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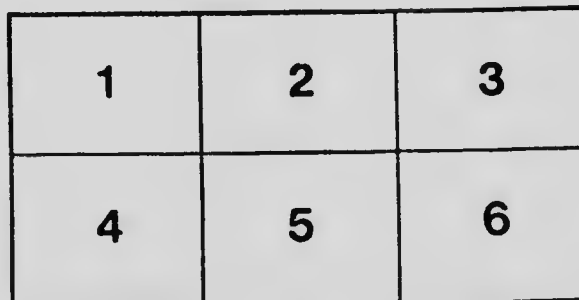
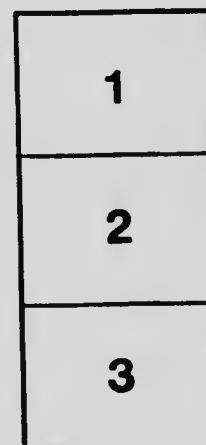
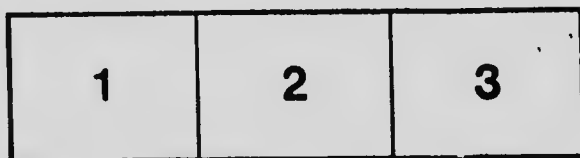
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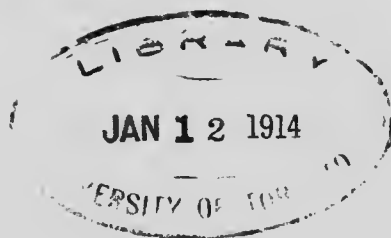
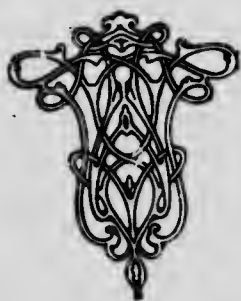
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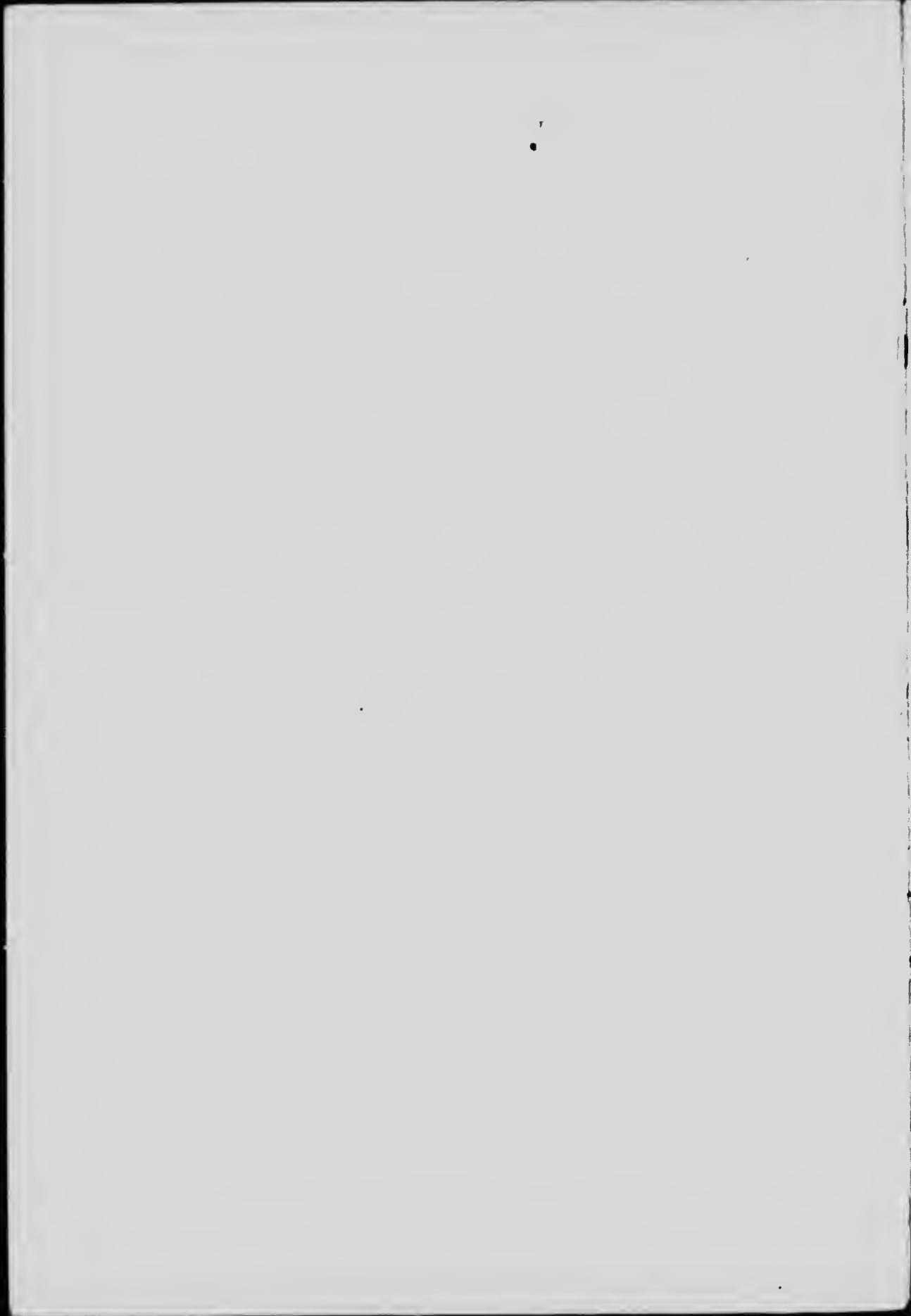
HOW TO IMPROVE THE RACE

By

ALEXANDER GRAHAM BELL



Reprinted from the Journal of Heredity (Organ of the American Genetic Association),
Washington, D. C., U. S. A., January, 1914. Vol. V, No. 1, pp. 1-7.



HOW TO IMPROVE THE RACE

Success Possible, but not by Processes Employed with Lower Animals—Little Gain from Preventing Marriage of Undesirables—Important Point Is Formation of a Prepotent, Desirable Stock by Marriages of Desirable People with Each Other—This Prepotent Stock Will Then Raise the Level of the Great Bulk or Normals.

ALEXANDER GRAHAM BELL, *Washington, D. C.*

LIVING organisms have proven so plastic in the hands of scientific breeders that we have learned to improve our breeds of plants and animals by suitable selection controlled by man.

Human beings, also, are undoubtedly capable of modification by selection; but it is manifestly impossible to apply to them the processes employed with the lower animals.

The difficulties of the problem may perhