capita cost than that of the prisons, reformatories and asylums where they are now kept, and the annual per capita cost of maintenance would be reduced from 20 to 50 per cent., except in almshouses, where the cost would be increased about $1 per week, but the almshouse inmates compose only a small fraction of the whole number.

"I desire to emphasize the fact that one-half of the feeble-minded of this state are already under public care, but that two-thirds of them are cared for in the wrong kind of institutions. This difficulty can be remedied without increasing the public burden, in the manner already suggested. That leaves 15,000 feeble-minded for whom no provision has yet been made. It must be remembered that these 15,000 persons are being cared for in some way. We do not allow them to starve to death, but they are fed, clothed and housed, usually by the self-denying labor of their relatives. Thousands of poor mothers are giving up their lives largely to the care of a feeble-minded child, but these mothers are unable to so protect them from becoming a menace to the community, and, in the long run, it would be far more economical for the community to segregate them in institutions than to allow them to remain in their homes, only to become ultimately paupers, criminals, prostitutes or parents of children like themselves."

Some sort of provision is now made for some of the feeble-minded in every state excepting eleven, viz.: Alabama, Arizona, Florida, Georgia, Louisiana, Nevada, New Mexico, South Carolina, Tennessee and Utah and West Virginia. Delaware sends a few cases to Pennsylvania institutions; other states sometimes care for especially difficult cases in hospitals for the insane. The District of Columbia should be added to the list, as having no institution for the care of its 800 or more feeble-minded. Alaska is likewise without such an institution.

Of the several hundred thousand feeble-minded persons in the

United States, probably not more than a tenth are getting the institutional care which is needed in most cases for their own happiness, and in nearly every case for the protection of society. It is evident that a great deal of new machinery must be created, or old institutions extended, to meet this pressing problem— [1] a problem to which, fortunately, the public is showing signs of awakening. In our opinion, the most promising attempt to solve the problem has been made by the Training School of Vineland, New Jersey, through its "Colony Plan." Superintendent E. R. Johnstone of the Training School describes the possibilities of action along this line, as follows: [2]

There are idiots, imbeciles, morons and backward children. The morons and the backward children are found in the public schools in large numbers. Goddard's studies showed twelve per cent. of an entire school district below the high school to be two or three years behind their grades, and three per cent. four or more years behind.

It is difficult for the expert to draw the line between these two classes, and parents and teachers are loth to admit that the morons are defective. This problem can best be solved by the establishment of special classes in the public schools for all who lag more than one year behind. If for no other reason, the normal children should be relieved of the drag of these backward pupils. The special classes will become the clearing houses. The training should be largely manual and industrial and as practical as possible. As the number of classes in any school district increases, the classification will sift out those who are merely backward and a little coaching and special attention will return them to the grades. The others—the morons—will remain and as long as they are not dangerous to society (sexually or otherwise) they may live at home and attend the special classes. As they grow older they will be transferred to proper custodial institutions. In the city districts, where there are many classes, this will occur between twelve and sixteen years of age. In the country districts it will occur earlier.

[1] For a sane and cautious discussion of the subject see Wallin, J. E. W., "A Program for the State Care of the Feeble-Minded and Epileptic," *School and Society*, IV, pp. 724–731, New York, Nov. 11, 1916.

[2] Johnstone, E. R., "Waste Land Plus Waste Humanity," *Training School Bulletin*, XI, pp. 60–63, Vineland, N. J., June, 1914.

These institutions will be the training schools and will form the center for the training and care of the other two groups, i. e., the imbeciles and idiots. Branching out from the training schools should be colonies (unless the parent institution is on a very large tract of ground, which is most advisable). These colonies, or groups of comparatively small buildings, should be of two classes. For the imbeciles, simple buildings costing from two to four hundred dollars per inmate. The units might well be one hundred. A unit providing four dormitories, bath house, dining-halls, employees' buildings, pump house, water tank, sewage disposal, laundry, stables and farm buildings can be built within the above figures providing the buildings are of simple construction and one story. This has been done at Vineland by having the larger imbecile and moron boys make the cement blocks of which the buildings are constructed.

For the idiots the construction can be much the same. Larger porches facing the south and more toilet fixtures will be necessary, and so add a little to the cost.

The colony should be located on rough uncleared land—preferable forestry land. Here these unskilled fellows find happy and useful occupation, waste humanity taking waste land and thus not only contributing toward their own support, but also making over land that would otherwise be useless.

One reason for building inexpensive buildings is that having cleared a large tract—say 1,000 acres—the workers can be moved to another waste tract and by brushing, clearing of rocks, draining and what not, increase its value sufficiently to keep on moving indefinitely.

Many of these boy-men make excellent farmers, dairymen, swineherds and poultry raisers under proper direction, and in the winter they can work in the tailor, paint, carpenter, mattress and mat shops.

Nor need this be confined to the males alone. The girl-women raise poultry, small fruits and vegetables very successfully. They pickle and can the products of the land, and in winter do knitting, netting and sewing of all kinds.

No manufacturer of to-day has let the product of his plant go to waste as society has wasted the energies of this by-product of humanity. And the feeble-minded are happy when they have occupation suited to their needs. If one will but see them when they are set at occupations within their comprehension and ability, he will quickly understand the joy they get out of congenial work.

Colonies such as Mr. Johnstone describes will take care of the able-bodied feeble-minded; other institutions will provide for the very young and the aged; finally, there will always be many of these defectives who can best be "segregated" in their own homes; whose relatives have means and inclination to care for them, and sufficient feeling of responsibility to see that the interests of society are protected. If there is any doubt on this last point, the state should itself assume charge, or should sterilize the defective individuals; but it is not likely that sterilization will need to be used to any large extent in the solution of this problem. In general it may be said that feeble-mindedness is the greatest single dysgenic problem facing the country, that it can be effectively solved by segregation, and that it presents no great difficulty save the initial one of arousing the public to its importance.

Similarly the hereditarily insane and epileptic can best be cared for through life-long segregation—a course which society is likely to adopt readily, because of a general dread of having insane and epileptic persons at liberty in the community. There are undoubtedly cases where the relatives of the affected individual can and should assume responsibility for his care. No insane or epileptic person whose condition is probably of a hereditary character should be allowed to leave an institution unless it is absolutely certain that he or she will not become a parent: if sterilization is the only means to assure this, then it should be used. In many cases it has been found that the individual and his relatives welcome such a step.

The habitual criminals, the chronic alcoholics, and the other defectives whom we have mentioned as being undesirable parents, will in most cases need to be given institutional care throughout life, in their own interest as well as that of society. This is already being done with many of them, and the extension of the treatment involves no new principle nor special difficulty.

It should be borne in mind that, from a eugenic point of view, the essential element in segregation is not so much isolation from society, but separation of the two sexes. Properly operated, segregation increases the happiness of the individuals segregated,

as well as working to the advantage of the body politic. In most cases the only objection to it is the expense, and this, as we have shown, need not be an insuperable difficulty. For these reasons, we believe that segregation is the best way in which to restrict the reproduction of those whose offspring could hardly fail to be undesirable, and that sterilization should be looked upon only as an adjunct, to be used in special cases where it may seem advantageous to allow an individual full liberty, or partial liberty, and yet where he or she can not be trusted to avoid reproduction.

Having reached this point in the discussion of restrictive eugenics, it may be profitable to consider the so-called "eugenic laws" which have been before the public in many states during recent years. They are one of the first manifestations of an awakening public conscience on the subject of eugenics; they show that the public, or part of it, feels the necessity of action; they equally show that the principles which should guide restrictive eugenics are not properly understood by most of those who have interested themselves in the legislative side of the program.

Twelve states now have laws on their statute books (but usually not in force) providing for the sterilization of certain classes of individuals. Similar laws have been passed in a number of other states, but were vetoed by the governors; while in many others bills have been introduced but not passed. We shall review only the bills which are actually on the statute books in 1916, and shall not attempt to detail all the provisions of them, but shall consider only the means by which they propose to attain a eugenic end.

The state of Indiana allows the sterilization of all inmates of state institutions, deemed by a commission of three surgeons to be unimprovable physically or mentally, and unfit for procreation. The object is purely eugenic. After a few hundred operations had been performed in Jeffersonville reformatory, the law aroused the hostility of Governor Thomas R. Marshall, who succeeded in preventing its enforcement; since 1913 we believe it has not been in effect. It is defectively drawn in some ways,

particularly because it includes those who will be kept in custody for life, and who are therefore not proper objects of sterilization.

The Washington law applies to habitual criminals and sex offenders; it is a punitive measure which may be ordered by the court passing sentence on the offender, but has never been put in force. Sterilization is not a suitable method of punishment, and its value as a eugenic instrument is jeopardized by the interjection of the punitive motive.

California applied her law to all inmates (not voluntary) of state hospitals for the insane and the state home for the feeble-minded, and all recidivists in the state prisons. The motive is partly eugenic, partly therapeutic, partly punitive. It is reported [1] that 635 operations have been performed under this law, which is administered by the state commission for the insane, the resident physician of any state prison, and the medical superintendent of any state institution for "fools and idiots." For several years California had the distinction of being the only state where sterilization was actually being performed in accordance with the law. The California measure applies to those serving life sentences—an unnecessary application. Although falling short of an ideal measure in some other particulars, it seems on the whole to be satisfactorily administered.

Connecticut's law provides that all inmates of state prisons and of the state hospitals at Middletown and Norwich may be sterilized if such action is recommended by a board of three surgeons, on eugenic or therapeutic grounds. It has been applied to a few insane persons (21, up to September, 1916).

Nevada has a purely punitive sterilization law applying to habitual criminals and sex offenders. The courts, which are authorized to apply it, have never done so.

Iowa's comprehensive statute applies to inmates of public institutions for criminals, rapists, idiots, feeble-minded, im-

[1] "Report of the Committee on the Sterilization of Criminals," *Journal of the Institute of Criminal Law and Criminology*, September, 1916. Of the operations mentioned, 634 are said to have been performed on insane persons and one on a criminal.

FEEBLE-MINDED MEN ARE CAPABLE OF MUCH ROUGH LABOR

FIG. 30.—Most of the cost of segregating the mentally defective can be met by properly organizing their labor, so as to make them as nearly self-supporting as possible. It has been found that they perform excellently such work as clearing forest land, or reforesting cleared land, and great gangs of them might profitably be put at such work, in most states. Photograph from the Training School, Vineland, N. J.

FEEBLE-MINDED AT A VINELAND COLONY

FIG. 31.—They have the bodies of adults but the minds of children. It is not to the interest of the state that they should be allowed to mingle with the normal population; and it is quite as little to their own interest, for they are not capable of competing successfully with people who are normal mentally.

beciles, lunatics, drug fiends, epileptics, syphilitics, moral and sexual perverts and diseased and degenerate persons. It is compulsory in case of persons twice convicted of felony or of a sexual offense other than "white slavery," in which offense one conviction makes sterilization mandatory. The state parole board, with the managing officer and physician of each institution, constitute the executive authorities. The act has many objectionable features, one of the most striking of which is the inclusion of syphilitics under the head of persons whom it is proposed to sterilize. As syphilis is a curable disease, there is scarcely more reason for sterilizing those afflicted with it than there is for sterilizing persons with measles. It is true that the sterilization of a large number of syphilitics might have a eugenic effect, if the cured syphilitics had a permanently impaired germplasm—a proposition which is very doubtful. But the framers of the law apparently were not influenced by that aspect of the case, and in any event such a method of procedure is too roundabout to be commendable. Criminals as such, and syphilitics, should certainly be removed from the workings of this law, and dealt with in some other way. However, no operations are reported as having been performed under the act.

New Jersey's law, which has never been operative, represents a much more advanced statute; it applies to inmates of state reformatories, charitable and penal institutions (rapists and confirmed criminals) and provides for a board of expert examiners, as well as for legal procedure.

New York's law, applying to inmates of state hospitals for the insane, state prisons, reformatories and charitable institutions, is also fairly well drawn, providing for a board of examiners, and surrounding the operation with legal safeguards. No operations have been performed under it.

North Dakota includes inmates of state prisons, reform school, school for feeble-minded and asylum for the insane in its law, which is administered by a special board. Although an emergency clause was tacked on, when it was passed in 1913, putting it into effect at once, no operations have been performed under it.

Michigan's law applies to all inmates of state institutions maintained wholly or in part at public expense. It lacks many of the provisions of an ideal law, but is being applied to some of the feeble-minded.

The Kansas law, which provides suitable court procedure, embraces inmates of all state institutions intrusted with the care or custody of habitual criminals, idiots, epileptics, imbeciles or insane, an "habitual criminal" being defined as "a person who has been convicted of some felony involving moral turpitude." It has been a dead letter ever since it was placed on the statute books.

Wisconsin [1] provides for a special board to consider the cases of "all inmates of state and county institutions for criminal, insane, feeble-minded and epileptic persons," prior to their release. The law has some good features, and has been applied to a hundred or more feeble-minded persons.

In 1911 the American Breeders' Association appointed a "Committee to Study and Report on the Best Practical Means of Cutting Off the Defective Germ-Plasm in the American Population," and this committee has been at work ever since, under auspices of the Eugenics Record Office, making a particular study of legal sterilization. It points out [2] that a sterilization law, to be of the greatest possible value, must:

(1) Consider sterilization as a eugenic measure, not as a punitive or even therapeutic one.

(2) Provide due process of law, before any operation is carried out.

(3) Provide adequate and competent executive agents.

(4) Designate only proper classes of persons as subject to the law.

(5) Provide for the nomination of individuals for sterilization, by suitable procedure.

(6) Make an adequate investigation of each case, the family

[1] Guyer, M. F., Wisconsin Eugenics Legislation. Trans. Amer. Asso. Study and Prevention of Infant Mortality, 1917, pp. 92-97.

[2] Eugenics Record Office, Bulletin No. 10 A, *The Scope of the Committee's Work*, Cold Spring Harbor, L. I., Feb., 1914; No. 10 B, *The Legal, Legislative and Administrative Aspects of Sterilization*, same date.

history being the most important part, and one which is often neglected at present.

(7) Have express and adequate criteria for determining upon sterilization.

(8) Designate the type of operation authorized.

(9) Make each distinct step mandatory and fix definitely the responsibility for it.

(10) Make adequate appropriation for carrying out the measure.

Tested by such standards, there is not a sterilization law in existence in the United States at the time this is written that is wholly commendable; and those introduced in various states during the last few years, but not passed, show few signs of improvement. It is evident that the commendable zeal has not had adequate guidance, in the drafting of sterilization legislation. The committee above referred to has drawn up a model law, and states which wish to adopt a program of legislative sterilization should pass a measure embodying at least the principles of this model law. But, as we have pointed out, wholesale sterilization is an unsatisfactory substitute for segregation. There are cases where it is advisable, in states too poor or niggardly to care adequately for their defectives and delinquents, but eugenists should favor segregation as the main policy, with sterilization for the special cases as previously indicated.

There is another way in which attempts have recently been made to restrict the reproduction of anti-social persons: by putting restrictions on marriage. This form of campaign, although usually calling itself eugenic, has been due far less to eugenists than to sex hygienists who have chosen to sail under a borrowed flag. Every eugenist must wish them success in their efforts to promote sex hygiene, but it is a matter of regret that they can not place their efforts in the proper light, for their masquerade as a eugenic propaganda has brought undeserved reproach on the eugenics movement.

The customary form of legal action in this case is to demand that both applicants for a marriage license, or in some cases only

the male, sign an affidavit or present a certificate from some medical authority stating that an examination has been made and the applicant found to be free from any venereal disease. In some cases other diseases or mental defects are included. When the law prevents marriage on account of insanity, feeble-mindedness, or other hereditary defect, it obviously has a eugenic value; but in so far as it concerns itself with venereal diseases, which are not hereditary, it is only of indirect interest to eugenics. The great objection to such laws is that they are too easily evaded by the persons whom they are intended to reach—a fact that has been demonstrated conclusively wherever they have been put in force. Furthermore, the nature of the examination demanded is usually wholly inadequate to ascertain whether the applicant really is or is not afflicted with a venereal disease. Finally, it is to be borne in mind that the denial of a marriage license will by no means prevent reproduction, among the anti-social classes of the community.

For these reasons, the so-called eugenic laws of several states, which provide for a certificate of health before a marriage license is issued, are not adequate eugenic measures. They have some value in awakening public sentiment to the value of a clean record in a prospective life partner. To the extent that they are enforced, the probability that persons afflicted with venereal disease are on the average eugenically inferior to the unaffected gives these laws some eugenic effect. We are not called on to discuss them from a hygienic point of view; but we believe that it is a mistake for eugenists to let legislation of this sort be anything but a minor achievement, to be followed up by more efficient legislation.

Laws which tend to surround marriage with a reasonable amount of formality and publicity are, in general, desirable eugenically. They tend to discourage hasty and secret marriages, and to make matrimony appear as a matter in which the public has a legitimate interest, and which is not to be undertaken lightly and without consideration. Laws compelling the young to get the consent of their parents before marriage are to be placed in this category; and likewise the German law

which requires the presentation of birth-certificates before a marriage license is issued.

A revival under proper form of the old custom of publishing the banns is desirable. Undoubtedly many hasty and ill-considered marriages are contracted at the present time, with dysgenic results, which could be prevented if the relatives and friends of the contracting parties knew what was going on, and could bring to light defects or objections unknown or not properly realized by the young people. Among other states, Missouri has recently considered such a law, proposing that each applicant for a marriage license be required to present a certificate from a reputable physician, stating in concise terms the applicant's health and his fitness to marry. Notice of application for a marriage license shall be published in a daily paper three consecutive times, at the expense of the county. If at the expiration of one day from the publication of the last notice, no charges have been filed with the recorder alleging the applicants' unfitness to marry, license shall be granted. If objection be made by three persons not related in blood to each other, on the ground of any item mentioned in the physician's certificate, the case shall be taken before the circuit court; if the court sustains the objection of these three unrelated persons, a license to wed shall be denied; if the court overrules the objection, the license shall be granted and court costs charged to the objectors.

Although interesting as showing the drift of public sentiment toward a revival of the banns, this proposed law is poorly drawn. Three unrelated laymen and the judge of a circuit court are not the proper persons to decide on the biological fitness of a proposed marriage. We believe the interests of eugenics would be sufficiently met at this time by a law which provided that adequate notice of application for marriage license should be published, and no license granted (except under exceptional circumstances) until the expiration of two weeks from the publication of the notice. This would give families and friends time to act; but it is probably not practicable to forbid the issuance of a license at the expiration of the designated time, unless evidence is brought forward showing that one of the applicants is not

legally capable of contracting marriage because of a previous mate still living and undivorced, or because of insanity, feeble-mindedness, under age, etc. Such a law, we believe, could be put on the statute books of any state, and enforced, without arousing prejudices or running counter to public sentiment; and its eugenic value, if small, would certainly be real.

This exhausts the list of suggested coercive means of restricting the reproduction of the inferior. What we propose is, we believe, a very modest program, and one which can be carried out, as soon as public opinion is educated on the subject, without any great sociological, legal or financial hindrances. We suggest nothing more than that individuals whose offspring would almost certainly be subversive of the general welfare, be prevented from having any offspring. In most cases, such individuals are, or should be, given life-long institutional care for their own benefit, and it is an easy matter, by segregation of the sexes, to prevent reproduction. In a few cases, it will probably be found desirable to sterilize the individual by a surgical operation.

Such coercive restriction does, in some cases, sacrifice what may be considered personal rights. In such instances, personal rights must give way before the immensely greater interests of the race. But there is a much larger class of cases, where coercion can not be approved, and yet where an enlightened conscience, or the subtle force of public opinion, may well bring about some measure of restraint on reproduction. This class includes many individuals who are not in any direct way detrimental to society; and who yet have some inherited taint or defect that should be checked, and of which they, if enlightened, would probably be the first to desire the elimination. The number of high-minded persons who deliberately refrain from marriage, or parenthood, in the interests of posterity, is greater than any one imagines, except a eugenist brought into intimate relations with people who take an intelligent interest in the subject.

X. comes, let us say, from a family in which there is a persistent taint of epilepsy, or insanity. X. is a normal, useful,

conscientious member of society. To talk of segregating such an individual would be rash. But X. has given some thought to heredity and eugenics, and decides that he, or she, will refrain from marriage, in order to avoid transmitting the family taint to another generation. Here we have, in effect, a non-coercive restriction of reproduction. What shall we say of the action of X. in remaining celibate,—is it wise or unwise? To be encouraged or condemned?

It is perhaps the most delicate problem which applied eugenics offers. It is a peculiarly personal one, and the outsider who advises in such a case is assuming a heavy responsibility, not only in regard to the future welfare of the race, but to the individual happiness of X. We can not accept the sweeping generalization sometimes made that "Strength should marry weakness and weakness marry strength." No more can we hold fast to the ideal, which we believe to be utopian, that "Strength should only marry strength." There are cases where such glittering generalities are futile; where the race and the individual would both be gainers by a marriage which produced children that had the family taint, but either latent or not to a degree serious enough to counteract their value. The individual must decide for himself with especial reference to the trait in question and his other compensating qualities; but he should at least have the benefit of whatever light genetics can offer him, before he makes his decision.

For the sake of a concrete example, let us suppose that a man, in whose ancestry tuberculosis has appeared for several generations, is contemplating marriage. The first thing to be remembered is that if he marries a woman with a similar family history, their children will have a double inheritance of the taint, and are almost certain to be affected unless living in an especially favorable region. It would *in most cases* be best that no children result from such a marriage.

On the other hand, the man may marry a woman in whose family consumption is unknown. The chance of their children being tuberculous will not be great; nevertheless the taint, the diathesis, will be passed on just the same, although concealed,

possibly to appear at some future time. Such a marriage is in some ways more dangerous to the race, in the long run, than that of "weakness with weakness." Yet society at present certainly has no safe grounds for interference, if such a marriage is made. If the two persons come of superior stock, it seems *probable* that the gain will outweigh the loss. In any event, it is at least to be expected that both man and woman would have a deliberate consciousness of what they are doing, and that no person with any honor would enter into a marriage, concealing a defect in his or her ancestry. Love is usually blind enough to overlook such a thing, but if it chooses not to, it ought not to be blindfolded.

In short, the mating of strength with strength is certainly the ideal which society should have and which every individual should have. But human heredity is so mixed that this ideal is not always practicable; and if any two persons wish to abandon it, society is hardly justified in interfering, unless the case be so gross as those which we were discussing in the first part of this chapter. Progress in this direction is to be expected mainly from the enlightened action of the individual. Much more progress in the study of heredity must be made before advice on marriage matings can be given in any except fairly obvious cases. The most that can now be done is to urge that a full knowledge of the family history of an intended life partner be sought, to encourage the discreet inquiries and subtle guidance of parents, and to appeal to the eugenic conscience of a young man or woman. In case of doubt the advice of a competent biologist should be taken. There is a real danger that high-minded people may allow some minor physical defect to outweigh a greater mental excellence.

There remains one other non-coercive method of influencing the distribution of marriage, which deserves consideration in this connection.

We have said that society can not well put many restrictions on marriage at the present time. We urge by every means at our command that marriage be looked upon more seriously, that it be undertaken with more deliberation and consideration. We

consider it a crime for people to marry, without knowing each other's family histories. But in spite of all this, ill-assorted, dysgenic marriages will still be made. When such a marriage is later demonstrated to have been a mistake, not only from an individual, but also from a eugenic point of view, society should be ready to dissolve the union. Divorce is far preferable to mere separation, since the unoffending party should not be denied the privilege of remarriage, as the race in most cases needs his or her contribution to the next generation. In extreme cases, it would be proper for society to take adequate steps to insure that the dysgenic party could neither remarry nor have offspring outside marriage. The time-honored justifiable grounds for divorce,—adultery, sterility, impotence, venereal infection, desertion, non-support, habitual cruelty,—appear to us to be no more worthy of legal recognition than the more purely dysgenic grounds of chronic inebriety, feeble-mindedness, epilepsy, insanity or any other serious inheritable physical, mental or moral defect.

This view of the eugenic value of divorce should not be construed as a plea for the admission of mutual consent as a ground for divorce. It is desirable, however, to realize that mismating is the real evil. Divorce in such cases is merely a cure for an improper condition. Social condemnation should stigmatize the wrong of mismating, not the undoing of such a wrong.

Restrictions on age at marriage are almost universal. The object is to prevent too early marriages. The objections which are commonly urged against early marriage (in so far as they bear upon eugenics) are the following:

1. That it results in inferior offspring. This objection is not well supported except possibly in the most extreme cases. Physically, there is evidence that the younger parents on the whole bear the sounder children.

2. That a postponement of marriage provides the opportunity for better sexual selection. This is a valid ground for discouraging the marriage of minors.

3. The better educated classes are obliged to marry late, because a man usually can not marry until he has finished his

education and established himself in business. A fair amount of restriction as to age at marriage will therefore not affect these classes, but may affect the uneducated classes. In so far as lack of education is correlated with eugenic inferiority, some restriction of this sort is desirable, because it will keep inferiors from reproducing too rapidly, as compared with the superior elements of the population.

While the widespread rule that men should not marry under 21 and women under 18 has some justification, then, an ideal law would permit exceptions where there was adequate income and good mating.

Laws to prohibit or restrict consanguineous marriages fall within the scope of this chapter, in so far as they are not based on dogma alone, since their aim is popularly supposed to be to prevent marriages that will result in undesirable offspring. Examining the laws of all the United States, C. B. Davenport [1] found the following classes excluded from marriage:

1. Sibs (i. e., full brothers and sisters) in all states, and half sibs in most states.

2. Parent and child in all states, and parent and grandchild in all states except Pennsylvania.

3. Child and parent's sibs (i. e., niece and uncle, nephew and aunt). Prohibited in all but four states.

4. First cousins. Marriages of this type are prohibited in over a third of the states, and tacitly or specifically permitted in the others.

5. Other blood relatives are occasionally prohibited from marrying. Thus, second cousins in Oklahoma and a child and his or her parent's half sibs in Alabama, Minnesota, New Jersey, Texas, and other states.

In the closest of blood-relationships the well-nigh universal restrictions should be retained. But when marriage between cousins—the commonest form of consanguineous marriage—is examined, it is found to result frequently well, sometimes ill. There is a widespread belief that such marriages are dangerous,

[1] Eugenics Record Office Bulletin No. 9: *State Laws Limiting Marriage Selection Examined in the Light of Eugenics*. Cold Spring Harbor, L. I., June, 1913.

and in support of this idea, one is referred to the histories of various isolated communities where consanguineous marriage is alleged to have led to "an appalling amount of defect and degeneracy." Without questioning the facts, one may question the interpretation of the facts, and it seems to us that a wrong interpretation of these stories is partly responsible for the widespread condemnation of cousin marriage at the present time.

The Bahama Islands furnish one of the stock examples. Clement A. Penrose writes [1] of them:

"In some of the white colonies where black blood has been excluded, and where, owing to their isolated positions, frequent intermarriage has taken place, as for instance at Spanish Wells, and Hopetown, much degeneracy is present, manifested by many abnormalities of mind and body. . . . I am strongly of the opinion that the deplorable state of degeneracy which we observed at Hopetown has been in a great measure, if not entirely, brought about by too close intermarrying of the inhabitants."

To demonstrate his point, he took the pains to compile a family tree of the most degenerate strains at Hopetown. There are fifty-five marriages represented, and the chart is overlaid with twenty-three red lines, each of which is said to represent an intermarriage. This looks like a good deal of consanguineous mating; but to test the matter a little farther the fraternity at the bottom of the chart,—eight children, of whom five were idiots,—was traced. In the second generation it ran to another island, and when the data gave out, at the fourth generation, there was not a single case of consanguineous marriage involved.

Another fraternity was then picked out consisting of two men, both idiots and congenitally blind, and a woman who had married and given birth to ten normal children. In the fourth generation this pedigree, which was far from complete, went out of the islands; so far as the data showed there was not a single case of consanguineous marriage. There was one case where a name was repeated, but the author had failed to mark this as a case of intermarriage, if it really was such. It is difficult to

[1] Penrose, Clement A., *Sanitary Conditions in the Bahama Islands*, Geographical Society of Baltimore, 1905.

share the conviction of Dr. Penrose, that the two pedigrees investigated, offer an example of the nefarious workings of intermarriage.

Finally a fraternity was traced to which the author had called particular attention because three of its eleven members were born blind. The defect was described as "optic atrophy associated with a pigmentary retinitis and choryditis" and "this condition," Dr. Penrose averred, "is one stated by the authorities to be due to the effects of consanguineous marriage."

Fortunately, the pedigree was fairly full and several lines of it could be carried through the sixth generation. There was, indeed, a considerable amount of consanguineous marriage involved. When the amount of inbreeding represented by these blind boys was measured, it proved to be almost identical with the amount represented by the present Kaiser of Germany.[1]

We are unable to see in such a history as that of Hopetown, Bahama Islands, any evidence that consanguineous marriage necessarily results in degeneracy. Dr. Penrose himself points to a potent factor when he says of his chart in another connection: "It will be noticed that only a few of the descendants of Widow Malone [the first settler at Hopetown] are indicated as having married. By this it is not meant that the others did not marry; many of them did, but they moved away and settled elsewhere, and in no way affected the future history of the settlement of Hopetown."

By moving away, it appears to us, they did very decidedly affect the future history of Hopetown. Who are the emigrants? Might they not have been the more enterprising and intelligent, the physically and mentally superior of the population, who rebelled at the limited opportunities of their little village, and went to seek a fortune in some broader field? Did not the best go in general; the misfits, the defectives, stay behind to propagate? Emigration in such a case would have the same effect as war; it would drain off the best stock and leave the weaklings to stay home and propagate their kind. Under such conditions,

[1] See von Gruber and Rüdin, *Fortpflanzung, Vererbung, Rassenhygiene*, p. 169, München, 1911.

defectives would be bound to multiply, regardless of whether or not the marriages are consanguineous.

"It will be seen at a glance," Dr. Penrose writes, "that early in the history of the Malone family these indications of degeneracy were absent; but they began in the fourth generation and rapidly increased afterward until they culminated by the presence of five idiots in one family. The original stock was apparently excellent, but the present state of the descendants is deplorable."

Now three generations of emigration from a little community, which even to-day has only 1,000 inhabitants, would naturally make quite a difference in the average eugenic quality of the population. In almost any population, a few defectives are constantly being produced. Take out the better individuals, and leave these defectives to multiply, and the amount of degeneracy in the population will increase, regardless of whether the defectives are marrying their cousins, or unrelated persons. The family of five idiots, cited by Dr. Penrose, is an excellent illustration, for it is not the result of consanguineous marriage—at least, not in a close enough degree to have appeared on the chart. It is doubtless a mating of like with like; and biologically, consanguineous marriage is nothing more.

Honesty demands, therefore, that consanguineous marriage be not credited with results for which the consanguineous element is in no wise responsible. The prevailing habit of picking out a community or a strain where consanguineous marriage and defects are associated and loudly declaring the one to be the cause of the other, is evidence of the lack of scientific thought that is all too common.

Most of the studies of these isolated communities where intermarriage has taken place, illustrate the same point. C. B. Davenport, for example, quotes [1] an anonymous correspondent from the island of Bermuda, which "shows the usual consequence of island life." He writes: "In some of the parishes (Somerset and Paget chiefly) there has been much intermarriage, not only with cousins but with double first cousins in

[1] Davenport, Charles B., *Heredity in Relation to Eugenics*, pp. 184 ff., New York, 1911.

several cases. Intermarriage has chiefly caused weakness of character leading to drink, not lack of brains or a certain amount of physical strength, but a very inert and lazy disposition."

It is difficult to believe that anyone who has lived in the tropics could have written this except as a practical joke. Those who have resided in the warmer parts of the world know, by observation if not by experience, that a "weakness of character leading to drink" and "an inert and lazy disposition" are by no means the prerogatives of the inbred.

If one is going to credit consanguineous marriage with these evil results, what can one say when evil results fail to follow?

What about Smith's Island, off the coast of Maryland, where all the inhabitants are said to be interrelated, and where a physician who lived in the community for three years failed to find among the 700 persons a single case of idiocy, insanity, epilepsy or congenital deafness?

What about the community of Batz, on the coast of France, where Voisin found five marriages of first cousins and thirty-one of second cousins, without a single case of mental defect, congenital deafness, albinism, retinitis pigmentosa or malformation? The population was 3,000, all of whom were said to be interrelated.

What about Cape Cod, whose natives are known throughout New England for their ability? "At a recent visit to the Congregational Sunday-School," says a student, "I noticed all officers, many teachers, organist, ex-superintendent, and pastor's wife all Dyers. A lady at Truro united in herself four quarters Dyer, father, mother and both grandmothers Dyers."

And finally, what about the experience of livestock breeders? Not only has strict brother and sister mating—the closest inbreeding possible—been carried on experimentally for twenty or twenty-five generations without bad results; but the history of practically every fine breed shows that inbreeding is largely responsible for its excellence.

The Ptolemies, who ruled Egypt for several centuries, wanted to keep the throne in the family, and hence practiced a system of intermating which has long been the classical evidence that

consanguineous marriage is not necessarily followed by immediate evil effects. The following fragment of the genealogy of Cleopatra VII (mistress of Julius Cæsar and Marc Antony) is condensed from Weigall's *Life and Times of Cleopatra* (1914) and

Ptolemy I
|
Ptolemy II
|
Ptolemy III m. Berenice II, his half-cousin.
|
Ptolemy IV m. Arsinoë III, his full sister.
|
Ptolemy V.
|
Ptolemy VII m. Cleopatra II, his full sister.
|
Cleopatra III m. Ptolemy IX (brother of VII), her uncle.
|
Ptolemy X. m. Cleopatra IV, his full sister.
|
Berenice II m. Ptolemy XI (brother of X), her uncle.
|
Ptolemy XII, d. without issue, succeeded by his uncle.

Ptolemy XIII.
|
Cleopatra VII.

shows an amount of continued inbreeding that has never been surpassed in recorded history, and yet did not produce any striking evil results. The ruler's consort is named, only when the two were related. The consanguineous marriages shown in this line of descent are by no means the only ones of the kind that took place in the family, many like them being found in collateral lines.

It is certain that consanguineous marriage, being the mating of like with like, intensifies the inheritance of the offspring,

which gets a "double dose" of any trait which both parents have in common. If the traits are good, it will be an advantage to the offspring to have a double dose of them; if the traits are bad, it will be a disadvantage. The marriage of superior kin should produce children better than the parents; the marriage of inferior kin should produce children even worse than their parents.

In passing judgment on a proposed marriage, therefore, the vital question is not, "Are they related by blood?" but "Are they carriers of desirable traits?"

The nature of the traits can be told only by a study of the ancestry. Of course, characters may be latent or recessive, but this is also the case in the population at large, and the chance of unpleasant results is so small, when no instance can be found in the ancestry, that it can be disregarded. If the same congenital defect or undesirable trait does not appear in the three previous generations of two cousins, including collaterals, the individuals need not be discouraged from marrying if they want to.

Laws which forbid cousins to marry are, then, on an unsound biological basis. As Dr. Davenport remarks, "The marriage of Charles Darwin and Emma Wedgewood would have been illegal and void, and their children pronounced illegitimate in Illinois, Indiana, Iowa, Kansas, Missouri, Nebraska, New Hampshire, Oklahoma, Oregon, Pennsylvania, South Dakota, Utah, Washington, Wyoming, and other states." The vitality and great capacity of their seven children are well known. A law which would have prevented such a marriage is certainly not eugenic.

We conclude, then, that laws forbidding cousin marriages are not desirable. Since it would be well to make an effort to increase the opportunities for further play of sexual selection, the lack of which is sometimes responsible for cousin marriages, consanguineous marriage is by no means to be indiscriminately indorsed. Still, if there are cases where it is eugenically injurious, there are also cases where its results are eugenically highly beneficial, as in families with no serious defects and with outstanding ability.

The laws prohibiting marriage between persons having no

blood relationship but connected by marriage should all be repealed. The best-known English instance, which was eugenically very objectionable,—the prohibition of marriage between a man and his deceased wife's sister,—has fortunately been extirpated, but laws still exist, in some communities, prohibiting marriage between a man and his stepchild or stepparent, between a woman and her deceased husband's brother, and between the second husband or wife of a deceased aunt or uncle and the wife or husband of a deceased nephew or niece, etc.

The only other problem of restrictive eugenics which it seems necessary to consider is that offered by miscegenation. This will be considered in Chapters XIV and XV.

To sum up: we believe that there are urgent reasons for and no objections to preventing the reproduction of a number of persons in the United States, many of whom have already been recognized by society as being so anti-social or inferior as to need institutional care. Such restriction can best be enforced by effective segregation of the sexes, although there are cases where individuals might well be released and allowed full freedom, either "on parole," so to speak, or after having undergone a surgical operation which would prevent their reproduction.

Laws providing for sterilization, such as a dozen states now possess, are not framed with a knowledge of the needs of the case; but a properly drafted sterilization law to provide for cases not better treated by segregation is desirable. Segregation should be considered the main method.

It is practicable to place only minor restrictions on marriage, with a eugenic goal in view. A good banns law, however, could meet no objections and would yield valuable results. Limited age restrictions are proper.

Marriages of individuals whose families are marked by minor taints can not justify social interference; but an enlightened conscience and a eugenic point of view should lead every individual to make as good a choice as possible.

If a eugenically bad mating has been made, society should minimize as far as possible the injurious results, by means of provision for properly restricted divorce.

Consanguineous marriages in a degree no closer than that of first cousins, are neither to be condemned nor praised indiscriminately. Their desirability depends on the ancestry of the two persons involved; each case should therefore be treated on its own merits.

CHAPTER XI

THE IMPROVEMENT OF SEXUAL SELECTION

"Love is blind" and "Marriage is a lottery," in the opinion of proverbial lore. But as usual the proverbs do not tell the whole truth. Mating is not wholly a matter of chance; there is and always has been a considerable amount of selection involved. This selection must of course be with respect to individual traits, a man or woman being for this purpose merely the sum of his or her traits. Reflection will show that with respect to any given trait there are three ways of mating: random, assortative and preferential.

1. Random mating is described by J. Arthur Harris [1] as follows:

"Suppose a most highly refined socialistic community should set about to equalize as nearly as possible not only men's labor and their recompense, but the quality of their wives. It would never do to allow individuals to select their own partners—superior cunning might result in some having mates above the average desirability, which would be socially unfair!

"The method adopted would be to write the names of an equal number of men and women officially condemned to matrimony on cards, and to place those for men in one lottery wheel and those for women in another. The drawing of a pair of cards, one from each wheel, would then replace the 'present wasteful system' of 'competitive' courtship. If the cards were thoroughly shuffled and the drawings perfectly at random, we should expect only chance resemblances between husband and wife for age, stature, eye and hair color, temper and so on; in the long run, a wife would resemble her husband no more than the

[1] Harris, J. Arthur, "Assortative Mating in Man," *Popular Science Monthly*, LXXX, pp. 476–493, May, 1912. The most important studies on the subject are cited by Dr. Harris.

husband of some other woman. In this case, the mathematician can give us a coefficient of resemblance, or of assortative mating, which we write as zero. The other extreme would be the state of affairs in which men of a certain type (that is to say men differing from the general average by a definite amount) always chose wives of the same type; the resemblance would then be perfect and the correlation, as we call it, would be expressed by a coefficient of 1."

If all mating were at random, evolution would be a very slow process. But actual measurement of various traits in conjugal pairs shows that mating is very rarely random. There is a conscious or unconscious selection for certain traits, and this selection involves other traits because of the general correlation of traits in an individual. Random mating, therefore, need not be taken into account by eugenists, who must rather give their attention to one of the two forms of non-random mating, namely, assortative and preferential.

2. If men who were above the average height always selected as brides women who were equally above the average height and short men selected similarly, the coefficient of correlation between height in husbands and wives would be 1, and there would thus be perfect assortative mating. If only one half of the men who differed from the average height always married women who similarly differed and the other half married at random, there would be assortative mating for height, but it would not be perfect: the coefficient would only be half as great as in the first case, or .5. If on the other hand (as is indeed the popular idea) a tall man tended to marry a woman who was shorter than the average, the coefficient of correlation would be less than 0; it would have some negative value.

Actual measurement shows that a man who exceeds the average height by a given amount will most frequently marry a woman who exceeds the average by a little more than one-fourth as much as her husband does. There is thus assortative mating for height, but it is far from perfect. The actual coefficient given by Karl Pearson is .28. In this case, then, the idea that "unlikes attract" is found to be the reverse of the truth.

If other traits are measured, assortative mating will again be found. Whether it be eye color, hair color, general health, intelligence, longevity, insanity, or congenital deafness, exact measurements show that a man and his wife, though not related by blood, actually resemble each other as much as do uncle and niece, or first cousins.

In some cases assortative mating is conscious, as when two congenitally deaf persons are drawn together by their common affliction and mutual possession of the sign language. But in the greater number of cases it is wholly unconscious. Certainly no one would suppose that a man selects his wife deliberately because her eye color matches his own; much less would he select her on the basis of resemblance in longevity, which can not be known until after both are dead.

Sigmund Freud and Ernest Jones explain such selection by the supposition that a man's ideal of everything that is lovely in womankind is based on his mother. During his childhood, her attributes stamp themselves on his mind as being the perfect attributes of the female sex; and when he later falls in love it is natural that the woman who mosts attracts him should be one who resembles his mother. But as he, because of heredity, resembles his mother, there is thus a resemblance between husband and wife. Cases where there is no resemblance would, on this hypothesis, either be not love matches, or else be cases where the choice was made by the woman, not the man. Proof of this hypothesis has not yet been furnished, but it may very well account for some part of the assortative mating which is so nearly universal.

The eugenic significance of assortative mating is obvious. Marriage of representatives of two long-lived strains ensures that the offspring will inherit more longevity than does the ordinary man. Marriage of two persons from gifted families will endow the children with more than the ordinary intellect. On the other hand, marriage of two members of feeble-minded strains (a very common form of assortative mating) results in the production of a new lot of feeble-minded children, while marriage contracted between families marked by criminality or alcoholism

means the perpetuation of such traits in an intensified form. For alcoholism, Charles Goring found the resemblance between husband and wife in the following classes to be as follows:

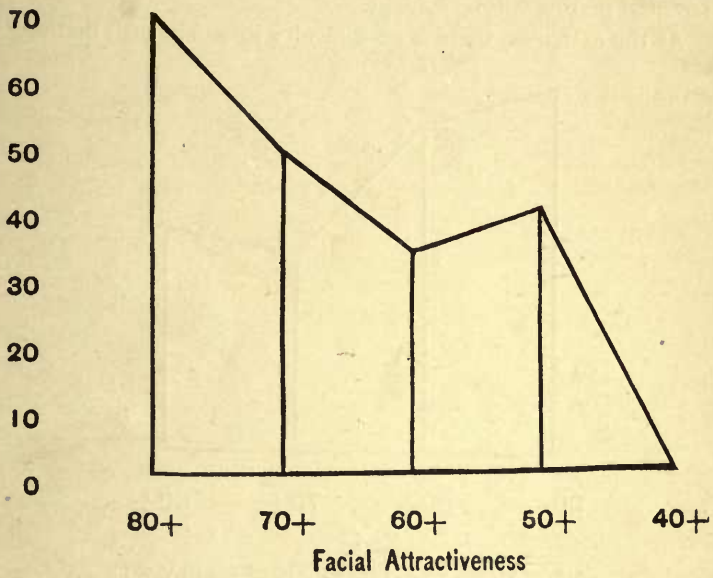
Very poor and destitute	.44
Prosperous poor	.58
Well-to-do	.69

The resemblance of husband and wife, in respect of possession of a police record, he found to be .20. Of course alcoholism and criminality are not wholly due to heredity; the resemblance between man and wife is partly a matter of social influences. But in any case the existence of assortative mating for such traits is significant.

3. Preferential mating occurs when certain classes of women are discriminated against by the average man, or by men as a class; or *vice versa*. It is the form of sexual selection made prominent by Charles Darwin, who brought it forward because natural selection, operating solely through a differential death-rate, seemed inadequate to account for many phases of evolution. By sexual selection he meant that an individual of one sex, in choosing a mate, is led to select out of several competitors the one who has some particular attribute in a high degree. The selection may be conscious, and due to the exercise of æsthetic taste, or it may be unconscious, due to the greater degree of excitation produced by the higher degree of some attribute. However the selection takes place, the individual so selected will have an opportunity to transmit his character, in the higher degree in which he possesses it, to his descendants. In this way it was supposed by Darwin that a large proportion of the ornamental characters of living creatures were produced: the tail of the peacock, the mane of the lion, and even the gorgeous coloring of many insects and butterflies. In the early years of Darwinism, the theory of sexual selection was pushed to what now seems an unjustifiable extent. Experiment has often failed to demonstrate any sexual selection, in species where speculation supposed it to exist. And even if sexual selection, conscious or unconscious, could be demonstrated in the lower animals, yet

the small percentage of unmated individuals indicates that its importance in evolution could not be very great.[1]

In man, however, there is—nowadays at least—a considerable percentage of unmated individuals. The Census of 1910 shows



HOW BEAUTY AIDS A GIRL'S CHANCE OF MARRIAGE

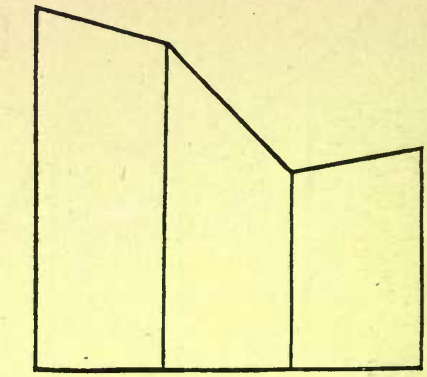
FIG. 32.—Graph showing the marriage rate of graduates of a normal school, correlated with their facial attractiveness as graded by estimates. The column of figures at the left-hand side shows the percentage of girls who married. Of the prettiest girls (those graded 80 or over), 70% married. As the less attractive girls are added to the chart, the marriage rate declines. Of the girls who graded around 50 on looks, only about one-half married. In general, the prettier the girl, the greater the probability that she will not remain single.

that in the United States one-fourth of all the men between 25 and 44 years of age, and one-sixth of all the women, were unmarried. Many of the men, and a smaller number of the

[1] An interesting and critical treatment of sexual selection is given by Vernon L. Kellogg in *Darwinism Today*, pp. 106–128 (New York, 1908). Darwin's own discussion (*The Descent of Man*) is still very well worth reading, if the reader is on his guard. The best general treatment of the theory of sexual selection, especially as it applies to man, is in chapter XI of Karl Pearson's *Grammar of Science* (2d ed., London, 1900).

women, will still marry; yet at the end there will remain a large number, particularly in the more highly educated classes, who die celibate. If these unmated individuals differ in any important respect from the married part of the population, preferential mating will be evident.

At the extremes, there is no difficulty in seeing such mating.



INTELLIGENT GIRLS ARE MOST LIKELY TO MARRY

FIG. 33.—Graph showing the marriage-rate (on the same scale as in Fig. 32) of the graduates of a normal school, as correlated with their class standing. The girls who received the highest marks in their studies married in the largest numbers. It is evident that, on the whole, girls who make a poor showing in their studies in such schools as this are more likely to be lifelong celibates than are the bright students.

Certain men and women are so defective, physically, mentally, or morally, as to be unable to find mates. They may be idiots, or diseased, or lacking normal sexuality, or wrongly educated.

But to get any adequate statistical proof of preferential mating on a broad scale, has been found difficult. Two small but suggestive studies made by Miss Carrie F. Gilmore of the University of Pittsburgh are interesting, though far from con-

clusive. She examined the records of the class of 1902, Southwestern State Normal School of Pennsylvania, to find which of the girls had married. By means of photographs, and the opinions of disinterested judges, the facial appearance of all the

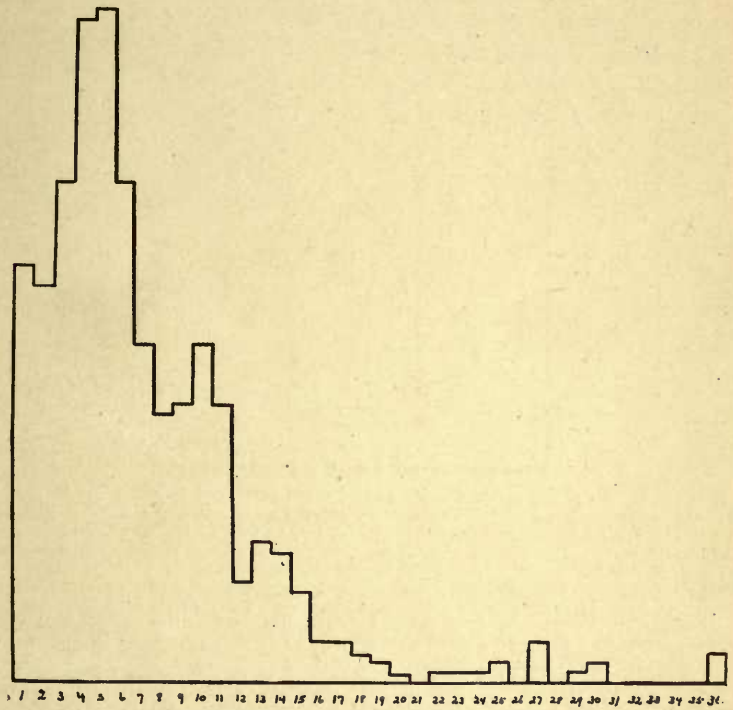


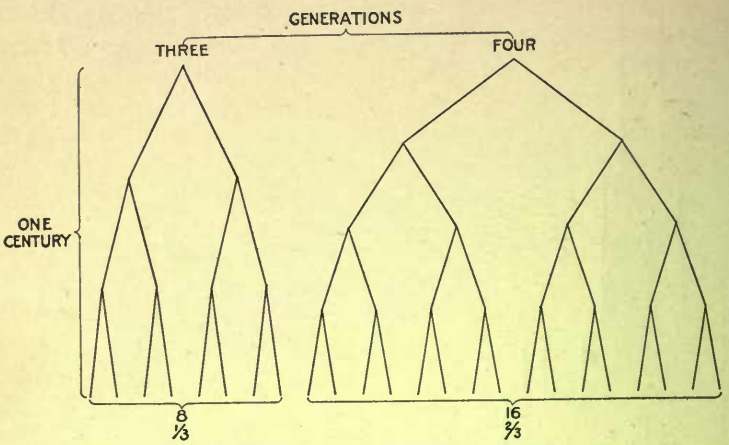
FIG. 34.—Curve showing period that elapsed between the graduation of women at Washington Seminary (at the average age of 19 years) and their marriage. It includes all the graduates of the classes of 1841 to 1900, status of 1913.

girls in the class was graded on a scale of 100, and the curve in Fig. 32 plotted, which shows at a glance just what matrimonial advantage a woman's beauty gives her. In general, it may be said that the prettier the girl, the better her chance of marriage.

Miss Gilmore further worked out the marriage rate of these normal school girls, on the basis of the marks they obtained in their class work, and found the results plotted in Fig. 33. It is

evident that the most intelligent girls, measured by their class standing, were preferred as wives.

It will be noted that these studies merely show that the brighter and prettier girls were preferred by men as a class. If



THE EFFECT OF LATE MARRIAGES

FIG. 35.—Given a population divided in two equal parts, one of which produces a new generation every 25 years and the other every 33 1/3 years, the diagram shows that the former group will outnumber the latter two to one, at the end of a century. The result illustrated is actually taking place, in various groups of the population of the United States. Largely for economic reasons, many superior people are postponing the time of marriage. The diagram shows graphically how they are losing ground, in comparison with other sections of the population which marry only a few years earlier, on the average. It is assumed in the diagram that the two groups contain equal numbers of the two sexes; that all persons in each group marry; and that each couple produces four children.

the individual men whom the girls married had been studied, it would probably have been found that the mating was also partly assortative.

If the choice of a life partner is to be eugenic, random mating must be as nearly as possible eliminated, and assortative and preferential mating for desirable traits must take place.

The concern of the eugenist is, then, (1) to see that young people have the best ideals, and (2) to see that their matings are actually guided by these ideals, instead of by caprice and passion alone.

1. In discussing ideals, we shall ask (a) what are the present

ideals governing sexual selection in the United States; (b) is it psychologically possible to change them; (c) is it desirable that they be changed, and if so, in what ways?

(a) There are several studies which throw light on the current ideals. *Physical Culture* magazine lately invited its women readers to send in the specifications of an ideal husband, and the results are worth considering because the readers of that publication are probably less swayed by purely conventional ideas than are most accessible groups of women whom one might question. The ideal husband was held by these women to be made up of the following qualities in the proportions given:

	Per cent.
Health	20
Financial success	19
Paternity	18
Appearance	11
Disposition	8
Education	8
Character	6
Housekeeping	7
Dress	3
	100

Without laying weight on the exact figures, and recognizing that each woman may have defined the qualities differently, yet one must admit aside from a low concern for mental ability that this is a fairly good eugenic specification. Appearance, it is stated, meant not so much facial beauty as intelligent expression and manly form. Financial success is correlated with intelligence and efficiency, and probably is not rated too high. The importance attached to paternity—which, it is explained, means a clean sex life as well as interest in children—is worth noticing.

For comparison there is another census of the preferences of 115 young women at Brigham Young College, Logan, Utah. This is a "Mormon" institution and the students, mostly farmers' daughters, are probably expressing ideals which have

been very little affected by the demoralizing influences of modern city life. The editor of the college paper relates that:

Eighty-six per cent of the girls specifically stated that the young man must be morally pure; 14% did not specifically state.

Ninety-nine per cent specifically stated that he must be mentally and physically strong.

Ninety-three per cent stated that he must absolutely not smoke, chew, or drink; 7% did not state.

Twenty per cent named an occupation they would like the young man to follow, and these fell into three different classes, that of farmer, doctor and business.

Four and seven-tenths per cent of the 20% named farmer; 2.7% named doctor, and 1.7% named business man; 80% did not state any profession.

Thirty-three and one-third per cent specifically stated that he must be ambitious; $66^2/_3\%$ did not state.

Eight per cent stated specifically that he must have high ideals.

Fifty-two per cent demanded that he be of the same religious conviction; 48% said nothing about religion.

Seventy-two per cent said nothing regarding money matters; 28% stated what his financial condition must be, but none named a specific amount. One-half of the 28% stated that he must be rich, and three-fourths of these were under twenty years of age; the other half of the 28% said that he must have a moderate income and two-thirds of these were under twenty years of age.

Forty-five per cent stated that the young man must be taller than they; 55% did not state.

Twenty per cent stated that the young man must be older, and from two to eight years older; 80% did not state.

Fifty per cent stated that he must have a good education; one-fourth of the 50% stated that he must have a college education; 95% of these were under twenty-one years of age; 50% did not state his intellectual attainments.

Ninety-one per cent of all the ideals handed in were written by persons under twenty years of age; the other 8½% were over twenty years of age.

Physical Culture, on another occasion, invited its male readers to express their requirements of an ideal wife. The proportions of the various elements desired are given as follows:

	Per cent
Health	23
"Looks"	14
Housekeeping	12
Disposition	11
Maternity	11
Education	10
Management	7
Dress	7
Character	5
	100

One might feel some surprise at the low valuation placed on "character," but it is really covered by other points. On the whole, one can not be dissatisfied with these specifications aside from its slight concern about mental ability.

Such wholesome ideals are probably rather widespread in the less sophisticated part of the population. In other strata, social and financial criteria of selection hold much importance. As a family ascends in economic position, its standards of sexual selection are likely to change. And in large sections of the population, there is a fluctuation in the standards from generation to generation. There is reason to suspect that the standards of sexual selection among educated young women in the United States to-day are higher than they were a quarter of a century, or even a decade, ago. They are demanding a higher degree of physical fitness and morality in their suitors. Men, in turn, are beginning to demand that the girls they marry shall be fitted for the duties of home-maker, wife and mother,—qualifications which were essential in the colonial period but little insisted on in the immediate past.

(b) It is evident, then, that the standards of sexual selection do change; there is therefore reason to suppose that they can change still further. This is an important point, for it is often alleged as an objection to eugenics that human affections are capricious and can not be influenced by rational considerations. Such an objection will be seen, on reflection, to be ill-founded.

As to the extent of change possible, the psychologist must have

the final word. The ingenious Mr. Diffloth,[1] who reduced love to a series of algebraical formulæ and geometrical curves, and proposed that every young man should find a girl whose curve was congruent to his own, and at once lead her to the altar, is not likely to gain many adherents. But the psychologist declares without hesitation that it is possible to influence the course of love in its earlier, though rarely in its later, stages. Francis Galton pointed this out with his usual clearness, showing that in the past the "incidence" of love, to borrow a technical term, had been frequently and sometimes narrowly limited by custom—by those unwritten laws which are sometimes as effective as the written ones. Monogamy, endogamy, exogamy, Australian marriages, tabu, prohibited degrees and sacerdotal celibacy all furnished him with historical arguments to show that society could bring about almost any restriction it chose; and a glance around at the present day will show that the barriers set up by religion, race and social position are frequently of almost prohibitive effect.

There is, therefore, from a psychological point of view, no reason why the ideals of eugenics should not become a part of the mores or unwritten laws of the race, and why the selection of life partners should not be unconsciously influenced to a very large extent by them. As a necessary preliminary to such a condition, intelligent people must cultivate the attitude of conscious selection, and get away from the crude, fatalistic viewpoint which is to-day so widespread, and which is exploited *ad nauseam* on the stage and in fiction. It must be remembered that there are two well-marked stages preceding a betrothal: the first is that of mere attraction, when reason is still operative, and the second is that of actual love, when reason is relegated to the background. During the later stage, it is notorious that good counsel is of little avail, but during the preliminary period direction of the affections is still possible, not only by active interference of friends or relatives, but much more easily and usefully by the tremendous influence of the mores.

Eugenic mores will exist only when many intelligent people

[1] Diffloth, Paul, *Le Fin de L'Enigme*, Paris, 1907.

become so convinced of the ethical value of eugenics that that conviction sinks into their subconscious minds. The general eugenics campaign can be expected to bring that result about in due time. Care must be taken to prevent highly conscientious people from being too critical, and letting a trivial defect outweigh a large number of good qualities. Moreover, changes in the standards of sexual selection should not be too rapid, as that results in the permanent celibacy of some excellent but hypercritical individuals. The ideal is an advance of standards as rapidly as will yet keep all the superior persons married. This is accomplished if all superior individuals marry as well as possible, yet with advancing years gradually reduce the standard so that celibacy may not result.

Having decided that there is room for improvement in the standards of sexual selection, and that such improvement is psychologically feasible, we come to point (c): in what particular ways is this improvement needed? Any discussion of this large subject must necessarily be only suggestive, not exhaustive.

If sexual selection is to be taken seriously, it is imperative that there be some improvement in the general attitude of public sentiment toward love itself. It is difficult for the student to acquire sound knowledge [1] of the normal manifestations of love: the psychology of sex has been studied too largely from the abnormal and pathological side; while the popular idea is based too much on fiction and drama which emphasize the high lights and make love solely an affair of emotion. We are not arguing for a rationalization of love, for the terms are almost contradictory; but we believe that more common sense could profitably be used in considering the subject.

If a typical "love affair" be examined, it is found that propinquity and a common basis for sympathy in some probably trivial matter lead to the development of the sex instinct; the parental instinct begins to make itself felt, particularly among women; the instincts of curiosity, acquisitiveness,

[1] The best popular yet scientific treatment of the subject we have seen is *The Dynamic of Manhood*, a book recently written by Luther H. Gulick for the Young Men's Christian Association (New York, The Association Press, 1917).

and various others play their part, and there then appears a well-developed case of "love." Such love may satisfy a purely biological definition, but it is incomplete. Love that is worthy of the name must be a function of the will as well as of the emotions. There must be a feeling on the part of each which finds strong satisfaction in service rendered to the other. If the existence of this constituent of love could be more widely recognized and watched for, it would probably prevent many a sensible young man or woman from being stampeded into a marriage of passion, where the real community of interest is slight; [1] and sexual selection would be improved in a way that would count immensely for the future of the race. Moreover, there would be much more real love in the world. Eugenics, as Havelock Ellis has well pointed out,[2] is not plotting against love but against those influences that do violence to love, particularly: (1) reckless yielding to mere momentary desire; and (2) still more fatal influences of wealth and position and worldly convenience which give a factitious value to persons who would never appear attractive partners in life were love and eugenic ideals left to go hand in hand.

"The eugenic ideal," Dr. Ellis foresees, "will have to struggle with the criminal and still more resolutely with the rich; it will have few serious quarrels with normal and well-constituted lovers."

The point is an important one. To "rationalize" marriage, is out of the question. Marriage must be mainly a matter of the emotions; but it is important that the emotions be exerted in the right direction. The eugenist seeks to remove the obstacles that

[1] The sympathy which we mentioned as the beginning of the hypothetical love affair does lead to a partial identity of will, it is true; but there is often too little in common between the man and woman to make this identity at all complete. As Karl Pearson points out, it is almost essential to a successful marriage that two people have sympathy with each other's aims and a considerable degree of similarity in habits. If such a bond is lacking, the bond of sympathy aroused by some trivial circumstance will not be sufficient to keep the marriage from shipwreck. The occasional altruism of young men who marry inferior girls because they "feel sorry for them" is not praiseworthy.

[2] Ellis, Havelock, *The Task of Social Hygiene*, pp. 208–209, Boston, Houghton Mifflin Co., 1912.

are now driving the emotions into wrong channels. If the emotions can only be headed in the right direction, then the more emotions the better, for they are the source of energy which are responsible for almost everything that is done in the world.

There is in the world plenty of that love which is a matter of mutual service and of emotions unswayed by any petty or sordid influences; but it ought not only to be common, it ought to be universal. It is not likely to be in the present century; but at least, thinking people can consciously adopt an attitude of respect toward love, and consciously abandon as far as possible the attitude of jocular cynicism with which they too often treat it,—an attitude which is reflected so disgustingly in current vaudeville and musical comedy.

It is the custom to smile at the extravagantly romantic idea of love which the boarding-school girl holds; but unrealizable as it may be, hers is a nobler conception than that which the majority of adults voice. Very properly, one does not care to make one's deepest feelings public; but if such subjects as love and motherhood can not be discussed naturally and without affectation, they ought to be left alone. If intelligent men and women will set the example, this attitude of mind will spread, and cultured families at least will rid themselves of such deplorable habits as that of plaguing children, not yet out of the nursery, about their "sweethearts."

No sane man would deny the desirability of beauty in a wife, particularly when it is remembered that beauty, especially as determined by good complexion, good teeth and medium weight, is correlated with good health in some degree, and likewise with intelligence. Nevertheless, we are strongly of the opinion that beauty of face is now too highly valued, as a standard of sexual selection.[1]

[1] G. Stanley Hall (*Adolescence*, II, 113) found the following points, in order, specified as most admired in the other sex by young men and women in their teens: eyes, hair, stature and size, feet, eyebrows, complexion, cheeks, form of head, throat, ears, chin, hands, neck, nose. The voice was highly specialized and much preferred. The principal dislikes, in order, were: prominent or deep-set eyes, fullness of neck, ears that stand out, eyebrows that meet, broad and long feet,

Good health in a mate is a qualification which any sensible man or woman will require, and for which a "marriage certificate" is in most cases quite unnecessary.[1] What other physical standard is there that should be given weight?

Alexander Graham Bell has lately been emphasizing the importance of longevity in this connection, and in our judgment he has thereby opened up a very fruitful field for education. It goes without saying that anyone would prefer to marry a partner with a good constitution. "How can we find a test of a good, sound constitution?" Dr. Bell asked in a recent lecture. "I think we could find it in the duration of life in a family. Take a family in which a large proportion live to old age with unimpaired faculties. There you know is a good constitution in an inheritable form. On the other hand, you will find a family in which a large proportion die at birth and in which there are relatively few people who live to extreme old age. There has developed an hereditary weakness of constitution. Longevity is a guide to constitution." Not only does it show that one's vital organs are in good running order, but it is probably the only means now available of indicating strains which are resistant to zymotic disease. Early death is not necessarily an evidence of physical weakness; but long life is a pretty good proof of constitutional strength.

Dr. Bell has elsewhere called attention to the fact that, longevity being a characteristic which is universally considered creditable in a family, there is no tendency on the part of families to conceal its existence, as there is in the case of unfavorable characters—cancer, tuberculosis, insanity, and the like. This gives it a great advantage as a criterion for sexual selection, since there will be little difficulty in finding whether or not the ancestors of a young man or woman were long-lived.[2]

high cheek-bones, light eyes, large nose, small stature, long neck or teeth, bushy brows, pimples, red hair. An interesting study of some of the trivial traits of manner which may be handicaps in sexual selection is published by Iva Lowther Peters in the *Pedagogical Seminary*, XXIII, No. 4, pp. 550–570, Dec., 1916.

[1] It has been suggested that the same goal would be reached if a young man before marriage would take out a life insurance policy in the name of his bride. The suggestion has many good points.

[2] The correlation between fecundity and longevity which Karl Pearson has demon-

Karl Pearson and his associates have shown that there is a tendency to assortative mating for longevity: that people from long-lived stocks actually do marry people from similar stocks, more frequently than would be the case if the matings were at random. An increase of this tendency would be eugenically desirable.[1] So much for the physique.

Though eugenics is popularly supposed to be concerned almost wholly with the physical, properly it gives most attention to mental traits, recognizing that these are the ones which most frequently make races stand or fall, and that attention to the physique is worth while mainly to furnish a sound body in which the sound mind may function. Now men and women may excel mentally in very many different ways, and eugenics, which seeks not to produce a uniform good type, but excellence in all desirable types, is not concerned to pick out any particular sort of mental superiority and exalt it as a standard for sexual selection. But the tendency, shown in Miss Gilmore's study, for men to prefer the more intelligent girls in secondary schools, is gratifying to the eugenist, since high mental endowment is principally a matter of heredity. From a eugenic point of view it would be well could such intellectual accomplishments weigh even more heavily with the average young man, and less weight be put on such superficial characteristics as "flashiness," ability to use the latest slang freely, and other "smart" traits which are usually considered attractive in a girl, but which have no real value and soon become tiresome. They are not wholly bad in themselves, but certainly should not influence a young man very seriously in his choice of a wife, nor a young woman in her choice of a husband. It is to be feared that such standards are largely promoted by the stage, the popular song, and popular fiction.

In a sense, the education which a young woman has received

strated gives longevity another great advantage as a standard in sexual selection. See *Proc. Royal Soc. London*, Vol. 67, p. 159.

[1] It is objected that if the long-lived marry each other, the short-lived will also marry each other and thus the race will gain no more than it loses. The reply to this is that the short-lived will marry in fewer numbers, as some of them die prematurely; that they will have fewer children; and that these children in turn will tend to die young. Thus the short-lived strains will gradually run out, while the long-lived strains are disseminated.

is no concern of the eugenist, since it can not be transmitted to her children. Yet when, as often happens, children die because their mother was not properly trained to bring them up, this feature of education does become a concern of eugenics. Young men are more and more coming to demand that their wives know something about woman's work, and this demand must not only increase, but must be adequately met. Woman's education is treated in more detail in another chapter.

It is proper to point out here, however, that in many cases woman's education gives no great opportunity to judge of her real intellectual ability. Her natural endowment in this respect should be judged also by that of her sisters, brothers, parents, uncles, aunts and grandparents. If a girl comes of an intellectual ancestry, it is likely that she herself will carry such traits germinally, even if she has never had an opportunity to develop them. She can, then, pass them on to her own children. Francis Galton long ago pointed out the good results of a custom obtaining in Germany, whereby college professors tended to marry the daughters or sisters of college professors. A tendency for men of science to marry women of scientific attainments or training is marked among biologists, at least, in the United States; and the number of cases in which musicians intermarry is striking. Such assortative mating means that the offspring will usually be well endowed with a talent.

Finally, young people should be taught a greater appreciation of the lasting qualities of comradeship, for which the purely emotional factors that make up mere sexual attraction are far from offering a satisfactory substitute.

It will not be out of place here to point out that a change in the social valuation of reputability and honor is greatly needed for the better working of sexual selection. The conspicuous waste and leisure that Thorstein Veblen points out as the chief criterion of reputability at present have a dubious relation to high mental or moral endowment, far less than has wealth. There is much left to be done to achieve a meritorious distribution of wealth. The fact that the insignia of success are too often awarded to trickery, callousness and luck does not argue for the abolition

altogether of the financial success element in reputability, in favor of a "dead level" of equality such as would result from the application of certain communistic ideals. Distinctions, rightly awarded, are an aid, not a hindrance to sexual selection, and effort should be directed, from the eugenic point of view, no less to the proper recognition of true superiority than to the elimination of unjustified differentiations of reputability.

This leads to the consideration of moral standards, and here again details are complex but the broad outlines clear. It seems probable that morality is to a considerable extent a matter of heredity, and the care of the eugenist should be to work with every force that makes for a clear understanding of the moral factors of the world, and to work against every force that tends to confuse the issues. When the issue is clear cut, most people will by instinct tend to marry into moral rather than immoral stocks.

True quality, then, should be emphasized at the expense of false standards. Money, social status, family alignment, though indicators to some degree, must not be taken too much at their face value. Emphasis is to be placed on real merit as shown by achievement, or on descent from the meritoriously eminent, whether or not such eminence has led to the accumulation of a family fortune and inclusion in an exclusive social set. In this respect, it is important that the value of a high average of ancestry should be realized. A single case of eminence in a pedigree should not weigh too heavily. When it is remembered that statistically one grandparent counts for less than one-sixteenth in the heredity of an individual, it will be obvious that the individual whose sole claim to consideration is a distinguished grandfather, is not necessarily a matrimonial prize. A general high level of morality and mentality in a family is much more advantageous, from the eugenic point of view, than one "lion" several generations back.

While we desire very strongly to emphasize the importance of breeding and the great value of a good ancestry, it is only fair to utter a word of warning in this connection. Good ancestry does not *necessarily* make a man or woman a desirable partner. What stockmen know as the "pure-bred scrub" is a recognized evil in

animal breeding, and not altogether absent from human society. Due to any one or more of a number of causes, it is possible for a germinal degenerate to appear in a good family; discrimination should certainly be made against such an individual. Furthermore, it is possible that there occasionally arises what may be called a mutant of very desirable character from a eugenic point of view. Furthermore a stock in general below mediocrity will occasionally, due to some fortuitous but fortunate combination of traits, give rise to an individual of marked ability or even eminence, who will be able to transmit in some degree that valuable new combination of traits to his or her own progeny. Persons of this character are to be regarded by eugenists as distinctly desirable husbands or wives.

The desirability of selecting a wife (or husband) from a family of more than one or two children was emphasized by Benjamin Franklin, and is also one of the time-honored traditions of the Arabs, who have always looked at eugenics in a very practical, if somewhat cold-blooded way. It has two advantages: in the first place, one can get a better idea of what the individual really is, by examining sisters and brothers; and in the second place, there will be less danger of a childless marriage, since it is already proved that the individual comes of a fertile stock. Francis Galton showed clearly the havoc wrought in the English peerage, by marriages with heiresses (an heiress there being nearly always an only child). Such women were childless in a much larger proportion than ordinary women.

"Marrying a man to reform him" is a speculation in which many women have indulged and usually—it may be said without fear of contradiction—with unfortunate results. It is always likely that she will fail to reform him; it is certain that she can not reform his germ-plasm. Psychologists agree that the character of a man or woman undergoes little radical change after the age of 25; and the eugenist knows that it is largely determined, *potentially*, when the individual is born. It is, therefore, in most cases the height of folly to select a partner with any marked undesirable trait, with the idea that it will change after a few years.

All these suggestions have in general been directed at the young man or woman, but it is admitted that if they reach their target at all, it is likely to be by an indirect route. No rules or devices can take the place, in influencing sexual selection, of that lofty and rational ideal of marriage which must be brought about by the uplifting of public opinion. It is difficult to bring under the control of reason a subject that has so long been left to caprice and impulse; yet much can unquestionably be done, in an age of growing social responsibility, to put marriage in a truer perspective. Much is already being done, but not in every case of change is the future biological welfare of the race sufficiently borne in mind. The interests of the individual are too often regarded to the exclusion of posterity. The eugenist would not sacrifice the individual, but he would add the welfare of posterity to that of the individual, when the standards of sexual selection are being fixed. It is only necessary to make the young person remember that he will marry, not merely an individual, but a family; and that not only his own happiness but to some extent the quality of future generations is being determined by his choice.

We must have (1) the proper ideals of mating but (2) these ideals must be realized. It is known that many young people have the highest kind of ideals of sexual selection, and find themselves quite unable to act on them. The college woman may have a definite idea of the kind of husband she wants; but if he never seeks her, she often dies celibate. The young man of science may have an ideal bride in his mind, but if he never finds her, he may finally marry his landlady's daughter. Opportunity for sexual selection must be given, as well as suitable standards; and while education is perhaps improving the standards each year, it is to be feared that modern social conditions, especially in the large cities, tend steadily to decrease the opportunity.

Statistical evidence, as well as common observation, indicates that the upper classes have a much wider range of choice in marriage than the lower classes. The figures given by Karl Pearson for the degree of resemblance between husband and

wife with regard to phthisis are so remarkable as to be worth quoting in this connection:

All poor	+.01
Prosperous poor	+.16
Middle classes	+.24
Professional classes	+.28

It can hardly be argued that infection between husband and wife would vary like this, even if infection, in general, could be proved. Moreover, the least resemblance is among the poor, where infection should be greatest. Professor Pearson thinks, as seems reasonable, that this series of figures indicates principally assortative mating, and shows that among the poor there is less choice, the selection of a husband or wife being more largely due to propinquity or some other more or less random factor. With a rise in the social scale, opportunity for choice of one from a number of possible mates becomes greater and greater; the tendency for an unconscious selection of likeness then has a chance to appear, as the coefficients graphically show.

If such a class as the peerage of Great Britain be considered, it is evident that the range of choice in marriage is almost unlimited. There are few girls who can resist the glamor of a title. The hereditary peer can therefore marry almost anyone he likes and if he does not marry one of his own class he can select and (until recently) usually has selected the daughter of some man who by distinguished ability has risen from a lower social or financial position. Thus the hereditary nobilities of Europe have been able to maintain themselves; and a similar process is undoubtedly taking place among the idle rich who occupy an analogous position in the United States.

But it is the desire of eugenics to raise the average ability of the whole population, as well as to encourage the production of leaders. To fulfill this desire, it is obvious that one of the necessary means is to extend to all desirable classes that range of choice which is now possessed only by those near the top of the social ladder. It is hardly necessary to urge young

people to widen the range of their acquaintance, for they will do it without urging if the opportunity is presented to them. It is highly necessary for parents, and for organizations and municipalities, deliberately to seek to further every means which will bring unmarried young people together under proper supervision. Social workers have already perceived the need of institutional as well as municipal action on these lines, although they have not in every case recognized the eugenic aspect, and from their efforts it is probable that suitable institutions, such as social centers and recreation piers, and municipal dance halls, will be greatly multiplied.

It is an encouraging sign to see such items as this from a Washington newspaper: "The Modern Dancing Club of the Margaret Wilson Social Center gave a masquerade ball at the Grover Cleveland school last night, which was attended by about 100 couples." Still more promising are such institutions as the self-supporting Inkowa camp for young women, at Greenwood Lake, N. J., conducted by a committee of which Miss Anne Morgan is president, and directed by Miss Grace Parker. Near it is a similar camp, Kechuka, for young men, and during the summer both are full of young people from New York City. A newspaper account says:

There is no charity, no philanthropy, no subsidy connected with Camp Inkowa. Its members are successful business women, who earn from $15 to $25 a week. Board in the camp is $9 a week. So every girl who goes there for a vacation has the comfortable feeling that she pays her way fully. This rate includes all the activities of camp life.

Architects, doctors, lawyers, bookkeepers, bank clerks, young business men of many kinds are the guests of Kechuka. Next week 28 young men from the National City Bank will begin their vacations there.

Inkowa includes young women teachers, stenographers, librarians, private secretaries and girls doing clerical work for insurance companies and other similar business institutions.

Saturday and Sunday are "at home" days at Camp Inkowa and the young men from Kechuka may come to call on the Inkowa girls,

participate with them in the day's "hike" or go on the moonlight cruise around the lake if there happens to be one.

"Young men and women need clean, healthy association with each other," Miss Parker told me yesterday, when I spent the day at Camp Inkowa. "Social workers in New York city ask me sometimes, 'How dare you put young men and women in camps so near to each other?'

"How dare you not do it? No plan of recreation or out-of-door life which does not include the healthy association of men and woman can be a success. Young men and women need each other's society. And if you get the right kind they won't abuse their freedom."

The churches have been important instruments in this connection, and the worth of their services can hardly be over-estimated, as they tend to bring together young people of similar tastes and, in general, of a superior character. Such organizations as the Young People's Society of Christian Endeavor serve the eugenic end in a satisfactory way; it is almost the unanimous opinion of competent observers that matches "made in the church" turn out well. Some idea of the importance of the churches may be gathered from a census which F. O. George of the University of Pittsburgh made of 75 married couples of his acquaintance, asking them where they first met each other. The answers were:

Church	32
School (only 3 at college)	19
Private home	17
Dance	7
	75

These results need not be thought typical of more than a small part of the country's population, yet they show how far-reaching the influence of the church may be on sexual selection. Quite apart from altruistic motives, the churches might well encourage social affairs where the young people could meet, because to do so is one of the surest way of perpetuating the church.

An increase in the number of non-sectarian bisexual societies,

clubs and similar organizations, and a diminution of the number of those limited to men or to women alone is greatly to be desired. It is doubtful whether the Y. M. C. A. and Y. W. C. A. are, while separated, as useful to society as they might be. Each of them tends to create a celibate community, where the chance for meeting possible mates is practically nil. The men's organization has made, so far as we are aware, little organized attempt to meet this problem. The women's organization in some cities has made the attempt, but apparently with indifferent success. The idea of a merger of the two organizations with reasonable differentiation as well would probably meet with little approval from their directors just now, but is worth considering as an answer to the urgent problem of providing social contacts for young people in large cities.

It is encouraging that thoughtful people in all walks of life are beginning to realize the seriousness of this problem of contacts for the young, and the necessity of finding some solution. The novelist Miss Maria Thompson Davies of Sweetbriar Farm, Madison, Tenn., is quoted in a recent newspaper interview as saying:

"I'm a Wellesley woman, but one reason why I'm dead against women's colleges is because they shut girls up with women, at the most impressionable period of the girls' lives, when they should be meeting members of the opposite sex continually, learning to tolerate their little weaknesses and getting ready to marry them."

"The city should make arrangements to chaperon the meetings of its young citizens. There ought to be municipal gathering places where, under the supervision of tactful, warm-hearted women—themselves successfully married—girls and young men might get introduced to each other and might get acquainted."

If it is thought that the time has not yet come for such municipal action, there is certainly plenty of opportunity for action by the parents, relatives and friends of young persons. The matchmaking proclivities of some mothers are matters of current jest: where subtly and wisely done they might better be taken seriously and held up as examples worthy of imitation. Formal

"full dress" social functions for young people, where acquaintance is likely to be too perfunctory, should be discouraged, and should give place to informal dances, beach parties, house parties and the like, where boys and girls will have a chance to come to know each other, and, at the proper age, to fall in love. Let social stratification be not too rigid, yet maintained on the basis of intrinsic worth rather than solely on financial or social position. If parents will make it a matter of concern to give their boys and girls as many desirable acquaintances of the opposite sex as possible, and to give them opportunity for ripening these acquaintances, the problem of the improvement of sexual selection will be greatly helped. Young people from homes where such social advantages can not be given, or in large cities where home life is for most of them non-existent, must become the concern of the municipality, the churches, and every institution and organization that has the welfare of the community and the race at heart.

To sum up this chapter, we have pointed out the importance of sexual selection, and shown that its eugenic action depends on young people having the proper ideals, and being able to live up to these ideals. Eugenists have in the past devoted themselves perhaps too exclusively to the inculcation of sound ideals, without giving adequate attention to the possibility of these high standards being acted upon. One of the greatest problems confronting eugenics is that of giving young people of marriageable age a greater range of choice. Much could be done by organized action; but it is one of the hopeful features of the problem that it can be handled in large part by intelligent individual action. If older people would make a conscious effort to help young people widen their circles of suitable acquaintances, they would make a valuable contribution to race betterment.

CHAPTER XII

INCREASING THE MARRIAGE RATE OF THE SUPERIOR

No race can long survive unless it conforms to the principles of eugenics, and indisputably the chief requirement for race survival is that the superior part of the race should equal or surpass the inferior part in fecundity.

It follows that the superior members of the community must marry, and at a reasonably early age. If in the best elements of the community celibacy increases, or if marriage is postponed far into the reproductive period, the racial contribution of the superior will necessarily fall, and after a few generations the race will consist mainly of the descendants of inferior people, its eugenic average being thereby much lowered.

In a survey of vital statistics, to ascertain whether marriages are as frequent and as early as national welfare requires, the eugenist finds at first no particularly alarming figures.

In France, to whose vital statistics one naturally turns whenever race suicide is suggested (and usually with a holier-than-thou attitude which the Frenchman might much more correctly assume toward America), it appears that there has been a very slight decrease in the proportion of persons under 20 who are married, but that between the ages of 20 and 30 the proportion of those married has risen during recent years. The same condition exists all over Europe, according to F. H. Hankins,[1] except in England and Scotland. "Moreover on the whole marriages take place earlier in France than in England, Germany or America. Nor is this all, for a larger proportion of the French population is married than in any of these countries. Thus the birth-rate in France has continued to fall in spite of those very

[1] Hankins, F. H., "The Declining Birth-Rate," *Journal of Heredity*, V, pp. 36–369, August, 1914.

conditions which should have sustained it or even caused it to increase."

In America, conditions are not dissimilar. Although it is generally believed that young persons are marrying at a later age than they did formerly, the census figures show that for the population as a whole the reverse is the case. Marriages are not only more numerous, but are contracted at earlier ages than they were a quarter of a century ago. Comparison of census returns for 1890, 1900 and 1910, reveals that for both sexes the percentage of married has steadily increased and the percentage listed as single has as steadily decreased. The census classifies young men, for this purpose, in three age-groups: 15–19, 20–24, and 25–34; and in every one of these groups, a larger proportion was married in 1910 than in 1900 or 1890. Conditions are the same for women. So far as the United States as a whole is concerned, therefore, marriage is neither being avoided altogether, nor postponed unduly,—in fact, conditions in both respects seem to be improving every year.

So far the findings should gratify every eugenist. But the census returns permit further analysis of the figures. They classify the population under four headings: Native White of Native Parentage, Native White of Foreign Parentage or of Mixed Parentage, Foreign-born White, and Negro. Except among Foreign-born Whites, who are standing still, the returns for 1910 show that in every one of these groups the marriage rate has steadily increased during the past three decades; and that the age of marriage is steadily declining in all groups during the same period, with a slight irregularity of no real importance in the statistics for foreign-born males.

On the whole, then, the marriage statistics of the United States are reassuring. Even if examination is limited to the Native Whites of Native Parentage, who are probably of greater eugenic worth, as a group, than any of the other three, the marriage rate is found to be moving in the right direction.

But going a step farther, one finds that within this group there are great irregularities, which do not appear when the group is

considered as a whole. And these irregularities are of a nature to give the eugenist grave concern.

If one sought, for example, to find a group of women distinctly superior to the average, he might safely take the college graduates. Their superior quality as a class lies in the facts that:

(a) They have survived the weeding-out process of grammar and high school, and the repeated elimination by examinations in college.

(b) They have persevered, after those with less mental ability have grown tired of the strain and have voluntarily dropped out.

(c) Some have even forced their way to college against great obstacles, because attracted by the opportunities it offers them for mental activity.

(d) Some have gone to college because their excellence has been discovered by teachers or others who have strongly urged it.

All these attributes can not be merely acquired, but must be in some degree inherent. Furthermore, these girls are not only superior in themselves, but are ordinarily from superior parents, because

(a) Their parents have in most cases coöperated by desiring this higher education for their daughters.

(b) The parents have in most cases had sufficient economic efficiency to be able to afford a college course for their daughters.

Therefore, although the number of college women in the United States is not great, their value eugenically is wholly disproportionate to their numbers. If marriage within such a selected class as this is being avoided, or greatly postponed, the eugenist can not help feeling concerned.

And the first glance at the statistics gives adequate ground for uneasiness. Take the figures for Wellesley College, for instance:

Status in fall of 1912	*Graduates*	*All students*
Per cent married (graduated 1879–1888)	55%	60%
Per cent married in:		
10 years from graduation	35%	37%
20 years from graduation	48%	49%

From a racial standpoint, the significant marriage rate of any group of women is the percentage that have married before the end of the childbearing period. Classes graduating later than 1888 are therefore not included, and the record shows the marital status in the fall of 1912. In compiling these data deceased members and the few lost from record are of course omitted.

In the foregoing study care was taken to distinguish as to when the marriage took place. Obviously marriages with the women at 45 or over being sterile must not be counted where it is the fecundity of the marriage that is being studied. The reader is warned therefore to make any necessary correction for this factor in the studies to follow in some of which unfortunately care has not been taken to make the necessary distinction.

Turn to Mount Holyoke College, the oldest of the great institutions for the higher education of women in this country. Professor Amy Hewes has collected the following data:

Decade of graduation	*Per cent remaining single*	*Per cent marrying*
1842–1849	14.6	85.4
1850–1859	24.5	75.5
1860–1869	39.1	60.9
1870–1879	40.6	59.4
1880–1889	42.4	57.6
1890–1892	50.0	50.0

Bryn Mawr College, between 1888 and 1900, graduated 376 girls, of whom 165, or 43.9%, had married up to January 1, 1913.

Studying the Vassar College graduates between 1867 and 1892, Robert J. Sprague found that 509 of the total of 959 had married, leaving 47% celibate. Adding the classes up to 1900,

it was found that less than half of the total number of graduates of the institution had married.

Remembering what a selected group of young women go to college, the eugenist can hardly help suspecting that the women's colleges of the United States, as at present conducted, are from his point of view doing great harm to the race. This suspicion becomes a certainty, as one investigation after another shows the same results. Statistics compiled on marriages among college women (1901) showed that:

45% of college women marry before the age of 40.

90% of all United States women marry before the age of 40.

96% of Arkansas women marry before the age of 40.

80% of Massachusetts women marry before the age of 40.

In Massachusetts, it is further to be noted, 30% of all women have married at the age when college women are just graduating.

It has, moreover, been demonstrated that the women who belong to Phi Beta Kappa and other honor societies, and therefore represent a second selection from an already selected class, have a lower marriage rate than college women in general.

In reply to such facts, the eugenist is often told that the college graduates marry as often and as early as the other members of their families. We are comparing conditions that can not properly be compared, we are informed, when we match the college woman's marriage rate with that of a non-college woman who comes from a lower level of society.

But the facts will not bear out this apology. Miss M. R. Smith's statistics [1] from the data of the Collegiate Alumnæ show the true situation. The average age at marriage was found to be for

	Years
College women	26.3
Their sisters	24.2
Their cousins	24.7
Their friends	24.2

and the age distribution of those married was as follows:

[1] Smith, Mary Roberts, "Statistics of College and Non-college Women," Quarterly Pubs. of the *American Statistical Assn.*, VII, p. 1 ff., 1900.

Percentage of married	*College*	*Equivalent non-college*
Under 23 years.....	8.6	30.1
23–32 years.....	83.2	64.9
33 and over.....	8.0	5.0

If these differences did not bring about any change in the birth-rate, they could be neglected. A slight sacrifice might

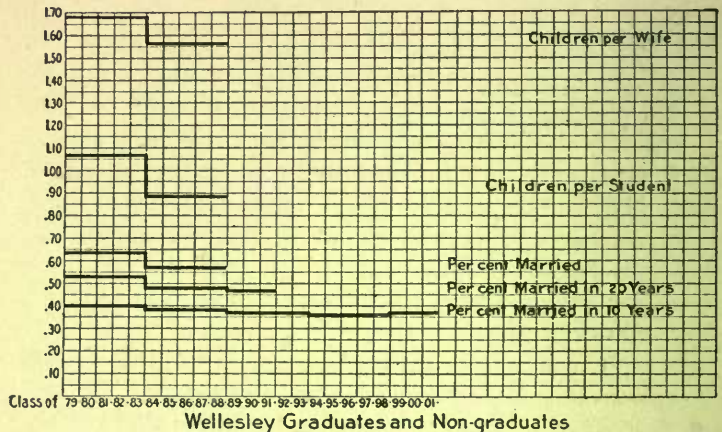


FIG. 36.—Graph showing at a glance the record of the student body in regard to marriage and birth rates, during the years indicated. Statistics for the latest years have not been compiled, because it is obvious that girls who agrduated during the last fifteen years still have a chance to marry and become mothers.

even be made, for the sake of having mothers better prepared. But taken in connection with the birth-rate figures which we shall present in the next chapter, they form a serious indictment against the women's colleges of the United States.

Such conditions are not wholly confined to women's colleges, or to any one geographical area. Miss Helen D. Murphey has compiled the statistics for Washington Seminary, in Washington, Pennsylvania, a secondary school for women, founded in 1837. The marriage rate among the graduates of this institution has steadily declined, as is shown in the following table where the records are considered by decades:

	'45	'55	'65	'75	'85	'95	'00
Per cent. married	78	74	67	72	59	57	55
Per cent. who have gone into other occupations than home-making	20	13	12	19	30	30	39

A graph, plotted to show how soon after graduation these girls have married, demonstrates that the greatest number of them wed five or six years after receiving their diplomas, but that the number of those marrying 10 years afterward is not very much less than that of the girls who become brides in the first or second year after graduation (see Fig. 35).

C. S. Castle's investigation [1] of the ages at which eminent women of various periods have married, is interesting in this connection, in spite of the small number of individuals with which it deals:

Century	*Average age*	*Range*	*Number of cases*
12	16.2	8–30	5
13	16.6	12–29	5
14	13.8	6–18	11
15	17.6	13–26	20
16	21.7	12–50	28
17	20.0	13–43	30
18	23.1	13–53	127
19	26.2	15–67	189

Women in coeducational colleges, particularly the great universities of the west, can not be compared without corrections with the women of the eastern separate colleges, because they represent different family and environmental selection. Their record none the less deserves careful study. Miss Shinn [2] calculated the marriage rate of college women as follows, assuming graduation at the age of 22:

Women over	*Coeducated*	*Separate*
25	38.1	29.6
30	49.7	40.1
35	53.6	46.6
40	56.9	51.8

[1] "Statistics of Eminent Women," *Pop. Sci. Mo.*, June, 1913.

[2] "Marriage of College Women," *Century Magazine*, Oct., 1895.

She has shown that only a part of this discrepancy is attributable to the geographic difference, some of it is the effect of lack of co-education. Some of it is also attributable to the type of education.

The marriage rate of women graduates of Iowa State College [1] is as follows:

1872–81	95.8
1882–91	62.5
1892–01	71.2
1902–06	69.0

Study of the alumni register of Oberlin,[2] one of the oldest coeducational institutions, shows that the marriage rate of women graduates, 1884–1905, was 65.2%, only 34.8% of them remaining unmarried. If the later period, 1890–1905, alone is taken, only 55.2% of the girls have married. The figures for the last few classes in this period are probably not complete.

At Kansas State Agricultural College, 1885–1905, 67.6% of the women graduates have married. At Ohio State University in the same period, the percentage is only 54.0. Wisconsin university, 1870–1905, shows a percentage of 51.8, the figures for the last five years of that period being:

1901	33.9
1902	52.9
1903	45.1
1904	32.3
1905	37.4

From alumni records of the University of Illinois, 54% of the women, 1880–1905, are found to be married.

It is difficult to discuss these figures without extensive study of each case. But that only 53% of the women graduates of three great universities like Illinois, Ohio and Wisconsin, should be married, 10 years after graduation, indicates that something is wrong.

[1] Blumer, J. O., in *Journal of Heredity*, VIII, p. 217, May, 1917.

[2] The statistics of this and the following middle west universities were presented by Paul Popenoe in the *Journal of Heredity*, VIII, pp. 43–45.

In most cases it is not possible to tell, from the alumni records of the above colleges, whether the male graduates are or are not married. But the class lists of Harvard and Yale have recently been carefully studied by John C. Phillips,[1] who finds that in the period 1851–1890 74% of the Harvard graduates and 78% of the Yale graduates married. In that period, he found, the age of marriage has advanced only about 1 year, from a little over 30 to just about 31. This is a much higher rate than that of college women.

Statistics from Stanford University [2] offer an interesting comparison because they are available for both men and women. Of 670 male graduates, classes 1892 to 1900, inclusive, 490 or 73.2% were reported as married in 1910. Of 330 women, 160 or 48.5% were married. These figures are not complete, as some of the graduates in the later classes must have married since 1910.

The conditions existing at Stanford are likewise found at Syracuse, on the opposite side of the continent. Here, as H. J. Banker has shown,[3] the men graduates marry most frequently 4.5 years after taking their degrees, and the women 4.7 years. Of the women 57% marry, of the men 81%. The women marry at the average age of 27.7 years and the men at 28.8. Less than one-fourth of the marrying men married women within the college. The last five decades he studied show a steady decrease in the number of women graduates who marry, while the men are much more constant. His figures are:

Decade	*Per cent of men graduates married*	*Per cent of women graduates married*
1852–61	81	87
1862–71	87	87
1872–81	90	81
1882–91	84	55
1892–01	73	48

[1] *Harvard Graduates' Magazine*, XXV, No. 97, pp. 25–34, September, 1916.

[2] Popenoe, Paul, "Stanford's Marriage-Rate," *Journal of Heredity*, VIII, p. 170–173.

[3] Banker, Howard J., "Coeducation and Eugenics," *Journal of Heredity*, VIII, pp. 208–214, May, 1917.

C. B. Davenport, looking at the record of his own classmates at Harvard, found [1] in 1909 that among the 328 original members there were 287 surviving, of whom nearly a third (31%) had never married.

"Of these [287]," he continues, "26 were in 'Who's Who in America?' We should expect, were success in professional life promoted by bachelorship, to find something over a third of those in Who's Who to be unmarried. Actually all but two, or less than 8%, were married, and one of these has since married. The only still unmarried man was a temporary member of the class and is an artist who has resided for a large part of the time in Europe. There is, therefore, no reason to believe that bachelorship favors professional success."

Particularly pernicious in tending to prevent marriage is the influence of certain professional schools, some of which have come to require a college degree for entrance. In such a case the aspiring physician, for example, can hardly hope to obtain a license to practice until he has reached the age of 27 since 4 years are required in Medical College and 1 year in a hospital. His marriage must in almost every case be postponed until a number of years after that of the young men of his own class who have followed business careers.

This brief survey is enough to prove that the best educated young women (and to a less extent young men) of the United States, who for many reasons may be considered superior, are in many cases avoiding marriage altogether, and in other cases postponing it longer than is desirable. The women in the separate colleges of the East have the worst record in this respect, but that of the women graduates of some of the coeducational schools leaves much to be desired.

It is difficult to separate the causes which result in a postponement of marriage, from those that result in a total avoidance of marriage. To a large extent the causes are the same, and the result differs only in degree. The effect of absolute celibacy of superior people, from a eugenic point of view, is of course obvious to all, but the racial effect of postponement of marriage, even for

[1] *Eugenics: Twelve University Lectures*, p. 9, New York, 1914.

a few years, is not always so clearly realized. The diagram in Fig. 36 may give a clearer appreciation of this situation.

Francis Galton clearly perceived the importance of this point, and attempted in several ways to arrive at a just idea of it. One of the most striking of his investigations is based on Dr. Duncan's statistics from a maternity hospital. Dividing the mothers into five-year groups, according to their age, and stating the median age of the group for the sake of simplicity, instead of giving the limits, he arrived at the following table:

Age of mother at her marriage	*Approximate average fertility*
17	9.00—6 x 1.5
22	7.50—5 x 1.5
27	6.00—4 x 1.5
32	4.50—3 x 1.5

which shows that the relative fertility of mothers married at the ages of 17, 22, 27 and 32, respectively, is as 6, 5, 4, and 3 approximately.

"The increase in population by a habit of early marriages," he adds, "is further augmented by the greater rapidity with which the generations follow each other. By the joint effect of these two causes, a large effect is in time produced."

Certainly the object of eugenics is not to merely increase human numbers. Quality is more important than quantity in a birth-rate. But it must be evident that other things being equal, a group which marries early will, after a number of generations, supplant a group which marries even a few years later. And there is abundant evidence to show that some of the best elements of the old, white, American race are being rapidly eliminated from the population of America, because of postponement or avoidance of marriage.

Taking the men alone, we find that failure to marry may often be ascribed to one of the following reasons:

1. The cultivation of a taste for sexual variety and a consequent unwillingness to submit to the restraints of marriage.

2. Pessimism in regard to women from premature or unfortunate sex experiences.

3. Infection by venereal disease.

4. Deficiency in normal sexual feeling, or perversion.

5. Deficiency of one kind or another, physical or mental, causing difficulty in getting an acceptable mate.

The persons in groups 4 and 5 certainly and in groups 1, 2, and 3 probably to a less extent, are inferior, and their celibacy is an advantage to the race, rather than a disadvantage, from a eugenic point of view. Their inferiority is in part the result of bad environment. But since innate inferiority is so frequently a large factor, the bad environment often being experienced only because the nature was inferior to start with, the average of the group as a whole must be considered innately inferior.

Then there are among celibate men two other classes, largely superior by nature:

6. Those who seek some other end so ardently that they will not make the necessary sacrifice in money and freedom, in order to marry.

7. Those whose likelihood of early marriage is reduced by a prolonged education and apprenticeship. Prolongation of the celibate period often results in life-long celibacy.

Some of the most important means of remedying the above conditions, in so far as they are dysgenic, can be grouped under three general heads:

1. Try to lead all young men to avoid a loose sexual life and venereal disease. A general effort will be heeded more by the superior than by the inferior.

2. Hold up the rôle of husband and father as particularly honorable, and proclaim its shirking, without adequate cause, as dishonorable. Depict it as a happier and healthier state than celibacy or pseudo-celibacy. For a man to say he has never met a girl he can love simply means he has not diligently sought one, or else he has a deficient emotional equipment; for there are many, surprisingly many, estimable, attractive, unmarried women.

3. Cease prolonging the educational period past the early twenties. It is time to call a halt on the schools and universities, whose constant lengthening of the educational period will result

in a serious loss to the race. External circumstances of an educational nature should not be allowed to force a young man to postpone his marriage past the age of 25. This means that students must be allowed to specialize earlier. If there is need of limiting the number of candidates, competitive entrance examinations may be arranged on some rational basis. Superior young men should marry, even at some cost to their early efficiency. The high efficiency of any profession can be more safely kept up by demanding a minimum amount of continuation work in afternoon, evening, or seasonal classes, laboratories, or clinics. No more graduate fellowships should be established until those now existing carry a stipend adequate for marriage. Those which already carry larger stipends should not be limited to bachelors, as are the most valuable awards at Princeton, the ten yearly Proctor fellowships of $1,000 each.

The causes of the remarkable failure of college women to marry can not be exhaustively investigated here, but for the purposes of eugenics they may be roughly classified as unavoidable and avoidable. Under the first heading must be placed those girls who are inherently unmarriageable, either because of physical defect or, more frequently, mental defect,—most often an over-development of intellect at the expense of the emotions, which makes a girl either unattractive to men, or inclines her toward a celibate career and away from marriage and motherhood. Opinions differ as to the proportion of college girls who are inherently unmarriageable. Anyone who has been much among them will testify that a large proportion of them are not inherently unmarriageable, however, and their celibacy for the most part must be classified as avoidable. Their failure to marry may be because

(1) They desire not to marry, due to a preference for a career, or development of a cynical attitude toward men and matrimony, due to a faulty education, or

(2) They desire to marry, but do not, for a variety of reasons such as:

(a) They are educated for careers, such as school-teaching, where they have little opportunity to meet men.

(b) Their education makes them less desirable mates than girls who have had some training along the lines of home-making and mothercraft.

(c) They have remained in partial segregation until past the age when they are physically most attractive, and when the other girls of their age are marrying.

(d) Due to their own education, they demand on the part of suitors a higher degree of education than the young men of their acquaintance possess. A girl of this type wants to marry but desires a man who is educationally her equal or superior. As men of such type are relatively rare, her chances of marriage are reduced.

(e) Their experience in college makes them desire a standard of living higher than that of their own families or of the men among whom they were brought up. They become resistant to the suit of men who are of ordinary economic status. While waiting for the appearance of a suitor who is above the average in both intelligence and wealth, they pass the marriageable age.

(f) They are better educated than the young men of their acquaintance, and the latter are afraid of them. Some young men dislike to marry girls who know more than they do, except in the distinctively feminine fields.

These and various similar causes help to lower the marriage-rate of college women and to account for the large number of alumnæ who desire to marry but are unable to do so. In the interest of eugenics, the various difficulties must be met in appropriate ways.

Marriage is not desirable for those who are eugenically inferior, from weak constitutions, defective sexuality, or inherent mental deficiency. But beyond these groups of women are the much larger groups of celibates who are distinctly superior, and whose chances of marriage have been reduced for one of the reasons mentioned above or through living in cities with an undue proportion of female residents. Then there are, besides these, superior women who, because they are brought up in families without brothers or brothers' friends, are so unnaturally shy that they are unable to become friendly with men, however

much they may care to. It is evident that life in a separate college for women often intensifies this defect. There are still other women who repel men by a manner of extreme self-repression and coldness, sometimes the result of parents' or teachers' over-zealous efforts to inculcate modesty and reserve, traits valuable in due degree but harmful in excess.

When will educators learn that the education of the emotions is as important as that of the intellect? When will the schools awake to the fact that a large part of life consists in relations with other human beings, and that much of their educational effort is absolutely valueless, or detrimental, to success in the fundamentally necessary practice of dealing with other individuals which is imposed on every one? Many a college girl of the finest innate qualities, who sincerely desires to enter matrimony, is unable to find a husband of her own class, simply because she has been rendered so cold and unattractive, so overstuffed intellectually and starved emotionally, that a typical man does not desire to spend the rest of his life in her company. The same indictment applies in a less degree to men. It is generally believed that an only child is frequently to be found in this class.

On the other hand, it is equally true—perhaps more important—that many innately superior young men are rejected, because of their manner of life. Superior young men should be induced to keep their physical records clean, in order that they may not suffer the severe depreciation which they would otherwise sustain in the eyes of superior women.

But in efforts to teach chastity, sex itself must not be made to appear an evil thing. This is a grave mistake and all too common since the rise of the sex-hygiene movement. Undoubtedly a considerable amount of the celibacy in sensitive women may be traced to ill-balanced mothers and teachers who, in word and attitude, build up an impression that sex is indecent and bestial, and engender in general a damaging suspicion of men.[1]

[1] Cf. Gould, Miriam C., "The Psychological Influence upon Adolescent Girls of the Knowledge of Prostitution and Venereal Disease," *Social Hygiene*, Vol. II, pp. 191–207, April, 1916. This interesting and important study of the reactions

Level heads are necessary in the sex ethics campaign. Whereas the venereal diseases will probably, with a continuation of present progress in treatment and prophylaxis, be brought under control in the course of a century, the problem of differential mating will exist as long as the race does, which can hardly be less than tens of millions of years. Lurid presentation, by drama, novel, or magazine-story, of dramatic and highly-colored individual sex histories, is to be avoided. These often impress an abnormal situation on sensitive girls so strongly that aversion to marriage, or sex antagonism, is aroused. Every effort should be made to permeate art—dramatic, plastic, or literary—with the highest ideals of sex and parenthood. A glorification of motherhood and fatherhood in these ways would have a portentous influence on public opinion.

"The true, intimate chronicle of an everyday married life has not been written. Here is a theme for genius; for only genius can divine and reveal the beauty, the pathos, and the wonder of the normal or the commonplace. A felicitous marriage has its comedy, its complexities, its element, too, of tragedy and grief, as well as its serenity and fealty. Matrimony, whether the pair fare well or ill, is always a great adventure, a play of deep instincts and powerful emotions, a drama of two psyches. Every marriage provides a theme for the literary artist. No lives are free from enigmas." [1]

More "temperance" in work would probably promote marriage of able and ambitious young people. Walter Gallichan complains that "we do not even recognize love as a finer passion than money greed. It is a kind of luxury, or pleasant pastime, for the sentimentally minded. Love is so undervalued as a source of happiness, a means of grace, and a completion of being, that many men would sooner work to keep a motor car than to marry."

Men should be taught greater respect for the individuality

of 50 girls reveals that present methods or indifference to the need of reasonable methods of teaching sex-hygiene are responsible for "a large percentage of harmful results, such as conditions bordering on neurasthenia, melancholia, pessimism and sex antagonism."

[1]Gallichan, Walter M., *The Great Unmarried*, New York, 1916.

of women, so that no high-minded girl will shrink from marriage with the idea that it means a surrender of her personality and a state of domestic servitude. A more discriminating idea of sex-equality is desirable, and a recognition by men that women are not necessarily creatures of inferior mentality. It would be an advantage if men's education included some instruction along these lines. It would be a great gain, also if intelligent women had more knowledge of domestic economy and mother-craft, because one of the reasons why the well-educated girl is handicapped in seeking a mate is the belief all too frequently well founded of many young men that she is a luxury which he can not afford.

Higher education in general needs to be reoriented. It has too much glorified individualism, and put a premium on "white collar" work. The trend toward industrial education will help to correct this situation.

Professor Sprague [1] points out another very important fault, when he says: "More strong men are needed on the staffs of public schools and women's colleges, and in all of these institutions more married instructors of both sexes are desirable. The catalogue of one of the [women's] colleges referred to above shows 114 professors and instructors, of whom 100 are women, of whom only two have ever married. Is it to be expected that the curriculum created by such a staff would idealize and prepare for family and home life as the greatest work of the world and the highest goal of woman, and teach race survival as a patriotic duty? Or, would it be expected that these bachelor staffs would glorify the independent vocation and life for women and create employment bureaus to enable their graduates to get into the offices, schools and other lucrative jobs? The latter seems to be what occurs."

Increase of opportunity for superior young people to meet each other, as discussed in our chapter on sexual selection, will play a very large part in raising the marriage rate. And finally,

[1] Sprague, Robert J., "Education and Race Suicide," *Journal of Heredity*, Vol. VI, pp. 158 ff., April, 1915. Many of the statistics of women's colleges, cited in the first part of this chapter, are from Dr. Sprague's paper.

the delayed or avoided marriage of the intellectual classes is in large part a reflection of public opinion, which has wrongly represented other things as being more worth while than marriage.

"The promotion of marriage in early adult life, as a part of social hygiene, must begin with a new canonization of marriage," Mr. Gallichan declares. " This is equally the task of the fervent poet and the scientific thinker, whose respective labors for humanity are never at variance in essentials. . . . The sentiment for marriage can be deepened by a rational understanding of the passion that attracts and unites the sexes. We need an apotheosis of conjugal love as a basis for a new appreciation of marriage. Reverence for love should be fostered from the outset of the adolescent period by parents and pedagogues."

If, in addition to this "diffusion of healthier views of the conjugal relation," some of the economic changes suggested in later chapters are put in effect, it seems probable that the present racially disastrous tendency of the most superior young men and women to postpone or avoid marriage would be checked.

CHAPTER XIII

INCREASE OF THE BIRTH-RATE OF THE SUPERIOR

Imagine 200 babies born to parents of native stock in the United States. On the average, 103 of them will be boys and 97 girls. By the time the girls reach a marriageable age (say 20 years), at least 19 will have died, leaving 78 possible wives, on whom the duty of perpetuating that section of the race depends.

We said "Possible" wives, not probable; for not all will marry. It is difficult to say just how many will become wives, but Robert J. Sprague has reported on several investigations that illuminate the point.

In a selected New England village in 1890, he says, "there were forty marriageable girls between the ages of 20 and 35. To-day thirty-two of these are married, 20 per cent. are spinsters.

"An investigation of 260 families of the Massachusetts Agricultural College students shows that out of 832 women over 40 years of age 755 or 91 per cent. have married, leaving only 9 per cent. spinsters. This and other observations indicate that the daughters of farmers marry more generally than those of some other classes.

"In sixty-nine (reporting) families represented by the freshman class of Amherst College (1914) there are 229 mothers and aunts over 40 years of age, of whom 186 or 81 per cent. have already married.

"It would seem safe to conclude that about 15 per cent. of native women in general American society do not marry during the child-bearing period." Deducting 15 per cent. from the 78 possible wives leaves sixty-six probable wives. Now among the native wives of Massachusetts 20 per cent. do not produce children, and deducting these thirteen childless ones from the

sixty-six probable wives leaves fifty-three probable, married, child-bearing women, who must be depended on to reproduce the original 200 individuals with whom we began this chapter. That means that each woman who demonstrates ability to bear offspring must bear 3.7 children. This it must be noted, is a minimum number, for no account has been taken of those who, through some defect or disease developed late in life, become unmarriageable. In general, unless every married woman brings three children to maturity, the race will not even hold its own in numbers. And this means that each woman must bear four children, since not all the children born will live. If the married women of the country bear fewer than nearly four children each, the race is in danger of losing ground.

Such a statement ought to strike the reader as one of grave importance; but we labor under no delusion that it will do so. For we are painfully aware that the bugaboo of the declining birth-rate of superior people has been raised so often in late years, that it has beome stale by repetition. It no longer causes any alarm. The country is filled with sincere but mentally short-sighted individuals, who are constantly ready to vociferate that numbers are no very desirable thing in a birth-rate; that quality is wanted, not quantity; that a few children given ideal care are of much more value to the state and the race than are many children, who can not receive this attention.

And this attitude toward the subject, we venture to assert, is a graver peril to the race than is the declining birth-rate itself. For there is enough truth in it to make it plausible, and to separate the truth from the dangerous untruth it contains, and to make the bulk of the population see the distinction, is a task which will tax every energy of the eugenist.

Unfortunately, this is not a case of mere difference of opinion between men; it is a case of antagonism between men and nature. If a race hypnotize itself into thinking that its views about race suicide are superior to nature's views, it may make its own end a little less painful; but it will not postpone that end for a single minute. The contest is to the strong, and although numbers are not the most important element in strength,

it is very certain that a race made up of families containing one child each will not be the survivor in the struggle for existence.

The idea, therefore, that race suicide and general limitation of births to the irreducible minimum, can be effectively justified by any conceivable appeal to economic or sociological factors, is a mistake which will eventually bring about the extinction of the people making it.

This statement must not be interpreted wrongly. Certainly we would not argue that a high birth-rate in itself is necessarily a desirable thing. It is not the object of eugenics to achieve as big a population as possible, regardless of quality. But in the last analysis, the only wealth of a nation is its people; moreover some people, are as national assets, worth more than others. The goal, then, might be said to be: a population adjusted in respect to its numbers to the resources of the country, and that number of the very best quality possible. Great diversity of people is required in modern society, but of each desirable kind the best obtainable representatives are to be desired.

It is at once evident that a decline, rather than an increase, in the birth-rate of some sections of the population, is wanted. There are some strata at the bottom that are a source of weakness rather than of strength to the race, and a source of unhappiness rather than of happiness to themselves and those around them. These should be reduced in number, as we have shown at some length earlier in this book.

The other parts of the population should be perpetuated by the best, rather than the worst. In no other way can the necessary leaders be secured, without whom, in commerce, industry, politics, science, the nation is at a great disadvantage. The task of eugenics is by no means what it is sometimes supposed to be: to breed a superior caste. But a very important part of its task is certainly to increase the number of leaders in the race. And it is this part of its task, in particular, which is menaced by the declining birth-rate in the United States.

As every one knows, race suicide is proceeding more rapidly among the native whites than among any other large section of the population; and it is exactly this part of the population

which has in the past furnished most of the eminent men of the country.

It has been shown in previous chapters that eminent men do not appear wholly by chance in the population. The production of eminence is largely a family affair; and in America, "the land of opportunity" as well as in older countries, people of eminence are much more interrelated than chance would allow. It has been shown, indeed, that in America it is at least a 500 to 1 bet that an eminent person will be rather closely related to some other eminent person, and will not be a sporadic appearance in the population.[1]

Taken with other considerations advanced in earlier chapters, this means that a falling off in the reproduction of the old American best strains means a falling off in the number of eminent men which the United States will produce. No improvement in education can prevent a serious loss, for the strong minds get more from education.

The old American stock has produced a vastly greater proportion of eminence, has accomplished a great deal more proportionately, in modern times, than has other any stock whose representatives have been coming in large numbers as immigrants to these shores during the last generation. It is, therefore, likely to continue to surpass them, unless it declines too greatly in numbers. For this reason, we feel justified in concluding that the decline of the birth-rate in the old American stock represents a decline in the birth-rate of a superior element.

There is another way of looking at this point. The stock under discussion has been, on the whole, economically ahead of such stocks as are now immigrating. In competition with them under equal conditions, it appears to remain pretty consistently

[1] Odin calculated that 16% of the eminent men of France had at least one relative who was in some way eminent; that 22% of the men of real talent had such relation; and that among the geniuses the percentage rose to 40. There are thus two chances out of five that a man of genius will have an eminent relative; for a man picked at random from the population the chance is one in several thousand. See Odin, A., *La Genèse des Grands Hommes*, Vol. I, p. 432 and Vol. II, Tableau xii, Lausanne, 1895.

ahead, economically. Now, although we would not insist on this point too strongly, it can hardly be questioned that eugenic value is to some extent correlated with economic success in life, as all desirable qualities tend to be correlated together. Within reasonable limits, it is justifiable to treat the economically superior sections of the nation as the eugenically superior. And it is among these economically superior sections of the nation that the birth-rate has most rapidly and dangerously fallen.

The constant influx of highly fecund immigrant women tends to obscure the fact that the birth-rate of the older residents is falling below par, and analysis of the birth-rate in various sections of the community is necessary to give an understanding of what is actually taking place.

In Rhode Island, F. L. Hoffmann found the average number of children for each foreign-born woman to be 3.35, and for each native-born woman to be 2.06. There were wide racial differences among the foreign born; the various elements were represented by the following average number of children per wife:

French-Canadians	4.42
Russians	3.51
Italians	3.49
Irish	3.45
Scotch and Welsh	3.09
English	2.89
Germans	2.84
Swedes	2.58
English-Canadians	2.56
Poles	2.31

In short, the native-born whites in this investigation fell below every one of the foreign nationalities.

The Massachusetts censuses for 1875 and 1884 showed similar results: the foreign-born women had 4.5 children each, and the native-born women 2.7 each.

Frederick S. Crum's careful investigation [1] of New England genealogies, including 12,722 wives, has thrown a great deal of

[1] Crum, Frederick S., "The Decadence of the Native American Stock," *Quarterly Pubs. Am. Statistical Assn.*, XIV, n. s. 107, pp. 215–223, Sept., 1914.

light on the steady decline in their birth-rate. He found the average number of children to be:

1750–1799	6.43
1800–1849	4.94
1850–1869	3.47
1870–1879	2.77

There, in four lines, is the story of the decline of the old American stock. At present, it is barely reproducing itself, probably not even that, for there is reason to believe that 1879 does not mark the lowest point reached. Before 1700, less than 2% of the wives in this investigation had only one child, now 20% of them have only one. With the emigration of old New England families to the west, and the constant immigration of foreign-born people to take their places, it is no cause for surprise that New England no longer exercises the intellectual leadership that she once held.

For Massachusetts as a whole, the birth-rate among the native-born population was 12.7 per 1,000 in 1890, 14.9 in 1910, while in the foreign-born population it was 38.6 in 1890 and 49.1 in 1910. After excluding all old women and young women, the birth-rate of the foreign-born women in Massachusetts is still found to be ¾ greater than that of the native-born.[1]

In short, the birth-rate of the old American stock is now so low that that stock is dying out and being supplanted by immigrants. In order that the stock might even hold its own, we have shown that each married woman should bear three to four children. At present the married women of the old white American race in New England appear to be bringing two or less to maturity.

It will be profitable to digress for a moment to consider farther what this disappearance of the ancient population of Massachusetts means to the country. When all the distinguished men of the United States are graded, in accordance with their distinction, it is regularly found, as Frederick Adams Woods says, that "Some states in the union, some sections of the country, have produced more eminence than others, far beyond the expecta-

[1] Kuczynski, R. R., *Quarterly Journ. of Economics*, Nov. 1901, and Feb., 1902.

tion from their respective white populations. In this regard Massachusetts always leads, and Connecticut is always second, and certain southern states are always behind and fail to render their expected quota." The accurate methods used by Dr. Woods in this investigation leave no room for doubt that in almost every way Massachusetts has regularly produced twice as many eminent men as its population would lead one to expect, and has for some ranks and types of achievement produced about four times the expectation.

Scott Nearing's studies [1] confirm those of Dr. Woods. Taking the most distinguished men and women America has produced, he found that the number produced in New England, per 100,000 population, was much larger than that produced by any other part of the country. Rhode Island, the poorest New England state in this respect, was yet 30% above New York, the best state outside New England.

The advantage of New England, however, he found to be rapidly decreasing. Of the eminent persons born before 1850, 30% were New Englanders although the population of New England in 1850 was only 11.8% of that of the whole country. But of the eminent younger men,—those born between 1880 and 1889, New England, with 7.5% of the country's population, could claim only 12% of the genius. Cambridge, Mass., has produced more eminent younger men of the present time than any other city, he discovered, but the cities which come next in order are Nashville, Tenn., Columbus, Ohio, Lynn, Mass., Washington, D. C., Portland, Ore., Hartford, Conn., Boston, Mass., New Haven, Conn., Kansas City, Mo., and Chicago, Ill.

There is reason to believe that some of the old New England stock, which emigrated to the West, retains a higher fecundity than does that part of the stock which remains on the Atlantic seaboard. This fact, while a gratifying one, of course does not compensate for the low fertility of the families which still live in New England.

[1] Nearing, Scott, "The Younger Generation of American Genius," *The Scientific Monthly*, II, pp. 48–61, Jan., 1916. "Geographical Distribution of American Genius," *Popular Science Monthly*, II, August, 1914.

Within this section of the population, the decline is undoubtedly taking place faster in some parts than in others. Statistical evidence is not available, to tell a great deal about this, but the birth-rate for the graduates of some of the leading women's colleges is known, and their student bodies are made up largely of girls of superior stork. At Wellesley, the graph in Fig. 36 shows at a glance just what is happening. Briefly, the graduates of that college contribute less than one child apiece to the race. The classes do not even reproduce their own numbers. Instead of the 3.7 children which, according to Sprague's calculation, they ought to bear, they are bearing .86 of a child.

The foregoing study is one of the few to carefully distinguish between families which were complete at the time of study and those families where additional children may yet be born. In the studies to follow this distinction may in some cases be made by the reader in interpreting the data while in other cases families having some years of possible productiveness ahead are included with others and the relative proportion of the types is not indicated. The error in these cases is therefore important and the reader is warned to accept them only with a mental allowance for this factor.

The best students make an even worse showing in this respect. The Wellesley alumnæ who are members of Phi Beta Kappa,—that is, the superior scholars—have not .86 of a child each, but only .65 of a child; while the holders of the Durant and Wellesley scholarships, awarded for intellectual superiority,[1] make the following pathetic showing in comparison with the whole class.

[1] In the chapter on Sexual Selection it was shown that the Normal School girls who stood highest in their classes married earliest. This may seem a contradiction of the Wellesley marriage rates in this table. The explanation probably is that while mental superiority is itself attractive in a mate, there are interferences built up in the collegiate life.

WELLESLEY COLLEGE

Graduates of '01, '02, '03, '04, Status of Fall of 1912

	All	*Durant or Wellesley scholars*
Per cent married	44	35
Number of children:		
Per graduate	.37	.20
Per wife	.87	.57

It must not be thought that Wellesley's record is an exception, for most of the large women's colleges furnish deplorable figures. Mount Holyoke's record is:

Decade of graduation	*Children per married graduate*	*Children per graduate*
1842–1849	2.77	2.37
1850–1859	3.38	2.55
1860–1869	2.64	1.60
1870–1879	2.75	1.63
1880–1889	2.54	1.46
1890–1892	1.91	0.95

Nor can graduation from Bryn Mawr College be said to favor motherhood. By the 376 alumnæ graduated there between 1888 and 1900, only 138 children had been produced up to Jan. 1, 1913. This makes .84 of a child per married alumna, or .37 of a child per graduate, since less than half of the graduates marry. These are the figures published by the college administration.

Professor Sprague's tabulation of the careers of Vassar college graduates, made from official records of the college, is worth quoting in full, for the light it throws on the histories of college girls, after they leave college:

CLASSES FROM 1867 TO 1892

Number of graduates.....959
Number that taught.....431 (45%)
Number that married.....509 (53%)
Number that did not marry.....450 (47%)
Number that taught and afterward married.....166 (39% of all who taught)
Number that taught, married and had children.....112 (67% of all who taught and married)
Number that taught, married and were childless.....54 (33%)
Number of children of those who taught and had children.....287 (1.73 children per family)
Number of children of those who married but did not teach.....686 (2 per married graduate that did not teach)
Total number of children of all graduates.....973 (1 child per graduate)
Average number of children per married graduate.....1.91
Average number of children per graduate.....1.00

CLASSES FROM 1867 TO 1900

Number of graduates.....1739
Number that taught.....800 (46%)
Number that married.....854 (49%)
Number that did not marry.....885 (51%)
Number that taught and afterward married.....294 (31%)
Number that taught, married and had children.....203 (69% of all who taught and married)
Number that taught, married and were childless.....91 (31%)
Number of children of those who taught and had children.....463 (1.57 children per family)
Number of children of those who married but did not teach.....1025 (2 each)
Total number of children of all graduates.....1488 (.8 child per graduate)

Average number of children per married graduate.....1.74 (per married graduate)
Average number of children per graduate.....0.8

If the women's colleges were fulfilling what the writers consider to be their duty toward their students, their graduates would have a higher marriage and birth-rate than that of their sisters, cousins and friends who do not go to college. But the reverse is the case. M. R. Smith's investigation showed the comparison between college girls and girls of equivalent social position and of the same or similar families, as follows:

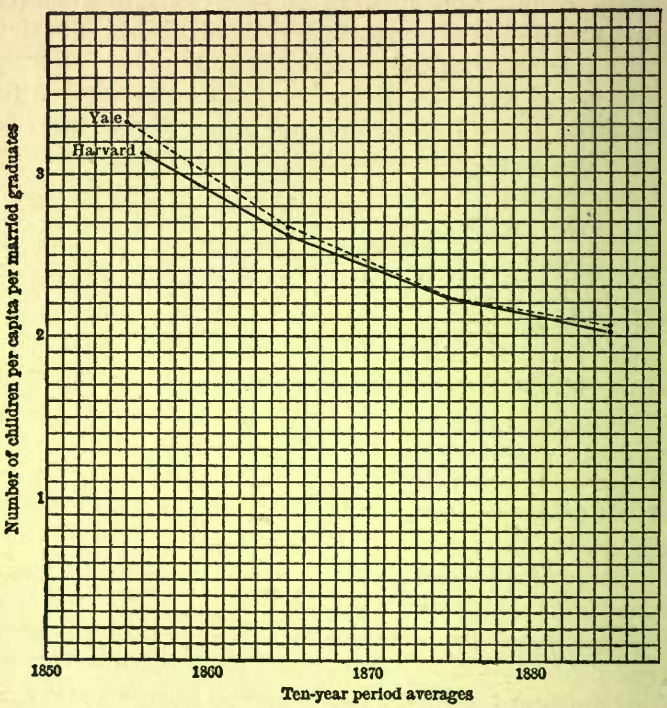
	Number of children	*Per cent childless at time*
College	1.65	25.36
Equivalent Non-College	1.874	17.89

Now if education is tending toward race suicide, then the writers believe there is something wrong with modern educational methods. And certainly all statistics available point to the fact that girls who have been in such an atmosphere as that of some colleges for four years, are, from a eugenic point of view, of diminished value to the race. This is not an argument against higher education for women, but it is a potent argument for a different kind of higher education than many of the colleges of America are now giving them.

This is one of the causes for the decline of the birth-rate in the old American stock. But of course it is only one. A very large number of causes are unquestionably at work to the same end, and the result can be adequately changed only if it is analyzed into as many of its component parts as possible, and each one of these dealt with separately. The writers have emphasized the shortcoming of women's colleges, because it is easily demonstrated and, they believe, relatively easily mitigated. But the record of men's colleges is not beyond criticism.

Miss Smith found that among the college graduates of the 18th century in New England, only 2% remained unmarried, while in the Yale classes of 1861–1879, 21% never married, and

of the Harvard graduates from 1870–1879 26% remained single. The average number of children per Harvard graduate of the earlier period was found to be 3.44, for the latest period studied 1.92. Among the Yale graduates it was found that the number of children per father had declined from 5.16 to 2.55.



BIRTH RATE OF HARVARD AND YALE GRADUATES

FIG. 37.—During the period under consideration it declined steadily, although marriage was about as frequent and as early at the end as at the beginning of the period. It is necessary to suppose that the decline in the birth rate is due principally to voluntary limitation of families. J. C. Phillips, who made the above graph, thinks that since 1890 the birth rate among these college graduates may be tending slightly to rise again.

Figures were obtained from some other colleges, which are incomplete and should be taken with reservation. Their incompleteness probably led the number of children to be considerably underestimated. At Amherst, 1872–1879, it was found that 44

of the 440 graduates of the period remained unmarried. The average number of children per married man was 1.72. At Wesleyan it was found that 20 of the 208 graduates, from 1863 to 1870, remained single; the average number of children per married man was 2.31.

The only satisfactory study of the birth-rate of graduates of men's colleges is that recently made by John C. Phillips from the class lists of Harvard and Yale, 1850–1890, summarized in the accompanying graph (Fig. 37). In discussing his findings, Dr. Phillips writes:

"Roughly, the number of children born per capita per married graduate has fallen from about 3.25 in the first decade to 2.50 in the last decade. The per cent of graduates marrying has remained about the same for forty years, and is a trifle higher for Yale; but the low figure, 68% for the first decade of Harvard, is probably due to faulty records, and must not be taken as significant.

"The next most interesting figure is the 'Children Surviving per Capita per Graduate.' This has fallen from over 2.50 to about 1.9. The per cent of childless marriages increased very markedly during the first two decades and held nearly level for the last two decades. For the last decade at Yale it has even dropped slightly, an encouraging sign. It is worthy of note that the number of children born to Yale graduates is almost constantly a trifle higher than that for Harvard, while the number of childless marriages is slightly less." This is probably owing to the larger proportion of Harvard students living in a large city.

If the birth-rate of graduates both of separate men's colleges and of separate women's colleges is alarmingly low, that of graduates of coeducational institutions is not always satisfactory, either. To some extent the low birth-rate is a characteristic of educated people, without regard to the precise nature of their education. In a study of the graduates of Syracuse University, one of the oldest coeducational colleges of the eastern United States, H. J. Banker found [1] that the number of

[1] Banker, Howard J., "Coeducation and Eugenics," *Journal of Heredity*, VIII, pp. 208–214, May, 1917.

children declined with each decade. Thus married women graduates prior to the Civil War had 2 surviving children each; in the last decade of the nineteenth century they had only one. For married men graduates, the number of surviving children had fallen in the same length of time from 2.62 to 1.38. When all graduates, married or not, are counted in the decade 1892–1901, it is found that the men of Syracuse have contributed to the next generation one surviving child each, the women only half a child apiece.

Dr. Cattell's investigation of the families of 1,000 contemporary American men of science all of which were probably not complete however, shows that they leave, on the average, less than two surviving children. Only one family in 75 is larger than six, and 22% of them are childless. Obviously, as far as those families are concerned, there will be fewer men of inherent scientific eminence in the next generation than in this.

The decline in the birth-rate is sometimes attributed to the fact that people as a whole are marrying later than they used to; we have already shown that this idea is, on the whole, false. The idea that people as a whole are marrying less than they used to is also, as we have shown, mistaken. The decline in the general birth-rate can be attributed to only one fact, and that is that married people are having fewer children.

The percentage of childless wives in the American stock is steadily increasing. Dr. Crum's figures show the following percentage of childless wives, in the New England genealogies with which he worked:

1750–1799	1.88
1800–1849	4.07
1850–1869	5.91
1870–1879	8.10

J. A. Hill [1] found, from the 1910 census figures, that one in eight of the native-born wives is childless, as compared with one in five among the Negroes, one in nineteen among the foreign born. Childlessness of American wives is therefore a consider-

[1] Hill, Joseph A., "Comparative Fecundity of Women of Native and Foreign Parentage," *Quarterly Pubs. Amer. Statistical Assn.*, XIII, 583–604.

able, although not a preponderant factor, in this decline of the birth rate.

Dr. Hill further found that from 10 marriages, in various stocks, the following numbers of children could be expected:

Native-born women	27
Negro-born women	31
English-born women	34
Russian-born women	54
French Canada-born women	56
Polish-born women	62

The women of the old American stock are on the whole more sterile or, if not sterile, less fecund, than other women in the United States. Why?

In answer, various physiological causes are often alleged. It is said that the dissemination of venereal diseases has caused an increase of sterility; that luxurious living lowers fecundity, and so on. It is impossible to take the time to analyze the many explanations of this sort which have been offered, and which are familiar to the reader; we must content ourselves with saying that evidence of a great many kinds, largely statistical and, in our opinion, reliable, indicates that physiological causes play a minor part in the decrease of the birth-rate.[1]

Or, plainly, women no longer bear as many children, because they don't want to.

This accords with Dr. Cattell's inquiry of 461 American men of science; in 285 cases it was stated that the family was voluntarily limited, the cause being given as health in 133 cases, expense in 98 cases, and various in 54 cases. Sidney Webb's investigation among "intellectuals" in London showed an even greater proportion of voluntary limitation. The exhaustive investigation of the Galton Laboratory of National Eugenics leaves little room for doubt that in England the decline in the birth-rate began about 1876–78, when the trial of Charles Bradlaugh and the Theosophist leader, Mrs. Annie Besant, on the charge of circulating "neo-Malthusian" literature, focused

[1] See Willcox, W. F., "Fewer Births and Deaths: What Do They Mean?" *Journal of Heredity*, VII, pp. 119–128, March, 1916.

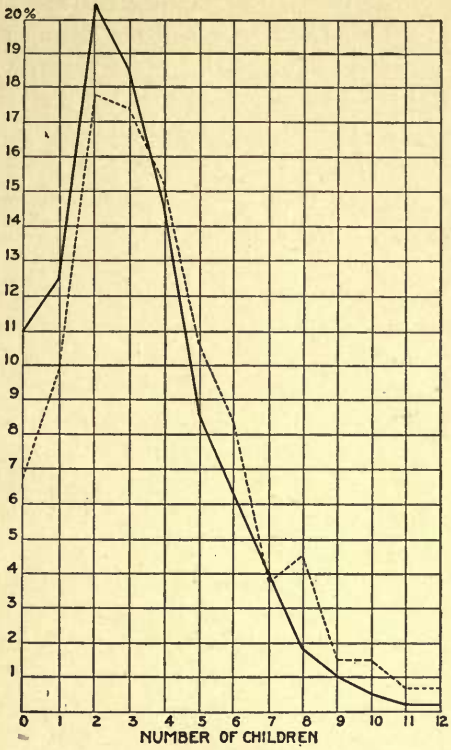
public attention on the possibility of birth control, and gradually brought a knowledge of the means of contraception within reach of many. In the United States statistics are lacking, but medical men and others in a position to form opinions generally agree that the limitation of births has been steadily increasing for the last few decades; and with the propaganda at present going on, it is pretty sure to increase much more rapidly during the next decade or two.

Some instructive results can be drawn, in this connection, from a study of the families of Methodist clergymen in the United States.[1] Although 98 out of every hundred of them marry, and they marry early, the birth-rate is not high. Its distribution is presented in the accompanying graph (Fig. 38). It is evident that they have tended to standardize the two-child family which is so much in evidence among college professors and educated classes generally, all over the world. The presence of a considerable number of large families raises the average number of surviving children of prominent Methodists to 3.12.

And in so explaining the cause of the declining birth-rate among native-born Americans, we have also found the principal reason for the *differential* nature of the decline in the nation at large, which is the feature that alarms the eugenist. The more intelligent and well-to-do part of the population has been able to get and use the needed information, and limit its birth-rate; the poor and ignorant has been less able to do so, and their rate of increase has therefore been more natural in a large percentage of cases.

It is not surprising, therefore, that many eugenists should have advocated wider dissemination of the knowledge of means of limiting births, with the idea that if this practice were extended

[1] The data are published in full by Paul Popenoe in the *Journal of Heredity*, October, 1917. It must be noted that, in spite of their small salaries, the Methodist clergymen marry earlier and have more children than do other men of equal education and social status, such as the Harvard and Yale graduates. This difference in marriage and birth-rate is doubtless to be credited in part to their inherent nature and in part to the action of religious idealism. It confirms the belief of eugenists that even under present economic circumstances the birth-rate of the superior classes might be raised appreciably by a campaign of eugenic education.



FAMILIES OF PROMINENT METHODISTS

FIG. 38.—The heavy line shows the distribution of families of prominent Methodists (mostly clergymen) who married only once. Eleven percent had no surviving children and nearly half of the families consisted of two children or less. The dotted line shows the families of those who were twice married. It would naturally be expected that two women would bear considerably more children than one woman, but as an average fact it appears that a second wife means the addition of only half a child to the minister's family. It is impossible to avoid the conclusion that the birth-rate in these families is determined more by the desire of the parents (based on economic grounds) than on the natural fecundity of the women. In other words, the number of children is limited to the number whom the minister can afford to bring up on his inadequate salary.

to the lower classes, their birth-rate would decrease just the same as has that of the upper classes, and the alarming differential rate would therefore be abolished.

Against this it might be argued that the desired result will never be wholly attained, because the most effective means of birth control involve some expense, and because their effective use presupposes a certain amount of foresight and self-control which is not always found among the lower strata of society.

Despite certain dangers accompanying a widespread dissemination of the knowledge of how to limit births, it seems to be the opinion of most eugenists that if free access to such information be not permitted that at least such knowledge ought to be given in many families, where it would be to the advantage of society that fewer children be produced. Such a step, of course, must be taken on the individual responsibility of a doctor, nurse or other social worker. A propaganda has arisen during recent years, in the United States, for the repeal of all laws which prohibit giving knowledge about and selling contraceptives. Whether or not it succeeds in changing the law it will, like the Bradlaugh-Besant episode, spread contraception widely. This propaganda is based largely on social and economic grounds, and is sometimes unscientific in its methods and avowed aims. But whatever its nature may be, there seems little reason (judging from analogy in European countries) to believe that it can be stopped.

The "infant mortality movement" also has an effect here which is rarely recognized. It is a stock argument of birth control propagandists that a high birth-rate means a high rate of infant mortality; but A. O. Powys has demonstrated that cause and effect are to some extent reversed in this statement, and that it is equally true that a high rate of infant mortality means a high birth-rate, in a section of the population where birth control is not practiced. The explanation is the familiar fact that conception takes place less often in nursing mothers. But if a child dies early or is bottle-fed, a new conception is likely to occur much sooner than would otherwise be the case. By re-

ducing infant mortality and teaching mothers to feed their babies naturally, the infant mortality movement is thereby reducing the birth-rate in the poorer part of the population, a eugenic service which to some extent offsets the dysgenic results that, as we shall show in the last chapter, follow the "Save the Babies" propaganda.

With the spread of the birth control and infant mortality movements one may therefore look forward to some diminution of the differential element in the birth-rate, together with a further decline in that birth-rate as a whole.

Such a situation, which seems to us almost a certainty within the next decade or two, will not change the duty of eugenics, on which we have been insisting in this chapter and, to a large extent, throughout the present book. It will be just as necessary as ever that the families which are, and have been in the past, of the greatest benefit and value to the country, have a higher birth-rate. The greatest task of eugenics, as we see it, will still be to find means by which the birth-rate among such families can be increased. This increase in the birth-rate among superior people must depend largely on a change in public sentiment. Such a change may be brought about in many ways. The authority of religion may be invoked, as it is by the Roman Catholic and Mormon churches [1] whose communicants are constantly taught that fecundity is a virtue and voluntary sterility a sin. Unfortunately their appeal fails to make proper discriminations. Whatever may be the theological reasons for such an attitude on the part of the churches, its practical eugenic significance is clear enough.

Nothing can be more certain than that, if present conditions continue, Roman Catholics will soon be in an overwhelming preponderance in the eastern United States, because of the differential birth-rate, if for no other reason; and that the Mormon population will steadily gain ground in the west. Similarly, it is alleged that the population of France is gradually assuming the characteristics of the Breton race, because that

[1] For an official statement of the attitude of the birth-rate of the Mormon church, see *Journal of Heredity*, VII, pp. 450–451, Oct., 1916.

race is the notably fecund section of the population, while nearly all the other components of the nation are committing race suicide (although not so rapidly as is the old white stock in New England). Again, the rôle of religion in eugenics is shown in China, where ancestor worship leads to a desire for children, and makes it a disgrace to be childless. A process analogous to natural selection applies to religions much as it does to races; and if the Chinese religion, with its requirement of a high birth-rate, and the present-day American Protestant form of the Christian religion, with its lack of eugenic teaching, should come into direct competition, under equal conditions of environment, it is obvious that the Chinese form would be the eventual survivor, just because its adherents would steadily increase and those of its rival would as steadily decrease. Such a situation may seem fanciful; yet the leaders of every church may well consider whether the religion which they preach is calculated to fill all the needs of its adherents, if it is silent on the subject of eugenics.

The influence of economic factors on the birth-rate is marked. The child, under modern urban conditions, is not an economic asset, as he was on the farm in earlier days. He is an economic liability instead. And with the constant rise of the standard of living, with the increase of taxation, the child steadily becomes more of a liability. Many married people desire children, or more children, but feel that they can not have them without sacrificing something that they are unwilling to sacrifice.

Analysis of this increase in the cost of children, reveals not less than five main elements which deserve attention from eugenists.

1. It costs more to clothe children than it used to. Not only does clothing of a given quality cost more now than it did a decade or two ago, but there are more fabrics and designs available, and many of these, while attractive, are costly and not durable. Compliance to fashion has increasingly made itself felt in the clothing of the child.

2. It costs more to feed them than it used to. Not only has food for everyone increased in price, but the standards for feed-

ing children have been raised. Once children were expected to be content with plain fare; now it is more frequently the custom to give them just what the rest of the family eats.

3. The cost of medical attention has increased. All demand more of the doctors now than they did in the last generation. The doctors are able to do more than they formerly could, and particularly for his children, every man wants the best that he can possibly afford. Hence medical attendance for a child is constantly becoming more costly, because more frequent; and further, the amount of money which parents spend on medical attendance for their children usually increases with any increase in their income.

4. The cost of domestic labor is greater. Most kinds of domestic service have more than doubled in price within the memory of relatively young people. Moreover, it is gradually being realized that a high standard is desirable in selecting a nurse for children. As a fact, a children's nurse ought to have much greater qualifications than the nurse whose duty is to care for sick adults. If a mother is obliged to delegate part of the work of bringing up her children to some other woman, she is beginning to recognize that this substitute mother should have superior ability; and the teachers of subconscious psychology have emphasized the importance of giving a child only the best possible intellectual surroundings. Ignorant nursemaids are unwillingly tolerated, and as the number of competent assistants for mothers is very small, the cost is correspondingly high. An increase in the number of persons trained for such work is to be anticipated, but it is likely that the demand for them will grow even more rapidly; hence there is no reason to expect that competent domestic help will become any less costly than it is now.

5. The standards of education have risen steadily. There is perhaps no other feature which has tended more to limit families. Conscientious parents have often determined to have no more children than they could afford to educate in the best possible way. This meant at least a college education, and frequently has led to one and two-child families. It is a motive of birth

control which calls for condemnation. The old idea of valuable mental discipline for all kinds of mental work to be gained from protracted difficult formal education is now rejected by educational psychologists, but its prevalence in the popular mind serves to make "higher education" still something of a fetish, from which marvelous results, not capable of precise comprehension, are anticipated. We do not disparage the value of a college education, in saying that parents should not attach such importance to it as to lead them to limit their family to the number to whom they can give 20 years of education without pecuniary compensation.

The effect of these various factors in the increasing cost of children is to decrease fecundity not so much on the basis of income of parents, as on the basis of their standards. The prudent, conscientious parent is therefore the one most affected, and the reduction in births is greatest in that class, where eugenics is most loth to see it.

The remedy appears to be a change in public opinion which will result in a truer idea of values. Some readjustments in family budgets are called for, which will discriminate more clearly between expenditure that is worth while, and that which is not. Without depriving his children of the best medical attention and education, one may eliminate those invidious sources of expense which benefit neither the children nor anyone else,—overdressing, for instance. A simplification of life would not only enable superior people to have larger families, but would often be an advantage to the children already born.

On the other hand, the fact that higher standards in a population lead to fewer children suggests a valuable means of reducing the birth-rate of the inferior. Raise their low standards of living and they will reduce their own fertility voluntarily (the birth control movement furnishing them with the possibility). All educational work in the slums therefore is likely to have a valuable though indirect eugenic outcome. The poor foreign-speaking areas in large cities, where immigrants live huddled together in squalor, should be broken up. As these people are given new ideas of comfort, and as their children are educated

in American ways of living, there is every reason to expect a decline in their birth-rate, similar to that which has taken place among the native-born during the past generation.

This elevation of standards in the lower classes will be accomplished without any particular exertion from eugenists; there are many agencies at work in this field, although they rarely realize the result of their work which we have just pointed out.

But to effect a discriminating change in the standards of the more intelligent and better educated classes calls for a real effort on the part of all those who have the welfare of society at heart. The difficulties are great enough and the obstacles are evident enough; it is more encouraging to look at the other side, and to see evidences that the public is awakening. The events of every month show that the ideals of eugenics are filtering through the public mind more rapidly than some of us, a decade ago, felt justified in expecting. There is a growing recognition of the danger of bad breeding; a growing recognition in some quarters at least of the need for more children from the superior part of the population; a growing outcry against the excessive standards of luxury that are making children themselves luxuries. The number of those who call themselves eugenists, or who are in sympathy with the aims of eugenics, is increasing every year, as is evidenced by the growth of such an organization as the American Genetic Association. Legislators show an eager desire to pass measures that as they (too often wrongly) believe will have a eugenic result. Most colleges and universities are teaching the principles of heredity, and a great many of them add definite instruction in the principles of eugenics. Although the ultimate aim of eugenics—to raise the level of the whole human race—is perhaps as great an undertaking as the human mind can conceive, the American nation shows distinct signs of a willingness to grapple with it. And this book will have failed in its purpose, if it has not convinced the reader that means are available for attacking the problem at many points, and that immediate progress is not a mere dream.

One of the first necessary steps is a change in educational

methods to give greater emphasis to parenthood. And this change, it is a great pleasure to be able to say, is being made in many places. The public schools are gradually beginning to teach mothercraft, under various guises, in many cities and the School of Practical Arts, Columbia Univ., gives a course in the "Physical Care of the Infant." Public and private institutions are beginning to recognize, what has long been ignored, that parenthood is one of the functions of men and women, toward which their education should be directed. Every such step will tend, we believe, to increase the birth-rate among the superior classes of the community; every such step is therefore, indirectly if not directly, a gain for eugenics; for, as we have emphasized time and again, a change in public opinion, to recognize parenthood as a beautiful and desirable thing, is one of the first desiderata of the eugenics program.

The introduction of domestic science and its rapid spread are very gratifying, yet there are serious shortcomings, as rather too vigorously set forth by A. E. Hamilton:

"There are rows of little gas stoves over which prospective wives conduct culinary chemical experiments. There are courses in biology, something of physiology and hygiene, the art of interior decoration and the science of washing clothes. There is text-book sociology and sometimes lectures on heredity or eugenics. But the smile of incredulity as to my seriousness when I asked a Professor in the Margaret Morrison Carnegie School [a college of Practical Arts for Women], 'Where are the babies?' is typical. Babies were impossible. They would interfere with the curriculum, there was no time for practice with babies, and besides, where could they be got, and how could they be taken care of? The students were altogether too busy with calories, balanced rations, and the history of medieval art."

Perhaps the time is not so far distant when babies will be considered an integral part of a girl's curriculum. If educators begin systematically to educate the emotions as well as the intellect, they will have taken a long step toward increasing the birth-rate of the superior. The next step will be to correlate income more truly with ability in such a way as to make it possible

for superior young parents to afford children earlier. The child ought, if eugenically desirable, to be made an asset rather than a liability; if this can not be done, the parents should at least not be penalized for having children. In this chapter, emphasis has been laid on the need for a change in public opinion; in future chapters some economic and social reforms will be suggested, which it is believed would tend to make superior parents feel willing to have more children.

The education of public opinion which, acting through the many agencies named, will gradually bring about an increase in the birth-rate of superior people, will not be speedy; but it has begun. The writers, therefore, feel justified in thinking, not solely as a matter of optimistic affirmation, but because of the evidence available, that the race suicide now taking place in the old American stock will soon reach its lowest limit, and that thereafter the birth-rate in that particular stock will slowly rise. If it does, and if, as seems probable, the birth-rate in some inferior sections of the American population at the same time falls from its present level, a change in the racial composition of the nation will take place, which, judged by past history, is bound to be of great eugenic value.

CHAPTER XIV

THE COLOR LINE

"A young white woman, a graduate of a great university of the far North, where Negroes are seldom seen, resented it most indignantly when she was threatened with social ostracism in a city farther South with a large Negro population because she insisted upon receiving upon terms of social equality a Negro man who had been her classmate.[1] "

The incident seems trivial. But the phenomenon back of it, the "color line," is so far-reaching that it deserves careful examination.

As the incident suggests, the color line is not a universal phenomenon. The Germans appear to have little aversion to receiving Negroes—*in Germany*—on terms of equality. These same Germans, when brought face to face with the question in their colonies, or in the southern United States, quickly change their attitude. Similarly a Negro in Great Britain labors under much less disadvantage than he does among the British inhabitants of Australia or South Africa.

The color line therefore exists only as the result of race experience. This fact alone is sufficient to suggest that one should not dismiss it lightly as the outgrowth of bigotry. Is is not perhaps a social adaptation with survival value?

The purpose of this chapter is to analyze society's "unconscious reasoning" which has led to the establishment of a color line—to the denial of social equality—wherever the white [2] and

[1] Mecklin, John M., *Democracy and Race Friction, a Study in Social Ethics*, New York, 1914. p. 147.

[2] It would be more accurate to say the Nordic race. Other white races have not uniformly shown this discrimination. The Mediterranean race in particular has never manifested the same amount of race feeling. The Arabs have tended to receive the Negro almost on terms of equality, partly on religious grounds; it seems probable that the decadence of the Arabs is largely due to their miscegenation.

black races have long been in contact during recent history; and to see whether this discrimination appears to be justified by eugenics.

J. M. Mecklin [1] summarizes society's logic as follows:

"When society permits the free social intercourse of two young persons of similar training and interests, it tacitly gives its consent to the possible legitimate results of such relations, namely, marriage. But marriage is not a matter that concerns the contracting parties alone; it is social in its origin and from society come its sanctions. It is society's legitimatised method for the perpetuation of the race in the larger and inclusive sense of a continuous racial type which shall be the bearer of a continuous and progressive civilization. There are, however, within the community, two racial groups of such widely divergent physical and psychic characteristics that the blending of the two destroys the purity of the type of both and introduces confusion—the result of the blend is a mongrel. The preservation of the unbroken, self-conscious existence of the white or dominant ethnic group is synonymous with the preservation of all that has meaning and inspiration in its past and hope for its future. It forbids by law, therefore, or by the equally effective social taboo, anything that would tend to contaminate the purity of its stock or jeopardize the integrity of its social heritage."

It is needless to say that the "social mind" does not consciously go through any such process of reasoning, before it draws a color line. The social mind rarely even attempts to justify its conclusions. It merely holds a general attitude of superiority, which in many cases appears to be nothing more than a feeling that another race is *different.*

In what way different?

The difference between the white race and the black (or any other race) might consist of two elements: (1) differences in heredity—biological differences; (2) differences in traditions, environment, customs—social differences, in short. A critical inquirer would want to know which kind of difference was greater, for he would at once see that the second kind might

[1] Mecklin, *op. cit.*, p. 147.

be removed by education and other social forces, while the first kind would be substantially permanent.

It is not difficult to find persons of prominence who will assert that all the differences between white and Negro are differences of a social nature, that the differences of a physical nature are negligible, and that if the Negro is "given a chance" the significant differences will disappear. This attitude permeates the public school system of northern states. A recent report on the condition of Negro pupils in the New York City public schools professes to give "few, perhaps no, recommendations that would not apply to the children of other races. Where the application is more true in regard to colored children, it seems largely to be because of this lack of equal justice in the cases of their parents. Race weakness appears but this could easily be balanced by the same or similar weakness in other races. Given an education carefully adapted to his needs and a fair chance for employment, the normal child of any race will succeed, unless the burden of wrong home conditions lies too heavily upon him." [1]

As the writer does not define what she means by "succeed," one is obliged to guess at what she means: Her anthropology is apparently similar to that of Franz Boas of Columbia University, who has said that, "No proof can be given of any material inferiority of the Negro race;—without doubt the bulk of the individuals composing the race are equal in mental aptitude to the bulk of our own people."

If such a statement is wholly true, the color line can hardly be justified, but must be regarded, as it is now the case sometimes, as merely the expression of prejudice and ignorance. If the only differences between white and black, which can not be removed by education, are of no real significance,—a chocolate hue of skin, a certain kinkiness of hair, and so on,—then logically the white race should remove the handicaps which lack of

[1] Blascoer, Frances, *Colored School Children in New York*, Public Education Association of the City of New York, 1915. The preface, from which the quotation is taken, is by Eleanor Hope Johnson, chairman of the committee on hygiene of school children.

education and bad environment have placed on the Negro, and receive him on terms of perfect equality, in business, in politics, and in marriage.

The proposition needs only to be stated in this frank form, to arouse an instinctive protest on the part of most Americans. Yet it has been urged in an almost equally frank form by many writers, from the days of the abolitionists to the present, and it seems to be the logical consequence of the position adopted by such anthropologists as Professor Boas, and by the educators and others who proclaim that there are no significant differences between the Negro and the white, except such as are due to social conditions and which, therefore, can be removed.

But what are these social differences, which it is the custom to dismiss in such a light-hearted way? Are they not based on fundamental incompatibilities of racial temperament, which in turn are based on differences in heredity? Modern sociologists for the main part have no illusions as to the ease with which these differences in racial tradition and custom can be removed.

The social heritage of the Negro has been described at great length and often with little regard for fact, by hundreds of writers. Only a glance can be given the subject here, but it may profitably be asked what the Negro did when he was left to himself in Africa.

"The most striking feature of the African Negro is the low forms of social organization, the lack of industrial and political coöperation, and consequently the almost entire absence of social and national self-consciousness. This rather than intellectual inferiority explains the lack of social sympathy, the presence of such barbarous institutions as cannibalism and slavery, the low position of woman, inefficiency in the industrial and mechanical arts, the low type of group morals, rudimentary art-sense, lack of race-pride and self-assertiveness, and in intellectual and religious life largely synonymous with fetishism and sorcery." [1]

An elementary knowledge of the history of Africa, or the more recent and much-quoted example of Haiti, is sufficient to prove

[1] Mecklin, *op. cit.*, p. 32.

that the Negro's own social heritage is at a level far below that of the whites among whom he is living in the United States. No matter how much one may admire some of the Negro's individual traits, one must admit that his development of group traits is primitive, and suggests a mental development which is also primitive.

If the number of original contributions which it has made to the world's civilization is any fair criterion of the relative value of a race, then the Negro race must be placed very near zero on the scale.[1]

The following historical considerations suggest that in comparison with some other races the Negro race is germinally lacking in the higher developments of intelligence:

1. That the Negro race in Africa has never, by its own initiative, risen much above barbarism, although it has been exposed to a considerable range of environments and has had abundant time in which to bring to expression any inherited traits it may possess.

2. That when transplanted to a new environment—say, Haiti—and left to its own resources, the Negro race has shown the same inability to rise; it has there, indeed, lost most of what it had acquired from the superior civilization of the French.

3. That when placed side by side with the white race, the Negro race again fails to come up to their standard, or indeed to come anywhere near it. It is often alleged that this third test is an unfair one; that the social heritage of slavery must be eliminated before the Negro can be expected to show his true worth. But contrast his career in and after slavery with that of the Mamelukes of Egypt, who were slaves, but slaves of good stock. They quickly rose to be the real rulers of the country. Again, compare the record of the Greek slaves in the Roman republic and empire or that of the Jews under Islam. Without pushing these analogies too far, is not one forced to conclude

[1] The Negro's contribution has perhaps been most noteworthy in music. This does not necessarily show advanced evolution; August Weismann long ago pointed out that music is a primitive accomplishment. For an outline of what the Negro race has achieved, particularly in America, see the *Negro Year Book*, Tuskegee Institute, Ala.

that the Negro lacks in his germ-plasm excellence of some qualities which the white races possess, and which are essential for success in competition with the civilizations of the white races at the present day?

If so, it must be admitted not only that the Negro is *different* from the white, but that he is in the large eugenically *inferior* to the white.

This conclusion is based on the relative achievements of the race; it must be tested by the more precise methods of the anthropological laboratory. Satisfactory studies of the Negro should be much more numerous, but there are a few informative ones. Physical characters are first to be considered.

As a result of the careful measurement of many skulls, Karl Pearson [1] has come to the following conclusions:

"There is for the best ascertainable characters a continuous relationship from the European skull, through prehistoric European, prehistoric Egyptian, Congo-Gaboon Negroes to Zulus and Kafirs.

"The indication is that of a long differentiated evolution, in which the Negro lies nearer to the common stem than the European; he is nearer to the childhood of man."

This does not prove any mental inferiority: there is little or no relation between conformation of skull and mental qualities, and it is a great mistake to make hasty inferences from physical to mental traits. Bean and Mall have made studies directly on the brain, but it is not possible to draw any sure conclusions from their work. A. Hrdlička found physical differences between the two races, but did not study traits of any particular eugenic significance.

On the whole, the studies of physical anthropologists offer little of interest for the present purpose. Studies of mental traits are more to the point, but are unfortunately vitiated in many cases by the fact that no distinction was made between full-blood Negroes and mulattoes, although the presence of white blood must necessarily have a marked influence on the traits under consideration. If the investigations are discounted

[1] *Social Problems; Their Treatment, Past, Present and Future*, p. 8, London, 1912.

when necessary for this reason, it appears that in the more elementary mental processes the two races are approximately equal. White and "colored" children in the Washington, D. C., schools ranked equally well in memory; the colored children were found to be somewhat the more sensitive to heat.[1] Summing up the available evidence, G. O. Ferguson concludes that "in the so-called lower traits there is no great difference between the Negro and the white. In motor capacity there is probably no appreciable racial difference. In sense capacity, in perceptive and discriminative ability, there is likewise a practical equality."

This is what one would, *a priori*, probably expect. But it is on the "higher" mental functions that race progress largely depends, and the Negro must be judged eugenically mainly by his showing in these higher functions. One of the first studies in this line is that of M. J. Mayo,[2] who summarizes it as follows:

"The median age of white pupils at the time of entering high school in the city of New York is 14 years 6 months: of colored pupils 15 years 1 month—a difference of 7 months. The average deviation for whites is 9 months; for colored 15 months. Twenty-seven per cent of the whites are as old as the median age of the colored or older.

"Colored pupils remain in school a greater length of time than do the whites. For the case studied [150 white and 150 colored], the average time spent in high school for white pupils was 3.8 terms; for colored 4.5 terms. About 28% of the whites attain the average time of attendance for colored.

"Considering the entire scholastic record, the median mark of the 150 white pupils is 66; of the 150 colored pupils 62; a difference of 4%. The average deviation of white pupils is 7; of colored 6.5. Twenty-nine per cent. of the colored pupils reach or surpass the median mark of the whites.

"The white pupils have a higher average standing in all sub-

[1] Stetson, G. R., "Memory Tests on Black and White Children," *Psych. Rev.*, 1897, p. 285. See also MacDonald, A., in *Rep. U. S. Comm. of Educ.*, 1897–98.

[2] Mayo, M. J., "The Mental Capacity of the American Negro," *Arch. of Psych.*, No. 28.

jects . . . the colored pupils are about ¾ as efficient as the whites in the pursuit of high school studies."

This whole investigation is probably much too favorable to the Negro race, first because Negro high school pupils represent a more careful selection than do the white pupils; but most of all because no distinction was made between Negroes and mulattoes.

B. A. Phillips, studying the public elementary schools of Philadelphia, found [1] that the percentage of retardation in the colored schools ranged from 72.8 to 58.2, while the percentage of retardation in the districts which contained the schools ranged from 45.1 to 33.3. The average percentage of retardation for the city as a whole was 40.3. Each of the colored schools had a greater percentage of retardation than any of the white schools, even those composed almost entirely of foreigners, and in those schools attended by both white and colored pupils the percentage of retardation on the whole varied directly with the percentage of colored pupils in attendance.

These facts might be interpreted in several ways. It might be that the curriculum was not well adapted to the colored children, or that they came from bad home environments, or that they differed in age, etc. Dr. Phillips accordingly undertook to get further light on the cause of retardation of the colored pupils by applying Binet tests to white and colored children of the same chronological age and home conditions, and found "a difference in the acceleration between the two races of 31% in favor of the white boys, 25% in favor of the white girls, 28% in favor of the white pupils with boys and girls combined."

A. C. Strong, using the Binet-Simon tests, found [2] colored school children of Columbia, S. C., considerably less intelligent than white children.

W. H. Pyle made an extensive test [3] of 408 colored pupils in

[1] Phillips, B. A., "Retardation in the Elementary Schools of Philadelphia," *Psych. Clinic*, VI, pp. 79–90; "The Binet Tests Applied to Colored Children," *ibid.*, VIII, pp. 190–196.

[2] Strong, A. C., *Ped. Sem.*, XX, pp. 485–515.

[3] Pyle, W. H., "The Mind of the Negro Child," *School and Society*, I, pp. 357–360.

Missouri public schools and compared them with white pupils. He concludes: "In general the marks indicating mental ability of the Negro are about two-thirds those of the whites. . . . In the substitution, controlled association, and Ebbinghaus tests, the Negroes are less than half as good as the whites. In free association and the ink-blot tests they are nearly as good. In quickness of perception and discrimination and in reaction, the Negroes equal or excel the whites."

"Perhaps the most important question that arises in connection with the results of these mental tests is: How far is ability to pass them dependent on environmental conditions? Our tests show certain specific differences between Negroes and whites. What these differences would have been had the Negroes been subject to the same environmental influences as the whites, it is difficult to say. The results obtained by separating the Negroes into two social groups would lead one to think that the conditions of life under which the negroes live might account for the lower mentality of the Negroes. On the other hand, it may be that the Negroes living under better social conditions are of better stock. They may have more white blood in them."

The most careful study yet made of the relative intelligence of Negroes and whites is that of G. O. Ferguson, Jr.,[1] on 486 white and 421 colored pupils in the schools of Richmond, Fredericksburg, and Newport News, Va. Tests were employed which required the use of the "higher" functions, and as far as possible (mainly on the basis of skin-color) the amount of white blood in the colored pupils was determined. Four classes were made: full-blood Negro, ¾ Negro, ½ Negro (mulatto) and ¼ Negro (quadroon). It was found that "the pure Negroes scored 69.2% as high as the whites; that the ¾ pure Negroes scored 73.2% as high as the whites; that the mulattoes scored 81.2% as high as the whites; and that the quadroons obtained 91.8% of the white score." This confirms the belief of many observers that the ability of a colored man is proportionate to the amount of white blood he has.

[1] Ferguson, G. O., Jr., "The Psychology of the Negro," *Arch. of Psych.* No. 36, April, 1916.

Summarizing a large body of evidence, Dr. Ferguson concludes that "the intellectual performance of the general colored population is approximately 75% as efficient as that of the whites," but that pure Negroes have only 60% of white intellectual efficiency, and that even this figure is probably too high. "It seems as though the white type has attained a higher level of development, based upon the common elementary capacities, which the Negro has not reached to the same degree." "All of the experimental work which has been done has pointed to the same general conclusion."

This is a conclusion of much definiteness and value, but it does not go as far as one might wish, for the deeper racial differences of impulse and inhibition, which are at present incapable of precise measurement, are likewise of great importance. And it is the common opinion that the Negro differs in such traits even more than in intellect proper. He is said to be lacking in that aggressive competitiveness which has been responsible for so much of the achievement of the Nordic race; it is alleged that his sexual impulses are strongly developed and inhibitions lacking; that he has "an instability of character, involving a lack of foresight, an improvidence, a lack of persistence, small power of serious initiative, a tendency to be content with immediate satisfactions." He appears to be more gregarious but less apt at organization than most races.

The significance of these differences depends largely on whether they are germinal, or merely the results of social tradition. In favor of the view that they are in large part racial and hereditary, is the fact that they persist in all environments. They are found, as Professor Mecklin says, "Only at the lower level of instinct, impulse and temperament, and do not, therefore, admit of clear definition because they are overlaid in the case of every individual with a mental superstructure gotten from the social heritage which may vary widely in the case of members of the same race. That they do persist, however, is evidenced in the case of the Negroes subjected to the very different types of civilization in Haiti, Santo Domingo, the United States, and Jamaica. In each of these cases a complete

break has been made with the social traditions of Africa and different civilizations have been substituted, and yet in temperament and character the Negro in all these countries is essentially the same. The so-called 'reversion to type' often pointed out in the Negro is in reality but the recrudescence of fundamental, unchanged race traits upon the partial breakdown of the social heritage or the Negro's failure successfully to appropriate it."

Again, as Professor Ferguson points out, the experimental tests above cited may be thought to give some support to the idea that the emotional characteristics of the Negro are really inherent. "Strong and changing emotions, an improvident character and a tendency to immoral conduct are not unallied," he explains; "They are all rooted in uncontrolled impulse. And a factor which may tend to produce all three is a deficient development of the more purely intellectual capacities. Where the implications of the ideas are not apprehended, where thought is not lively and fertile, where meanings and consequences are not grasped, the need for the control of impulse will not be felt. And the demonstrable deficiency of the Negro in intellectual traits may involve the dynamic deficiencies which common opinion claims to exist."

There are other racial and heritable differences of much importance, which are given too little recognition—namely, the differences of disease resistance. Here one can speak unhesitatingly of a real inferiority in respect to the environment of North America.

As was pointed out in the chapter on Natural Selection, the Negro has been subjected to lethal selection for centuries by the Negro diseases, the diseases of tropical Africa, of which malaria and yellow fever are the most conspicuous examples. The Negro is strongly resistant to these and can live where the white man dies. The white man, on the other hand, has his own diseases, of which tuberculosis is an excellent example. Compared with the Negro, he is relatively resistant to phthisis and will survive where the Negro dies.

When the two races are living side by side, it is obvious that each is proving a menace to the other, by acting as a disseminator

of infection. The white man kills the Negro with tuberculosis and typhoid fever. In North America the Negro can not kill the white man with malaria or yellow fever, to any great extent, because these diseases do not flourish here. But the Negro has brought some other diseases here and given them to the white race; elephantiasis is one example, but the most conspicuous is hookworm, the extent and seriousness of which have only recently been realized.

In the New England states the average expectation of life, at birth, is 50.6 years for native white males, 34.1 years for Negro males. For native white females it is 54.2 years and for Negro females 37.7 years, according to the Bureau of the Census (1916). These very considerable differences can not be wholly explained away by the fact that the Negro is crowded into parts of the cities where the sanitation is worst. They indicate that the Negro is out of his environment. In tropical Africa, to which the Negro is adapted by many centuries of natural selection, his expectation of life might be much longer than that of the white man. In the United States he is much less "fit," in the Darwinian sense.

In rural districts of the South, according to C. W. Stiles, the annual typhoid death rate per 100,000 population is:

	Whites	*Negroes*
Males	37.4	75.3
Females	27.4	56.3

These figures again show, not alone the greater intelligence of the white in matters of hygiene, but probably also the greater inherent resistance of the white to a disease which has been attacking him for many centuries. Biologically, North America is a white man's country, not a Negro's country, and those who are considering the Negro problem must remember that natural selection has not ceased acting on man.

From the foregoing different kinds of evidence, we feel justified in concluding that the Negro race differs greatly from the white race, mentally as well as physically, and that in many respects it may be said to be inferior, when tested by the re-

quirements of modern civilization and progress, with particular reference to North America.

We return now to the question of intermarriage. What is to be expected from the union of these diverse streams of descent?

The best answer would be to study and measure the mulattoes and their posterity, in as many ways as possible. No one has ever done this. It is the custom to make no distinction whatever between mulatto and Negro, in the United States, and thus the whole problem is beclouded.

There is some evidence from life insurance and medical sources, that the mulatto stands above the Negro but below the white in respect to his health. There is considerable evidence that he occupies the same relation in the intellectual world; it is a matter of general observation that nearly all the leaders of the Negro race in the United States are not Negroes but mulattoes.

Without going into detail, we feel perfectly safe in drawing this conclusion: that in general the white race loses and the Negro gains from miscegenation.

This applies, of course, only to the germinal nature. Taking into consideration the present social conditions in America, it is doubtful whether either race gains. But if social conditions be eliminated for the moment, biologists may believe that intermarriage between the white and Negro races represents, on the whole, an advance for the Negro; and that it represents for the white race a distinct loss.

If eugenics is to be thought of solely in terms of the white race, there can be no hesitation about rendering a verdict. We must unhesitatingly condemn miscegenation.

But there are those who declare that it is small and mean to take such a narrow view of the evolution of the race. They would have America open its doors indiscriminately to immigration, holding it a virtue to sacrifice one's self permanently for someone else's temporary happiness; they would equally have the white race sacrifice itself for the Negro, by allowing a mingling of the two blood-streams. That, it is alleged, is the true way to elevate the Negro.

The question may well be considered from that point of view,

even though the validity of such a point of view is not admitted.

To ensure racial and social progress, nothing will take the place of leadership, of genius. A race of nothing but mediocrities will stand still, or very nearly so; but a race of mediocrities with a good supply of men of exceptional ability and energy at the top, will make progress in discovery, invention and organization, which is generally recognized as progressive evolution.

If the level of the white race be lowered, it will hurt that race and be of little help to the Negro. If the white race be kept at such a level that its productivity of men of talent will be at a maximum, everyone will progress; for the Negro benefits just as the white does from every forward step in science and art, in industry and politics.

Remembering that the white race in America is nine times as numerous as the black race, we conclude that it would be desirable to encourage amalgamation of the two races only in case the average of mulattoes is superior to the average of the whites. No one can seriously maintain that this supposition is true. Biologically, therefore, there is no reason to think that an increase in the number of mulattoes is desirable.

There is a curious argument in circulation, which points out that mulattoes are almost always the offspring of Negro mothers and white fathers, not of Negro fathers and white mothers. Therefore, it is said, production of mulattoes does not mean at all a decrease in the number of white births, but merely substitutes a number of mulatto births for an equivalent number of pure Negro births. It is therefore alleged that the production of mulattoes is in the long run a benefit, elevating the Negro race without impairing the white race.

But this argument assumes that most mulatto births are illegitimate,—a condition which eugenists do not sanction, because it tends to disintegrate the family. Rather than such a condition, the legitimate production of pure-blood Negroes is preferable, even though they be inferior in individual ability to the illegitimate mulattoes offered as a substitute. There are not at the present time enough desirable white fathers in the

country. If desirable ones are set aside to produce mulattoes, it would be a great loss to the nation; while if the mulattoes are the offspring of eugenically undesirable white fathers, then the product is not likely to be anything America wants.

From whatever standpoint we take, we see nothing good to be said for miscegenation.[1] We have discussed the problem as a particular one between the blacks and whites but the argument will hold good when applied to any two races between which the differences are so marked that one may be considered decidely inferior to the other.

Society,—white society,—long ago reached the instinctive conclusion, which seems to us a correct one, that it must put a ban on intermarriage between two such races. It has given expression to this feeling by passing laws to prohibit miscegenation in 22 states, while six other states prohibit it in their constitutions. There are thus 22 states which have attempted legally to prevent intermarriage of the white and black race. While in 20 states there is no law on the subject, it is needless to say that popular feeling about it is almost uniform, and that the legislators of New England for instance would refuse to give their daughters in marriage to Negroes, even though they might the day before have voted down a proposed law to prohibit intermarriage on the ground that it was an expression of race prejudice.

In a majority of the states which have no legislation of this kind, bills have been introduced during the last two or three years, and have been defeated through the energetic interference of the National Association for the Advancement of Colored People, an organization of which Oswald Garrison Villard is

[1] Though the Negro is not assimilable, he is here to stay; he should therefore be helped to develop along his own lines. It is desirable not to subject him to too severe a competition with whites; yet such competition, acting as a stimulus, is probably responsible for part of his rapid progress during the last century, a progress which would not have been possible in a country where Negroes competed only with each other. The best way to temper competition is by differentiation of function, but this principle should not be carried to the extent of pocketing the Negro in blind-alley occupations where development is impossible. As mental tests show him to be less suited to literary education than are the whites, it seems likely that agriculture offers the best field for him.

chairman of the Board of Directors and W. E. B. DuBois, a brilliant mulatto, is Director of Publicity and Research. As this association represents a very large part of the more intelligent Negro public opinion, its attitude deserves careful consideration. It is set forth summarily in a letter [1] which was addressed to legislators in various states, as follows:

"The National Association for the Advancement of Colored People earnestly protests against the bill forbidding intermarriage between the races, not because the Association advocates intermarriage, which it does not, but primarily because whenever such laws have been enacted they have become a menace to the whole institution of matrimony, leading directly to concubinage, bastardy, and the degradation of the Negro woman. No man-made law can stop the union of the races. If intermarriage be wrong, its prevention is best left to public opinion and to nature, which wreaks its own fearful punishments on those who transgress its laws and sin against it. We oppose the proposed statute in the language of William Lloyd Garrison in 1843, in his successful campaign for the repeal of a similar law in Massachusetts: 'Because it is not the province, and does not belong to the power of any legislative assembly, in a republican government, to decide on the complexional affinity of those who choose to be united together in wedlock; and it may as rationally decree that corpulent and lean, tall and short, strong and weak persons shall not be married to each other as that there must be an agreement in the complexion of the parties.'

"We oppose it for the physical reason that to prohibit such intermarriage would be publicly to acknowledge that black blood is a physical taint, something no self-respecting colored man and woman can be asked to admit. We oppose it for the moral reason that all such laws leave the colored girl absolutely helpless before the lust of the white man, without the power to compel the seducer to marry. The statistics of intermarriage in those

[1] This letter, and much of the data regarding the legal status of Negro-white amalgamation, are from an article by Albert Ernest Jenks in the *Am. Journ. Sociology*, XXI, 5, pp. 666–679, March, 1916.

states where it is permitted show this happens so infrequently as to make the whole matter of legislation unnecessary. Both races are practically in complete agreement on this question, for colored people marry colored people, and white marry whites, the exceptions being few. We earnestly urge upon you an unfavorable report on this bill."

Legislation on the subject of marriage is clearly inside the province of government. That such an argument as is quoted from William Lloyd Garrison can still be circulated in the United States and apparently carry weight, is sufficient cause for one to feel pessimistic over the spread of the scientific spirit in this nation. Suffice it to say that on this point the National Association is a century behind the times.

The following policy seems to us to be in accordance with modern science, and yet meet all the legitimate arguments of the National Association. We will state our attitude as definitely as possible:

1. We hold that it is to the interests of the United States, for the reasons given in this chapter, to prevent further Negro-white amalgamation.

2. The taboo of public opinion is not sufficient in all cases to prevent intermarriage, and should be supplemented by law, particularly as the United States have of late years received many white immigrants from other countries (e. g., Italy) where the taboo is weak because the problem has never been pressing.

3. But to prevent intermarriage is only a small part of the solution, since most mulattoes come from extramarital miscegenation. The only solution of this, which is compatible with the requirements of eugenics, is not that of *laissèz faire*, suggested by the National Association, but an extension of the taboo, and an extension of the laws, to prohibit all sexual intercourse between the two races.

Four states (Louisiana, Nevada, South Dakota and Alabama) have already attempted to gain this end by law. We believe it to be highly desirable that such laws should be enacted and enforced by all states. A necessary preliminary would be to standardize the laws all over the Union, particularly with a view

to agreement on what a "Negro" legally is; for in some states the legislation applies to one who is one-sixteenth, or even less, Negro in descent, while in other states it appears to refer only to full-blood or, at the most, half-blood individuals.

Such legislation, and what is more important, such public opinion, leading to a cessation of Negro-white amalgamation, we believe to be in the interests of national eugenics, and to further the welfare of both of the races involved. Miscegenation can only lead to unhappiness under present social conditions and must, we believe, under *any* social conditions be biologically wrong.

We favor, therefore, the support of the taboo which society has placed on these mixed marriages, as well as any legal action which can practicably be taken to make miscegenation between white and black impossible. Justice requires that the Negro race be treated as kindly and considerately as possible, with every economic and political concession that is consistent with the continued welfare of the nation. Such social equality and intercourse as might lead to marriage are not compatible with this welfare.

CHAPTER XV

IMMIGRATION

There are now in the United States some 14,000,000 foreign-born persons, together with other millions of the sons and daughters of foreigners who although born on American soil have as yet been little assimilated to Americanism. This great body of aliens, representing perhaps a fifth of the population, is not a pool to be absorbed, but a continuous, inflowing stream, which until the outbreak of the Great War was steadily increasing in volume, and of which the fountain-head is so inexhaustible as to appal the imagination. From the beginning of the century, the inflow averaged little less than a million a year, and while about one-fifth of this represented a temporary migration, four-fifths of it meant a permanent addition to the population of the New World.

The character of this stream will inevitably determine to a large extent the future of the American nation. The direct biological results, in race mixture, are important enough, although not easy to define. The indirect results, which are probably of no less importance to eugenics, are so hard to follow that some students of the problem do not even realize their existence.

The ancestors of all white Americans, of course, were immigrants not so very many generations ago. But the earlier immigration was relatively homogeneous and stringently selected by the dangers of the voyage, the hardships of life in a new country, and the equality of opportunity where free competition drove the unfit to the wall. There were few people of eminence in the families that came to colonize North America, but there was a high average of sturdy virtues, and a good deal of ability, particularly in the Puritan and Huguenot invasions and in a part of that of Virginia.

In the first three-quarters of the nineteenth century, the

number of these "patriots and founders" was greatly increased by the arrival of immigrants of similar racial stocks from Ireland, Germany, Scandinavia, and to a less extent from the other countries of northern and western Europe. These arrivals added strength to the United States, particularly as a large part of them settled on farms.

This stream of immigration gradually dried up, but was succeeded by a flood from a new source,—southern and eastern Europe. Italians, Slavs, Poles, Magyars, East European Hebrews, Finns, Portuguese, Greeks, Roumanians and representatives of many other small nationalities began to seek fortunes in America. The earlier immigration had been made up largely of those who sought escape from religious or political tyranny and came to settle permanent homes. The newer immigration was made up, on the whole, of those who frankly sought wealth. The difference in the reason for coming could not fail to mean a difference in selection of the immigrants, quite apart from the change in the races.

Last of all began an immigration of Levantines, of Syrians, Armenians, and other inhabitants of Asiatic Turkey. Beyond this region lie the great nations of Asia, "oversaturated" with population. So far there has been little more than the threat of their overflow, but the threat is certain to become a reality within a few years unless prevented by legal restriction.

The eugenic results of immigration are partly indirect and partly direct. Direct results follow if the newcomers are assimilated,—a word which we shall use rather narrowly to mean that free intermarriage takes place between them and all parts of the older population. We shall discuss the direct results first, the nature of which depends largely on whether the newcomers are racially homogeneous with the population already in the country.

If they are like, the old and new will blend without difficulty. The effects of the immigration then depend on whether the immigrants are better or worse in average quality than the older residents. If as good or better, they are valuable additions; if inferior they are biologically a detriment.

But if the new arrivals are different, if they represent a different subspecies of *Homo sapiens*, the question is more serious, for it involves the problem of crossing races which are biologically more or less distinct. Genetics can throw some light on this problem.

Waiving for the moment all question as to the relative quality of two distinct races, what results are to be expected from crossing? It (1) gives an increase of vigor which diminishes in later generations and (2) produces recombination of characters.

The first result may be disregarded, for the various races of man are probably already much mixed, and too closely related, to give rise to much hybrid vigor in crosses.

The second result will be favorable or unfavorable, depending on the characters which go into the cross; and it is not possible to predict the result in human matings, because the various racial characters are so ill known. It is, therefore, not worth while here to discuss at length genetic theory. In general it may be said that some valuable characters are likely to disappear, as the result of such crosses, and less desirable ones to take their place. The great bulk of the population resulting from such racial crosses is likely to be more or less mongrel in nature. Finally, some individuals will appear who combine the good characters of the two races, without the bad ones.

The net result will therefore probably be some distinct gain, but a greater loss. There is danger that complex and valuable traits of a race will be broken down in the process of hybridization, and that it will take a long time to bring them together again. The old view that racial crosses lead fatally to race degeneration is no longer tenable, but the view recently advanced, that crosses are advantageous, seems equally hasty. W. E. Castle has cited the Pitcairn Islanders and the Boer-Hottentot mulattoes of South Africa as evidence that wide crosses are productive of no evil results. These cases may be admitted to show that such a hybrid race may be physically healthy, but in respect of mental traits they hardly do more than suggest the conclusion we advanced in our chapter on the Color Line,—

that such miscegenation is an advantage to the inferior race and a disadvantage to the superior one.

On the whole, we believe wide racial crosses should be looked upon with suspicion by eugenists.

The colonizers of North America mostly belonged to the Nordic race.[1] The earlier immigrants to the United States,—roughly, those who came here before the Civil War,—belonged mostly to the same stock, and therefore mixed with the early settlers without difficulty. The advantages of this immigration were offset by no impairment of racial homogeneity.

But the more recent immigration belongs mostly to other races, principally the Mediterranean and Alpine. Even if these immigrants were superior on the average to the older population, it is clear that their assimilation would not be an unmixed blessing, for the evil of crossbreeding would partly offset the advantage of the addition of valuable new traits. If, on the other hand, the average of the new immigration is inferior in quality, or in so far as it is inferior in quality, it is evident that it must represent biologically an almost unmixed evil; it not only brings in new undesirable traits, but injures the desirable ones already here.

E. A. Ross has attempted to predict some of the changes that will take place in the population of the United States, as a result of the immigration of the last half-century.[2] "It is reasonable," he thinks, "to expect an early falling off in the frequency of good looks in the American people." A diminution of stature, a depreciation of morality, an increase in gross fecundity, and a considerable lowering of the level of average natural ability are among other results that he considers probable. Not only are the races represented in the later immigration in many cases inferior in average ability to the earlier immigrant races, but America does not get the best, or even a representative selection,[3] from the races which are now contributing to her population.

[1] A recent readable account of the races of the world is Madison Grant's *The Passing of the Great Race* (New York, 1916).

[2] *The Old World in the New.* By E. A. Ross, professor of Sociology in the University of Wisconsin, New York, 1914.

[3] Cf. Stevenson, Robert Louis, *The Amateur Emigrant.*

"Europe retains most of her brains, but sends multitudes of the common and sub-common. There is little sign of an intellectual element among the Magyars, Russians, South Slavs, Italians, Greeks or Portuguese" who are now arriving. "This does not hold, however, for currents created by race discrimination or oppression. The Armenian, Syrian, Finnish and Russo-Hebrew streams seem *representative*, and the first wave of Hebrews out of Russia in the eighties was superior."

While the earlier immigration brought a liberal amount of intelligence and ability, the later immigration (roughly, that of the last half century) seems to have brought distinctly less. It is at present principally an immigration of unskilled labor, of vigorous, ignorant peasants. Some of this is "promoted" by agents of transportation companies and others who stand to gain by stirring up the population of a country village in Russia or Hungary, excite the illiterate peasants by stories of great wealth and freedom to be gained in the New World, provide the immigrant with a ticket to New York and start him for Ellis Island. Naturally, such immigration is predominantly male. On the whole, females make up one-third of the recent inflow, but among some races—Greeks, Italians and Roumanians, for example—only one-fifth.

In amount of inherent ability these immigrants are not only less highly endowed than is desirable, but they furnish, despite weeding out, altogether too large a proportion of the "three D's"—defectives, delinquents and dependents. In the single year 1914 more than 33,000 would-be immigrants were turned back, about half of them because likely to become public charges. The immigration law of 1907, amended in 1910, 1913 and 1917, excludes the following classes of aliens from admission into the United States:

> Idiots, imbeciles, feeble-minded persons,epileptics, insane persons, persons who have been insane within 5 years previously; persons who have had two or more attacks of insanity at any time previously or who are affected by constitutional psychopathic inferiority or chronic alcoholism; paupers, vagrants, persons likely to become public charges; professional beggars, persons afflicted with tuberculosis or with

a loathsome or contagious disease; persons who have been convicted of a crime involving moral turpitude; polygamists, anarchists, contract laborers, prostitutes, persons not comprehended within any one of the foregoing excluded classes who are found to be and are certified by the examining surgeon as being mentally or physically defective, such mental or physical defect being of such a nature as to affect the ability of the alien to earn a living.

Despite the efficiency of the U. S. Public Health Service, it is quite impossible for its small staff to examine thoroughly every immigrant, when three or four thousand arrive in a single day, as has frequently happened at Ellis Island. Under such circumstances, the medical officer must pass the immigrants with far too cursory an inspection. It is not surprising that many whose mental defects are not of an obvious nature manage to slip through; particularly if, as is charged,[1] many of the undesirables are informed that the immigrant rush is greatest in March and April, and therefore make it a point to arrive at that time, knowing the medical inspection will be so overtaxed that they will have a better chance to get by. The state hospitals of the Atlantic states are rapidly filling up with foreign-born insane.[2] Probably few of these were patently insane when they passed through the port of entry. Insanity, it must be remembered, is predominantly a disease of old age, whereas the average alien on arrival is not old. The mental weakness appears only after he has been here some years, perhaps inevitably or perhaps because he finds his environment in, say, lower Manhattan Island is much more taxing to the brain than the simple surroundings of his farm overlooking the bay of Naples.

The amount of crime attributable to certain sections of the more recent immigration is relatively large. "It was frequently

[1] Interview with W. Williams, former commissioner of immigration, in the *New York Herald*, April 13, 1912.

[2] Of the total number of inmates of insane asylums of the entire U. S. of Jan. 1, 1910, 28.8% were whites of foreign birth, and of the persons admitted to such institutions during the year 1910, 25.5% were of this class. Of the total population of the United States in 1910 the foreign-born whites constituted 14.5%. Special report on the insane, Census of 1910 (pub. 1914).

stated to the members of the Immigration Commission in southern Italy that crime had greatly diminished in many communities because most of the criminals had gone to America." The amount of crime among immigrants in the United States is partly due to their age and sex distribution, partly due to their concentration in cities, partly to the bad environment from which they have sometimes come; partly to inherent racial characteristics, such as make crimes of violence frequent among the Southern Italians, crimes of gain proportionately more frequent among the Jews, and violence when drunk more a characteristic of the Slavs. No restriction of immigration can wholly eliminate the criminal tendencies, but, says Dr. Warne,[1] after balancing the two sides, "It still remains true that because of immigration we have a greater amount of pauperism and crime than would be the case if there were no immigration. It is also an indisputable fact that with a better regulation of immigration the United States would have less of these social horrors."

To dwell too much on the undesirable character of part of the present immigration would be to lose perspective. Most of it consists of vigorous, industrious, ignorant peasants, induced to come here in search of a better living than they can get at home. But it is important to remember that if they come here and stay, they are pretty certain to be assimilated sooner or later. In cases superior to the average of the older population, their arrival should be welcomed if not too racially diverse; but if, as we believe the record of their achievements shows, a large part of the immigration is on the average inferior to the older population of the United States, such are eugenically a detriment to the future progress of the race. The direct biological result to be expected from the assimilation of such newcomers is the swamping of the best characteristics of the old American stock, and a diminution of the average of intelligence of the whole country.

The interbreeding is too slow at present to be conspicuous, and

[1] *The Tide of Immigration.* By Frank Julian Warne, special expert on foreign-born population, 13th U. S. Census, New York, 1916.

hence its effects are little noticed. The foreigners tend to keep by themselves, to form "Little Italies," "Little Russias," transplanted Ghettoes and "foreign quarters," where they retain their native languages and customs and marry compatriots. This condition of segregation can not last forever; the process of amalgamation will be more rapid with each generation, particularly because of the preponderance of males in the newer immigration who must marry outside their own race, if they are to marry at all.

The direct results of immigration that lead to intermarriage with the older population are fairly easy to outline. The indirect results, which we shall now consider, are more complex. We have dealt so far only with the effects of an immigration that is assimilated; but some immigration (that from the Orient, for example) is not assimilated; other immigration remains unassimilated for a long time. What are the eugenic consequences of an unassimilated immigration?

The presence of large numbers of immigrants who do not intermarry with the older stock will, says T. N. Carver,[1] inevitably mean one of three things:

1. Geographical separation of races.

2. Social separation of races (as the "color line" in the South and to a large extent in the North, between Negroes and whites who yet live side by side).

3. Continuous racial antagonism, frequently breaking out into race war. This third possibility has been at least threatened, by the conflict between the white and yellow races in California, and the conflict between whites and Hindus in British Columbia.

None of these alternatives is attractive. The third is undesirable in every way and the first two are difficult to maintain. The first is perhaps impossible; the second is partly practicable, as is shown by the case of the Negro. One of its drawbacks is not sufficiently recognized.

In a soundly-organized society, it is necessary that the road

[1] *Essays in Social Justice.* By Thomas Nixon Carver, professor of Political Economy in Harvard University, Cambridge, 1915.

should be open from top to bottom and bottom to top, in order that genuine merit may get its deserts. A valuable strain which appears at the bottom of the social scale must be able to make its way to the top, receiving financial and other rewards commensurate with its value to the state, and being able to produce a number of children proportionate to its reward and its value. This is an ideal which is seldom approximated in government, but it is the advantage of a democratic form of government that it presents the open road to success, more than does an oligarchic government. That this freedom of access to all rewards that the state can give should be open to every one (and conversely that no one should be kept at the top and over-rewarded if he is unworthy) is essential to eugenics; but it is quite incompatible with the existence within the state of a number of isolated groups, some of which must inevitably and properly be considered inferior. It is certain that, at the present time in this country, no Negro can take a place in the upper ranks of society, which are and will long remain white. The fact that this situation is inevitable makes it no less unfortunate for both Negro and white races; consolation can only be found in the thought that it is less of a danger than the opposite condition would be. But this condition of class discrimination is likely to exist, to a much less extent it is true, in every city where there are foreign-born and native-born populations living side by side, and where the epithets of "Sheeny," "Dago," "Wop," "Kike," "Greaser," "Guinea," etc., testify to the feeling of the older population that it is superior.

While eugenic strength in a state is promoted by variety, too great a heterogeneity offers serious social difficulties. It is essential if America is to be strong eugenically that it slow down the flood of immigrants who are not easily assimilable. At present a state of affairs is being created where class distinctions are likely to be barriers to the promotion of individual worth—and equally, of course, to the demotion of individual worthlessness.

Even if an immigration is not assimilated, then, it yet has an indirect effect on eugenics. But there are other indirect effects of immigration, which are quite independent of assimila-

tion: they inhere in the mere bulk and economic character of the immigration. The arrivals of the past few decades have been nearly all unskilled laborers. Professor Carver believes that continuous immigration which enters the ranks of labor in larger proportion and the business and professional classes in a smaller proportion than the native-born will produce the following results:

1. Distribution. It will keep competition more intense among laborers and less intense among business and professional men: it will therefore raise the income of the employing classes and lower the wages of unskilled labor.

2. Production. It will give a relatively low marginal productivity to a typical immigrant and make him a relatively unimportant factor in the production of wealth.

3. Organization of industry. Immigrants can only be employed economically at low wages and in large gangs, because of (2).

4. Agriculture. If large numbers of immigrants should go into agriculture, it will mean one of two things, probably the second:

(a) Continuous subdivision of farms resulting in inefficient and wasteful application of labor and smaller crops per man, although probably larger crops per acre.

(b) Development of a class of landed proprietors on the one hand and a landless agricultural proletariat on the other.

It is true that the great mass of unskilled labor which has come to the United States in the last few decades has made possible the development of many industries that have furnished an increased number of good jobs to men of intelligence, but many who have made a close study of the immigration problem think that despite this, unskilled labor has been coming in altogether too large quantities. Professor Ross publishes the following illustration:

"What a college man saw in a copper-mine in the Southwest gives in a nutshell the logic of low wages.

"The American miners, getting $2.75 a day, are abruptly displaced without a strike by a train-load of 500 raw Italians

brought in by the company and put to work at from $1.50 to $2 a day. For the Americans there is nothing to do but to 'go down the road.' At first the Italians live on bread and beer, never wash, wear the same filthy clothes night and day, and are despised. After two or three years they want to live better, wear decent clothes, and be respected. They ask for more wages, the bosses bring in another trainload from the steerage, and the partly Americanized Italians follow the American miners 'down the road.' No wonder the estimate of government experts as to the number of our floating casual laborers ranges up to five millions!"

"It is claimed that the natives are not displaced" by the constant inflow of alien unskilled labor, says H. P. Fairchild,[1] but that they "are simply forced into higher occupations. Those who were formerly common laborers are now in positions of authority. While this argument holds true of individuals, its fallacy when applied to groups is obvious. There are not nearly enough places of authority to receive those who are forced out from below. The introduction of 500 Slav laborers into a community may make a demand for a dozen or a score of Americans in higher positions, but hardly for 500."

"The number of unskilled workers coming in at the present time is sufficient to check decidedly the normal tendency toward an improved standard of living in many lines of industry," in the opinion of J. W. Jenks, who was a member of the Immigration Commission appointed by President Roosevelt in 1907. He alludes to the belief that instead of crowding the older workers *out*, the aliens merely crowd them up, and says that he himself formerly held that view; "but the figures collected by the Immigration commission, from a sufficient number of industries in different sections of the country to give general conclusions, prove beyond a doubt that in a good many cases these incoming immigrants actually drive out into other localities and into other unskilled trades large numbers of American workingmen and workingmen of the earlier immigration who do not get better positions but, rather, worse ones. . . . Professor Lauck, our

[1] Fairchild's and Jenks' opinions are quoted from Warne, Chapter XVI.

chief superintendent of investigators in the field, and, so far as I am aware, every single investigator in the field, before the work ended, reached the conclusion from personal observation that the tendency of the large percentage of immigration of unskilled workers is clearly to lower the standard of living in a number of industries, and the statistics of the commission support this impression. I therefore changed my earlier views."

If the immigration of large quantities of unskilled labor with low standards of living tends in most cases to depress wages and lower the standard of living of the corresponding class of the old American population, the consequences would appear to be:

1. The employers of labor would profit, since they would get abundant labor at low wages. If this increase in the wealth of employers led to an increase in their birth-rate, it would be an advantage. But it apparently does not. The birth-rate of the employing class is probably little restricted by financial difficulties; therefore on them immigration probably has no immediate eugenic effect.

2. The American skilled laborers would profit, since there is more demand for skilled labor in industries created by unskilled immigrant labor. Would the increasing prosperity and a higher standard of living here, tend to lower the relative birth-rate of the class or not?

The answer probably depends on the extent of the knowledge of birth control which has been discussed elsewhere.

3. The wages and standard of living of American unskilled laborers will fall, since they are obliged directly to compete with the newcomers. It seems most likely that a fall in wages and standards is correlated with a fall in birth-rate. This case must be distinguished from cases where the wages and standards *never were high*, and where poverty is correlated with a high birth-rate. If this distinction is correct, the present immigration will tend to lower the birth-rate of American unskilled laborers.

The arguments here used may appear paradoxical, and have little statistical support, but they seem to us sound and not in contradiction with any known facts. If they are valid, the effect of such immigration as the United States has been receiving is to

"Taking the 1910 census as our basis, the 5% Restriction Proposal would have fixed the maximum permissible immigration of males from North and West Europe at 759,000 annually, while the actual annual immigration for the last 5 years averages but 115,000. The permissible immigration from South and East Europe would have been 189,000 annually, while the average for the last five years has been 372,000. When applied to China, the policy would have admitted 1,106 males per year, while the number admitted on the average for the last 5 years has been 1,571. The proposal would provide for the admission of 1,200 Japanese annually, here again resulting in the exclusion on the average of 1,238 males yearly during the years 1911–1915. No estimate is made here of the effect of the exclusion of males on the arrival of women and children." The percentage restriction is unsatisfactory to a eugenist, as not sufficiently discriminating.

The literary restriction has been a great step forward but should be backed by the addition of such mental tests as will make it fairly certain to keep out the dull-minded as well as feeble-minded. Long division would suffice as such a test until better tests relatively unaffected by schooling can be put into operation, since it is at this point in the grades that so many dull-minded drop out of the schools.

Oriental immigration is becoming an urgent problem, and it is essential that its biological, as well as its economic and sociological features be understood, if it is to be solved in a satisfactory and reasonably permanent way. In the foregoing discussion, Oriental immigration has hardly been taken into account; it must now receive particular consideration.

What are the grounds, then, for forbidding the yellow races, or the races of British India, to enter the United States? The considerations urged in the past have been (1) Political: it is said that they are unable to acquire the spirit of American institutions. This is an objection which concerns eugenics only indirectly. (2) Medical: it is said that they introduce diseases, such as the oriental liver, lung and intestinal flukes, which are serious, against which Americans have never been selected,

and for which no cure is known. (3) Economic: it is argued that the Oriental's lower standard of living makes it impossible for the white man to compete with him. The objection is well founded, and is indirectly of concern to eugenics, as was pointed out in a preceding section of this chapter. As eugenists we feel justified in objecting to the immigration of large bodies of unskilled Oriental labor, on the ground that they rear larger families than our stock on the same small incomes.

A biological objection has also been alleged, in the possibility of interbreeding between the yellow and white races. In the past such cases have been very rare; it is authoritatively stated [1] that "there are on our whole Pacific coast not more than 20 instances of intermarriage between Americans and Japanese, and . . . one might count on the fingers of both hands the number of American-Chinese marriages between San Diego and Seattle." The presence of a body of non-interbreeding immigrants is likely to produce the adverse results already discussed in the earlier part of this chapter.

Eugenically, then, the immigration of any considerable number of unskilled laborers from the Orient may have undesirable direct results and is certain to have unfavorable indirect results. It should therefore be prevented, either by a continuation of the "gentlemen's agreement" now in force between the United States and Japan, and by similar agreements with other nations, or by some such non-invidious measure as that proposed by Dr. Gulick. This exclusion should not of course be applied to the intellectual classes, whose presence here would offer advantages which would outweigh the disadvantages.

We have a different situation in the Philippine islands, there the yellow races have been denied admission since the United States took possession. Previously, the Chinese had been trading there for centuries, and had settled in considerable numbers almost from the time the Spaniards colonized the archipelago.

[1] *Oriental Immigration.* By W. C. Billings, surgeon, U. S. Public Health Service; Chief Medical Officer, Immigration Service; Angel Island (San Francisco), Calif., *Journal of Heredity*, Vol. VI (1915), pp. 462–467.

At present it is estimated that there are 100,000 Chinese in the islands, and their situation was not put too strongly by A. E. Jenks, when he wrote: [1]

"As to the Chinese, it does not matter much what they themselves desire; but what their descendants desire will go far toward answering the whole question of the Filipinos' volition toward assimilation, because they are *the* Filipinos. To be specific: During the latter days of my residence in the Islands in 1905 Governor-General Wright one day told me that he had recently personally received from one of the most distinguished Filipinos of the time, and a member of the Insular Civil Commission, the statement that 'there was not a single prominent and dominant family among the Christianized Filipinos which did not possess Chinese blood.' The voice and will of the Filipinos of to-day is the voice and the will of these brainy, industrious, rapidly developing men whose judgment in time the world is bound to respect."

This statement will be confirmed by almost any American resident in the Islands. Most of the men who have risen to prominence in the Islands are mestizos, and while in political life some of the leaders are merely Spanish metis, the financial leaders almost without exception, the captains of industry, have Chinese blood in their veins, while this class has also taken an active part in the government of the archipelago. Emilio Aguinaldo is one of the most conspicuous of the Chinese mestizos. Individual examples might be multiplied without limit; it will be sufficient to mention Bautista Lim, president of the largest tobacco firm in the islands and also a physician; his brother, formerly an insurgent general and later governor of Sampango province under the American administration; the banker Lim Hap; Faustino Lechoco, cattle king of the Philippines; Fernandez brothers, proprietors of a steamship line; Locsin and Lacson, wealthy sugar planters; Mariano Velasco, dry-goods importer; Datto Piang, the Moro warrior and chieftain; Paua,

[1] *Assimilation in the Philippines, etc.* By Albert Ernest Jenks, professor of anthropology in the University of Minnesota. *American Journal of Sociology*, Vol. XIX (1914), p. 783.

insurgent general in southern Luzon; Ricardo Gochuico, tobacco magnate. In most of these men the proportion of Chinese blood is large.

Generalizing, we are justified in saying that the cross between Chinese and Filipinos produces progeny superior to the Filipinos. It must be remembered that it is not a very wide cross, the Malayans, who include most of the Filipinos, being closely related to the Chinese.

It appears that even a small infusion of Chinese blood may produce long-continued favorable results, if the case of the Ilocanos is correctly described. This tribe, in Northern Luzon, furnishes perhaps the most industrious workers of any tribe in the islands; foremen and overseers of Filipinos are quite commonly found to be Ilocanos, while the members of the tribe are credited with accomplishing more steady work than any other element of the population. The current explanation of this is that they are Chinese mestizos: their coast was constantly exposed to the raids of Chinese pirates, a certain number of whom settled there and took Ilocano women as wives. From these unions, the whole tribe in the course of time is thought to have benefited.[1]

The history of the Chinese in the Philippines fails to corroborate the idea that he never loses his racial identity. It must be borne in mind that nearly all the Chinese in the United States are of the lowest working class, and from the vicinity of Canton; while those in the Philippines are of a higher class, and largely from the neighborhood of Amoy. They have usually married Filipino women of good families, so their offspring had exceptional advantages, and stand high in the estimation of the community. The requirement of the Spanish government was that a Chinese must embrace Christianity and become a citizen, before he could marry a Filipino. Usually he assumed his wife's name, so the children were brought up wholly as Filipinos,

[1] Students of the inheritance of mental and moral traits may be interested to note that while the ordinary Chinese mestizo in the Philippines is a man of probity, who has the high regard of his European business associates, the Ilocanos, supposed descendents of pirates, are considered rather tricky and dishonest.

and considered themselves such, without cherishing any particular sentiment for the Flowery Kingdom.

The biologist who studies impartially the Filipino peoples may easily conclude that the American government is making a mistake in excluding the Chinese; that the infiltration of intelligent Chinese and their intermixture with the native population would do more to raise the level of ability of the latter than a dozen generations of that compulsory education on which the government has built such high hopes.

And this conclusion leads to the question whether much of the surplus population of the Orient could not profitably be diverted to regions occupied by savage and barbarian people. Chinese immigrants, mostly traders, have long been going in small numbers to many such regions and have freely intermarried with native women. It is a matter of common observation to travelers that much of the small mercantile business has passed into the hands of Chinese mestizos. As far as the first few generations, at least, the cross here seems to be productive of good results. Whether Oriental immigration should be encouraged must depend on the decision of the respective governments, and considerations other than biologic will have weight. As far as eugenics is concerned it is likely that such regions would profit by a reasonable amount of Chinese or Japanese immigration which resulted in interbreeding and not in the formation of isolated race-groups, because the superior Orientals tend to raise the level of the native population into which they marry.

The question of the regulation of immigration is, as we have insisted throughout this chapter, a question of weighing the consequences. A decision must be reached in each case by asking what course will do most for the future good both of the nation and of the whole species. To talk of the sacred duty of offering an asylum to any who choose to come, is to indulge in immoral sentimentality. Even if the problem be put on the most unselfish plane possible, to ask not what will be for this country's own immediate or future benefit, but what will most benefit the world at large, it can only be con-

cluded that the duty of the United States is to make itself strong, efficient, productive and progressive. By so doing they will be much better able to help the rest of the world than by progressively weakening themselves through failure to regulate immigration.

Further, in reaching a decision on the regulation of immigration, there are numerous kinds of results to be considered: political, social, economic and biologic, among others. All these interact, and it is hard to say that one is more important than another; naturally we have limited ourselves to the biologic aspect, but not without recognizing that the other aspects exist and must be taken into account by those who are experts in those fields.

Looking only at the eugenic consequences, we can not doubt that a considerable and discriminatory selection of immigrants to this country is necessary. Both directly and indirectly, the immigration of recent years appears to be diminishing the eugenic strength of the nation more than it increases it.

The state would be in a stronger position eugenically (and in many other ways) if it would decrease the immigration of unskilled labor, and increase the immigration of creative and directing talent. A selective diminution of the volume of immigration would tend to have that result, because it would necessarily shut out more of the unskilled than the skilled.

CHAPTER XVI

WAR

War always changes the composition of a nation; but this change may be either a loss or a gain. The modification of selection by war is far more manifold than the literature on the biological effects of war would lead the reader to suppose. All wars are partly eugenic and partly dysgenic; some are mainly the one, some are mainly the other. The racial effects of war occur in at least three periods:

1. The period of preparation.
2. The period of actual fighting.
3. The period of readjustment after the war.

The first division involves the effect of a standing army, which withdraws men during a part of the reproductive period and keeps most of them in a celibate career. The officers marry late if at all and show a very low birth-rate. The prolonged celibacy has in many armies led to a higher incidence of venereal diseases which prolongs the celibacy and lowers the birth-rate.[1] Without extended discussion, the following considerations may be named as among those which should govern a policy of military preparedness that will safeguard, as far as possible, the eugenic interests:

1. If the army is a standing one, composed of men serving long terms of enlistment, they should be of as advanced an age as is compatible with military efficiency. If a man of 35 has not married, it is probable that he will never marry, and therefore there is less loss to the race in enrolling him for military service, than is the case with a man of 20–25.

2. The army (except in so far as composed of inferior men)

[1] An important study of this subject was published by Professor Vernon L. Kellogg in *Social Hygiene* (New York), Dec., 1914.

should not foster celibacy. Short enlistments are probably the most valuable means of avoiding this evil.

3. Universal conscription is much better than voluntary service, since the latter is highly selective, the former much less so. Those in regular attendance in college should receive their military training in their course as is now done.

4. Officers' families should be given an additional allowance for each child. This would aid in increasing the birth-rate, which appears to be very low among army and navy officers in the United States service, and probably in that of all civilized countries.

5. Every citizen owes service to his nation, in time of need, but fighting service should not be exacted if some one else could perform it better than he where he is expert in some other needed field. The recent action of England in sending to the front as subaltern officers, who were speedily killed, many highly trained technicians and young scientists and medical men who would have been much more valuable at home in connection with war measures, is an example of this mistake. Carrying the idea farther, one sees that in many nations there are certain races which are more valuable on the firing line than in industries at the rear; and it appears that they should play the part for which they are best fitted. From this point of view, the Entente allies were wholly justified in employing their Asiatic and African subjects in war. In the United States are millions of negroes who are of less value than white men in organized industry but almost as valuable as the whites, when properly led, at the front. It would appear to be sound statesmanship to enlist as many Negroes as possible in the active forces, in case of war, thus releasing a corresponding number of more skilled white workers for the industrial machine on whose efficiency success in modern warfare largely rests.

The creation of the National Army in the United States, in 1917, while in most ways admirably conducted, was open to criticism in several respects, from the eugenic point of view:

(a) Too many college men and men in intellectual pursuits were taken as officers, particularly in the aviation corps. There

should have been more men employed as officers who had demonstrated the necessary qualifications, as foremen and others accustomed to boss gangs of men.

(b) The burden was thrown too heavily on the old white Americans, by the exemption of aliens, who make up a large part of the population in some states. There were communities in New England which actually could not fill their quotas, even by taking every acceptable native-born resident, so large is their alien population. The quota should have been adjusted if aliens were to be exempt.

(c) The district boards were not as liberal as was desirable, in exempting from the first quota men needed in skilled work at home. The spirit of the *selective* draft was widely violated, and necessitated a complete change of method before the second quota was called by the much improved questionnaire method.

It is difficult to get such mistakes as these corrected; nevertheless a nation should never lose sight of the fact that war is inevitably damaging, and that the most successful nation is the one which wins its wars with the least possible eugenic loss.

Leaving the period of preparedness, we consider the period of open warfare. The reader will remember that, in an earlier chapter, we divided natural selection into (1) lethal, that which operates through differential mortality; (2) sexual, that which operates through differential mating; and (3) fecundal, that which operates through differential fecundity. Again, selection operates both in an inter-group competition and an intra-group competition. The influence of any agency on natural selection must be examined under each of these six heads. In the case of war, however, fecundal selection may be eliminated, as it is little influenced. Still another division arises from the fact that the action of selection is different during war upon the armed forces themselves and upon the population at home; and after the war, upon the nations with the various modifications that the war has left.

We will consider lethal selection first. To measure the effect of the inter-group selection of the armed forces, one must com-

pare the relative quality of the two races involved. The evidence for believing in substantial differences between races is based (a) upon their relative achievement when each is isolated, (b) upon the relative rank when the two are competing in one society, and (c) upon the relative number of original contributions to civilization each has made. Such comparisons are fatal to the sentimental equalitarianism that denies race differences. While there is, of course, a great deal of overlapping, there are, nevertheless, real average differences. To think otherwise is to discard evolution and revert to the older standpoint of "special creation."

Comparison of the quality of the two sides is sometimes, of course, very difficult. One may feel little hesitation in giving a decision in the classical war of the Greeks and Persians, or the more modern case of the English and Afghans, but when considering the Franco-Prussian war, or the Russo-Japanese war, or the Boer war, or the American civil war, it is largely a matter of mere opinion, and perhaps an advantage can hardly be conceded to either side. Those who, misunderstanding the doctrine of evolution, adhere to the so-called "philosophy of force," would answer without hesitation that the side which won was, *ipso facto*, the better side. But such a judgment is based on numerous fallacies, and can not be indorsed in the sweeping way it is uttered. Take a concrete example:

"In 1806, Prussia was defeated at the battle of Jena. According to the philosophy of force, this was because Prussia was 'inferior' and France was 'superior.' Suppose we admit for the moment that this was the case. The selection now represents the survival of the fittest, the selection which perfects the human species. But what shall we say of the battle of Leipsic? At Leipsic, in 1813, all the values were reversed; it is now France which is the 'inferior' nation. . . . Furthermore, a large number of the same generals and soldiers who took part in the battle of Jena also took part in the battle of Leipsic. Napoleon belonged, therefore, to a race which was superior to that of Blücher in 1806, but to an inferior race in 1813, in spite of the fact that they were the same persons and had not changed

their nationality. As soon as we bring these assertions to the touchstone of concrete reality we see at once how untenable and even ridiculous are direct biological comparisons." [1]

Without going into further detail, it is readily seen that, on the world at large, the eugenic effect of a war would be very different according as the sides differ much or little. Yet this difference in quality, however great, will have no significance, unless the superior or inferior side is in general more likely to lose fewer men. Where the difference has been considerable, as between a civilized and savage nation, it has been seldom that the superior has not triumphed with fewer losses. Victory, however, is influenced much less in these later days by the relative military efficiency of two single nations than by their success in making powerful alliances. But such alignments are by no means always associated with better quality, because (a) there is a natural tendency for the weak to unite against a strong nation, (b) to side with a group which is apparently succeeding, and (c) the alliances may be the work of one or a few individuals who happen to be in positions of power at the critical time.

Modern European wars, especially the latest one, have been marked by the high quality of the combatants on both sides relative to the rest of the world. As these same races fight with pertinacity, there is a high mortality rate, so that the dysgenic result of these wars is particularly deplorable.

As for the selection taking place *within* each of the struggling nations, the combatants and the non-combatants of the same age and sex must first be compared. The difference here depends largely on how the army in question was raised. Where the army is a permanent, paid force, it probably does not represent a quality above the average of the nation, except physically. When it is conscripted, it is superior physically and

[1] Nasmyth, George, *Social Progress and the Darwinian Theory*, p. 146, New York, 1916. While his book is too partisan, his Chapter III is well worth reading by those who want to avoid the gross blunders which militarists and many biologists have made in applying Darwinism to social progress; it is based on the work of Professor J. Novikov of the University of Odessa. See also *Headquarters Nights* by Vernon Kellogg.

probably slightly in other respects. If it is a volunteer army, its quality depends largely on whether the cause being fought for is one that appeals merely to the spirit of adventure or one that appeals to some moral principle. In the latter case, the quality may be such that the loss of a large part of the army will be peculiarly damaging to the progress of the race. This situation is more common than might be supposed, for by skillful diplomacy and journalism a cause which may be really questionable is presented to the public in a most idealistic light. But here, again, one can not always apply sweeping generalizations to individual cases. It might be supposed, for instance, that in the Confederate army the best eugenic quality was represented by the volunteers, the second best by those who stayed out until they were conscripted, and the poorest by the deserters. Yet David Starr Jordan and Harvey Ernest Jordan, who investigated the case with care, found that this was hardly true and that, due to the peculiar circumstances, the deserters were probably not as a class eugenically inferior to the volunteers.[1] Again some wars, such as that between the United States and Spain, probably develop a volunteer army made up largely of the adventurous, the nomadic, and those who have fewer ties; it would be difficult to demonstrate that they are superior to those who, having settled positions at home, or family obligations, fail to volunteer. The greatest damage appears to be done in such wars as those waged by great European nations, where the whole able-bodied male population is called out, and only those left at home who are physically or mentally unfit for fighting—but not, it appears to be thought, unfit to perpetuate the race.

Even within the army of one side, lethal selection is operative. Those who are killed are by no means a haphazard sample of the whole army. Among the victims there is a disproportionate representation of those with (1) dauntless bravery, (2) recklessness, (3) stupidity. These qualities merge into each other, yet in their extremes they are widely different. However, as the nature of warfare changes with the increase of artillery,

[1] Jordan, D. S., and Jordan, H. E., *War's Aftermath*, Boston, 1915.

mines, bombs, and gases, and decrease of personal combat, those who fall are more and more chance victims.

In addition to the killed and mortally wounded, there are many deaths from disease or from wounds which were not necessarily fatal. Probably the most selective of any of these three agencies is the variable resistance to disease and infection and the widely varying knowledge and appreciation of the need for hygienic living shown by the individual, as, for instance, by less reckless drinking of unsterilized water. But here, too, in modern warfare, this item is becoming less selective, with the advance in discipline and in organized sanitation.

The efficiency of selection will be affected by the percentage that each side has sent to the front, if the combatants are either above or below the average of the population. A nation that sends all its able-bodied males forward will be affected differently from its enemy that has needed to call upon only one-half of its able-bodied men in order to win its cause.

Away from the fighting lines of the contending sides, conditions that prevail are rendered more severe in many ways than in times of peace. Poverty becomes rife, and sanitation and medical treatment are commonly sacrificed under the strain. During a war, that mitigation of the action of natural selection which is so common now among civilized nations, is somewhat less effective than in times of peace. The scourge of typhus in Serbia is a recent and graphic illustration.

After a war has been concluded, certain new agencies of intergroup selection arise. The result depends largely on whether the vanquished have had a superior culture brought to them, as in the case of the Philippines, or whether, on the contrary, certain diseases have been introduced, as to the natives of the New World by the Spanish conquerors and explorers, or crushing tribute has been levied, or grievous oppression such as has befallen Belgium.

Sometimes the conquerors themselves have suffered severely as the result of excessive spoliation, which has produced vicious idleness and luxurious indulgence, with the ultimate effect of diminishing the birth-rate.

Within the nation there may be various results. Sometimes, by the reduction of overcrowding, natural selection will be less severe. On the other hand, the loss of that part of the population which is more economically productive is a very serious loss, leading to excessive poverty with increased severity in the action of natural selection, of which some of the Southern States, during the Reconstruction period, offer a good illustration.

Selection is also rendered more intense by the heavy burden of taxation, and in the very common depreciation of currency as is now felt in Russia.

Sexual selection as well as lethal is affected by war in manifold ways. Considering the armed force, there is an inter-group selection, when the enemy's women are assaulted by the soldiers. While this has been an important factor in the past, it is somewhat less common now, with better army discipline and higher social ideals.

Within the group, mating at the outset of a war is greatly increased by many hurried marriages. There is also alleged to be sometimes an increase of illegitimacy in the neighborhood of training camps. In each of these instances, these matings do not represent as much maturity of judgment as there would have been in times of peace, and hence give a less desirable sexual selection.

In the belligerent nation at home, the number of marriageable males is of course far less than at ordinary times. It becomes important, then, to compare the quality of the non-combatants and those combatants who survive and return home, since their absence during the war period of course decreases their reproduction as compared with the non-combatants. The marked excess of women over men, both during the war and after, necessarily intensifies the selection of women and proportionately reduces that of men, since relatively fewer men will remain unmated. This excess of women is found in all classes. Among superiors there are, in addition, some women who never marry because the war has so reduced the number of suitors thought eligible.

The five years' war of Paraguay with Brazil, Uruguay and

Argentina (1864–1869) is perhaps the most glaring case on record [1] in recent years of the destruction of the male population of a country. Whole regiments were made up of boys of 16 or less. At the beginning of the war the population of Paraguay had been given as 1,337,437. It fell to 221,709 (28,746 men, 106,254 women, 86,079 children); it is even now probably not more than half of the estimate made at the beginning of the war. "Here in a small area has occurred a drastic case of racial ravage without parallel since the time of the Thirty Years' War." Macedonia, however, furnishes a fairly close parallel—D. S. Jordan found whole villages there in 1913 in which not a single man remained: only women and children. Conditions were not so very much better in parts of the South at the close of the Civil War, particularly in Virginia and North Carolina, where probably 40% of the young men of reproductive age died without issue. And in a few of the Northern states, such as Vermont, Connecticut and Massachusetts, the loss was proportionately almost as great. These were probably as good men as any country has produced, and their loss, with that of their potential offspring, undoubtedly is causing more far-reaching effects in the subsequent history of the United States than has ever been realized.

In the past and still among many savage peoples, inter-group selection has been affected by the stealing of women from the vanquished. The effect of this has been very different, depending on whether these women would otherwise have been killed or spared, and also depending on the relative quality of their nation to that of their conquerors.

To sum up, there are so many features of natural selection, each of which must be separately weighed and the whole then balanced, that it is a matter of extensive inquiry to determine whether a certain war has a preponderance of eugenic or dysgenic results.

When the quality of the combatants is so high, compared with

[1] Jordan, David Starr, *War and the Breed*, p. 164. Boston, 1915. Chancellor Jordan has long been the foremost exponent of the dysgenic significance of war, and this book gives an excellent summary of the problem from his point of view.

the rest of the world, as during the Great War, no conceivable eugenic gains from the war can offset the losses. It is probably well within the facts to assume that the period of this war represents a decline in inherent human quality, greater than in any similar length of time in the previous history of the world.

Unfortunately, it does not appear that war is becoming much less common if we consider number of combatants rather than number of wars as times goes on,[1] and it steadily tends to be more destructive. War, then, offers one of the greatest problems which the eugenist must face, for a few months of war may undo all that eugenic reforms can gain in a generation.

The total abolition of war would, of course, be the ideal, but there is no possibility of this in the near future. The fighting instinct, it must be remembered, is one of the most primitive and powerful that the human mechanism contains. It was evolved in great intensity, to give man supremacy over his environment —for the great "struggle for existence" is with the environment, not with members of one's own species. Man long ago conquered the environment so successfully that he has never since had to exert himself in physical combat in this direction; but the fighting instinct remained and could not be baulked without causing uneasiness. Spurred on by a complex set of psychological and economic stimuli, man took to fighting his own kind, to a degree that no other species shows.

Now contrary to what the militarist philosophers affirm, this particular sort of "struggle for existence" is not a necessity to the futher progressive evolution of the race. On the contrary it more frequently reverses evolution and makes the race go backward, rather than forward.

The struggle for existence which makes the race progress is principally that of the species with its environment, not that of some members of the species with others. If the latter struggle could be supplanted by the former then racial evolution would go ahead steadily without the continuous reversals that warfare now gives.

[1] See Woods, Frederick Adams, and Baltzly, Alexander, *Is War Diminishing?* New York, 1916.

William James saw, we believe, the true solution of the problem of militarism, when he wrote his famous essay on *The Moral Equivalent of War*. Here is man, full of fighting instinct which will not be baulked. What is he to do? Professor James suggested that the youth of the nation be conscripted to fight the environment, thus getting the fight "out of its system" and rendering a real service to the race by constructive reclamation work, instead of slaying each other and thus turning the hands of the evolutionary clock backward.

When education has given everyone the evolutionary and eugenic view of man as a species adapted to his environment, it may be possible to work out some such solution as this of James. The only immediate course of action open seems to be to seek, if possible, to diminish the frequency of war by subduing nations which start wars and, by the organization of a League to Enforce Peace; to avoid war-provoking conquests; to diminish as much as possible the disastrous effects of war when it does come, and to work for the progress of science and the diffusion of knowledge which will eventually make possible the greater step, effective international organization.

CHAPTER XVII

GENEALOGY AND EUGENICS

Scientific plant breeders to-day have learned that their success often depends on the care with which they study the genealogy of their plants.

Live-stock breeders admit that their profession is on a sure scientific basis only to the extent that the genealogy of the animals used is known.

Human genealogy is one of the oldest manifestations of man's intellectual activity, but until recently it has been subservient to sentimental purposes, or pursued from historical or legal motives. Biology has had no place in it.

Genealogy, however, has not altogether escaped the re-examination which all sciences received after the Darwinian movement revolutionized modern thought. Numerous ways have been pointed out in which it could be brought into line with the new way of looking at man and his world. The field of genealogy has already been invaded at many points by biologists, seeking the furtherance of their own aims.

It will be worth while to discuss briefly the relations between the conventional genealogy and eugenics. It may be that genealogy could become an even more valuable branch of human knowledge than it now is, if it were more closely aligned with biology. In order to test this possibility, one must inquire:

(1) What is genealogy?

(2) What does it now attempt to do?

(3) What faults, from the eugenist's standpoint, seem to exist in present genealogical methods?

(4) What additions should be made to the present methods?

(5) What can be expected of it, after it is revised in accordance with the ideas of the eugenist?

The answer to the first question, "What is genealogy?" may

be brief. Genealogy may be envisaged from several points. It serves history. It has a legal function, which is of more consequence abroad than in America. It has social significance, in bolstering family pride and creating a feeling of family solidarity—this is perhaps its chief office in the United States. It has, or can have, biological significance, and this in two ways: either in relation to pure science or applied science. In connection with pure science, its function is to furnish means for getting knowledge of the laws of heredity. In application, its function is to furnish a knowledge of the inherited characters of any given individual, in order to make it possible for the individual to find his place in the world and, in particular, to marry wisely. It is obvious that the use of genealogy in the applied science of eugenics is dependent on previous research by geneticists; for marriage matings which take account of heredity can not be made unless the mode of inheritance of human traits has previously been discovered.

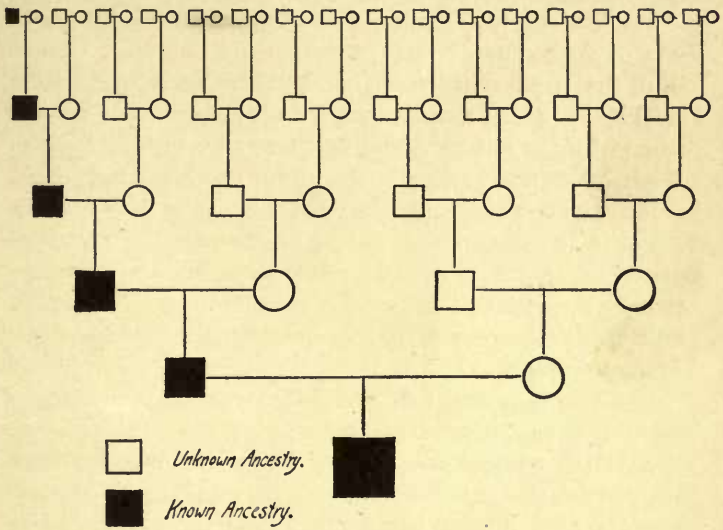
The historical, social, legal and other aspects of genealogy do not concern the present discussion. We shall discuss only the biological aspect; not only because it alone is germane to the present book, but because we consider it to have by far the greatest true value, accepting the criterion of value as that which increases the welfare of mankind. By this criterion, the historical, legal and social aspects of genealogy will be seen, with a little reflection, to be of secondary importance to its biological aspect.

(2) Genealogy now is too often looked upon as an end in itself. It would be recognized as a science of much greater value to the world if it were considered not an end but a means to a far greater end than it alone can supply. It has, indeed, been contended, even by such an authority as Ottokar Lorenz, who is often called the father of modern scientific genealogy, that a knowledge of his own ancestry will tell each individual exactly what he himself is. This appears to be the basis of Lorenz's valuation of genealogy. It is a step in the right direction: but

(3) The present methods of genealogy are inadequate to

support such a claim. Its methods are still based mainly on the historical, legal and social functions. A few of the faults of method in genealogy, which the eugenist most deplores, are:

(a) The information which is of most value is exactly that



LINE OF ASCENT THAT CARRIES THE FAMILY NAME

FIG. 40.—In some pedigrees, particularly those dealing with antiquity, the only part known is the line of ascent which carries the family name,—what animal breeders call the tail-male. In such cases it is evident that from the point of view of a geneticist practically nothing is known. How insignificant any single line of ascent is, by comparison with the whole ancestry, even for a few generations, is graphically shown by the above chart. It is assumed in this chart that no cousin marriages took place.

which genealogy ordinarily does not furnish. Dates of birth, death and marriage of an ancestor are of interest, but of limited biological importance. The facts about that ancestor which vitally concern his living descendant are the facts of his character, physical and mental; and these facts are given in very few genealogies.

(b) Genealogies are commonly too incomplete to be of real value. Sometimes they deal only with the direct male line of ascent—the line that bears the family name, or what animal

breeders call the tail-male. In this case, it is not too much to say that they are nearly devoid of genuine value. It is customary to imagine that there is some special virtue inherent in that line of descent which carries the family name. Some one remarks, for instance, to Mr. Jones that he seems to be fond of the sea.

"Yes," he replies, "You know the Joneses have been sailors for many generations."

But the small contribution of heredity made to an individual by the line of descent carrying his family name, in comparison with the rest of his ancestry, may be seen from Fig. 40.

Such incomplete pedigrees are rarely published nowadays, but in studying historic characters, one frequently finds nothing more than the single line of ascent in the family name. Fortunately, American genealogies rarely go to this extreme, unless it be in the earliest generations; but it is common enough for them to deal only with the direct ancestors of the individual, omitting all brothers and sisters of those ancestors. Although this simplifies the work of the genealogist immensely, it deprives it of value to a corresponding degree.

(c) As the purpose of genealogy in this country has been largely social, it is to be feared that in too many cases discreditable data have been tacitly omitted from the records. The anti-social individual, the feeble-minded, the insane, the alcoholic, the "generally no-count," has been glossed over. Such a lack of candor is not in accord with the scientific spirit, and makes one uncertain, in the use of genealogies, to what extent one is really getting all the facts. There are few families of any size which have not one such member or more, not many generations removed. To attempt to conceal the fact is not only unethical but from the eugenist's point of view, at any rate, it is a falsification of records that must be regarded with great disapproval. At present it is hard to say to what extent undesirable traits occur in the most distinguished families; and it is of great importance that this should be learned.

Maurice Fishberg contends [1] that many Jewish families are

[1] See an interesting series of five articles in *The American Hebrew*, Jan and Feb., 1917.

characterized by extremes,—that in each generation they have produced more ability and also more disability than would ordinarily be expected. This seems to be true of some of the more prominent old American families as well. On the other hand, large families can be found, such as the remarkable family of New England office-holders described by Merton T. Goodrich,[1] in which there is a steady production of civic worth in every generation with almost no mental defectives or gross physical defectives. In such a family there is a high sustained level. It is such strains which eugenists wish especially to increase.

In this connection it is again worth noting that a really great man is rarely found in an ancestry devoid of ability. This was pointed out in the first chapter, but is certain to strike the genealogist's attention forcibly. Abraham Lincoln is often quoted as an exception; but more recent studies of his ancestry have shown that he is not really an exception; that, as Ida M. Tarbell [2] says, "So far from his later career being unaccounted for in his origin and early history, it is as fully accounted for as is the case of any man." The Lincoln family was one of the best in America, and while Abraham's own father was an eccentric person, he was yet a man of considerable force of character, by no means the "poor white trash" which he is often represented to have been. The Hanks family, to which the Emancipator's mother belonged, had also maintained a high level of ability in every generation; furthermore, Thomas Lincoln and Nancy Hanks, the parents of Abraham Lincoln, were first cousins.

The more difficult cases, for the eugenist, are rather to be found in such ancestries as those of Louis Pasteur and Michael Faraday. Pasteur[3] might perhaps be justly considered the greatest man France has ever produced; his father was a non-commissioned soldier who came of a long line of tanners, while his mother's family had been gardeners for generations. Far-

[1] *Journal of Heredity*, VIII, pp. 277–283, June, 1917.

[2] *The Early Life of Abraham Lincoln*, New York, 1896. For the Emancipator's maternal line see *Nancy Hanks*, by Caroline Hanks Hitchcock. New York, 1899.

[3] *The Life of Pasteur* by his son-in-law, René Vallery Radot, should be read by every student of biology.

aday, who is worthy to be placed close to Charles Darwin among eminent Englishmen, was the son of a blacksmith and a farmer's daughter. Such pedigrees are striking; and yet, as Frederick Adams Woods has remarked, they ought to strengthen rather than to weaken one's belief in the force of heredity. When it is considered how rarely such an ancestry produces a great man, it must be fairly evident that his greatness is due to an accidental conjunction of favorable traits, as the modern theory of genetics holds; and that greatness is not due to the inheritance of acquired characters, on which hypothesis Pasteur and Faraday would indeed be difficult to explain.

Cases of this sort, even though involving much less famous people, will be found in almost every genealogy, and add greatly to the interest of its study, as well as offering valuable data to the professional geneticist.

(d) Even if the information it furnishes were more complete, human genealogy would not justify the claims sometimes made for it as a science, because, to use a biological phrase, "the matings are not controlled." The results of a certain experiment are exhibited, but can not be interpreted unless one knows what the results would have been, had the preceding conditions been varied in this way or in that way. These controlled experiments can be made in plant and animal breeding; they have been made by the thousand, by the hundred thousand, for many years. They can not be made in human society. It is, of course, not desirable that they should be made; but the consequence is that the biological meaning of human history, the real import of genealogy, can not be known unless it is interpreted in the light of modern plant and animal breeding. It is absolutely necessary that genealogy go into partnership with genetics, the general science of heredity. If a spirit of false pride leads genealogists to hold aloof from these experiments, they will make slow progress. The interpretation of genealogy in the light of modern research in heredity through the experimental breeding of plants and animals is full of hope; without such light, it will be discouragingly slow work.

Genealogists are usually proud of their pedigrees; they usu-

ally have a right to be. But their pride should not lead them to scorn the pedigrees of some of the peas, and corn, snapdragons and sugar beets, bulldogs and Shorthorn cattle, with which geneticists have been working during the last generation; for these humble pedigrees may throw more light on their own than a century of research in purely human material.

The science of genealogy will not have full meaning and full value to those who pursue it, unless they bring themselves to look on men and women as organisms subject to the same laws of heredity and variation as other living things. Biologists were not long ago told that it was essential for them to learn to think like genealogists. For the purpose of eugenics, neither science is complete without the other; and we believe that it is not invidious to say that biologists have been quicker to realize this than have genealogists. The Golden Age of genealogy is yet to come.

(4) In addition to the correction of these faulty methods, there are certain extensions of genealogical method which could advantageously be made without great difficulty.

(a) More written records should be kept, and less dependence placed on oral communication. The obsolescent family Bible, with its chronicle of births, deaths and marriages, is an institution of too great value in more ways than one, to be given up. The United States have not the advantage of much of the machinery of State registration which aids European genealogy, and while working for better registration of vital statistics, it should be a matter of pride with every family to keep its own archives.

(b) Family trees should be kept in more detail, including all brothers and sisters in every family, no matter at what age they died, and including as many collaterals as possible. This means more work for the genealogist, but the results will be of much value to science.

(c) More family traits should be marked. Those at present recorded are mostly of a social or economic nature, and are of little real significance after the death of their possessor. But the traits of his mind and body are likely to go on to his descend-

ants indefinitely. These are therefore the facts of his life on which attention should be focused.

(d) More pictorial data should be added. Photographs of the members of the family, at all ages, should be carefully preserved. Measurements equally deserve attention. The door jamb is not a satisfactory place for recording the heights of children, particularly in this day when removals are so frequent. Complete anthropometric measurements, such as every member of the Young Men's Christian Association, most college students, and many other people are obliged to undergo once or periodically, should be placed on file.

(e) Pedigrees should be traced upward from a living individual, rather than downward from some hero long since dead. Of course, the ideal method would be to combine these two, or to keep duplicate pedigrees, one a table of ascendants and the other of descendants, in the same stock.

Genealogical data of the needed kind, however, can not be reduced to a mere table or a family tree. The ideal genealogy starts with a whole fraternity—the individual who is making it and all his brothers and sisters. It describes fully the fraternity to which the father belongs, giving an account of each member, of the husband or wife of that member (if married) and their children, who are of course the first cousins of the maker of the genealogical study. It does the same for the mother's fraternity. Next it considers the fraternity to which the father's father belongs, considers their consorts and their children and grandchildren, and then takes up the study of the fraternity of the father's mother in the same way. The mother's parents next receive attention; and then the earlier generations are similarly treated, as far as the available records will allow. A pedigree study constructed on this plan really shows what traits are running through the families involved, and is vastly more significant than a mere chain of links, even though this might run through a dozen generations.

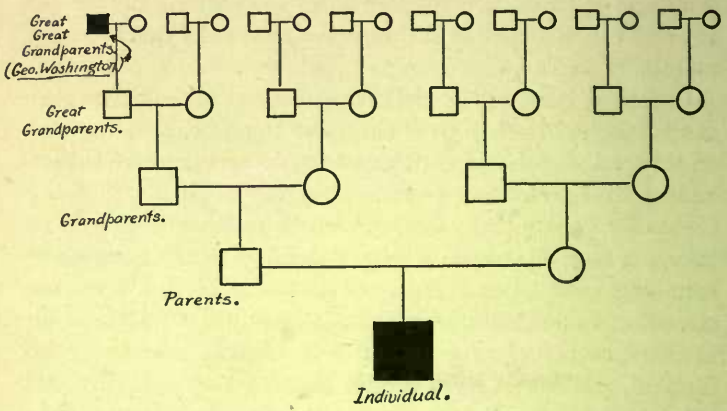
(5) With these changes, genealogy would become the study of heredity, rather than the study of lineage.

It is not meant to say that the study of heredity is nothing

more than applied genealogy. As understood nowadays, it includes mathematical and biological territory which must always be foreign to genealogy. It might be said that in so far as man is concerned, heredity is the interpretation of genealogy, and eugenics the application of heredity. Genealogy should give its students a vision of the species as a great group of ever-changing, interrelated organisms, a great network originating in the obscurity of the past, stretching forward into the obscurity of the future, every individual in it organically related to every other, and all of them the heritors of the past in a very real sense.

Genealogists do well in giving a realization of the importance of the family, but they err if they base this teaching altogether on the family's pride in some remote ancestor who, even though he bore the family name and was a prodigy of virtues, probably counts for very little in the individual's make-up to-day. To take a concrete though wholly imaginary illustration: what man would not feel a certain satisfaction in being a lineal descendant of George Washington? And yet, if the Father of his Country be placed at only four removes from the living individual, nothing is more certain than that this hypothetical living individual had fifteen other ancestors in George Washington's generation, any one of whom may play as great or a greater part in his ancestry; and so remote are they all that, as a statistical average, it is calculated that the contribution of George Washington to the ancestry of the hypothetical living individual would be perhaps not more than one-third of 1% of the total. The small influence of one of these remote ancestors may be seen at a glance, if a chart of all the ancestors up to the generation of the great hero is made. Following out the illustration, a pedigree based on George Washington would look like the diagram in Fig. 41. In more remote generations, the probable biological influence of the ancestor becomes practically nil. Thus Americans who trace their descent to some royal personage of England or the Continent, a dozen generations ago, may get a certain amount of spiritual satisfaction out of the relationship, but they certainly can derive little real help, of a

hereditary kind, from this ancestor. And when one goes farther back,—as to William the Conqueror, who seems to rank with the Mayflower immigrants as a progenitor of many descendants —the claim of descent becomes really a joke. If 24 generations have elapsed between the present and the time of William the Conqueror, every individual living to-day must have had living in the epoch of the Norman conquest not less than sixteen million ancestors. Of course, there was no such number of people



THE SMALL VALUE OF A FAMOUS, BUT REMOTE, ANCESTOR

FIG. 41.—A living individual who was a lineal descendant of George Washington might well take pride in the fact, but genetically that fact might be of very little significance. The above chart shows graphically how small a part any single ancestor plays, a few generations back. A general high average of ability in an ancestry is much more important, eugenically, than the appearance of one or two distinguished individuals.

in all England and Normandy, at that time, hence it is obvious that the theoretical number has been greatly reduced in every generation by consanguineous marriages, even though they were between persons so remotely related that they did not know they were related. C. B. Davenport, indeed, has calculated that most persons of the old American stock in the United States are related to each other not more remotely than thirtieth cousins, and a very large proportion as closely as fifteenth cousins.

At any rate, it must be obvious that the ancestors of any person of old American stock living to-day must have included practically all the inhabitants of England and Normandy, in

the eleventh century. Looking at the pedigree from the other end, William the Conqueror must have living to-day at least 16,000,000 descendants. Most of them can not trace back their pedigrees, but that does not alter the fact.

Such considerations give one a vivid realization of the brotherhood of man; but they can hardly be said to justify any great pride in descent from a family of crusaders for instance, except on purely sentimental grounds.

Descent from a famous man or woman should not be disparaged. It is a matter of legitimate pride and congratulation. But claims for respect made on that ground alone are, from a biological point of view, negligible, if the hero is several generations removed. What Sir Francis Galton wrote of the peers of England may, with slight alterations, be given general application to the descendants of famous people:

"An old peerage is a valueless title to natural gifts, except so far as it may have been furbished up by a succession of wise intermarriages. . . . I cannot think of any claim to respect, put forward in modern days, that is so entirely an imposture as that made by a peer on the ground of descent, who has neither been nobly educated, nor has any eminent kinsman within three degrees."

But, some one may protest, are we not shattering the very edifice of which we are professed defenders, in thus denying the force of heredity? Not at all. We wish merely to emphasize that a man has sixteen great-great-grandparents, instead of one, and that those in the maternal lines are too often overlooked, although from a biological point of view they are every bit as important as those in the paternal lines. And we wish further to emphasize the point that it is the near relatives who, on the whole, represent what one is. The great family which for a generation or two makes unwise marriages, must live on its past reputation and see the work of the world done and the prizes carried away by the children of wiser matings. No family can maintain its eugenic rank merely by the power of inertia. Every marriage that a member of the family makes is a matter of vital concern to the future of the family: and this is one of the lessons

which a broad science of genealogy should inculcate in every youth.

Is it practicable to direct genealogy on this slightly different line? As to that, the genealogist must decide. These are the qualifications which old Professor William Chauncey Fowler laid down as essential for a successful genealogist:

Love of kindred.
Love of investigation.
Active imagination.
Sound and disciplined judgment.
Conscientious regard to truth.
A pleasing style as a writer.

With such qualifications, one can go far, and it would seem that one who possesses them has only to fix his attention upon the biological aspect of genealogy, to become convinced that his science is only part of a science, as long as it ignores eugenics. After all, nothing more is necessary than a slight change in the point of view; and if genealogists can adopt this new point of view, can add to their equipment some familiarity with the fundamental principles of biology as they apply to man and are laid down in the science of eugenics, the value of the science of genealogy to the world ought to increase at least five-fold within a generation.

What can be expected from a genealogy with eugenic foundation?

First and foremost, it will give genetics a chance to advance with more rapidity, in its study of man. Genetics, the study of heredity, can not successfully proceed by direct observation in the human species as it does with plants and rapidly-breeding animals, because the generations are too long. Less than three generations are of little value for genetic researches, and even three can rarely be observed to advantage by any one person. Therefore, second-hand information must be used. So far, most of this has been gained by sending field-workers—a new kind of genealogist—out among the members of a family, and having them collect the desired information, either by study of extant records, or by word of mouth. But the written records of value

have been usually negligible in quantity, and oral communication has therefore been the mainstay. It has not been wholly satisfactory. Few people—aside from genealogists—can give even the names of all their great-grandparents, far less can they tell anything of importance about them.

It is thus to genealogy that genetics is driven. Unless family records are available, it can accomplish little. And it can not get these family records unless genealogists realize the importance of furnishing them; for as has already been pointed out, most genealogies at present available are of little value to genetics, because of the inadequacy of the data they furnish. It is only in the case of exceptional families, such as the royal houses of Europe, that enough information is given about each individual to furnish an opportunity for analysis. What could be done if there were more such data available is brilliantly illustrated in the investigation by Frederick Adams Woods of Boston of the reigning houses of Europe. His writings should be read by every genealogist, as a source of inspiration as well as information.

More such data must be obtained in the future. Genealogists must begin at once to keep family records in such a way that they will be of the greatest value possible—that they will serve not only family pride, but bigger purposes. It will not take long to get together a large number of family histories, in which the idea will be to tell as much as possible, instead of as little as possible, about every individual mentioned.

The value of pedigrees of this kind is greater than most people realize.

In the first place, it must be remembered that these traits, on whose importance in the pedigree we have been insisting, are responsible not only for whatever the individual is, but for whatever society is,—whatever the race is. They are not personal matters, as C. B. Davenport and H. H. Laughlin well point out; "they come to us from out of the population of the past, and, in so far as we have children, they become disseminated throughout the population of the future. Upon such traits society is built; good or bad they determine the fate of our society. Apart from migration, there is only one way to get socially desirable

traits into our social life, and that is reproduction; there is only one way to get them out, by preventing the reproduction. All social welfare work is merely education of the germs of traits; it does not provide such germs. In the absence of the germs the traits can not develop. On the other hand, it is possible with difficulty, if possible at all, by means of the strongest repressive measures merely, to prevent the development of undesirable hereditary traits. Society can treat the delinquent individual more reasonably, more effectively, and more humanely, if it knows the 'past performance' of his germ-plasm."

In addition to their importance to society, a knowledge of the traits of a pedigree has a great direct importance to the individual; one of the most valuable things to be learned from that knowledge is the answer to the question, "What shall a boy or girl do? What career shall one lay out for one's children?" A knowledge of the child's inborn nature, such as can be had only through study of his ancestry, will guide those who have his education in hand, and will further guide those who decide, or help the child decide, what work to take up in life. This helps to put the problem of vocational guidance on a sound basis,—the basis of the individual's inherent aptitudes.

Not too much must be expected from vocational guidance at the present time, but in the case of traits that are inherited, it is a fair inference that a child is more likely to be highly endowed with a trait which both parents possess, than with one that only one parent possesses. "Among the traits which have been said to occur in some such direct hereditary way," H. L. Hollingworth [1] observes, "or as the result of unexplained mutation or deviation from type, are: mathematical aptitude, ability in drawing,[2] musical composition,[3] singing, poetic reaction, mili-

[1] Hollingworth, H. L., *Vocational Psychology*, pp. 212–213, New York, 1916.

[2] Sir Francis Galton and C. B. Davenport have called attention to the probable inheritance of artistic ability and lately H. Drinkwater (*Journal of Genetics*, July, 1916), has attempted to prove that it is due to a Mendelian unit. The evidence alleged is inadequate to prove that the trait is inherited in any particular way, but the pedigrees cited by these three investigators, and the boyhood histories of such artists as Benjamin West, Giotto, Ruskin and Turner, indicate that an hereditary basis exists.

[3] The difficulty about accepting such traits as this is that they are almost im-

tary strategy, chess playing. Pitch discrimination seems to depend on structural factors which are not susceptible of improvement by practice.[1] The same may be said of various forms of professional athletic achievement. Color blindness seems to be an instance of the conspicuous absence of such a unit characteristic."

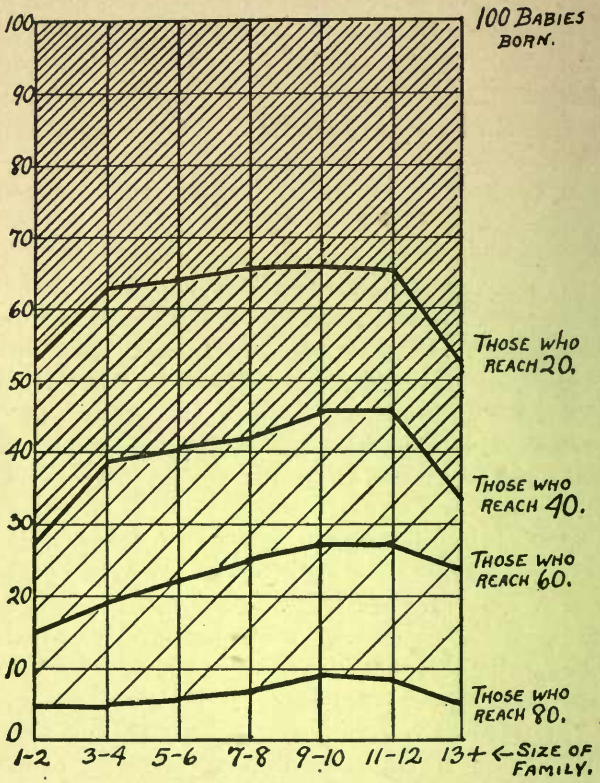
Again, the knowledge of ancestry is an essential factor in the wise selection of a husband or wife. Insistence has been laid on this point in an earlier chapter of this book, and it is not necessary here to repeat what was there said. But it seems certain that ancestry will steadily play a larger part in marriage selection in the future; it is at least necessary to know that one is not marrying into a family that carries the taint of serious hereditary defect, even if one knows nothing more. An intelligent study of genealogy will do much, we believe, to bring about the intelligent selection of the man or woman with whom one is to fall in love.

In addition to these general considerations, it is evident that genealogy, properly carried out, would throw light on most of the specific problems with which eugenics is concerned, or which fall in the field of genetics. A few examples of these problems may be mentioned, in addition to those which are discussed in various other chapters of this book.

1. The supposed inferiority of first-born children has been debated at some length during the last decade, but is not yet wholly settled. It appears possible that the first-born may be, on the average, inferior both physically and mentally to the children who come directly after him; on the other hand, the

possible of exact definition. The long teaching experience of Mrs. Evelyn Fletcher-Copp (*Journal of Heredity*, VII, 297–305, July, 1916) suggests that any child of ordinary ability can and will compose music if properly taught, but of course in different degree.

[1] Seashore, C. E., in *Psychol. Monogs*, XIII, No. 1, pp. 21–60, Dec., 1910. See also Fletcher-Copp, *ubi sup.* Mrs. Copp declares that the gift of "positive pitch" or "absolute pitch," i. e., the ability to name any sound that is heard, "may be acquired, speaking very conservatively, by 80% of normal children," if they begin at an early age. It may be that this discrepancy with Seashore's careful laboratory tests is due to the fact that the pupils and teachers trained by Mrs. Copp are a selected lot, to start with.

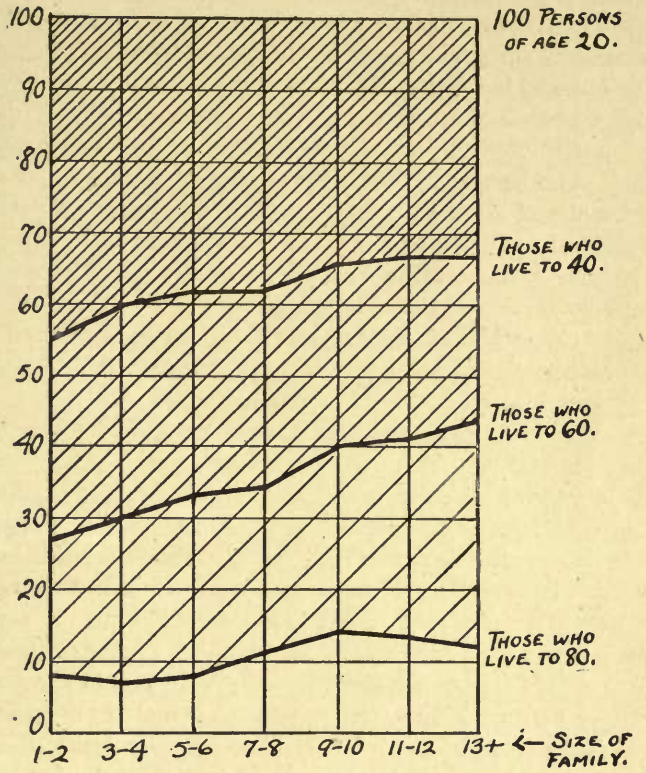


HISTORY OF 100 BABIES

FIG. 42.—The top of the diagram shows the children "starting from scratch." By following down the vertical lines, one can see that their longevity depends largely on the size of family from which they come. Those who had 10 or a dozen brothers and sisters are most likely to live to extreme age. Alexander Graham Bell's data, 2964 members of the Hyde family in America.

number of first-born who attain eminence is greater than would be expected on the basis of pure chance. More data are needed to clear up this problem.[1]

[1] The contributions on this subject are very widely scattered through periodical literature. The most important is Karl Pearson's memoir (1914), reviewed in the *Journal of Heredity*, VI, pp. 332–336, July, 1915. See also Gini, Corrado, "The Superiority of the Eldest," *Journal of Heredity*, VI, 37–39, Jan., 1915.



ADULT MORTALITY

FIG. 43.—If child mortality is eliminated, and only those individuals studied who live to the age of 20 or longer, the small families are still found to be handicapped. In general it may be said that the larger the family, the longer a member of it will live. Large families (in a normal, healthy section of the population) indicate vitality on the part of the parents. This does not, of course, hold good in the slums, where mental and financial inefficiency are abundant. Within certain classes, however, it may be said with confidence that the weaklings in the population are most likely to be from small families. Alexander Graham Bell's data.

2. The advantage to a child of being a member of a large or small family is a question of importance. In these days of birth control, the argument is frequently heard that large families are an evil of themselves, the children in them being handi-

capped by the excessive child-bearing of the mother. The statistics cited in support of this claim are drawn from the slums, where the families are marked by poverty and by physical and mental inferiority. It can easily be shown, by a study of more favored families, that the best children come from the large fraternities. In fact Alexander Graham Bell found evidence,[1] in his investigation of the Hyde Family in America, that the families of 10 or more children were those which showed the greatest longevity (see Figs. 42 and 43). In this connection, longevity is of course a mark of vitality and physical fitness.

3. The question of the effect of child-bearing on the mother is equally important, since exponents of birth control are urging that mothers should not bear more children than they desire. A. O. Powys' careful study [2] of the admirable vital statistics of New South Wales showed that the mothers who lived longest were those who bore from five to seven children.

4. The age at which men and women should marry has not yet been sufficiently determined, on biological grounds. Statistics so far compiled do not indicate that the age of the father has any direct influence on the character of the children, but the age of the mother undoubtedly exercises a strong influence on them. Thus it is now well established [3] that infant mortality is lowest among the children of young mothers,—say from 20 to 25 years of age,—and that delay in childbearing after that age penalizes the children (see Fig. 44). There is also some evidence that, altogether apart from the infant mortality, the children of young mothers attain a greater longevity than do those of older women. More facts are needed, to show how much of this effect is due to the age of the mother, how much to her experience, and how much to the influence of the number of children she has previously borne.

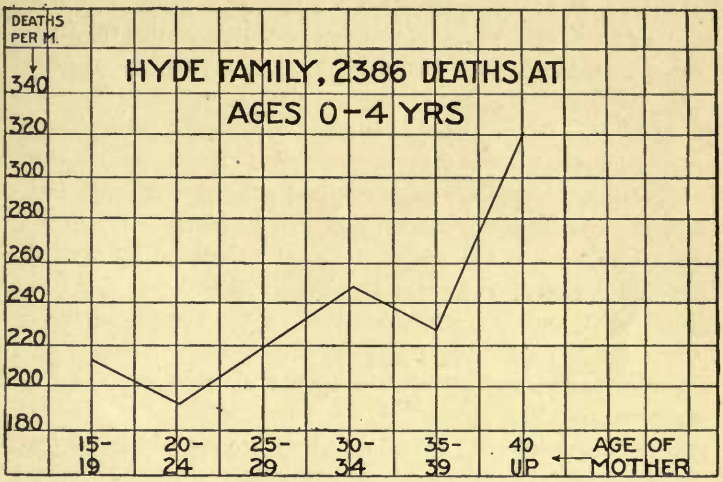
5. Assortative mating, consanguineous marriage, the inheri-

[1] *Journal of Heredity*, VIII, pp. 299–302, July, 1917.

[2] *Biometrika*, IV, pp. 233–286, London, 1905.

[3] See, for example, *Journal of Heredity*, VIII, pp. 394–396, September, 1917. A large body of evidence from European sources, bearing on the relation between various characters of the offspring, and the age of the parents, was brought together by Corrado Gini in Vol. II, *Problems in Eugenics* (London, 1913).

tance of a tendency to disease, longevity, sex-linked heredity, sex-determination, the production of twins, and many other problems of interest to the general public as well as to the biologist, are awaiting the collection of fuller data. All such problems



INFLUENCE OF MOTHER'S AGE

FIG. 44.—As measured by the percentage of infant deaths, those children show the greatest vitality who were born to mothers between the ages of 20 and 25. Infant mortality increases steadily as the mother grows older. In this case the youngest mothers (those under 20 years of age) do not make quite as good a showing as those who are a little older, but in other studies the youngest mothers have made excellent records. In general, such studies all show that the babies are penalized if marriage is delayed beyond the age of 25, or if child-bearing is unduly delayed after marriage. Alexander Graham Bell's data.

will be illuminated, when more genealogies are kept on a biological basis.

Here, however, an emphatic warning against superficial investigation must be uttered. The medical profession has been particularly hasty, many times, in reporting cases which were assumed to demonstrate heredity. The child was so and so; it was found on inquiry that the father was also so and so: *Post hoc, ergo propter hoc*—it was heredity. Such a method of investigation is calculated to bring genetics into disrepute, and would hazard the credit of genealogy. As a fact, one case counts for practically nothing as proof of hereditary influence;

even half a dozen or a dozen may be of no significance. There are two ways in which genealogical data can be analyzed to deduce biological laws: one is based on the application of statistical and graphic methods to the data, and needs some hundreds of cases to be of value; the other is by pedigree-study, and needs at least three generations of pedigree, usually covering numerous collaterals, to offer important results. It is not to be supposed that anyone with a sufficiently complete record of his own ancestry would necessarily be able by inspection to deduce from it any important contribution to science. But if enough complete family records are made available, the professional geneticist can be called into coöperation, can supplement the human record with his knowledge of the results achieved by carefully controlled animal and plant breeding, and between them, the genealogist and the geneticist can in most cases arrive at the truth. That such truth is of the highest importance to any family, and equally to society as a whole, must be evident.

Let the genealogist, then, bring together data on every trait he can think of. As a guide and stimulus, he should read the opening chapters of Herbert's Spencer's *Autobiography*, or of Karl Pearson's, *Life, Letters and Labors of Sir Francis Galton*, or C. B. Davenport's study [1] of C. O. Whitman, one of the foremost American biologists. He will also find help in Bulletin No. 13 of the Eugenics Record Office, Cold Spring Harbor, Long Island, New York. It is entitled, *How to Make a Eugenical Family Study*, and gives a list of questions which should be answered, and points which should be noted. With some such list as this, or even with his own common-sense, the genealogist may seek to ascertain as much as possible about the significant facts in the life of his ancestors, bearing in mind that the geneticist will ask two questions about every trait mentioned:

1. Is this characteristic inherited?
2. If so, how?

Nor must it be forgotten that the geneticist is often as much

[1] Davenport, Charles B., "The Personality, Heredity and Work of Charles Otis Whitman," *American Naturalist*, LI, pp. 5–30, Jan., 1917.

interested in knowing that a given character is not inherited under certain conditions, as that it is.

It is highly desirable that genealogists should acquire the habit of stating the traits of their subjects in quantitative terms. They too often state that a certain amount is "much"; what should be told is "how much." Instead of saying that an individual had fairly good health, tell exactly what diseases he had during his lifetime; instead of remarking that he was a good mathematician, tell some anecdote or fact that will allow judgment of the extent of his ability in this line. Did he keep record of his bank balance in his head instead of on paper? Was he fond of mathematical puzzles? Did he revel in statistics? Was the study of calculus a recreation to him? Such things probably will appear trivial to the genealogist, but to the eugenist they are sometimes important.

Aside from biology, or as much of it as is comprised in eugenics, genealogy may also serve medicine, jurisprudence, sociology, statistics, and various other sciences as well as the ones which it now serves. But in most cases, such service will have a eugenic aspect. The alliance between eugenics and genealogy is so logical that it can not be put off much longer.

Genealogists may well ask what facilities there are for receiving and using pedigrees such as we have been outlining, if they were made up. All are, of course, familiar with the repositories which the different patriotic societies, the National Genealogical Society, and similar organizations maintain, as well as the collections of the Library of Congress and other great public institutions. Anything deposited in such a place can be found by investigators who are actively engaged in eugenic research.

In addition to this, there are certain establishments founded for the sole purpose of analyzing genealogies from a biological or statistical point of view. The first of these was the Galton Laboratory of the University of London, directed by Karl Pearson. There are two such at work in the United States. The larger is the Eugenics Record Office at Cold Spring Harbor, Long Island, New York, directed by Charles B. Davenport. Blank schedules are sent to all applicants, in which the pedigree of an

individual may be easily set down, with reference particularly to the traits of eugenic importance. When desired, the office will send duplicate schedules, one of which may be retained by the applicant for his own files. The schedules filed at the Eugenics Record Office are treated as confidential, access to them being given only to accredited investigators.

The second institution of this kind is the Genealogical Record Office, founded and directed by Alexander Graham Bell at 1601 Thirty-fifth Street N. W., Washington D. C. This devotes itself solely to the collection of data regarding longevity, and sends out schedules to all those in whose families there have been individuals attaining the age of 80 or over. It welcomes correspondence on the subject from all who know of cases of long life, and endeavors to put the particulars on record, especially with reference to the ancestry and habits of the long-lived individual.

The Eugenics Registry at Battle Creek, Mich., likewise receives pedigrees, which it refers to Cold Spring Harbor for analysis.

Persons intelligently interested in their ancestry might well consider it a duty to society, and to their own posterity, to send for one of the Eugenics Record Office schedules, fill it out and place it on file there, and to do the same with the Genealogical Record Office, if they are so fortunate as to come of a stock characterized by longevity. The filling out of these schedules would be likely to lead to a new view of genealogy; and when this point of view is once gained, the student will find it adds immensely to his interest in his pursuit.

Genealogists are all familiar with the charge of long standing that genealogy is a subject of no use, a fad of a privileged class. They do not need to be told that such a charge is untrue. But genealogy can be made a much more useful science than it now is, and it will be at the same time more interesting to its followers, if it is no longer looked upon as an end in itself, nor solely as a minister to family pride. We hope to see it regarded as a handmaid of evolution, just as are the other sciences; we hope to see it linked with the great biological movement of the present day, for the betterment of mankind.

So much for the science as a whole. What can the individual do? Nothing better than to broaden his outlook so that he may view his family not as an exclusive entity, centered in a name, dependent on some illustrious man or men of the past; but rather as an integral part of the great fabric of human life, its warp and woof continuous from the dawn of creation and criss-crossed at each generation. When he gets this vision, he will desire to make his family tree as full as possible, to include his collaterals, to note every trait which he can find on record, to preserve the photographs and measurements of his own contemporaries, and to take pleasure in feeling that the history of his family is a contribution to human knowledge, as well as to the pride of the family.

If the individual genealogist does this, the science of genealogy will become a useful servant of the whole race, and its influence, not confined to a few, will be felt by all, as a positive, dynamic force helping them to lead more worthy lives in the short span allotted to them, and helping them to leave more worthy posterity to carry on the names they bore and the sacred thread of immortality, of which they were for a time the custodians.

CHAPTER XVIII

THE EUGENIC ASPECT OF SOME SPECIFIC REFORMS

Nearly every law and custom of a country has an influence direct or remote on eugenics. The eugenic progress to be expected if laws and customs are gradually but steadily modified in appropriate ways, is vastly greater and more practicable than is any possible gain which could be made at present through schemes for the direct control of "eugenic marriages."

In this present chapter, we try to point out some of the eugenic aspects of certain features of American society. It must not be supposed that we have any legislative panaceas to offer, or that the suggestions we make are necessarily the correct ones. We are primarily concerned with stimulating people to think about the eugenic aspects of their laws and customs. Once the public thinks, numerous changes will be tried and the results will show whether the changes shall be followed up or discontinued.

The eugenic point of view that we have here taken is becoming rather widespread, although it is often not recognized as eugenic. Thinkers in all subjects that concern social progress are beginning to realize that the test of whether or not a measure is good is its effect. The pragmatic school of philosophy, which has been in vogue in recent years, has reduced this attitude to a system. It is an attitude to be welcomed wherever it is found, for it only needs the addition of a knowledge of biology, to become eugenic.

TAXATION

To be just, any form of taxation should repress productive industry as little as possible, and should be of a kind that can not easily be shifted. In addition to these qualifications, it should,

if possible, contribute directly to the eugenic strength of the nation by favoring, or at least by not penalizing, useful families.

A heavy tax on land values (in extreme, the single-tax) and a heavy tax on bachelors have sometimes been proposed as likely to be eugenic in effect. But they are open to criticism. The tax on land values appears too likely to be indiscriminate in working: it would appear to favor inferior families as much as superior ones. The tax on bachelors is proposed as a means of getting bachelors to marry; but is this always desirable? It depends on the quality of the bachelors. Even at present it is our belief that, on the whole, the married men of the population are superior to the unmarried men. If the action of sexual selection is improved still further by the eugenics campaign, this difference in quality will be increased. It will then be rather an advantage that the bachelors should remain single, and a tax which would force them into marriage for reasons of economy, is not likely to result in any eugenic gain. But a moderate indirect tax by an exemption for a wife and each child after a general exemption of $2,000 would be desirable.

The inheritance tax seems less open to criticism. Very large inheritances should be taxed to a much greater degree than is at present attempted in the United States, and the tax should be placed, not on the total amount of the inheritance, but on the amount received by each individual beneficiary. This tends to prevent the unfair guarantee of riches to individuals regardless of their own worth and efforts. But to suggest, on the other hand, as has often been done, that inheritances should be confiscated by the government altogether, shows a lack of appreciation of the value of a reasonable right to bequeath in encouraging larger families among those having a high standard of living. It is not desirable to penalize the kind of strains which possess directing talent and constructive efficiency; and they certainly would be penalized if a man felt that no matter how much he might increase his fortune, he could not leave any of it to those who continued his stock.

The sum exempted should not be large enough to tempt the beneficiary to give up work and settle down into a life of com-

placent idleness, but enough to be of decided assistance to him in bringing up a family: $50,000 might be a good maximum. Above this, the rate should advance rapidly, and should be progressive, not proportional. A 50% tax on inheritances above $250,000 seems to us desirable, since large inheritances tend to interfere with the correlation of wealth and social worth, which is so necessary from a eugenic point of view as well as from that of social justice.

The Federal estate law, passed in September, 1916, is a step in the right direction. It places the exemption at $50,000 net. The rate, however, is not rapid enough in its rise: e. g., estates exceeding $250,000 but less than $450,000 are taxed only 4%, while the maximum, for estates above $5,000,000, is only 10%. This, moreover, is on the total estate, while we favor the plan that taxes not the total amount bequeathed but the amount inherited by each individual. With the ever increasing need of revenue, it is certain that Congress will make a radical increase in progressive inheritance tax on large fortunes, which should be retained after the war.

Wisconsin and California have introduced an interesting innovation by providing a further graded tax on inheritances in accordance with the degree of consanguinity between the testator and the beneficiary. Thus a small bequest to a son or daughter might be taxed only 1%; a large bequest to a trained nurse or a spiritualistic medium might be taxed 15%. This is frank recognition of the fact that inheritance is to be particularly justified as it tends to endow a superior family. Eugenically it may be permissible to make moderate bequests to brothers, nephews and nieces, as well as one's own children; and to endow philanthropies; but the State might well take a large part of any inheritance which would otherwise go to remote heirs, or to persons not related to the testator.

At present there is, on the whole, a negative correlation between size of family and income. The big families are, in general in the part of the population which has the smallest income, and it is well established that the number of children tends to decrease as the income increases and as a family rises in the

social scale—a fact to which we have devoted some attention in earlier chapters. If this condition were to be permanent, it would be somewhat difficult to suggest a eugenic form of income tax. We believe, however, that it is not likely to be permanent in its present extent. The spread of birth control seems likely to reduce the negative correlation and the spread of eugenic ideas may possibly convert it into a slight positive correlation, so that the number of children may be more nearly proportional to the means of the family. Perhaps it is Utopian to expect a positive correlation in the near future, yet a decrease in the number of children born to the class of casual laborers and unskilled workers is pretty certain to take place as rapidly as the knowledge of methods of birth control is extended; and at present it does not seem that this extension can be stopped by any of the agencies that are opposing it.

If the size of a family becomes more nearly proportional to the income, instead of being inversely proportional to it as at present, and if income is even roughly a measure of the value of a family to the community—an assumption that can hardly be denied altogether, however much one may qualify it in individual cases,—then the problem of taxing family incomes will be easier. The effect of income differences will be, on the whole, eugenic. It would then seem desirable to exempt from taxation all incomes of married people below a certain critical sum, this amount being the point at which change in income may be supposed to not affect size of family. This means exemption of all incomes under $2,000, an additional $2,000 for a wife and an additional $2,000 for each child, and a steeply-graded advance above that amount, as very large incomes act to reduce the size of family by introducing a multiplicity of competing cares and interests. There is also a eugenic advantage in heavy taxes on harmful commodities and unapprovable luxuries.

THE "BACK TO THE FARM" MOVEMENT

One of the striking accompaniments of the development of American civilization, as of all other civilizations, is the growth

of the cities. If (following the practice of the U. S. Census) all places with 2,500 or more population be classed as urban, it appears that 36.1% of the population of the United States was urban in 1890, that the percentage had risen to 40.5 in 1900, and that by 1910 not less than 46.3% of the total population was urban.

There are four components of this growth of urban population: (1) excess of births over deaths, (2) immigration from rural districts, (3) immigration from other countries, and (4) the extension of area by incorporation of suburbs. It is not to be supposed that the growth of the cities is wholly at the expense of the country; J. M. Gillette calculates [1] that 29.8% of the actual urban gain of 11,826,000 between 1900 and 1910 was due to migration from the country, the remaining 70.2% being accounted for by the other three causes enumerated.

Thus it appears that the movement from country to city is of considerable proportions, even though it be much less than has sometimes been alleged. This movement has eugenic importance because it is generally believed, although more statistical evidence is needed, that families tend to "run out" in a few generations under city conditions; and it is generally agreed that among those who leave the rural districts to go to the cities, there are found many of the best representatives of the country families.

If superior people are going to the large cities, and if this removal leads to a smaller reproductive contribution than they would otherwise have made, then the growth of great cities is an important dysgenic factor.

This is the view taken by O. F. Cook,[2] when he writes: "Statistically speaking cities are centers of population, but biologically or eugenically speaking they are centers of depopulation. They are like sink-holes or *siguanas*, as the Indians of Guatemala call the places where the streams of their country drop into subterranean channels and disappear. It never happens that cities

[1] Gillette, John M., *Constructive Rural Sociology*, p. 89, New York, 1916.

[2] Cook, O. F., "Eugenics and Agriculture," *Journal of Heredity*, VII, pp. 249–254, June, 1916.

develop large populations that go out and occupy the surrounding country. The movement of population is always toward the city. The currents of humanity pass into the urban *siguanas* and are gone."

"If the time has really come for the consideration of practical eugenic measures, here is a place to begin, a subject worthy of the most careful study—how to rearrange our social and economic system so that more of the superior members of our race will stay on the land and raise families, instead of moving to the city and remaining unmarried or childless, or allowing their children to grow up in unfavorable urban environments that mean deterioration and extinction."

"The cities represent an eliminating agency of enormous efficiency, a present condition that sterilizes and exterminates individuals and lines of descent rapidly enough for all but the most sanguinary reformer. All that is needed for a practical solution of the eugenic problem is to reverse the present tendency for the better families to be drawn into the city and facilitate the drafting of others for urban duty. . . . The most practical eugenists of our age are the men who are solving the problems of living in the country and thus keeping more and better people under rural conditions where their families will survive."

"To recognize the relation of eugenics to agriculture," Mr. Cook concludes, "does not solve the problems of our race, but it indicates the basis on which the problems need to be solved, and the danger of wasting too much time and effort in attempting to salvage the derelict populations of the cities. However important the problems of urban society may be, they do not have fundamental significance from the standpoint of eugenics, because urban populations are essentially transient. The city performs the function of elimination, while agriculture represents the constructive eugenic condition which must be maintained and improved if the development of the race is to continue."

On the other hand, city life does select those who are adapted to it. It is said to favor the Mediterranean race in competition with the Nordic, so that mixed city populations tend to become more brunette, the Nordic strains dying out. How well this

claim has been established statistically is open to question; but there can be no doubt that the Jewish race is an example of urban selection. It has withstood centuries of city life, usually under the most severe conditions, in ghettoes, and has survived and maintained a high average of mentality.

Until recently it has been impossible, because of the defective registration of vital statistics in the United States, to get figures which show the extent of the problem of urban sterilization. But Dr. Gillette has obtained evidence along several indirect lines, and is convinced that his figures are not far from the truth.[1] They show the difference to be very large and its eugenic significance of corresponding importance.

"When it is noted," Dr. Gillette says, "that the rural rate is almost twice the urban rate for the nation as a whole, that in only one division does the latter exceed the former, and that in some divisions the rural rate is three times the urban rate, it can scarcely be doubted that the factor of urbanization is the most important cause of lowered increase rates. Urban birth-rates are lower than rural birth-rates, and its death-rates are higher than those of the latter."

Considering the United States in nine geographical divisions, Dr. Gillette secured the following results:

	Rate of Net Annual Increase		
Division	*Rural*	*Urban*	*Average*
New England	5.0	7.3	6.8
Middle Atlantic	10.7	9.6	10.4
East North Central	12.4	10.8	11.6
West North Central	18.1	10.1	15.8
South Atlantic	18.9	6.00	16.0
East South Central	19.7	7.4	17.8
West South Central	23.9	10.2	21.6
Mountain	21.1	10.5	17.6
Pacific	12.6	6.6	9.8
Average	16.9	8.8	13.65

[1] Gillette, John M., "A Study in Social Dynamics: A Statistical Determination of the Rate of Natural Increase and of the Factors Accounting for the Increase of Population in the United States," *Quarterly Publications of the American Statistical Association*, n. s. 116, Vol. XV, pp. 345–380, December, 1916.

Even though fuller returns might show these calculations to be inaccurate, Dr. Gillette points out, they are all compiled on the same basis, and therefore can be fairly compared, since any unforeseen cause of increase or decrease would affect all alike.

It is difficult to compare the various divisions directly, because the racial composition of the population of each one is different. But the difference in rates is marked. The West South Central states would almost double their population in four decades, by natural increase alone, while New England would require 200 years to do so.

Dr. Gillette tried, by elaborate computations, to eliminate the effect of immigration and emigration in each division, in order to find out the standing of the old American stock. His conclusions confirm the beliefs of the most pessimistic. "Only three divisions, all Western, add to their population by means of an actual excess of income over outgo of native-born Americans," he reports. Even should this view turn out to be exaggerated, it is certain that the population of the United States is at present increasing largely because of immigration and the high fecundity of immigrant women, and that as far as its own older stock is concerned, it has ceased to increase.

To state that this is due largely to the fact that country people are moving to the city is by no means to solve the problem, in terms of eugenics. It merely shows the exact nature of the problem to be solved. This could be attacked at two points.

1. Attempts might be made to keep the rural population on the farms, and to encourage a movement from the cities back to the country. Measures to make rural life more attractive and remunerative and thus to keep the more energetic and capable young people on the farm, have great eugenic importance, from this point of view.

2. The growth of cities might be accepted as a necessary evil, an unavoidable feature of industrial civilization, and direct attempts might be made, through eugenic propaganda, to secure a higher birth-rate among the superior parts of the city population.

The second method seems in many ways the more practicable.

On the other hand, the first method is in many ways more ideal, particularly because it would not only cause more children to be born, but furnish these children with a suitable environment after they were born, which the city can not do. On the other hand, the city offers the better environment for the especially gifted who require a specialized training and later the field for its use in most cases.

In practice, the problem will undoubtedly have to be attacked by eugenists on both sides. Dr. Gillette's statistics, showing the appalling need, should prove a stimulus to eugenic effort.

DEMOCRACY

By democracy we understand a government which is responsive to the will of a majority of the entire population, as opposed to an oligarchy where the sole power is in the hands of a small minority of the entire population, who are able to impose their will on the rest of the nation. In discussing immigration, we have pointed out that it is of great importance that the road for promotion of merit should always be open, and that the road for demotion of incompetence should likewise be open. These conditions are probably favored more by a democracy than by any other form of government, and to that extent democracy is distinctly advantageous to eugenics.

Yet this eugenic effect is not without a dysgenic after-effect. The very fact that recognition is attainable by all, means that democracy leads to social ambition; and social ambition leads to smaller families. This influence is manifested mainly in the women, whose desire to climb the social ladder is increased by the ease of ascent which is due to lack of rigid social barriers. But while ascent is possible for almost anyone, it is naturally favored by freedom from handicaps, such as a large family of children. In the "successful" business and professional classes, therefore, there is an inducement to the wife to limit the number of her offspring, in order that she may have more time to devote to social "duties." In a country like Germany, with more or less stratified social classes, this factor in the dif-

ferential birth-rate is probably less operative. The solution in America is not to create an impermeable social stratification, but to create a public sentiment which will honor women more for motherhood than for eminence in the largely futile activities of polite society.

In quite another way, too great democratization of a country is dangerous. The tendency is to ask, in regard to any measure, "What do the people want?" while the question should be "What ought the people to want?" The *vox populi* may and often does want something that is in the long run quite detrimental to the welfare of the state. The ultimate test of a state is whether it is strong enough to survive, and a measure that all the people, or a voting majority of them (which is the significant thing in a democracy), want, may be such as to handicap the state severely.

In general, experts are better able to decide what measures will be desirable in the long run, than are voters of the general population, most of whom know little about the real merits of many of the most important projects. Yet democracies have a tendency to scorn the advice of experts, most of the voters feeling that they are as good as any one else, and that their opinion is entitled to as much weight as that of the expert. This attitude naturally makes it difficult to secure the passage of measures which are eugenic or otherwise beneficial in character, since they often run counter to popular prejudices.

The initiative by small petitions, and the referendum as a frequent resort, are dangerous. They are of great value if so qualified as to be used only in real emergencies, as where a clique has got control of the government and is running it for its self-interest, but as a regularly and frequently functioning institution they are unlikely to result in wise statesmanship.

The wise democracy is that which recognizes that officials may be effectively chosen by vote, only for legislative offices; and which recognizes that for executive offices the choice must be definitely selective, that is, a choice of those who by merit are best fitted to fill the positions. Appointment in executive officers is not offensive when, as the name indicates, it is truly the best

who govern. All methods of choice by properly judged competition or examination with a free chance to all, are, in principle, selective yet democratic in the best sense, that of "equality of opportunity." When the governing few are not the best fitted for the work, a so-called aristocracy is of course not an aristocracy (government by the best) at all, but merely an oligarchy. When officers chosen by vote are not well fitted then such a government is not "for the people."

Good government is then an aristo-democracy. In it the final control rests in a democratically chosen legislature working with a legislative commission of experts, but all executive and judicial functions are performed by those best qualified on the basis of executive or judicial ability, not vote-getting or speech-making ability. All, however, are eligible for such positions provided they can show genuine qualifications.

SOCIALISM

It is difficult to define socialism in terms that will make a discussion practicable. The socialist movement is one thing, the socialist political program is another. But though the idea of socialism has as many different forms as an amœba, there is always a nucleus that remains constant,—the desire for what is conceived to be a more equitable distribution of wealth. The laborer should get the value which his labor produces, it is held, subject only to subtraction of such a part as is necessary to meet the costs of maintenance; and in order that as little as possible need be subtracted for that purpose, the socialists agree in demanding a considerable extension of the functions of government: collective ownership of railways, mines, the tools of production. The ideal socialistic state would be so organized, along these lines, that the producer would get as much as possible of what he produces, the non-producer nothing.

This principle of socialism is invariably accompanied by numerous associated principles, and it is on these associated principles, not on the fundamental principle, that eugenists and socialists come into conflict. Equalitarianism, in partic-

ular, is so great a part of current socialist thought that it is doubtful whether the socialist movement as such can exist without it. And this equalitarianism is usually interpreted not only to demand equality of opportunity, but is based on a belief in substantial equality of native ability, where opportunity is equal.

Any one who has read the preceding chapters will have no doubt that such a belief is incompatible with an understanding of the principles of biology. How, then, has it come to be such an integral part of socialism?

Apparently it is because the socialist movement is, on the whole, made up of those who are economically unsatisfied and discontented. Some of the intellectual leaders of the movement are far from inferior, but they too often find it necessary to share the views of their following, in order to retain this following. A group which feels itself inferior will naturally fall into an attitude of equalitarianism, whereas a group which felt itself superior to the rest of society would not be likely to.

Before criticising the socialistic attitude in detail, we will consider some of the criticisms which some socialists make of eugenics.

1. It is charged that eugenics infringes on the freedom of the individual. This charge (really that of the individualists more than of socialists strictly speaking) is based mainly on a misconception of what eugenics attempts to do. Coercive measures have little place in modern eugenics, despite the gibes of the comic press. We propose little or no interference with the freedom of the normal individual to follow his own inclinations in regard to marriage or parenthood; we regard indirect measures and the education of public opinion as the main practicable methods of procedure. Such coercive measures as we indorse are limited to grossly defective individuals, to whom the doctrine of personal liberty can not be applied without stultifying it.

It is indeed unfortunate that there are a few sincere advocates of eugenics who adhered to the idea of a wholesale surgical campaign. A few reformers have told the public for several years of

the desirability of sterilizing the supposed 10,000,000 defectives at the bottom of the American population. Lately one campaigner has raised this figure to 15,000,000. Such fantastic proposals are properly resented by socialists and nearly every one else, but they are invariably associated in the public mind with the conception of eugenics, in spite of the fact that 99 out of 100 eugenists would repudiate them. The authors can speak only for themselves, in declaring that eugenics will not be promoted by coercive means except in a limited class of pathological cases; but they are confident that other geneticists, with a very few exceptions, hold the same attitude. There is no danger that this surgical campaign will ever attain formidable proportions, and the socialist, we believe, may rest assured that the progress of eugenics is not likely to infringe unwarrantably on the principle of individual freedom, either by sterilization or by coercive mating.

2. Eugenists are further charged with ignoring or paying too little attention to the influence of the environment in social reform. This charge is sometimes well founded, but it is not an inherent defect in the eugenics program. The eugenist only asks that both factors be taken into account, whereas in the past the factor of heredity has been too often ignored. In the last chapter of this book we make an effort to balance the two sides.

3. Again, it is alleged that eugenics proposes to substitute an aristocracy for a democracy. We do think that those who have superior ability should be given the greatest responsibilities in government. If aristocracy means a government by the people who are best qualified to govern, then eugenics has most to hope from an aristo-democratic system. But admission to office should always be open to anyone who shows the best ability; and the search for such ability must be much more thorough in the future than it has been in the past.

4. Eugenists are charged with hindering social progress by endeavoring to keep woman in the subordinate position of a domestic animal, by opposing the movement for her emancipation, by limiting her activity to child-bearing and refusing to

recognize that she is in every way fitted to take an equal part with man in the world's work. This objection we have answered elsewhere, particularly in our discussion of feminism. We recognize the general equality of the two sexes, but demand a differentiation of function which will correspond to biological sex-specialization. We can not yield in our belief that woman's greatest function is motherhood, but recognition of this should increase, not diminish, the strength of her position in the state.

5. Eugenists are charged with ignoring the fact of economic determinism, the fact that a man's acts are governed by economic conditions. To debate this question would be tedious and unprofitable. While we concede the important rôle of economic determinism, we can not help feeling that its importance in the eyes of socialists is somewhat factitious. In the first place, it is obvious that there are differences in the achievements of fellow men. These socialists, having refused to accept the great weight of germinal differences in accounting for the main differences in achievement, have no alternative but to fall back on the theory of economic determinism. Further, socialism is essentially a reform movement; and if one expects to get aid for such a movement, it is essential that one represent the consequences as highly important. The doctrine of economic determinism of course furnishes ground for glowing accounts of the changes that could be made by economic reform, and therefore fits in well with the needs of the socialist propagandists. When the failure of many nations to make any use of their great resources in coal and water power is remembered; when the fact is recalled that many of the ablest socialist leaders have been the sons of well-to-do intellectuals who were never pinched by poverty; it must be believed that the importance of economic determinism in the socialist mind is caused more by its value for his propaganda purposes than a weighing of the evidence.

Such are, we believe, the chief grounds on which socialists criticise the eugenics movement. All of these criticisms should be stimulating, should lead eugenists to avoid mistakes in program or procedure. But none of them, we believe, is a

serious objection to anything which the great body of eugenists proposes to do.

What is to be said on the other side? What faults does the eugenist find with the socialist movement?

For the central principle, the more equitable distribution of wealth, no discussion is necessary. Most students of eugenics would probably assent to its general desirability, although there is much room for discussion as to what constitutes a really equitable division of wealth. In sound socialist theory, it is to be distributed according to a man's value to society; but the determination of this value is usually made impossible, in socialist practice, by the intrusion of the metaphysical and untenable dogma of equalitarianism.

If one man is by nature as capable as another, and equality of opportunity [1] can be secured for all, it must follow that one man will be worth just as much as another; hence the equitable distribution of wealth would be an equal distribution of wealth, a proposal which some socialists have made. Most of the living leaders of the socialist movement certainly recognize its fallacy, but it seems so far to have been found necessary to lean very far in this direction for the maintenance of socialism as a movement of class protest.

Now this idea of the equality of human beings is, in every respect that can be tested, absolutely false, and any movement which depends on it will either be wrecked or, if successful, will wreck the state which it tries to operate. It will mean the penalization of real worth and the endowment of inferiority and incompetence. Eugenists can feel no sympathy for a doctrine which is so completely at variance with the facts of human nature.

But if it is admitted that men differ widely, and always must differ, in ability and worth, then eugenics can be in accord with the socialistic desire for distribution of wealth according to

[1] The popular demand for "equality of opportunity" is, if taken literally, absurd, in the light of the provable inequality of abilities. What is wanted is more correctly defined as an equal consideration of all with an *appropriate* opportunity for each based on his demonstrated capacities.

merit, for this will make it possible to favor and help perpetuate the valuable strains in the community and to discourage the inferior strains. T. N. Carver sums up the argument [1] concisely:

"Distribution according to worth, usefulness or service is the system which would most facilitate the progress of human adaptation. It would, in the first place, stimulate each individual by an appeal to his own self-interest, to make himself as useful as possible to the community. In the second place, it would leave him perfectly free to labor in the service of the community for altruistic reasons, if there was any altruism in his nature. In the third place it would exercise a beneficial selective influence upon the stock or race, because the useful members would survive and perpetuate their kind and the useless and criminal members would be exterminated."

In so far as socialists rid themselves of their sentimental and Utopian equalitarianism, the eugenist will join them willingly in a demand that the distribution of wealth be made to depend as far as feasible on the value of the individual to society.[2] As to the means by which this distribution can be made, there will of course be differences of opinion, to discuss which would be outside the province of this volume. Fundamentally, eugenics is anti-individualistic and in so far a socialistic movement, since it seeks a social end involving some degree of individual subordination, and this fact would be more frequently recognized if the movement which claims the name of socialist did not so often allow the wish to believe that a man's environ-

[1] *Essays in Social Justice.* By Thomas Nixon Carver, Harvard University Press, 1915, pp. 168–169.

[2] Answering the question "How Much is a Man Worth?" Professor Carver states the following axioms:

"The value of a man equals his production minus his consumption.

"His economic success equals his acquisition minus his consumption.

"When his acquisition equals his production then his economic success equals his value.

"It is the duty of the state to make each man's acquisition equal his production. That is justice."

Of course, "production" is here used in a broad sense, to mean the real social value of the services rendered, and not merely the present exchange value of the services, or the goods produced.

mental change could eliminate natural inequalities to warp its attitude.

CHILD LABOR

It is often alleged that the abolition of child labor would be a great eugenic accomplishment; but as is the case with nearly all such proposals, the actual results are both complex and far-reaching.

The selective effects of child labor obviously operate directly on two generations: (1) the parental generation and (2) the filial generation, the children who are at work. The results of these two forms of selection must be considered separately.

1. On the parental generation. The children who labor mostly come from poor families, where every child up to the age of economic productivity is an economic burden. If the children go to work at an early age, the parents can afford to have more children and probably will, since the children soon become to some extent an asset rather than a liability. Child labor thus leads to a higher birth-rate of this class, abolition of child labor would lead to a lower birth-rate, since the parents could no longer afford to have so many children.

Karl Pearson has found reason to believe that this result can be statistically traced in the birth-rate of English working people,—that a considerable decline in their fecundity, due to voluntary restriction, began after the passage of each of the laws which restricted child labor and made children an expense from which no return could be expected.

If the abolition of child labor leads to the production of fewer children in a certain section of the population the value of the result to society, in this phase, will depend on whether or not society wants that strain proportionately increased. If it is an inferior stock, this one effect of the abolition of child labor would be eugenic.

Comparing the families whose children work with those whose children do not, one is likely to conclude that the former are on the average inferior to the latter. If so, child labor is in this one

particular aspect dysgenic, and its abolition, leading to a lower birth-rate in this class of the population, will be an advantage.

2. On the filial generation. The obvious result of the abolition of child labor will be, as is often and graphically told, to give children a better chance of development. If they are of superior stock, and will be better parents for not having worked as children (a proviso which requires substantiation) the abolition of their labor will be of direct eugenic benefit. Otherwise, its results will be at most indirect; or, possibly, dysgenic, if they are of undesirable stock, and are enabled to survive in greater numbers and reproduce. In necessarily passing over the social and economic aspects of the question, we do not wish it thought that we advocate child labor for the purpose of killing off an undesirable stock prematurely. We are only concerned in pointing out that the effects of child labor are many and various.

The effect of its abolition within a single family further depends on whether the children who go to work are superior to those who stay at home. If the strongest and most intelligent children are sent to work and crippled or killed prematurely, while the weaklings and feeble-minded are kept at home, brought up on the earnings of the strong, and enabled to reach maturity and reproduce, then this aspect of child labor is distinctly dysgenic.

The desirability of prohibiting child labor is generally conceded on euthenic grounds, and we conclude that its results will on the whole be eugenic as well, but that they are more complex than is usually recognized.

COMPULSORY EDUCATION

Whether one favors or rejects compulsory education will probably be determined by other arguments than those derived from eugenics; nevertheless there are eugenic aspects of the problem which deserve to be recognized.

One of the effects of compulsory education is similar to that which follows the abolition of child labor—namely, that the child is made a source of expense, not of revenue, to the parent.

Not only is the child unable to work, while at school, but to send him to school involves in practice dressing him better than would be necessary if he stayed at home. While it might fit the child to work more gainfully in later years, yet the years of gain are so long postponed that the parent can expect to share in but little of it.

These arguments would not affect the well-to-do parent, or the high-minded parent who was willing or able to make some sacrifice in order that his children might get as good a start as possible. But they may well affect the opposite type of parent, with low efficiency and low ideals.[1] This type of parent, finding that the system of compulsory education made children a liability, not an immediate asset, would thereby be led to reduce the size of his family, just as he seems to have done when child labor was prohibited in England and children ceased to be a source of revenue. Compulsory education has here, then, a eugenic effect, in discouraging the reproduction of parents with the least efficiency and altruism.

If this belief be well founded, it is likely that any measure tending to decrease the cost of schooling for children will tend to diminish this effect of compulsory education. Such measures as the free distribution of text-books, the provision of free lunches at noon, or the extension to school children of a reduced car-fare, make it easier for the selfish or inefficient parent to raise children; they cost him less and therefore he may tend to have more of them. If such were the case, the measures referred to, despite the euthenic considerations, must be classified as dysgenic.

In another and quite different way, compulsory education is of service to eugenics. The educational system should be a sieve, through which all the children of the country are passed, —or more accurately, a series of sieves, which will enable the teacher to determine just how far it is profitable to educate each child so that he may lead a life of the greatest possible usefulness to the state and happiness to himself. Obviously such a func-

[1] Kornhauser, A. W., "Economic Standing of Parents and the Intelligence of their Children," *Jour. of Educ. Psychology*, Vol. IX., pp. 159–164, March, 1918.

tion would be inadequately discharged, if the sieve failed to get all the available material; and compulsory education makes it certain that none will be omitted.

It is very desirable that no child escape inspection, because of the importance of discovering every individual of exceptional ability or inability. Since the public educational system has not yet risen to the need of this systematic mental diagnosis, private philanthropy should for the present be alert to get appropriate treatment for the unusually promising individual. In Pittsburgh, a committee of the Civic Club is seeking youths of this type, who might be obliged to leave school prematurely for economic reasons, and is aiding them to appropriate opportunities. Such discriminating selection will probably become much more widespread and we may hope a recognized function of the schools, owing to the great public demonstration of psychometry now being conducted at the cantonments for the mental classification of recruits. Compulsory education is necessary for this selection.

We conclude that compulsory education, as such, is not only of service to eugenics through the selection it makes possible, but may serve in a more unsuspected way by cutting down the birth-rate of inferior families.

VOCATIONAL GUIDANCE AND TRAINING

In arguments for vocational guidance and education of youth, one does not often hear eugenics mentioned; yet these measures, if effectively carried out, seem likely to be of real eugenic value.

The need for as perfect a correlation as possible between income and eugenic worth, has been already emphasized. It is evident that if a man gets into the wrong job, a job for which he is not well fitted, he may make a very poor showing in life, while if properly trained in something suited to him, his income would have been considerably greater. It will be a distinct advantage to have superior young people get established earlier, and this can be done if they are directly taught efficiency in what they

can do best, the boys being fitted for gainful occupations, and the girls for wifehood and motherhood in addition.

As to the details of vocational guidance, the eugenist is perhaps not entitled to give much advice; yet it seems likely that a more thorough study of the inheritance of ability would be of value to the educator. It was pointed out in Chapter IV that inheritance often seems to be highly specialized,—a fact which leads to the inference that the son might often do best in his father's calling or vocation, especially if his mother comes from a family marked by similar capacities. It is difficult to say how far the occupation of the son is, in modern conditions, determined by heredity and how far it is the result of chance, or the need of taking the first job open, the lack of any special qualifications for any particular work, or some similar environmental influence. Miss Perrin investigated 1,550 pairs of fathers and sons in the English *Dictionary of National Biography* and an equal number in the English *Who's Who*. "It seems clear," she concluded, "that whether we take the present or the long period of the past embraced by the Dictionary, the environmental influences which induce a man in this country to follow his father's occupation must have remained very steady." She found the coefficient of contingency [1] between occupation of father and occupation of son in *Who's Who* to be .75 and in the *Dictionary of National Biography* .76. For the inheritance of physical and mental characters, in general, the coefficient would be about .5. She thinks, "therefore, we may say that in the choice of a profession inherited taste counts for about $^2/_3$ and environmental conditions for about $^1/_3$."

An examination of 990 seventh and eighth grade boys in the public schools of St. Paul [2] showed that only 11% of them desired to enter the occupation of their fathers; there was a pronounced tendency to choose occupations of a more remunerative or intellectual and less manual sort than that followed

[1] The coefficient of contingency is similar in significance to the coefficient of correlation, with which readers have already become familiar. Miss Perrin's study is in *Biometrika*, III (1904), pp. 467–469.

[2] "The Social Waste of Unguided Personal Ability." By Erville B. Woods, *American Journal of Sociology*, XIX (1913), pp. 358–369.

by the father. That this preference would always determine the ultimate occupation is not to be expected, as a considerable per cent may fail to show the necessary ability.

While inherited tastes and aptitude for some calling probably should carry a good deal of weight in vocational guidance, we can not share the exaggerated view which some sociologists hold about the great waste of ability through the existence of round pegs in square holes. This attitude is often expressed in such words as those of E. B. Woods: "Ability receives its reward only when it is presented with the opportunities of a fairly favorable environment, *its* peculiarly indispensable sort of environment. Naval commanders are not likely to be developed in the Transvaal, nor literary men and artists in the soft coal fields of western Pennsylvania. For ten men who succeed as investigators, inventors, or diplomatists, there may be and probably are in some communities fifty more who would succeed better under the same circumstances."

While there is some truth in this view, it exaggerates the evil by ignoring the fact that good qualities frequently go together in an individual. The man of Transvaal who is by force of circumstances kept from a naval career is likely to distinguish himself as a successful colonist, and perhaps enrich the world even more than if he had been brought up in a maritime state and become a naval commander. It may be that his inherited talent fitted him to be a better naval commander than anything else; if so, it probably also fitted him to be better at many other things, than are the majority of men. "Intrinsically good traits have also good correlatives," physical, mental and moral.

F. A. Woods has brought together the best evidence of this, in his studies of the royal families of Europe. If the dozen best generals were selected from the men he has studied, they would of course surpass the average man enormously in military skill; but, as he points out, they would also surpass the average man to a very high degree as poets,—or doubtless as cooks or lawyers, had they given any time to those occupations.[1]

[1] See also "Eugenics: With Special Reference to Intellect and Character," by E. L. Thorndike. In *Eugenics: Twelve University Lectures*, pp. 319–342, New York, 1914.

The above considerations lead to two suggestions for vocational guidance: (1) it is desirable to ascertain and make use of the child's inherited capacities as far as possible; but (2) it must not be supposed that every child inherits the ability to do one thing only, and will waste his life if he does not happen to get a chance to do that thing. It is easy to suppose that the man who makes a failure as a paperhanger might, if he had had the opportunity, have been a great electrical engineer; it is easy to cite a few cases, such as that of General U. S. Grant, which seem to lend some color to the theory, but statistical evidence would indicate it is not the rule. If a man makes a failure as a paperhanger, it is at least possible that he would have made a failure of very many things that he might try; and if a man makes a brilliant success as a paperhanger, or railway engineer, or school teacher, or chemist, he is a useful citizen who would probably have gained a fair measure of success in any one of several occupations that he might have taken up but not in all.

To sum up: vocational guidance and training are likely to be of much service to eugenics. They may derive direct help from heredity; and their exponents may also learn that a man who is really good in one thing is likely to be good in many things, and that a man who fails in one thing would not necessarily achieve success if he were put in some other career. One of their greatest services will probably be to put a lot of boys into skilled trades, for which they are adapted and where they will succeed, and thus prevent them from yielding to the desire for a more genteel clerical occupation, in which they will not do more than earn a bare living. This will assist in bringing about the high correlation between merit and income which is so much to be desired.

THE MINIMUM WAGE

Legal enactment of a minimum wage is often urged as a measure that would promote social welfare and race betterment. By minimum wage is to be understood, according to its advocates, not the wage that will support a single man, but one that will support a man, wife, and three or four children. In

the United States, the sum necessary for this purpose can hardly be estimated at less than $2.50 a day.

A living wage is certainly desirable for every man, but the idea of giving every man a wage sufficient to support a family can not be considered eugenic. In the first place, it interferes with the adjustment of wages to ability, on the necessity of which we have often insisted. In the second place, it is not desirable that society should make it possible for every man to support a wife and three children; in many cases it is desirable that it be made impossible for him to do so. Eugenically, teaching methods of birth control to the married unskilled laborer is a sounder way of solving his problems, than subsidizing him so he can support a large family.

It must be frankly recognized that poverty is in many ways eugenic in its effect, and that with the spread of birth control among people below the poverty line, it is certain to be still more eugenic than at present. It represents an effective, even though a cruel, method of keeping down the net birth-rate of people who for one reason or another are not economically efficient; and the element of cruelty, involved in high infant mortality, will be largely mitigated by birth control. Free competition may be tempered to the extent of furnishing every man enough charity to feed him, if he requires charity for that purpose; and to feed his family, if he already has one; but charity which will allow him to increase his family, if he is too inefficient to support it by his own exertions, is rarely a benefit eugenically.

The minimum wage is admittedly not an attempt to pay a man what he is worth. It is an attempt to make it possible for every man, no matter what his economic or social value, to support a family. Therefore, in so far as it would encourage men of inferior quality to have or increase families, it is unquestionably dysgenic.

MOTHERS' PENSIONS

Half of the states of the Union have already adopted some form of pension for widowed mothers, and similar measures are

being urged in nearly all remaining states. The earliest of these laws goes back only to 1911.

In general,[1] these laws apply to mothers who are widows, or in some cases to those who have lost their means of support through imprisonment or incapacity of the husband. The maximum age of the child on whose account allowance is made varies from 14 to 16, in a few cases to 17 or 18. The amount allowed for each child varies in each state, approximately between the limits of $100 and $200 a year. In most states the law demands that the mother be a fit person, physically, mentally and morally to bring up her children, and that it be to their interest that they remain with her at home instead of being placed at work or sent to some institution. In all cases considerable latitude is allowed the administrator of the law,—a juvenile court, or board of county commissioners, or some body with equivalent powers.

Laws of this character have often been described as being eugenic in effect, but examination shows little reason for such a characterization. Since the law applies for the most part to women who have lost their husbands, it is evident that it is not likely to affect the differential birth-rate which is of such concern to eugenics. On the whole, mothers' pensions must be put in the class of work which may be undertaken on humanitarian grounds, but they are probably slightly dysgenic rather than eugenic, since they favor the preservation of families which are, on the whole, of inferior quality, as shown by the lack of relatives with ability or willingness to help them. On the other hand, they are not likely to result in the production from these families of more children than those already in existence.

HOUSING

At present it is sometimes difficult, in the more fashionable quarters of large cities, to find apartments where families with

[1] See U. S. Department of Labor, Children's Bureau Publication, No. 7, "Laws Relating to Mothers' Pensions in the United States, Denmark and New Zealand," Washington, 1914.

children are admitted. In other parts of the city, this difficulty appears to be much less. Such a situation tends to discourage parenthood, on the part of young couples who come of good families and desire to live in the part of the city where their friends are to be found. It is at least likely to cause postponement of parenthood until they feel financially able to take a separate house. Here is an influence tending to lower the birth-rate of young couples who have social aspirations, at least to the extent of desiring to live in the pleasanter and more reputable part of their city. Such a hindrance exists to a much less extent, if at all, for those who have no reason for wanting to live in the fashionable part of the city. This discrimination of some apartment owners against families with children would therefore appear to be dysgenic in its effect.

Married people who wish to live in the more attractive part of a city should not be penalized. The remedy is to make it illegal to discriminate against children. It is gratifying to note that recently a number of apartment houses have been built in New York, especially with a view to the requirements of children. The movement deserves wide encouragement. Any apartment house is an unsatisfactory place in which to bring up children, but since under modern urban conditions it is inevitable that many children must be brought up in apartments, if they are brought up at all, the municipality should in its own interests take steps to ensure that conditions will be as good as possible for them. In a few cases of model tenements, the favored poor tenants are better off than the moderately well-to-do. It is essential that the latter be given a chance to have children and bring them up in comfortable surroundings, and the provision of suitable apartment houses would be a gain in every large city.

The growing use of the automobile, which permits a family to live under pleasant surroundings in the suburbs and yet reach the city daily, alleviates the housing problem slightly. Increased facilities for rapid transit are of the utmost importance in placing the city population (a selected class, it will be remembered) under more favorable conditions for bringing up

their children. Zone rates should be designed to effect this dispersal of population.

FEMINISM

The word "feminism" might be supposed to characterize a movement which sought to emphasize the distinction between woman's nature and that of man to provide for women's special needs. It was so used in early days on the continent. But at present in England and America it denotes a movement which is practically the reverse of this; which seeks to minimize the difference between the two sexes. It may be broadly described as a movement which seeks to remove all discrimination based on sex. It is a movement to secure recognition of an equality of the two sexes. The feminists variously demand that woman be recognized as the equal of man (1) biologically, (2) politically, (3) economically.

1. Whether or not woman is to be regarded as biologically equal to man depends on how one uses the word "equal." If it is meant that woman is as well adapted to her own particular kind of work as is man to his, the statement will readily be accepted. Unfortunately, feminists show a tendency to go beyond this and to minimize differentiation in their claims of equality. An attempt is made to show that women do not differ materially from men in the nature of their capacity of mental or physical achievement. Mrs. Charlotte Perkins Gilman makes the logical application by demanding that little girls' hair be cut short and that they be prevented from playing with dolls in order that differences fostered in this way be reduced.

In forming a judgment on this proposition, it must be remembered that civilization covers not more than 10,000 years out of man's history of half a million or more. During 490,000 out of the 500,000 years, man was the hunter and warrior; while woman stayed at home of necessity to bear and rear the young, to skin the prey, to prepare the food and clothing. He must have a small knowledge of biology who could suppose that this long

history would not lead to any differentiation of the two sexes; and the biologist knows that man and woman in some respects differ in every cell of their bodies: that, as Jacques Loeb says, "Man and woman are, physiologically, different species."

But the biologist also knows that sex is a quantitative character. It is impossible to draw a sharp line and say that those on one side are in every respect men, and those on the other side in every respect women, as one might draw a line between goats and sheep. Many women have a considerable amount of "maleness"; numerous men have distinct feminine characteristics, physical and mental. There is thus an ill-defined "intermediate sex," as Edward Carpenter called it, whose size has been kept down by sexual selection; or better stated there is so much overlapping that it is a question of different averages with many individuals of each sex beyond the average of the other sex.

A perusal of Havelock Ellis' book, *Man and Woman*, will leave little doubt about the fact of sex differentiation, just as it will leave little doubt that one sex is, in its way, quite as good as the other, and that to talk of one sex as being inferior is absurd.

It is worth noting that the spread of feminism will reinforce the action of sexual selection in keeping down the numbers of this "intermediate sex." In the past, women who lacked femininity or maternal instinct have often married because the pressure of public opinion and economic conditions made it uncomfortable for any woman to remain unmarried. And they have had children because they could not help it, transmitting to their daughters their own lack of maternal instinct. Under the new régime a large proportion of such women do not marry, and accordingly have few if any children to inherit their defects. Hence the average level of maternal instinct of the women of America is likely steadily to rise.

We conclude that any claim of biological equality of the two sexes must use the word in a figurative sense, not ignoring the differentiation of the two sexes, as extreme feminists are inclined to do. To this differentiation we shall return later.

2. Political equality includes the demand for the vote and for

the removal of various legal restrictions, such as have sometimes prevented a wife from disposing of her own property without the consent of her husband or such as have made her citizenship follow that of her husband. In the United States, these legal restrictions are rapidly being removed, at such a rate that in some states it is now the husband who has a right to complain of certain legal discriminations.

Equal suffrage is also gaining steadily, but its eugenic aspect is not wholly clear. Theoretically much is to be said for it, as making use of woman's large social sympathies and responsibilities and interest in the family; but in the states where it has been tried, its effects have not been all that was hoped. Beneficial results are to be expected unless an objectionably extreme feminism finds support.

In general, the demand for political equality, in a broad sense, seems to the eugenist to be the most praiseworthy part of the feminist program. The abolition of those laws, which now discharge women from positions if they marry or have children, promises to be in principle a particularly valuable gain.

3. Economic equality is often summed up in the catch phrase "equal pay for equal work." If the phrase refers to jobs where women are competing on piecework with men, no one will object to it. In practice it applies particularly to two distinct but interlocking demands: (a) that women should receive the same pay as men for any given occupation—as, stenography, for example; and (b) that child-bearing should be recognized as just as much worthy of remuneration as any occupation which men enter, and should be paid for (by the state) on the same basis.

At present, there is almost universally a discrimination against women in commerce and industry. They sometimes get no more than half as much pay as men for similar grades of employment. But there is for this one good reason. An employer needs experienced help, and he expects a man to remain with him and become more valuable. He is, therefore, willing to pay more because of this anticipation. In hiring a woman, he knows that she will probably soon leave to marry. But whatever may be the origin of this discrimination, it is justified in the last analysis

by the fact that a man is paid as the head of a family, a woman only as an individual who ordinarily has fewer or no dependents to support. Indeed, it is largely this feature which, under the law of supply and demand, has caused women to work for low wages.

It is evident that real economic equality between men and women must be impossible, if the women are to leave their work for long periods of time, in order to bear and rear children. It is normally impossible for a woman to earn her living by competitive labor, at the same time that she is bearing and rearing children. Either the doctrine of economic equality is largely illusory, therefore, or else it must be extended to making motherhood a salaried occupation just as much as mill work or stenography.

The feminists have almost universally adopted the latter alternative. They say that the woman who is capable of earning money, and who abandons wage-earning for motherhood, ought to receive from the state as nearly as possible what she would have received if she had not had children; or else they declare that the expense of children should be borne wholly by the community.

This proposal must be tested by asking whether it would tend to strengthen and perpetuate the race or not. It is, in effect, a proposal to have the state pay so much a head for babies. The fundamental question is whether or not the quality of the babies would be taken into account. Doubtless the babies of obviously feebleminded women would be excluded, but would it be possible for the state to pay liberally for babies who would grow up to be productive citizens, and to refuse to pay for babies that would doubtless grow up to be incompetents, dolts, dullards, laggards or wasters? The scheme would work, eugenically, in proportion as it is discriminatory and graded.

But the example of legislation in France and England, and the main trend of popular thought in America, make it quite certain that at present, and for many years to come, it will be impossible to have babies valued on the basis of quality rather than mere numbers. It is sometimes possible to get indirect measures of a eugenic nature passed, and it has been found possible to

secure the passage of direct measures which prevent reproduction of those who are actually defective. But even the most optimistic eugenist must feel that, short of the remote future, any attempt to have the state grade and pay for babies on the basis of their quality is certain to fail to pass.

The recent action of the municipality of Schönberg, Berlin, is typical. It is now paying baby bounties at the rate of $12.50 a head for the first born, $2.50 a head for all later born, and no questions asked. It is to be feared that any success which the feminists may gain in securing state aid for mothers in America will secure, as in Schönberg, in England, in France, and in Australia, merely a small uniform sum. This acts dysgenically because it is a stimulus to married people to have large families in inverse proportion to their income, and is felt most by those whose purpose in having children is least approvable.

The married woman of good stock ought to bear four children. For many reasons these ought to be spaced well apart, preferably not much less than three years. She must have oversight of these children until they all reach adolescence. This means a period of about $12+13=25$ years during which her primary, though by no means her only, concern will be mothercraft. It is hardly possible and certainly not desirable that she should support herself outside of the home during this period. As state support would pretty certainly be indiscriminate and dangerously dysgenic, it therefore appears that the present custom of having the father responsible for the support of the family is not only unavoidable but desirable. If so, it is desirable to avoid reducing the wages of married men too much by the competition of single women.

To attain this end, without working any injustice to women, it seems wise to modify their education in general in such a way as to prepare women for the kinds of work best adapted to her capacities and needs. Women were long excluded from a higher education, and when they secured it, they not unnaturally wanted the kind of education men were receiving,—partly in order to demonstrate that they were not intellectually inferior to men. Since this demonstration is now complete, the continu-

ation of duplicate curricula is uncalled for. The coeducational colleges of the west are already turning away from the old single curriculum and are providing for the election of more differentiated courses for women. The separate women's colleges of the east will doubtless do so eventually, since their own graduates and students are increasingly discontented with the present narrow and obsolete ideals. If the higher education of women, and much of the elementary education, is directed toward differentiating them from men and giving them distinct occupations (including primarily marriage and motherhood) instead of training them so the only thing they are capable of doing is to compete with men for men's jobs, the demand of "equal pay for equal work" will be less difficult to reconcile with the interests of the race. In this direction the feminists might find a large and profitable field for the employment of their energies.

There is good ground for the feminist contention that women should be liberally educated, that they should not be regarded by men as inferior creatures, that they should have the opportunity of self-expression in a richer, freer life than they have had in the past. All these gains can be made without sacrificing any racial interests; and they must be so made. The unrest of intelligent women is not to be lessened or removed by educating them in the belief that they are not different from men and setting them to work as men in the work of the world. Except where the work is peculiarly adapted to women or there is a special individual aptitude, such work will, for the reasons we have set forth, operate dysgenically and therefore bring about the decadence of the race which practices it.

The true solution is rather to be sought in recognizing the natural differentiation of the two sexes and in emphasizing this differentiation by education. Boys will be taught the nobility of being productive and of establishing families; girls will have similar ideals held up to them but will be taught to reach them in a different way, through cultivation of the intellectual and emotional characters most useful to that division of labor for which they are supremely adapted, as well as those that are

common to both sexes. The home must not be made a subordinate interest, as some feminists desire, but it must be made a much richer, deeper, more satisfying interest than it is too frequently at present.

OLD AGE PENSIONS

Pensions for aged people form an important part of the modern program of social legislation. What their merits may be in relieving poverty will not be discussed here. But beyond the direct effect, it is important to inquire what indirect eugenic effect they would have, as compared with the present system where the aged are most frequently supported by their own children when they have failed through lack of thrift or for other reasons to make provision for their old age.

The ordinary man, dependent on his daily work for a livelihood, can not easily support his parents and his offspring at the same time. Aid given to the one must be in some degree at the expense of the other. The eugenic consequences will depend on what class of man is required to contribute thus to parental support.

It is at once obvious that superior families will rarely encounter this problem. The parents will, by their superior earning capacity and the exercise of thrift and foresight, have provided for the wants of their old age. A superior man will therefore seldom be under economic pressure to limit the number of his own children because of the necessity of supporting his parents. In inferior families, on the other hand, the parents will have made no adequate provision for their old age. A son will have to assume their support, and thus reduce the number of his own children,—a eugenic result. With old age pensions from the state, the economic pressure would be taken off these inferior families and the children would thus be encouraged to marry earlier and have more children,—a dysgenic result.

From this point of view, the most eugenic course would perhaps be to make the support of parents by children compulsory, in cases where any support was needed. Such a step would

not handicap superior families, but would hold back the inferior. A contributory system of old age pensions, for which the money was provided out of the individual's earnings, and laid aside for his old age, would also be satisfactory. A system which led to the payment of old age pensions by the state would be harmful.

The latter system would be evil in still another way because, as is the case with most social legislation of this type, the funds for carrying out such a scheme must naturally be furnished by the efficient members of the community. This adds to their financial burdens and encourages the young men to postpone marriage longer and to have fewer children when they do marry, —a dysgenic result.

It appears, therefore, that old age pensions paid by the state would be dysgenic in a number of ways, encouraging the increase of the inferior part of the population at the expense of the superior. If old age pensions are necessary, they should be contributory.

THE SEX HYGIENE MOVEMENT

Sexual morality is thought by some to be substantially synonymous with eugenics or to be included by it. One of the authors has protested previously [1] against this confusion of the meaning of the word "eugenics." The fallacy of believing that a campaign against sexual immorality is a campaign for eugenics will be apparent if the proposition is analyzed.

First, does sexual immorality increase or decrease the marriage rate of the offenders? We conclude that it reduces the marriage rate. Although it is true that some individuals might by sexual experience become so awakened as to be less satisfied with a continent life, and might thus in some cases be led to marriage, yet this is more than counterbalanced by the following considerations:

1. The mere consciousness of loss of virginity has led in some sensitive persons, especially women, to an unwillingness to

[1] *American Journal of Sociology*, Vol. XX, No. 1, pp. 96–103, July, 1914.

marry from a sense of unworthiness. This is not common, yet such cases are known.

2. The loss of reputation has prevented the marriage of the desired mates. This is not at all uncommon.

3. Venereal infection has led to the abandonment of marriage. This is especially common.

4. Illicit experiences may have been so disillusioning, owing to the disaffecting nature of the consorts, that an attitude of pessimism and misanthropy or misogyny is built up. Such an attitude prevents marriage not only directly, but also indirectly, since persons with such an outlook are thereby less attractive to the opposite sex.

5. A taste for sexual variety is built up so that the individual is unwilling to commit himself to a monogamous union.

6. Occasionally, threat of blackmail by a jilted paramour prevents marriage by the inability to escape these importunities.

We consider next the relative birth-rate of the married and the incontinent unmarried. There can not be the slightest doubt that this is vastly greater in the case of the married. The unmarried have not only all the incentives of the married to keep down their birth-rate but also the obvious and powerful incentive of concealment as well.

Passing to the relative death-rate of the illegitimate and legitimate progeny, the actual data invariably indicate a decided advantage of the legitimately born. The reasons are too obvious to be retailed.

Now, then, knowing that the racial contribution of the sexually moral is greater than that of the sexually immoral, we may compare the quality of the sexually moral and immoral, to get the evolutionary effect.

For this purpose a distinction must be made between the individual who has been chaste till the normal time of marriage and whose sexual life is truly monogamous, and that abnormal group who remain chaste and celibate to an advanced age. These last are not moral in the last analysis, if they have valuable and needed traits and are fertile, because in the long run their failure to reproduce affects adversely the welfare of

their group. While the race suffers through the failure of many of these individuals to contribute progeny, probably this does not happen, so far as males are concerned, as much as might be supposed, for such individuals are often innately defective in their instincts or, in the case of disappointed lovers, have a badly proportioned emotional equipment, since it leads them into a position so obviously opposed to race interests.

But, to pass to the essential comparison, that between the sexually immoral and the sexually moral as limited above, it is necessary first of all to decide whether monogamy is a desirable and presumably permanent feature of human society.

We conclude that it is:

1. Because it is spreading at the expense of polygamy even where not favored by legal interference. The change is most evident in China.

2. In monogamy, sexual selection puts a premium on valuable traits of character, rather than on mere personal beauty or ability to acquire wealth; and

3. The greatest amount of happiness is produced by a monogamous system, since in a polygamous society so many men must remain unmarried and so many women are dissatisfied with having to share their mates with others.

Assuming this, then adaptation to the condition of monogamous society represents race progress. Such a race profits if those who do not comply with its conditions make a deficient racial contribution. It follows then that sexual immorality is eugenic in its result for the species and that if all sexual immorality should cease, an important means of race progress might be lost. An illustration is the case of the Negro in America, whose failure to increase more rapidly in number is largely attributable to the widespread sterility resulting from venereal infection.[1] Should venereal diseases be eliminated,

[1] According to Captain (now Lt. Col.) E. B. Vedder of the Medical Corps, U. S. A., 50% of the Negroes of the class applying for enlistment in the army are syphilitic. He believes that the amount of infection among Negro women is about the same. (*Therapeutic Gazette*, May 15, 1916.) Venereal disease must, then, play a much more important part than is generally supposed, in cutting down the birth-rate of the Negro race, but it would of course be a mistake to suppose that an abnormally

that race might be expected to increase in numbers very much faster than the whites.

It may be felt by some that this position would have an immoral effect upon youth if widely accepted. This need not be feared. On the contrary, we believe that one of the most powerful factors in ethical culture is pride due to the consciousness of being one who is fit and worthy.

The traditional view of sexual morality has been to ignore the selectional aspect here discussed and to stress the alleged deterioration of the germ-plasm by the direct action of the toxins of syphilis. The evidence relied upon to demonstrate this action seems to be vitiated by the possibility that there was, instead, a transmitted infection of the progeny. This "racial poison" action, since it is so highly improbable from analogy, can not be credited until it has been demonstrated in cases where the parents have been indubitably cured.

Is it necessary, then, to retain sexual immorality in order to achieve race progress? No, because it is only one of many factors contributing to race progress. Society can mitigate this as well as alcoholism, disease, infant mortality—all powerful selective factors—without harm, provided increased efficiency of other selective factors is ensured, such as the segregation of defectives, more effective sexual selection, a better correlation of income and ability, and a more eugenic distribution of family limitation.

TRADES UNIONISM

A dysgenic feature often found in trades unionism will easily be understood after our discussion of the minimum wage. The

low birth-rate among Negroes is always to be explained on this ground. Professor Kelly Miller points out (*Scientific Monthly*, June, 1917) that the the birth-rate among college professors at Howard University, the leading Negro institution for higher education, is only 0.7 of a child and that the completed families will hardly have more than two children. He attributes this to (1) the long period of education required of Negro "intellectuals", (2) the high standard of living required of them, and (3) the unwillingness of some of them to bring children into the world, because of the feeling that these children would suffer from race prejudice.

union tends to standardize wages; it tends to fix a wage in a given industry, and demand that nearly all workers in that classification be paid that wage. It cannot be denied that some of these workers are much more capable than others. Artificial interference with a more exact adjustment of wages to ability therefore penalizes the better workmen and subsidizes the worse ones. Economic pressure is thereby put on the better men to have fewer children, and with the worse men encourages more children, than would be the case if their incomes more nearly represented their real worth. Payment according to the product, with prizes and bonuses so much opposed by the unions, is more in accord with the principles of eugenics.

PROHIBITION

It was shown in Chapter II that the attempt to ban alcoholic beverages on the ground of direct dysgenic effect is based on dubious evidence. But the prohibition of the use of liquors, at least those containing more than 5% alcohol, can be defended on indirect eugenic grounds, as well as on the familiar grounds of pathology and economics which are commonly cited.

1. Unless it is present to such a degree as to constitute a neurotic taint, the desire to be stimulated is not of itself necessarily a bad thing. This will be particularly clear if the distribution of the responsiveness to alcoholic stimulus is recalled. Some really valuable strains, marked by this susceptibility, may be eliminated through the death of some individuals from debauchery and the penalization of others in preferential mating; this would be avoided if narcotics were not available.

2. In selection for eugenic improvement, it is desirable not to have to select for too many traits at once. If alcoholism could, through prohibition, be eliminated from consideration, it would just so far simplify the problem of eugenics.

3. Drunkenness interferes with the effectiveness of means for family limitation, so that if his alcoholism is not extreme, the drunkard's family is sometimes larger than it would otherwise be.

On the other hand, prohibition is dysgenic and intemperance is eugenic in their effect on the species in so far as alcoholism is correlated with other undesirable characters and brings about the elimination of undesirable strains. But its action is not sufficiently discriminating nor decisive; and if the strains have many serious defects, they can probably be dealt with better in some other, more direct way.

We conclude, then, that, on the whole, prohibition is desirable for eugenic as well as for other reasons.

PEDAGOGICAL CELIBACY

Whether women are more efficient teachers than men, and whether single women are more efficient teachers than married women, are disputed questions which it is not proposed here to consider. Accepting the present fact, that most of the school teachers in the United States are unmarried women, it is proper to examine the eugenic consequences of this condition.

The withdrawal of this large body of women from the career of motherhood into a celibate career may be desirable if these women are below the average of the rest of the women of the population in eugenic quality. But it would hardly be possible to find enough eugenic inferiors to fill the ranks of teachers, without getting those who are inferior in actual ability, in patent as well as latent traits. And the idea of placing education in the hands of such inferior persons is not to be considered.

It is, therefore, inevitable that the teachers are, on the whole, superior persons eugenically. Their celibacy must be considered highly detrimental to racial welfare.

But, it may be said, there is a considerable number of women so deficient in sex feeling or emotional equipment that they are certain never to marry; they are, nevertheless, persons of intellectual ability. Let them be the school teachers. This solution is, however, not acceptable. Many women of the character described undoubtedly exist, but they are better placed in some other occupation. It is wholly undesirable that

children should be reared under a neuter influence, which is probably too common already in education.

If women are to teach, then, it must be concluded that on eugenic grounds preference should be given to married rather than single teachers, and that the single ones should be encouraged to marry. This requires (1) that considerable change be made in the education of young women, so that they shall be fitted for motherhood rather than exclusively for school teaching as is often the case, and (2) that social devices be brought into play to aid them in mating—since undoubtedly a proportion of school teachers are single from the segregating character of their profession, not from choice, and (3) provision for employing some women on half-time and (4) increase of the number of male teachers in high schools.

It is, perhaps, unnecessary to mention a fifth change necessary: that school boards must be brought to see the undesirability of employing only unmarried women, and of discharging them, no matter how efficient, if they marry or have children. The courts must be enabled to uphold woman's right of marriage and motherhood, instead of, as in some cases at present, upholding school boards in their denial of this right. Contracts which prevent women teachers from marrying or discontinuing their work for marriage should be illegal, and talk about the "moral obligation" of normal school graduates to teach should be discountenanced.

Against the proposal to employ married school teachers, two objections are urged. It is said (1) that for most women school teaching is merely a temporary occupation, which they take up to pass the few years until they shall have married. To this it may be replied that the hope of marriage too often proves illusory to the young woman who enters on the pedagogical career, because of the lack of opportunities to meet men, and because the nature of her work is not such as to increase her attractiveness to men, nor her fitness for home-making. Pedagogy is too often a sterilizing institution, which takes young women who desire to marry and impairs their chance of marriage.

Again it will be said (2) that married teachers would lose too

much time from their work; that their primary interests would be in their own homes instead of in the school; that they could not teach school without neglecting their own children. These objections fall in the realm of education, not eugenics, and it can only be said here that the reasons must be extraordinarily cogent, which will justify the enforcement of celibacy on so large a body of superior young women as is now engaged in school teaching.

The magnitude of the problem is not always realized. In 1914 the Commissioner of education reported that there were, in the United States, 169,929 men and 537,123 women engaged in teaching. Not less than half a million women, therefore, are potentially affected by the institution of pedagogical celibacy.

CHAPTER XIX

RELIGION AND EUGENICS

Man is the only animal with a religion. The conduct of the lower animals is guided by instinct,[1] and instinct normally works for the benefit of the species. Any action which is dictated by instinct is likely to result in the preservation of the species, even at the expense of the individual which acts, provided there has not been a recent change in the environment.

But in the human species reason appears, and conduct is no longer governed by instinct alone. A young man is impelled by instinct, for instance, to marry. It is to the interests of the species that he marry, and instinct therefore causes him to desire to marry and to act as he desires. A lower animal would obey the impulse of instinct without a moment's hesitation. Not so the man. Reason intervenes and asks, "Is this really the best thing for you to do now? Would you not better wait awhile and get a start in your business? Of course marriage would be agreeable, but you must not be shortsighted. You don't want to assume a handicap just now." There is a corresponding reaction among the married in respect to bearing additional children. The interests of self are immediate and easily seen, the interests of the species are not so pressing. In any such conflict between instinct and reason, one must win; and if reason wins it is in some cases for the immediate benefit of the individual but at the expense of the species' interests.

Now with reason dominant over instinct in man, there is a grave danger that with each man consulting his own interests instead of those of the species, some groups and even races

[1] One can not draw a hard and fast distinction between reason and instinct in this way, nor deny to animals all ability to reason. We have simplified the case to make it more graphic. The fact that higher animals may have mental processes corresponding to some of those we call reason in man does not impair the validity of our generalization, for the present purpose.

will become exterminated. Along with reason, therefore, it is necessary that some other forces shall appear to control reason and give the interests of the species a chance to be heard along with the interests of the individual.

One such force is religion. Without insisting that this is the only view which may be taken of the origin of religion, or that this is the only function of religion, we may yet assert that one of the useful purposes served by religion is to cause men to adopt lines of conduct that will be for the good of the race, although it may sacrifice the immediate good of the individual.[1] Thus if a young Mohammedan be put in the situation just described, he may decide that it is to his material interest to postpone marriage. His religion then obtrudes itself, with quotations from the Prophet to the effect that Hell is peopled with bachelors. The young man is thereupon moved to marry, even if it does cause some inconvenience to his business plans. Religion, reinforcing instinct, has triumphed over reason and gained a victory for the larger interests of the species, when they conflict with the immediate interests of the individual.

From this point of view we may, paraphrasing Matthew Arnold, define religion as *motivated ethics*. Ethics is a knowledge of right conduct, religion is an agency to produce right conduct. And its working is more like that of instinct than it is like that of reason. The irreligious man, testing a proposition by reason alone, may decide that it is to the interests of all concerned that he should not utter blasphemy. The orthodox Christian never considers the pros and cons of the question; he has the Ten Commandments and the teachings of his youth in his mind, and he refrains from blasphemy in almost the instinctive way that he refrains from putting his hand on a hot stove.

This chapter proposes primarily to consider how eugenics can be linked with religion, and specifically the Christian religion; but the problem is not a simple one, because Christianity is made of diverse elements. Not only has it undergone some change during the last 1900 years, but it was founded upon Judaism,

[1] See *Jewish Eugenics and Other Essays*. By Rabbi Max Reichler, New York, Bloch Publishing Co., 1916.

which itself involved diverse elements. We shall undertake to show that eugenics fits in well with Christianity; but it must fit in with different elements in different ways.

We can distinguish four phases of religion:

1. Charm and taboo, or reward and punishment in the present life. The believer in these processes thinks that certain acts possess particular efficacies beyond those evident to his observation and reason; and that peculiar malignities are to be expected as the consequence of certain other acts. Perhaps no one in the memory of the tribe has ever tested one of these acts to find whether the expected result would appear; it is held as a matter of religious belief that the result would appear, and the act is therefore avoided.

2. Reward and punishment in a future life after death. Whereas the first system was supposed to bring immediate reward and punishment as the result of certain acts, this second system postpones the result to an after-life. There is in nature a system of reward and punishment which everyone must have observed because it is part of the universal sequence of cause and effect; but these two phases of religion carry the idea still farther; they postulate rewards and punishments of a supernatural character, over and above those which naturally occur. It is important to note that in neither of these systems is God essentially involved. They are in reality independent of the idea of God, since that is called "luck" in some cases which in others is called the favor or wrath of God. And again in some cases, one may be damned by a human curse, although in others this curse of damnation is reserved for divine power.

3. Theistic religion. In essence this consists of the satisfaction derived from doing that which pleases God, or "getting into harmony with the underlying plan of the universe," as some put it. It is idealistic and somewhat mystic. It should be distinguished from the idea of doing or believing certain things to insure salvation, which is not essentially theistic but belongs under (2). The true theist desires to conform to the will of God, wholly apart from whether he will be rewarded or punished for so doing.

4. Humanistic religion. This is a willingness to make the end of ethics the totality of happiness of all men, or some large group of men, rather than to judge conduct solely by its effects on some one individual. At its highest, it is a sort of loyalty to the species.

It must be noted that most cults include more than one of these elements—usually all of them at various stages. As a race rises in intelligence, it tends to progress from the first two toward the last two, but usually keeping parts of the earlier attitude, more or less clearly expressed. And individual adherents of a religion usually have different ideas of its scope; thus the religious ideas of many Christians embrace all four of the above elements; others who equally consider themselves Christians may be influenced by little more than (4) alone, or (3) alone, or even (2) alone.

There is no reason to believe that any one of these types of religion is the only one adapted to promoting sound ethics in all individuals, nor that a similar culture can bring about uniformity in the near future, since the religion of a race corresponds to some extent to the inherent nature of the mind of its individuals. Up to a certain point, each type of religion has a distinct appeal to a certain temperament or type of mind. With increasing intelligence, it is probable that a religion tends to emphasize the interests of all rather than the benefits to be derived by one; such has been clearly the case in the history of the Christian religion. The diverse elements of retribution, damnation, "communion with God" and social service still exist, but in America the last-named one is yearly being more emphasized. Emphasis upon it is the marked characteristic of Jesus' teaching.

With this rough sketch of religious ideas in mind, the part religion can play at the present day in advancing the eugenic interests of the race or species may be considered. Each religion can serve eugenics just as well as it can serve any other field of ethics, and by the very same devices. We shall run over our four types again and note what appeals eugenics can make to each one.

1. Reward and punishment in this life. Here the value of

children, emotionally and economically, to their parents in their later life can be shown, and the dissatisfaction that is felt by the childless. The emotions may be reached (as they have been reached in past centuries) by the painting of Madonnas, the singing of lullabies, by the care of the baby sister, by the laurel wreath of the victorious son, by the great choruses of white-robed girls, by the happiness of the bride, and by the sentiment of the home. Here are some of the noblest subjects for the arts, which in the past have unconsciously served eugenics well. In a less emotional way, a deep desire for that "terrestrial immortality" involved in posterity should be fostered. The doctrine of the continuity of germ-plasm might play a large part in religion. It should at least be brought home to everyone at some point in his education. Man should have a much stronger feeling of identity with his forebears and his progeny. Is it not a loss to Christians that they have so much less of this feeling than the Chinese?

It may be urged in opposition that such conceptions are dangerously static and have thereby harmed China. But that can be avoided by shifting the balance a little from progenitors to posterity. If people should live more in their children than they now do, they would be not only anxious to give them a sound heredity, but all the more eager to improve the conditions of their children's environment by modifying their own.

It may be objected that this sort of propaganda is indiscriminate,—that it may further the reproduction of the inferior just as much as the superior. We think not. Such steps appeal more to the superior type of mind and will be little heeded by the inferior. They will be ultimately, if not directly, discriminative.

In so far as the foregoing appeals to reason alone it is not religion. The appeal to reason must either be emotionalized or colored with the supernatural to be religion.

2. Reward and punishment in a future life. Here the belief in the absolute, verbal inspiration of sacred writings and the doctrine of salvation by faith alone are rapidly passing, and it is therefore the easier to bring eugenics into this type of religion. Even where salvation by faith is still held as an article of creed,

it is accompanied by the concession that he who truly believes will manifest his belief by works. Altruism can be found in the sacred writings of probably all religions, and the modern tendency is to make much of such passages, in which it is easy for the eugenist to find a warrant. What is needed here, then, is to impress upon the leaders in this field that eugenic conduct is a "good work" and as such they may properly include it along with other modern virtues, such as honest voting and abstinence from graft as a key to heaven. Dysgenic conduct should equally be taught to be an obstacle to salvation.

3. Theism. The man who is most influenced by the desire to be at one with God naturally wants to act in accordance with God's plan. But God being omnibeneficent, he necessarily believes that God's plan is that which is for the best interests of His children—unless he is one of those happily rare individuals who still believe that the end of man is to glorify God by voice, not by means of human betterment.

This type of religion (and the other types in different degrees) is a great motive power. It both creates energy in its adherents, and directs that energy into definite outlets. It need only be made convincingly evident that eugenics is truly a work of human betterment,—really the greatest work of human betterment, and a partnership with God—to have it taken up by this type of religion with all the enthusiasm which it brings to its work.

4. The task of enlisting the humanist appears to be even simpler. It is merely necessary to show him that eugenics increases the totality of happiness of the human species. Since the keynote of his devotion is loyalty, we might make this plea: "Can we not make every superior man or woman ashamed to accept existence as a gift from his or her ancestors, only to extinguish this torch instead of handing it on?"

Eugenics is in some ways akin to the movement for the conservation of natural resources. In pioneer days a race uses up its resources without hesitation. They seem inexhaustible. Some day it is recognized that they are not inexhaustible, and then such members of the race as are guided by good ethics begin to consider the interests of the future.

No system of ethics is worth the name which does not make provision for the future. It is right here that the ethics of present-day America is too often found wanting. As this fault is corrected, eugenics will be more clearly seen as an integral part of ethics.

Provision for the future of the individual leads, in a very low state of civilization, to the accumulation of wealth. Even the ants and squirrels have so much ethics! Higher in the evolutionary scale comes provision for the future of children; their interests lead to the foundation of the family and, at a much later date, a man looks not only to his immediate children but to future generations of heirs, when he entails his estates and tries to establish a notable family line. Provision for the future is the essence of his actions. But so far only the individual or those related closely to him have been taken into consideration. With a growth of altruism, man begins to recognize that he must make provision for the future of the race; that he should apply to all superior families the same anxiety which he feels that his children shall not tarnish the family name by foolish marriages; that they shall grow up strong and intelligent. This feeling interpreted by science is eugenics, an important element of which is religion: for religion more than any other influence leads one to look ahead, and to realize that immediate benefits are not the greatest values that man can secure in life,—that there is something beyond and superior to eating, drinking and being merry.

If the criterion of ethical action is the provision it makes for the future, then the ethics of the eugenist must rank high, for he not only looks far to the future, but takes direct and effective steps to safeguard the future.

Theoretically, then, there is a place for eugenics in every type of religion. In practice, it will probably make an impression only on the dynamic religions,—those that are actually accomplishing something. Buddhism, for example, is perhaps too contemplative to do anything. But Christianity, above any other, would seem to be the natural ally of the eugenist. Christianity itself is undergoing a rapid change in ideals at present,

and it seems impossible that this evolution should leave its adherents as ignorant of and indifferent to eugenics as they have been in the past—even during the last generation.

Followers of other religions, as this chapter has attempted to show, can also make eugenics a part of their respective religions. If they do not, then it bodes ill for the future of their religion and of their race.

It is not difficult to get people to see the value of eugenics,—to give an intellectual adhesion to it. But as eugenics sometimes calls for seeming sacrifices, it is much more difficult to get people to *act* eugenically. We have at numerous points in this book emphasized the necessity of making the eugenic appeal emotional, though it is based fundamentally on sound reasoning from facts of biology.

The great value of religion in this connection is that it provides a driving power,[1] a source of action, which the intellect alone can rarely furnish. Reason itself is usually an inhibitor of action. It is the emotions that impel one to do things. The utilization of the emotions in affecting conduct is by no means always a part of religion, yet it is the essence of religion. Without abandoning the appeal to reason, eugenists must make every effort to enlist potent emotional forces on their side. There is none so strong and available as religion, and the eugenist may turn to it with confidence of finding an effective ally, if he can once gain its sanction.

The task, as this chapter was intended to show, is a complex one, yet we see no insuperable obstacles to it. Eugenics may not become a part of the Christian religion, as a whole, until scientific education is much more widespread than at present, but it is not too soon to make a start, by identifying the interests of the two wherever such identification is justified and profitable.

We have endeavored to point out that as a race rises, and instinct becomes less important in guiding the conduct of its members, religion has often put a restraint on reason, guiding

[1] Dublin, Louis I., "Significance of the Declining Birth Rate," *Congressional Record*, Jan. 11, 1918.

the individual in racially profitable paths. What is to happen when religion gives way? Unbridled selfishness too often takes the reins, and the interests of the species are disregarded. Religion, therefore, appears to be a necessity for the perpetuation of any race. It is essential to racial welfare that the national religion should be of such a character as to appeal to the emotions effectively and yet conciliate the reason. We believe that the religion of the future is likely to acquire this character, in proportion as it adheres to eugenics. There is no room in the civilized world now for a dysgenic religion. Science will progress. The idea of evolution will be more firmly grasped. Religion itself evolves, and any religion which does not embrace eugenics will embrace death.

CHAPTER XX

EUGENICS AND EUTHENICS

Emphasis has been given, in several of the foregoing chapters, to the desirability of inheriting a good constitution and a high degree of vigor and disease-resistance. It has been asserted that no measures of hygiene and sanitation can take the place of such inheritance. It is now desirable to ascertain the limits within which good inheritance is effective, and this may be conveniently done by a study of the lives of a group of people who inherited exceptionally strong physical constitutions.

The people referred to are taken from a collection of histories of long life made by the Genealogical Record Office of Washington.[1] One hundred individuals were picked out at random, each of whom had died at the age of 90 or more, and with the record of each individual were placed those of all his brothers and sisters. Any family was rejected in which there was a record of wholly accidental death (e. g., families of which a member had been killed in the Civil War). The 100 families, or more correctly fraternities or sibships, were classified by the number of children per fraternity, as follows:

[1] At the request of Alexander Graham Bell, founder and director of the Genealogical Record Office, Paul Popenoe made an examination and report on these records in the fall of 1916. Thanks are due to Dr. Bell for permitting the use in this chapter of two portions of the investigation.

Number of fraternities	*Number of children per fraternity*	*Total number of children in group*
1	2	2
11	3	33
8	4	32
17	5	85
13	6	78
14	7	98
9	8	72
11	9	99
10	10	100
3	11	33
2	12	24
1	13	13
100		669

The average at death of these 669 persons was 64.7 years. The child mortality (first 4 years of life) was 7.5% of the total mortality, 69 families showing no deaths of that kind. The group is as a whole, therefore, long-lived.

The problem was to measure the resemblance between brothers and sisters in respect of longevity,—to find whether knowledge of the age at which one died would justify a prediction as to the age at death of the others,—or technically, it was to measure the fraternal correlation of longevity. A zero coefficient here would show that there is no association; that from the age at which one dies, nothing whatever can be predicted as to the age at which the others will die. Since it is known that heredity is a large factor in longevity, such a finding would mean that all deaths were due to some accident which made the inheritance of no account.

In an ordinary population it has been found that the age at death of brothers and sisters furnishes a coefficient of correlation of the order of .3, which shows that heredity does de-

termine the age at which one shall die to considerable extent, but not absolutely.[1]

The index of correlation [2] between the lengths of life within the fraternity in these 100 selected families, furnished a coefficient of $-.0163 \pm .0672$, practically zero. In other words, if the age is known at which a member of one of these families died, whether it be one month or 100 years, nothing whatever can be predicted about the age at which his brothers and sisters died.

Remembering that longevity is in general inherited, and that it is found in the families of all the people of this study (since one in each fraternity lived to be 90 or over) how is one to interpret this zero coefficient? Evidently it means that although these people had inherited a high degree of longevity, their deaths were brought about by causes which prevented the heredity from getting full expression. As far as hereditary potentialities are concerned, it can be said that all their deaths were due to accident, using that word in a broad sense to include all non-selective deaths by disease. If they had all been able to get the full benefit of their heredity, it would appear that each of these persons might have lived to 90 or more, as

[1] Beeton, Mary, and Karl Pearson, *Biometrika* I, p. 60. The actual correlation varies with the age and sex: the following are the results:

COLLATERAL INHERITANCE

Elder adult brother and younger adult brother	$.2290 \pm .0194$
Adult brother and adult brother	$.2853 \pm .0196$
Minor brother and minor brother	$.1026 \pm .0294$
Adult brother and minor brother	$-.0262 \pm .0246$
Elder adult sister and younger adult sister	$.3464 \pm .0183$
Adult sister and adult sister	$.3322 \pm .0185$
Minor sister and minor sister	$.1748 \pm .0307$
Adult sister and minor sister	$-.0260 \pm .0291$
Adult brother and adult sister	$.2319 \pm .0145$
Minor brother and minor sister	$.1435 \pm .0251$
Adult brother and minor sister	$-.0062 \pm .0349$
Adult sister and minor brother	$-.0274 \pm .0238$

[2] The method used is the ingenious one devised by J. Arthur Harris (*Biometrika* IX, p. 461). The probable error is based on $n = 100$.

did the one in each family who was recorded by the Genealogical Record Office. Genetically, these other deaths may be spoken of as premature.

In an ordinary population, the age of death is determined to the extent of probably 50% by heredity. In this selected long-lived population, heredity appears not to be responsible in any measurable degree whatsoever for the differences in age at death.

The result may be expressed in another, and perhaps more striking, way. Of the 669 individuals studied, a hundred—namely, one child in each family—lived beyond 90; and there were a few others who did. But some 550 of the group, though they had inherited the potentiality of reaching the average age of 90, actually died somewhere around 60; they failed by at least one-third to live up to the promise of their inheritance. If we were to generalize from this single case, we would have to say that five-sixths of the population does not make the most of its physical inheritance.

This is certainly a fact that discourages fatalistic optimism. The man who tells himself that, because of his magnificent inherited constitution, he can safely take any risk, is pretty sure to take too many risks and meet with a non-selective—i. e., genetically, a premature—death, when he might in the nature of things have lived almost a generation longer.

It should be remarked that most of the members of this group seem to have lived in a hard environment. They appear to belong predominantly to the lower strata of society; many of them are immigrants and only a very few of them, to judge by a cursory inspection of the records, possessed more than moderate means. This necessitated a frugal and industrious life which in many ways was doubtless favorable to longevity but which may often have led to overexposure, overwork, lack of proper medical treatment, or other causes of a non-selective death. We would not push the conclusion too far, but we can not doubt that this investigation shows the folly of ignoring the environment,—shows that the best inherited constitution must have a fair chance. And what has here been found for a physical character, would probably hold good in even greater degree

for a mental character. All that man inherits is the capacity to develop along a certain line under the influence of proper stimuli,—food and exercise. The object of eugenics is to see that the inherent capacity is there. Given that, the educational system is next needed to furnish the stimuli. The consistent eugenist is therefore an ardent euthenist. He not only works for a better human stock but, because he does not want to see his efforts wasted, he always works to provide the best possible environment for this better stock.

In so far, then, as euthenics is actually providing man with more favorable surroundings,—not with ostensibly more favorable surroundings which, in reality, are unfavorable—there can be no antagonism between it and eugenics. Eugenics is, in fact, a prerequisite of euthenics, for it is only the capable and altruistic man who can contribute to social progress; and such a man can only be produced through eugenics.

Eugenic fatalism, a blind faith in the omnipotence of heredity regardless of the surroundings in which it is placed, has been shown by the study of long-lived families to be unjustified. It was found that even those who inherited exceptional longevity usually did not live as long as their inheritance gave them the right to expect. If they had had more euthenics, they should have lived longer.

But this illustration certainly gives no ground for a belief that euthenics is sufficient to prolong one's life *beyond* the inherited limit. A study of these long-lived families from another point of view will reveal that heredity is the primary factor and that good environment, euthenics, is the secondary one.

For this purpose we augment the 100 families of the preceding section by the addition of 240 more families like them, and we examine each family history to find how many of the children died before completing the fourth year of life. The data are summarized in the following table:

CHILD MORTALITY IN FAMILIES OF LONG-LIVED STOCK, GENEALOGICAL RECORD OFFICE DATA

Size of family	*No. of families investigated*	*No. of families showing deaths under 5 years*	*Total no. of deaths*
1 child	6	0	0
2 children	6	0	0
3 "	38	4	5
4 "	40	6	7
5 "	38	4	4
6 "	44	12	13
7 "	34	8	11
8 "	46	13	18
9 "	31	14	20
10 "	27	14	14
11 "	13	6	9
12 "	13	9	16
13 "	1	0	0
14 "	2	0	0
17 "	1	1	2
	340	91	119

The addition of the new families (which were not subjected to any different selection than the first 100) has brought down the child mortality rate. For the first 100, it was found to be 7.5%. If in the above table the number of child deaths, 119, be divided by the total number of children represented, 2,259, the child mortality rate for this population is found to be 5.27%, or 53 per thousand.

The smallness of this figure may be seen by comparison with the statistics of the registration area, U. S. Census of 1880, when the child mortality (0–4 years) was 400 per thousand, as calculated by Alexander Graham Bell. A mortality of 53 for the first four years of life is smaller than any district known in the United States, even to-day, can show for the *first* year of life *alone*. If any city could bring the deaths of babies during their first twelve months down to 53 per 1,000, it would think it had achieved the impossible; but here is a population in which 53 per 1,000 covers the deaths, not only of the fatal first 12 months, but of the following three years in addition.

Now this population with an unprecedentedly low rate of child mortality is not one which had had the benefit of any Baby Saving Campaign, nor even the knowledge of modern science. Its mothers were mostly poor, many of them ignorant; they lived frequently under conditions of hardship; they were peasants and pioneers. Their babies grew up without doctors, without pasteurized milk, without ice, without many sanitary precautions, usually on rough food. But they had one advantage which no amount of applied science can give after birth—namely, good heredity. They had inherited exceptionally good constitutions.

It is not by accident that inherited longevity in a family is associated with low mortality of its children. The connection between the two facts was first discovered by Mary Beeton and Karl Pearson in their pioneer work on the inheritance of duration of life. They found that high infant mortality was associated with early death of parents, while the offspring of long-lived parents showed few deaths in childhood. The correlation of the two facts was quite regular, as will be evident from a glance at the following tables prepared by A. Plœtz:

LENGTH OF LIFE OF MOTHERS AND CHILD-MORTALITY OF THEIR DAUGHTERS. ENGLISH QUAKER FAMILIES, DATA OF BEETON AND PEARSON, ARRANGED BY PLŒTZ

	Year of life in which mothers died					*At all ages*
	o 38	39–53	54–68	69–83	84 *up*	
No. of daughters	234	304	395	666	247	1846
No. of them who died in first 5 years	122	114	118	131	26	511
Per cent. of daughters who died	52.1	37.5	29.9	19.7	10.5	27.7

LENGTH OF LIFE OF FATHERS AND CHILD MORTALITY OF THEIR DAUGHTERS

	Year of life in which fathers died					*At all ages*
	to 38	39–53	54–68	69–83	84 *up*	
No. of daughters	105	284	585	797	236	2009
No. of them who died in first 5 years	51	98	156	177	40	522
Per cent. of daughters who died	48.6	34.5	26.7	22.2	17.0	26.0

To save space, we do not show the relation between parent and son; it is similar to that of parent and daughter which is shown in the preceding tables. In making comparison with the 340 families from the Genealogical Record Office, above studied, it must be noted that Dr. Plœtz' tables include one year longer in the period of child mortality, being computed for the first five years of life instead of the first four. His percentages would therefore be somewhat lower if computed on the basis used in the American work.

These various data demonstrate the existence of a considerable correlation between short life (*brachybioty*, Karl Pearson calls it) in parent and short life in offspring. Not only is the tendency to live long inherited, but the tendency *not* to live long is likewise inherited.

But perhaps the reader may think they show nothing of the sort. He may fancy that the early death of a parent left the child without sufficient care, and that neglect, poverty, or some other factor of euthenics brought about the child's death. Perhaps it lacked a mother's loving attention, or perhaps the father's death removed the wage-earner of the family and the child thenceforth lacked the necessities of life.

Dr. Plœtz has pointed out [1] that this objection is not valid, because the influence of the parent's death is seen to hold good even to the point where the child was too old to require any assistance. If the facts applied only to cases of early death, the supposed objection might be weighty, but the correlation exists from one end of the age-scale to the other. It is not credible that a child is going to be deprived of any necessary maternal care when its mother dies at the age of 69; the child herself was probably married long before the death of the mother. Nor is it credible that the death of the father takes bread from the child's mouth, leaving it to starve to death in the absence of a pension for widowed mothers, if the father died at 83, when the "child" herself was getting to be an old woman. The early death of a parent may occasionally bring about the child's

[1] A. Plœtz, "Lebensdauer der Eltern und Kindersterblichkeit," *Archiv für Rassen- und Gesellschafts-Biologie*, VI (1909), pp. 33–43.

death for a reason wholly unconnected with heredity, but the facts just pointed out show that such cases are exceptional. The steady association of the child death-rate and parent death-rate *at all ages* demonstrates that heredity is a common cause.

But the reader may suspect another fallacy. The cause of this association is really environmental, he may think, and the same poverty or squalor which causes the child to die early may cause the parent to die early. They may both be of healthy, long-lived stock, but forced to live in a pestiferous slum which cuts both of them off prematurely and thereby creates a spurious correlation in the statistics.

We can dispose of this objection most effectively by bringing in new evidence. It will probably be admitted that in the royal families of Europe, the environment is as good as knowledge and wealth can make it. No child dies for lack of plenty of food and the best medical care, even if his father or mother died young. And the members of this caste are not exposed to any such unsanitary conditions, or such economic pressure as could possibly cause both parent and child to die prematurely. If the association between longevity of parent and child mortality holds for the royal families of Europe and their princely relatives, it can hardly be regarded as anything but the effect of heredity, —of the inheritance of a certain type of constitution.

Dr. Plœtz studied the deaths of 3,210 children in European royalty, from this viewpoint. The following table shows the relation between father and child:

LENGTH OF LIFE OF FATHERS AND CHILD-MORTALITY OF THEIR CHILDREN IN ROYAL AND PRINCELY FAMILIES, PLŒTZ' DATA

	Year of life in which fathers died							*Years*	*At all ages*
	16–25	26–35	36–45	46–55	56–65	66–75	76–85	86 *up*	
No. of children.	23	90	367	545	725	983	444	33	3210
No. who died in first 5 years..	12	29	115	171	200	254	105	1	887
Per cent. who died.....	52.2	32.2	31.3	31.4	27.6	25.8	23.6	3.0	27.6

Allowing for the smallness of some of the groups, it is evident

that the amount of correlation is about the same here as among the English Quakers of the Beeton-Pearson investigation, whose mortality was shown in the two preceding tables. In the healthiest group from the royal families—the cases in which the father lived to old age—the amount of child mortality is about the same as that of the Hyde family in America, which Alexander Graham Bell has studied—namely, somewhere around 250 per 1,000. One may infer that the royal families are rather below par in soundness of constitution.[1]

All these studies agree perfectly in showing that the amount of child mortality is determined primarily by the physical constitution of the parents, as measured by their longevity. In the light of these facts, the nature of the extraordinarily low child mortality shown in the 340 families from the Genealogical Record Office, with which we began the study of this point, can hardly be misunderstood. These families have the best inherited constitution possible and the other studies cited would make us certain of finding a low child mortality among them, even if we had not directly investigated the facts.

If the interpretation which we have given is correct, the conclusion is inevitable that child mortality is primarily a problem of eugenics, and that all other factors are secondary. There is found to be no warrant for the statement so often repeated in one form or another, that "the fundamental cause of the excessive rate of infant mortality in industrial communities is poverty, inadequate incomes, and low standards of living."[2] Royalty and its princely relatives are not characterized by a low standard of living, and yet the child mortality among them is very high—somewhere around 400 per 1,000, in cases where a parent died young. If poverty is responsible in the one case, it must be in the other—which is absurd. Or else the logical absurdity is involved of inventing one cause to explain an effect to-day and a wholly different cause to explain the same effect to-

[1] Or it may be supposed that the environment is so good as to make a non-selective death less likely, and therefore such deaths as do occur must more frequently be selective.

[2] Hibbs, Henry H., Jr., *Infant Mortality: Its Relation to Social and Industrial Conditions*, New York, 1916.

morrow. This is unjustifiable in any case, and it is particularly so when the single cause that explains both cases is so evident. If weak heredity causes high mortality in the royal families, why, similarly, can not weak heredity cause high infant mortality in the industrial communities? We believe it does account for much of it, and that the inadequate income and low standard of living are largely the consequences of inferior heredity, mental as well as physical. The parents in the Genealogical Record Office files had, many of them, inadequate incomes and low standards of living under frontier conditions, but their children grew up while those of the royal families were dying in spite of every attention that wealth could command and science could furnish.

If the infant mortality problem is to be solved on the basis of knowledge and reason, it must be recognized that sanitation and hygiene can not take the place of eugenics any more than eugenics can dispense with sanitation and hygiene. It must be recognized that the death-rate in childhood is largely selective, and that the most effective way to cut it down is to endow the children with better constitutions. This can not be done solely by any euthenic campaign; it can not be done by swatting the fly, abolishing the midwife, sterilizing the milk, nor by any of the other panaceas sometimes proposed.

But, it may be objected, this discussion ignores the actual facts. Statistics show that infant mortality campaigns *have* consistently produced reductions in the death-rate. The figures for New York, which could be matched in dozens of other cities, show that the number of deaths per 1,000 births, in the first year of life, has steadily declined since a determined campaign to "Save the Babies" was started:

1902.....181
1903.....152
1904.....162
1905.....159
1906.....153
1907.....144
1908.....128
1909.....129

1910.....125
1911.....112
1912.....105
1913.....102
1914..... 95

To one who can not see beyond the immediate consequences of an action, such figures as the above indeed give quite a different idea of the effects of an infant mortality campaign, than that which we have just tried to create. And it is a great misfortune that euthenics so often fails to look beyond the immediate effect, fails to see what may happen next year, or 10 years from now, or in the next generation.

We admit that it is possible to keep a lot of children alive who would otherwise have died in the first few months of life. It is being done, as the New York figures, and pages of others that could be cited, prove. The ultimate result is twofold:

1. Some of those who are doomed by heredity to a selective death, but are kept alive through the first year, die in the second or third or fourth year. They must die sooner or later; they have not inherited sufficient resistance to survive more than a limited time. If they are by a great effort carried through the first year, it is only to die in the next. This is a statement which we have nowhere observed in the propaganda of the infant mortality movement; and it is perhaps a disconcerting one. It can only be proved by refined statistical methods, but several independent determinations by the English biometricians leave no doubt as to the fact. This work of Karl Pearson, E. C. Snow, and Ethel M. Elderton, was cited in our chapter on natural selection; the reader will recall how they showed that nature is weeding out the weaklings, and in proportion to the stringency with which she weeds them out at the start, there are fewer weaklings left to die in succeeding years.

To put the facts in the form of a truism, part of the children born in any district in a given year are doomed by heredity to an early death; and if they die in one year they will not be alive to die in the succeeding year, and vice versa. Of course there are in addition infant deaths which are not selective and which if

prevented would leave the infant with as good a chance as any to live.

In the light of these researches, we are forced to conclude that baby-saving campaigns accomplish less than is thought; that the supposed gain is to some extent temporary and illusory.

2. There is still another consequence. If the gain is by great exertions made more than temporary; if the baby who would otherwise have died in the first months is brought to adult life and reproduction, it means in many cases the dissemination of another strain of weak heredity, which natural selection would have cut off ruthlessly in the interests of race betterment. In so far, then, as the infant mortality movement is not futile it is, from a strict biological viewpoint, often detrimental to the future of the race.

Do we then discourage all attempts to save the babies? Do we leave them all to natural selection? Do we adopt the "better dead" gospel?

Unqualifiedly, no! The sacrifice of the finer human feelings, which would accompany any such course, would be a greater loss to the race than is the eugenic loss from the perpetuation of weak strains of heredity. The abolition of altruistic and humanitarian sentiment for the purpose of race betterment would ultimately defeat its own end by making race betterment impossible.

But race betterment will also be impossible unless a clear distinction is made between measures that really mean race betterment of a fundamental and permanent nature, and measures which do not.

We have chosen the Infant Mortality Movement for analysis in this chapter because it is an excellent example of the kind of social betterment which is taken for granted, by most of its proponents, to be a fundamental piece of race betterment; but which, as a fact, often means race impairment. No matter how abundant and urgent are the reasons for continuing to reduce infant mortality wherever possible, it is dangerous to close the eyes to the fact that the gain from it is of a kind that

must be paid for in other ways; that to carry on the movement without adding eugenics to it will be a short-sighted policy, which increases the present happiness of the world at the cost of diminishing the happiness of posterity through the perpetuation of inferior strains.

While some euthenic measures are eugenically evils, even if necessary ones, it must not be inferred that all euthenic measures are dysgenic. Many of them, such as the economic and social changes we have suggested in earlier chapters, are an important part of eugenics. Every euthenic measure should be scrutinized from the evolutionary standpoint; if it is eugenic as well as euthenic, it should be whole-heartedly favored; if it is dysgenic but euthenic it should be condemned or adopted, according to whether or not the gain in all ways from its operation will exceed the damage.

In general, euthenics, when not accompanied by some form of selection (i. e., eugenics) ultimately defeats its own end. If it is accompanied by rational selection, it can usually be indorsed. Eugenics, on the other hand, is likewise inadequate unless accompanied by constant improvement in the surroundings; and its advocates must demand euthenics as an accompaniment of selection, in order that the opportunity for getting a fair selection may be as free as possible. If the euthenist likewise takes pains not to ignore the existence of the racial factor, then the two schools are standing on the same ground, and it is merely a matter of taste or opportunity, whether one emphasizes one side or the other. Each of the two factions, sometimes thought to be opposing, will be seen to be getting the same end result, namely, human progress.

Not only are the two schools working for the same end, but each must depend in still another way upon the other, in order to make headway. The eugenist can not see his measures put into effect except through changes in law and custom—i. e., euthenic changes. He must and does appeal to euthenics to secure action. The social reformer, on the other hand, can not see any improvements made in civilization except through the discoveries and inventions of some citizens who are inherently

superior in ability. He in turn must depend on eugenics for every advance that is made.

It may make the situation clearer to state it in the customary terms of biological philosophy. Selection does not necessarily result in progressive evolution. It merely brings about the adaptation of a species or a group to a given environment. The tapeworm is the stock example. In human evolution, the nature of this environment will determine whether adaptation to it means progress or retrogression, whether it leaves a race happier and more productive, or the reverse. All racial progress, or eugenics, therefore, depends on the creation of a good environment, and the fitting of the race to that environment. Every improvement in the environment should bring about a corresponding biological adaptation. The two factors in evolution must go side by side, if the race is to progress in what the human mind considers the direction of advancement. In this sense, euthenics and eugenics bear the same relation to human progress as a man's two legs do to his locomotion.

Social workers in purely euthenic fields have frequently failed to remember this process of adaptation, in their efforts to change the environment. Eugenists, in centering their attention on adaptation, have sometimes paid too little attention to the kind of environment to which the race was being adapted. The present book holds that the second factor is just as important as the first, for racial progress; that one leg is just as important as the other, to a pedestrian. Its only conflict with euthenics appertains to such euthenic measures as impair the adaptability of the race to the better environment they are trying to make.

Some supposedly euthenic measures opposed by eugenics are not truly euthenic, as for instance the limitation of a superior family in order that all may get a college education. For these spurious euthenic measures, something truly euthenic should be substituted.

Measures which show a real conflict may be typified by the infant mortality movement. There can be no doubt but that sanitation and hygiene, prenatal care and intelligent treat-

ment of mothers and babies, are truly euthenic and desirable. At the same time, as has been shown, these euthenic measures result in the survival of inferior children, who directly or through their posterity will be a drag on the race. Euthenic measures of this type should be accompanied by counterbalancing measures of a more eugenic character.

Barring these two types, euthenics forms a necessary concomitant of the eugenic program; and, as we have tried to emphasize, eugenics is likewise necessary to the complete success of every euthenic program. How foolish, then, is antagonism between the two forces! Both are working toward the same end of human betterment, and neither can succeed without the other. When either attempts to eliminate the other from its work, it ceases to advance toward its goal. In which camp one works is largely a matter of taste. If on a road there is a gradient to be leveled, it will be brought down most quickly by two parties of workmen, one cutting away at the top, the other filling in the bottom. For the two parties to indulge in mutual scorn and recrimination would be no more absurd than for eugenics and euthenics to be put in opposition to each other. The only reason they have been in opposition is because some of the workers did not clearly understand the nature of their work. With the dissemination of a knowledge of biology, this ground of antagonism will disappear.

APPENDIX A

OVARIAN TRANSPLANTATION

In 1890, W. Heape published an account of some experiments with rabbits. Taking the fertilized egg of an angora rabbit (i. e., a long-haired, white one) from the oviduct of its mother previous to its attachment to the wall of the uterus, he transferred it to the uterus of a Belgian hare, a rabbit which is short-haired and gray. The egg developed normally in the new body and produced an animal with all the characteristics, as far as could be seen, of the real mother, rather than the foster-mother. Its coat was long and white, and there was not the slightest trace of influence of the short, gray-haired doe in whose body it had grown.

Here was a case in which environment certainly failed to show any modifying influence. But it was objected that the transplanted egg was already full-grown and fertilized when the transfer was made, and that therefore no modification need be expected. If the egg were transferred at an earlier stage, it was thought, the result might be different.

W. E. Castle and J. C. Phillips therefore undertook an experiment to which this objection should not be possible.[1]

"A female albino guinea-pig just attaining sexual maturity was by an operation deprived of its ovaries, and instead of the removed ovaries there were introduced into her body the ovaries of a young black female guinea-pig, not yet sexually mature, aged about three weeks. The grafted animal was now mated with a male albino guinea-pig. From numerous experiments with albino guinea-pigs it may be stated emphatically that normal albinos mated together, without exception, produce only albino young, and the presumption is strong, therefore, that had this female not been operated on she would have done the same. She produced, however, by the albino male three litters of young, which together consisted of six individuals, all black. The first litter of young was produced about six months after the operation, the last about one year. The transplanted ovarian tissue must have remained in its new environment therefore from four to

[1] See Castle, W. E., *Heredity*, pp. 30–32, New York, 1911.

ten months before the eggs attained full growth and were discharged; ample time, it would seem, for the influence of a foreign body upon the inheritance to show itself were such influence possible."

While such experiments must not be stretched too far, in application to the human species, they certainly offer striking evidence of the fact that the characters of any individual are mainly due to something in the germ-plasm, and that this germ-plasm is to a surprising degree independent of any outside influence, even such an intimate influence as that of the body of the mother in which it reaches maturity.

APPENDIX B

"DYNAMIC EVOLUTION"

As C. L. Redfield has secured considerable publicity for his attempt to bolster up the Lamarckian theory, it deserves a few words of comment. His contention is that "the energy in animals, known as intelligence and physical strength, is identical with the energy known in mechanics, and is governed by the same laws." He therefore concludes that (1) an animal stores up energy in its body, in some undescribed and mystical way, and (2) that in some equally undescribed and mystical way it transmits this stored-up energy to its offspring. It follows that he thinks superior offspring are produced by parents of advanced age, because the latter have had more time to do work and store up energy for transmission. In his own words:

"Educating the grandfather helps to make the grandson a superior person. . . . We are, in our inheritance, exactly what our ancestors made us by the work they performed before reproducing. Whether our descendants are to be better or worse than we are will depend upon the amount and kind of work we do before we produce them."

The question of the influence of parental age on the characters of the offspring is one of great importance, for the solution of which the necessary facts have not yet been gathered together. The data compiled by Mr. Redfield are of value, but his interpretation of them can not be accepted for the following reasons.

1. In the light of modern psychology, it is absurd to lump all sorts of mental ability under one head, and to suppose that the father's exercise of reasoning power, for example, will store up "energy" to be manifested in the offspring in the shape of executive or artistic ability. Mental abilities are much subdivided and are inherited separately. Mr. Redfield's idea of the process is much too crude.

Moreover, Mr. Redfield's whole conception of the increase of intelligence with increase of age in a parent shows a disregard of the facts of psychology. As E. A. Doll has pointed out,[1] in criticising Mr. Redfield's recent and extreme claim that feeble-mindedness is the product of early marriage, it is incorrect to speak of 20-, 30-, or 40-year

[1] Doll, E. A., "Education and Inheritance," *Journal of Education*, Feb. 1, 1917.

standards of intelligence; for recent researches in measurement of mental development indicate that the heritable standard of intelligence of adults increases very little beyond the age of approximately 16 years. A person 40 years old has an additional *experience* of a quarter of a century, and so has a larger mental content, but his intelligence is still nearly at the 16-year level. Mental activity is the effect, not the cause, of mental growth or development. Education merely turns inherent mental powers to good account; it makes very little change in those powers themselves. To suppose that a father can, by study, raise his innate level of intelligence and transmit it at the new level to his son, is a naïve idea which finds no warrant in the known facts of mental development.

2. In his entire conception of the storing-up and transmission of energy, Mr. Redfield has fallen victim to a confusion of ideas due to the use of the same word to mean two different things. He thinks of energy as an engineer; he declares the body-cell is a storage battery; he believes that the athlete by performing work stores up energy in his body (in some mysterious and unascertainable way) just as the clock stores up energy when it is wound. The incorrectness of supposing that the so-called energy of a man is of that nature, is remarkable. If, hearing Bismarck called a man of iron, one should analyze his remains to find out how much more iron he contained than ordinary men, it would be a performance exactly comparable to Mr. Redfield's, when he thinks of a man's "energy" as something stored up by work.

As a fact, a man contains less energy, after the performance of work, than he did at the start. All of his "energy" comes from the metabolism of food that he has previously eaten. His potential energy is the food stored up in his body, particularly the glycogen in the liver and muscles.[1]

Why, then, can one man run faster than another? Mr. Redfield thinks it is because the sprinter has, by previous work, stored up energy in his body, which carries him over the course more rapidly than the sluggard who has not been subjected to systematic training. But the differences in men's ability are not due to the amount of energy they have stored up. It is due rather to differences in their structure (using this word in a very broad sense), which produce dif-

[1] Atwater's celebrated experiments proved that all the energy (food) which goes into an animal can be accounted for in the output of heat or work. They are conveniently summarized in Abderhalden's *Text-book of Physiological Chemistry*, p. 335.

ferences in the efficiency with which they can use the stored-up energy (i. e., food) in their bodies. A fat Shorthorn bull contains much more stored-up energy than does a race horse, but the latter has the better structure—coördination of muscles with nervous system, in particular—and there is never any doubt about how a race between the two will end. The difference between the results achieved by a highly educated thinker and a low-grade moron are similarly differences in structural efficiency: the moron may eat much more, and thereby have more potential energy, than the scholar; but the machine, the brain, can not utilize it.

The effects of training are not to store up energy in the body, for it has been proved that work decreases rather than increases the amount of energy in the body. How is it, then, that training increases a man's efficiency? It is obviously by improving his "structure," and probably the most important part of this improvement is in bring about better relations between the muscles and the nerves. To pursue the analogy which Mr. Redfield so often misuses, the effect of training on the human machine is merely to oil the bearings and straighten out bent parts, to make it a more efficient transformer of the energy that is supplied to it.

The foundation stone of Mr. Redfield's hypothesis is his idea that the animal by working stores up energy. This idea is the exact reverse of the truth. While the facts which Mr. Redfield has gathered deserve much study, his idea of "Dynamic Evolution" need not be taken seriously.[1]

[1] In this connection see farther Raymond Pearl's review of Mr. Redfield's "Dynamic Evolution" (*Journal of Heredity*, VI, p. 254), and Paul Popenoe's review, "The Parents of Great Men," *Journal of Heredity*, VIII, pp. 400–408.

APPENDIX C

THE "MELTING POT"

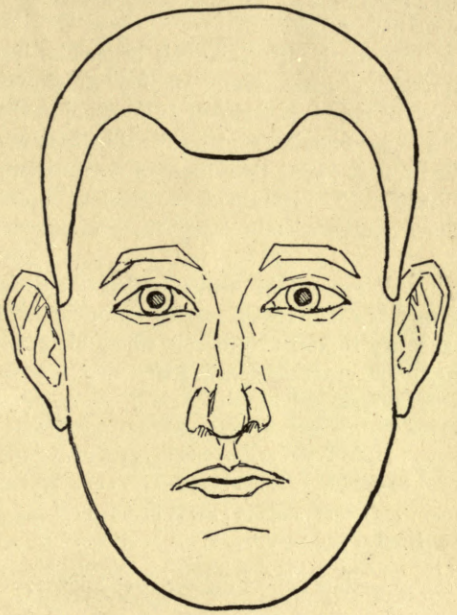
America as the "Melting Pot" of peoples is a picture often drawn by writers who do not trouble themselves as to the precision of their figures of speech. It has been supposed by many that all the racial stocks in the United States were tending toward a uniform type. There has never been any real evidence on which to base such a view, and the study completed in 1917 by Dr. Aleš Hrdlička, curator of the division of physical anthropology of the U. S. National Museum, furnishes evidence against it. He examined 400 individuals of the Old White American stock, that is, persons all of whose ancestors had been in the United States as far as the fourth ascending generation. He found little or no evidence that hereditary traits had been altered. Even the descendants of the Pilgrim Fathers, the Virginia cavaliers, the Pennsylvania Dutch and the Huguenots, while possibly not as much unlike as their ancestors were, are in no sense a blend.

The "Melting Pot," it must be concluded, is a figure of speech; and as far as physical anthropology is concerned, it will not be anything more in this country, at least for many centuries.

Announcing the results of study of the first 100 males and 100 females of his series,[1] Dr. Hrdlička said, "The most striking result of the examinations is the great range of variation among Old Americans in nearly all the important measurements. The range of variation is such that in some of the most significant determinations it equals not only the variation of any one group, but the combined variations of all the groups that enter into the composition of the Americans." This fact would be interpreted by the geneticist as an evidence of hybridity. It is clear that, at the very beginning, a number of diverse, although not widely differing, stocks must have made up the colonial population; and intermarriage and the influence of the environment have not welded these stocks into one blend, but have merely produced a mosaic-like mixture. This is good evidence of the perma-

[1] See Dr. Hrdlička's communication to the XIXth International Congress of Americanists, Dec. 28, 1915 (the proceedings were published at Washington, in March, 1917); or an account in the *Journal of Heredity*, VIII, pp. 98 ff., March, 1917.

nence of inherited traits, although it must be qualified by the statement that it does not apply equally to all features of the body, the face, hands and feet having been found less variable, for instance, than stature and form of head.



THE "MEAN MAN" OF THE OLD WHITE AMERICAN STOCK

FIG. 45.—Anthropologists have an ideal "mean man," whose every feature measures the arithmetic mean or average of that feature in all the individuals of his race. The above diagram drawn to scale from Dr. Hrdlička's measurements represents the mean man of Colonial ancestry. The outline of the face is almost oblong; the head is high and well-developed, particularly in the regions which are popularly supposed to denote superior intelligence. In general, it is a highly specialized type, denoting an advanced evolution.

The stature of both American men and women is high, higher than the average of any European nation except the Scotch. The individual variation is, however, enormous, amounting to 16.4% of the average in males and nearly 16% in females. For males, 174 cm. is

the average height, for females 162. The arm spread in males is greater than their stature, in females it is less.

The average weight of the males is 154 lbs. of the females 130. Taking into consideration the tall stature, these weights are about equal to those among Europeans.

The general proportions of the body must be classed as medium, but great fluctuations are shown.

The face is, in general, high and oval; in females it occasionally gives the impression of narrowness. The forehead is well developed in both sexes. The nose is prevalently long and of medium breadth, its proportions being practically identical with those of the modern English. The ears are longer than those of any modern immigrants except the English. The mouth shows medium breadth in both sexes, and its averages exactly equal those obtained for modern French.

One of the most interesting results is that there were obtained among these first 200 individuals studied no pronounced blonds, although the ancestry is North European, where blondness is more or less prevalent.[1] The exact distribution is:

	Male	*Female*
Light-brown	12%	16%
Medium-brown to dark	77	68
Very dark	11	6
Golden-red and red	0	10

Dr. Hrdlička's classification of the eye is as follows:

	Male	*Female*
Gray	2%	4%
Greenish	7	10
Blues	54	50
Browns	37	36

The head among Old Americans is in many cases notable for its good development, particularly in males. Among 12 groups of male

[1] Cf. Grant, Madison, *The Passing of the Great Race*, p. 74 (New York, 1916): "One often hears the statement made that native Americans of Colonial ancestry are of mixed ethnic origin. This is not true. At the time of the Revolutionary War the settlers in the 13 colonies were not only purely Nordic, but also purely Teutonic, a very large majority being Anglo-Saxon in the most limited meaning of that term. The New England settlers in particular came from those counties in England where the blood was almost purely Saxon, Anglian, and Dane."

immigrants [1] measured at Ellis Island under Dr. Hrdlička's direction in recent years, not one group quite equals in this respect the Americans, the nearest approach being noted in the Irish, Bohemians, English, Poles, and North Italians. The type of head, however, differs among the Americans very widely, as is the case with most civilized races at the present day.

Head form is most conveniently expressed by means of the cephalic index, that is, the ratio of breadth to length. Anthropologists generally speak of any one with an index of 75 (or where the breadth is 75% of the length) and below this as dolichocephalic, or long-headed; from 75 to 80 is the class of the mesocephalic, intermediates; while above 80 is that of the subbrachycephalic and brachycephalic, or round-headed. For the most part, the Old Americans fall into the intermediate class, the average index of males being 78.3 and that of females 79.5.

Barring a few French Huguenots, the Old Americans considered here are mostly of British ancestry, and their head form corresponds rather closely to that of the English of the present day. In England, as is well known, the round-headed type of Central and Eastern Europe, the Alpine or Celto-Slav type, has few representatives. The population is composed principally of long-headed peoples, deriving from the two great European stocks, the Nordic and the Mediterranean. To the latter the frequency of dark hair and brown eyes is probably due, both in England and America.

While the average of the Old Americans corresponds closely to the average of the English, there is a great deal of variation in both countries. Unfortunately, it is impossible to compare the present Americans with their ancestors, because measurements of the latter are lacking. But to assume that the early colonists did not differ greatly from the modern English is probably justifiable. A comparison of modern Americans (of the old white stock) with modern English should give basis for an opinion as to whether the English stock underwent any marked modifications, on coming to a new environment.

It has already been noted that the average cephalic index is practically the same; the only possibility of a change then lies in the amount of variability. Is the American stock more or less variable?

[1] Comprising Armenians, Croatians, English, Greeks, Russian Jews, Irish, South Italians, North Italians, Magyars, Poles, Rumanians and Russians, 500 individuals in all.

Can a "melting pot" influence be seen, tending to produce homogeneity, or has change of environment rather produced greater variability, as is sometimes said to be the case?

The amount of variability is most conveniently measured by a coefficient known as the standard deviation (σ), which is small when the range of variation is small, but large when diversity of material is great. The following comparisons of the point at issue may be made.[1]

	Avg.	σ
100 American men	78.3	3.1
1011 Cambridge graduates (English males)	79.85	2.95

For the men, little difference is discernible. The Old Americans are slightly more long-headed than the English, but the amount of variation in this trait is nearly the same on the two sides of the ocean.

The average of the American women is 79.5 with $\sigma = 2.6$. No suitable series of English women has been found for comparison.[2] It will be noted that the American women are slightly more round-headed than the men; this is found regularly to be the case, when comparisons of the head form of the two sexes are made in any race.

In addition to establishing norms or standards for anthropological comparison, the main object of Dr. Hrdlička's study was to determine whether the descendants of the early American settlers, living in a new environment and more or less constantly intermarrying, were being amalgamated into a distinct sub-type of the white race. It has been found that such amalgamation has not taken place to any important degree. The persistence in heredity of certain features, which run down even through six or eight generations, is one of the remarkable results brought out by the study.

If the process could continue for a few hundred years more, Dr. Hrdlička thinks, it might reach a point where one could speak of the members of old American families as of a distinct stock. But so far this point has not been reached; the Americans are almost as diverse and variable, it appears, as were their first ancestors in this country.

[1] English data from K. Pearson, *Biometrika* V, p. 124.

[2] Pearson (*ubi supra*) measured 12-year-old English school children, and found the average cephalic index for 2298 boys to be 78.88, with $\sigma = 3.2$, for 2188 girls 78.43, with $\sigma = 3.9$. It is not proper to compare adolescents with adults, however.

APPENDIX D

THE ESSENCE OF MENDELISM

It is half a century since the Austrian monk, Gregor Mendel, published in a provincial journal the results of his now famous breeding experiments with garden peas. They lay unnoticed until 1900, when three other breeders whose work had led them to similar conclusions, almost simultaneously discovered the work of Mendel and gave it to the world.

Breeding along the lines marked out by Mendel at once became the most popular method of attack, among those who were studying heredity. It became an extremely complicated subject, which can not be grasped without extended study, but its fundamentals can be briefly summarized.

Inherited differences in individuals, it will be admitted, are due to differences in their germ-plasms. It is convenient to think of these differences in germ-plasms (that is, differences in heredity) as being due to the presence in the germ-plasm of certain hypothetical units, which are usually referred to as factors. The factor, nowadays, is the ultimate unit of Mendelian research. Each of these factors is considered to be nearly or quite constant,—that is, it undergoes little, or no change from generation to generation. It is ordinarily resistant to "contamination" by other factors with which it may come in contact in the cell. The first fundamental principle of Mendelism, then, is the existence of relatively constant units, the Mendelian factors, as the basis for transmission of all the traits that go to make up an animal or plant.

Experimental breeding gives reason to believe that each factor has one or more alternatives, which may take its place in the mechanism of heredity, thereby changing the visible character of the individual plant or animal in which it occurs. To put the matter a little differently, one germ-cell differs from another in having alternatives present in place of some of the factors of the latter. A given germ-cell can never have more than one of the possible alternatives of each factor. These alternatives of a factor are called its allelomorphs.

Now a mature germ-cell has a single system of these factors: but when two germ-cells unite, there result from that union two kinds of cells—namely, immature germ-cells and body-cells; and both these kinds of cells contain a double system of factors, because of course they have received a single entire system from each parent. This is the second of the fundamental principles of Mendelism: that the factors are single in the mature germ-cell, but in duplicate in the body-cell (and also in the immature germ-cell).

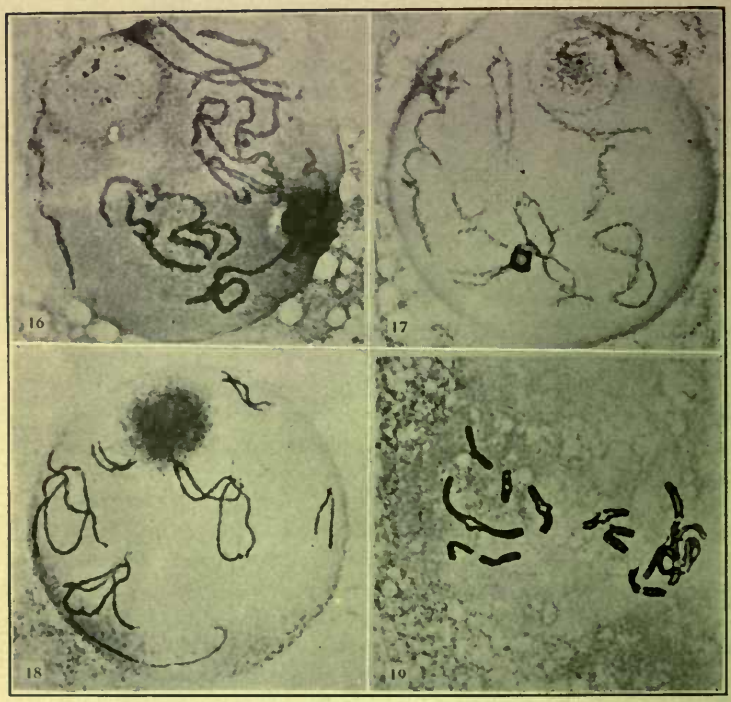
In every cell with a double system of factors, there are necessarily present two representatives from each set of allelomorphs, but these may or may not be alike—or in technical language the individual may be homozygous, or heterozygous, as regards the given set of alternative factors. Looking at it from another angle, there is a single visible character in the plant or animal, but it is produced by a double factor, in the germ-plasm.

When the immature germ-cell, with its double system of factors, matures, it throws out half the factors, retaining only a single system: and the allelomorphic factors which then segregate into different cells are, as has been said above, ordinarily uninfluenced by their stay together.

But the allelomorphic factors are not the only ones which are segregated into different germ-cells, at the maturation of the cell; for the factors which are not alternative are likewise distributed, more or less independently of each other, so that it is largely a matter of chance whether factors which enter a cross in the same germ-cell, segregate into the same germ-cell or different ones, in the next generation. This is the next fundamental principle of Mendelism, usually comprehended under the term "segregation," although, as has been pointed out, it is really a double process, the segregation of alternative factors being a different thing from the segregation of non-alternative factors.

From this fact of segregation, it follows that as many kinds of germ-cells can be formed by an individual, as there are possible combinations of factors, on taking one alternative from each pair of allelomorphs present. In practice, this means that the possible number of different germ-cells is almost infinitely great, as would perhaps be suspected by anyone who has tried to find two living things that are just alike.

Such is the essence of Mendelism; and the reader is probably ready to admit that it is not a simple matter, even when reduced to the



THE CARRIERS OF HEREDITY

FIG. 46.—Many different lines of study have made it seem probable that much, although not all, of the heredity of an animal or plant is carried in the nucleus of the germ-cell and that in this nucleus it is further located in little rods or threads which can be easily stained so as to become visible, and which have the name of chromosomes. In the above illustration four different views of the nucleus of the germ-cell of an earthworm are shown, with the chromosomes in different stages; in section 19 each chromosome is doubled up like a hairpin. Study of the fruit-fly Drosophila has made it seem probable not only that the hypothetical factors of heredity are located in the chromosomes, but that each factor has a perfectly definite location in its chromosome; and T. H. Morgan and his associates have worked out an ingenious method of measuring the distance from either end, at which the factor lies. Photomicrograph after Foot and Strobell.

simplest terms. To sum up, the principal features at the base of the hypothetical structure are these:

1. There exist relatively constant units in the germ-plasm.

2. There are two very distinct relationships which these units may show to each other. Two (or more) unit factors may be alternatives in the mechanism of inheritance, indicating that one is a variation (or loss) of the other; or they may be independent of each other in the mechanism of inheritance.

3. The mature germ-cell contains a single system of independent factors (one representative from each set of alternates).

The immature germ-cells, and body-cells, have double systems of independent factors (two from each set of alternatives).

4. The double system arises simply from the union of two single systems (i. e., two germ-cells), without union or even contamination of the factors involved.

In the formation of a single system (mature germ-cells) from a double (immature germ-cells), pairs of alternates separate, passing into different germ-cells. Factors not alternates may or may not separate—the distribution is largely a matter of chance.

Such are the fundamental principles of Mendelism; but on them was early grafted a theoretical structure due mainly to the German zoölogist, August Weismann. To understand his part in the story, we must advert to that much mooted and too often misunderstood problem furnished by the chromosomes. (See Fig. 46.) These little rods of easily stained material, which are found in every cell of the body, were picked out by Professor Weismann as the probable carriers of heredity. With remarkable acuteness, he predicted their behavior at cell-division, the intricate nature of which is usually the despair of every beginner in biology. When Mendelian breeding, in the early years of this century, showed temporary pairing and subsequent separation of units in the germ-cell, it was soon realized that the observed facts of breeding fitted to a nicety the observed facts (predicted by Weismann) of chromosome-behavior; for at each cell-division the chromosomes, too, pair and separate again. The observed behavior of transmitted characters in animals and plants followed, in so many cases, the observed behavior of the chromosomes, that many students found it almost impossible to believe that there was no connection between the two, and Dr. Weismann's prediction, that the chromosomes are the carriers of heredity, came to be looked on as a fact, by many biologists.

But when so much of Professor Weismann's system was accepted, other parts of it went along, including a hypothetical system of "determiners" in the chromosome, which were believed to determine the development of characters in the organism. Every trait of an animal or plant, it was supposed, must be represented in the germ-plasm by its own determiner; one trait, one determiner. Did a notch in the ear run through a pedigree? Then it must be due to a determiner for a notch in the ear in the germ-plasm. Was mathematical ability hereditary? Then there must be a determiner, the expression of which was mathematical ability.

For a while, this hypothesis was of service in the development of genetics; some students even began to forget that it was a hypothesis, and to talk as if it were a fact. But the exhaustive tests of experimental breeding of plants and animals have long caused most of the advanced students of genetics to drop this simple hypothesis.

In its place stands the factorial hypothesis, evolved by workers in America, England, and France at about the same time. As explained in Chapter V, this hypothesis carries the assumption that every visible character is due to the effects of not one but many factors in the germ-cell.

In addition to these fundamentals, there are numerous extensions and corollaries, some of them of a highly speculative nature. The reader who is interested in pursuing the subject farther must turn to one of the text-books on Mendelism.

In plant-breeding a good deal of progress has been made in the exact study of Mendelian heredity; in animal breeding, somewhat less; in human heredity, very little. The reason is obvious: that experiments can not be made in man, and students must depend on the results of such matings as they can find; that only a very few offspring result from each mating; and that generations are so long that no one observer can have more than a few under his eyes. These difficulties make Mendelian research in man a very slow and uncertain matter.

Altogether, it is probable that something like a hundred characters in man have been pointed out as inherited in Mendelian fashion. A large part of these are pathological conditions or rare abnormalities.

But the present writers can not accept most of these cases. It has been pointed out in Chapter V that there are good reasons for doubting that feeble-mindedness is inherited in a simple Mendelian fashion, although it is widely accepted as such. We can not help feeling that

in most cases heredity in man is being made to appear much simpler than it really is; and that particularly in mental characters, analysis of traits has by no means reached the bottom.

If we were asked to make out a list of characters, as to the Mendelian inheritance of which there could be little doubt, we would hardly be able to go farther than the following:

The sex-linked characters (one kind of color-blindness, hemophilia, one kind of night-blindness, atrophy of the optic nerve, and a few other rare abnormalities).

Albinism. This appears to be a recessive, but probably involves multiple allelomorphs in man, as in other animals.

Brachydactyly, apparently a dominant. This is so much cited in text-books on Mendelism that the student might think it is a common character. As a fact, it is extremely rare, being found in only a few families. The similar trait of orthodactyly or symphalangism, which likewise appears to be a good Mendelian dominant, seems to exist in only one family. Traits like these, which are easily defined and occur very rarely, make up a large part of the cases of probably Mendelian heredity. They are little more than curiosities, their rarity and abnormal nature depriving them of evolutionary significance other than to demonstrate that Mendelian heredity does operate in man.

White blaze in the hair or, as it might better be called to show its resemblance to the trait found in other mammals, piebaldism. A rather rare dominant.[1]

Huntington's Chorea, which usually appears to be a good dominant, although the last investigators (Muncey and Davenport) found some unconformable cases.

A few abnormalities, such as a premature graying of the hair (one family cited by K. Pearson) are well enough attested to be admitted. Many others, such as baldness, are probably Mendelian but not yet sufficiently supported by evidence.

None of these characters, it will be observed, is of much significance eugenically. If the exact manner of inheritance of some of the more important mental and physical traits were known, it would be of

[1] Sewall Wright has pointed out (*Journal of Heredity*, VIII, p. 376) that the white blaze in the hair can not be finally classed as dominant or recessive until the progeny of *two* affected persons have been seen. All matings so far studied have been between an affected person and a normal. It may be that the white blaze (or piebaldism) represents merely a heterozygous condition, and that the trait is really a recessive. The same argument applies to brachydactyly.

value. But it is not a prerequisite for eugenic action. Enough is known for a working program.

To sum up: the features in the modern view of heredity, which the reader must keep in mind, are the following:

1. That the various characters which make up the physical constitution of any individual plant or animal are due to the action (concurrently with the environment, of course) of what are called, for convenience, factors, separable hypothetical units in the germplasm, capable of independent transmission.

2. That each visible character is due to the coöperative action of an indefinitely large number of factors; conversely, that each of these factors affects an indefinitely large number of characters.

APPENDIX E

USEFUL WORKS OF REFERENCE

The most complete bibliography is that published by the State Board of Charities of the State of New York (*Eugenics and Social Welfare Bulletin* No. III, pp. 130, Albany, 1913).

An interesting historical review of eugenics, with critical comments on the literature and a bibliography of 100 titles, was published by A. E. Hamilton in the *Pedagogical Seminary*, Vol. XXI, pp. 28–61, March, 1914.

Much of the important literature of eugenics has been mentioned in footnotes. For convenience, a few of the books which are likely to be most useful to the student are here listed:

GENETICS AND EUGENICS, by W. E. Castle. Harvard University Press, Cambridge, 1916.

HEREDITY AND ENVIRONMENT IN THE DEVELOPMENT OF MEN, by Edwin G. Conklin. Princeton University Press, 1915.

HEREDITY IN RELATION TO EUGENICS, by C. B. Davenport, Henry Holt and Co., New York, 1911.

ESSAYS IN EUGENICS, by Francis Galton. Eugenics Education Society, London, 1909.

BEING WELL-BORN, by Michael F. Guyer. Indianapolis, Bobbs-Merrill Co., 1916.

THE SOCIAL DIRECTION OF HUMAN EVOLUTION, by W. E. Kellicott. New York, 1911.

THE PHYSICAL BASIS OF SOCIETY, by Carl Kelsey. New York, D. Appleton & Co., 1916.

EUGENICS, by Edward Schuster. Collins' Clear Type Press, London and Glasgow, 1913.

HEREDITY, by J. Arthur Thompson. Edinburgh, 1908.

GENETICS, by Herbert E. Walter. The Macmillan Co., New York, 1913.

AN INTRODUCTION TO EUGENICS, by W. C. D. Whetham and C. D. Whetham. Macmillan and Co., London, 1912.

HEREDITY AND SOCIETY, by W. C. D. Whetham and C. D. Whetham. Longmans, Green & Co., London, 1912.

THE FAMILY AND THE NATION, by W. C. D. Whetham and C. D. Whetham. Longmans, Green & Co., London, 1909.

The publications of the Galton Laboratory of National Eugenics, University of London, directed by Karl Pearson, and of the Eugenics Record Office, Cold Spring Harbor, Long Island, N. Y., directed by C. B. Davenport, furnish a constantly increasing amount of original material on heredity.

The principal periodicals are the *Journal of Heredity* (organ of the American Genetic Association), 511 Eleventh St., N. W., Washington, D. C. (monthly); and the *Eugenics Review* (organ of the Eugenics Education Society), Kingsway House, Kingsway, W. C., London (quarterly). These periodicals are sent free to members of the respective societies. Membership in the American organization is $2 a year, in the English 1 guinea a year, associate membership 5 shillings a year.

APPENDIX F

GLOSSARY

ACQUIRED CHARACTER, a modification of a germinal trait after cell fusion. It is difficult to draw a line between characters that are acquired and those that are inborn. The idea involved is as follows: in a standard environment, a given factor in the germ-plasm will develop into a trait which varies not very widely about a certain mean. The mean of this trait is taken as representing the germinal trait in its typical condition. But if the environment be not standard, if it be considerably changed, the trait will develop a variation far from the mean of that trait in the species. Thus an American, whose skin in the standard environment of the United States would be blonde, may under the environment of Cuba develop into a brunette. Such a wide variation from the mean thus caused is called an acquired character; it is usually impressed on the organism after the germinal trait has reached a full, typical development.

ALLELOMORPH (one another form), one of a pair of factors which are alternative to each other in Mendelian inheritance. Instead of a single pair, there may be a group of "multiple allelomorphs," each member being alternative to every other member of the group.

ALLELOMORPHISM, a relation between two or more factors, such that two which are present in one zygote do not both enter into the same gamete, but are separated into sister gametes.

BIOMETRY (life measure), the study of biology by statistical methods.

BRACHYDACTYLY (short-finger), a condition in which the bones, particularly of the fingers and toes, fail to grow to their normal length. In well-marked cases one of these is a reduction from three phalanges or joints to two.

CHARACTER (a contraction of "characteristic"), a term which is used, often rather vaguely, to designate any function, feature, or organ of the body or mind.

CHROMOSOME (color body, so called from its affinity for certain stains), a body of peculiar protoplasm, in the nucleus of the cell. Each species has its own characteristic number; the cells of the human body contain 24 chromosomes each.

CONGENITAL (with birth), present at birth. The term fails to distinguish between traits which are actually inherited, and modifications acquired during prenatal life. In the interest of clear thinking its use should be avoided so far as possible.

CORRELATION (together relation), a relation between two variables in a certain population, such that for every variation of one, there is a corresponding variation of the other. Mathematically, two correlated variables are thus mutually dependent. But a correlation is merely a statistical description of a particular case, and in some other population the same two variables might be correlated in a different way, other influences being at work on them.

CYTOLOGY (cell word), the study of the cell, the constituent unit of organisms.

DETERMINER (completely end), an element or condition in a germ-cell, supposed to be essential to the development of a particular quality, feature, or manner of reaction of the organism which arises from that germ-cell. The word is gradually falling into disuse, and "factor" taking its place.

DOMINANCE (mastery), in Mendelian hybrids the capacity of a character which is derived from only one of two generating gametes to develop to an extent nearly or quite equal to that exhibited by an individual which has derived the same character from both of the generating gametes. In the absence of dominance the given character of the hybrid usually presents a "blend" or intermediate condition between the two parents.

DYSGENIC (bad origin), tending to impair the racial qualities of future generations; the opposite of eugenic.

ENDOGAMY (within mating), a custom of some primitive peoples, in compliance with which a man must choose his wife from his own group (clan, gens, tribe, etc.).

EUGENIC (good origin), tending to improve the racial qualities of future generations, either physical or mental.

EUTHENIC (good thriving), tending to produce beneficial acquired characters or better conditions for people to live in, but not tending (except incidentally and indirectly) to produce people who can hand on the improvement by heredity.

EVOLUTION (unroll), ORGANIC, the progressive change of living forms, usually associated with the development of complex from simple forms.

EXOGAMY (out mating), a custom of primitive peoples which re-

quires a man to choose a wife from some other group (clan, gens, tribe, etc.) than his own.

FACTOR (maker), a name given to the hypothetical *something*, the independently inheritable element in the germ-cell, whose presence is necessary to the development of a certain inherited character or characters or contributes with other factors to the development of a character. "Gene" and "determiner" are sometimes used as synonyms of factor.

FEEBLE-MINDEDNESS, a condition in which mental development is retarded or incomplete. It is a relative term, since an individual who would be feeble-minded in one society might be normal or even bright in another. The customary criterion is the inability of the individual, because of mental defect existing from an early age, to compete on equal terms with his normal fellows, or to manage himself or his affairs with ordinary prudence. American students usually distinguish three grades of mental defect: Idiots are those who are unable to take care of themselves, even to the extent of guarding against common physical dangers or satisfying physical needs. Their mentality does not progress beyond that of a normal two-year-old child. Imbeciles can care for themselves after a fashion, but are unable to earn their living. Their mental ages range from three to seven years, inclusive. Morons, who correspond to the common acceptation of the term feeble-minded, "can under proper direction become more or less self-supporting but they are as a rule incapable of undertaking affairs which demand judgment or involve unrestricted competition with normal individuals. Their intelligence ranges with that of normal children from seven to twelve years of age." There is necessarily a considerable border-line, but any adult whose intelligence is beyond that of the normal twelve-year-old child is usually considered to be not feeble-minded.

GAMETE (mate), a mature germ-cell; in animals an ovum or spermatozoön.

GENETICS (origins), for a long time meant the study of evolution by experimental breeding and was often synonomous with Mendelism. It is gradually returning to its broader, original meaning of the study of variation and heredity, that is, the origin of the individual's traits. This broader meaning is preferable.

GERMINAL (sprig), due to something present in the germ-cell. A trait is germinal when its basis is inherited,—as eye color,—and when it develops with nothing more than the standard environment; re-

maining relatively constant from one generation to another, except as influenced by reproduction.

GERM-PLASM (sprig form), mature germ-cells and the living material from which they are produced.

HÆMOPHILIA (blood love), an inability of the blood to clot. It thus becomes impossible to stop the flow of blood from a cut, and one who has inherited hæmophilia usually dies sooner or later from hæmorrhage.

HEREDITY (heirship), is usually considered from the outside, when it may properly be defined as organic resemblance based on descent, or the correlation between relatives. But a better definition, based on the results of genetics, looks at it as a mechanism, not as an external appearance. From this point of view, heredity may be said to be "the persistence of certain cell-constituents (in the germ-cells) through an unending number of cell-divisions."

HETEROZYGOTE (different yolk), a zygotic individual which contains both members of an allelomorphic pair.

HOMOZYGOTE (same yolk), an individual which contains only one member of an allelomorphic pair, but contains that in duplicate, having received it from both parents. A homozygous individual, having been formed by the union of like gametes, in turn regularly produces gametes of only one kind with respect to any given factor, thus giving rise to offspring which are, in this regard, like the parents; in other words, homozygotes regularly "breed true." An individual may be a homozygote with respect to one factor and a heterozygote with respect to another.

HORMONES (chain), the secretions of various internal glands, which are carried in the blood and have an important specific influence on the growth and functioning of various parts of the body. Their exact nature is not yet understood.

INBORN usually means germinal, as applied to a trait, and it is so used in this book. Strictly speaking, however, any trait which appears in a child at birth might be called inborn, and some writers, particularly medical men, thus refer to traits acquired in prenatal life. Because of this ambiguity the word should be carefully defined when used, or avoided.

INHERENT (in stick), as used in this book, is synonymous with germinal.

INDUCTION (in lead), a change brought about in the germ-plasm with the effect of temporarily modifying the characters of an indi-

vidual produced from that germ-plasm; but not of changing in a definite and permanent way any such germ-plasm and therefore any individual inherited traits.

INNATE (inborn), synonymous with inborn.

LATENT (lie hidden), a term applied to traits or characters whose factors exist in the germ-plasm of an individual, but which are not visible in his body.

LAW, in natural science means a concise and comprehensive description of an observed uniform sequence of events. It is thus quite different from the law of jurists, who mean a rule laid down for the guidance of an intelligent being, by an intelligent being having power over him.

MENDELISM, a collection of laws of heredity (see Appendix D) so-called after the discoverer of the first of them to become known; also the analytical study of heredity with a view to learning the constitution of the germ-cells of animals and plants.

MENDELIZE, to follow Mendel's laws of inheritance.

MORES (customs), the approved customs or unwritten laws of a people; the conventions of society; popular usage or folk-ways which are reputable.

MUTATION (change), has now two accepted meanings: (1) a profound change in the germ-plasm of an organism such as will produce numerous changes in its progeny; and (2) a discontinuous heritable change in a Mendelian factor. It is used in the first sense by De Vries and other "mutationists" and in the second sense by Morgan and other Mendelists; confusion has arisen from failure to note the difference in usage.

NORMAL CURVE, the curve of distribution of variations of something whose variations are due to a multiplicity of causes acting nearly equally in both directions. It is characterized by having more individuals of a mediocre degree and progressively fewer above and below this mode.

NUCLEUS (little nut), a central, highly-organized part of every living cell, which seems to play a directive rôle in cell-development and contains, among other things, the chromosomes.

PATENT (lie open), a term applied to traits which are manifestly represented in the body as well as the germ-plasm of an individual. The converse of "latent."

PROBABILITY CURVE, the same as normal curve. Also called a Gaussian curve.

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EXAMINING IMMIGRANTS AT ELLIS ISLAND, NEW YORK

FIG. 39.—Surgeons of the United States Public Health Service test every immigrant, physically and mentally, in order to send back any who give promise of being undesirable additions to the population. The above photograph shows how the examination of those whose condition has aroused suspicion, is conducted. The boy under the measuring bar, in the foreground, and the three immediately to the left of the desk, are examples of congenital asthenia and poor physique; two of the four were found to be dull mentally. Photograph from U. S. Public Health Service.

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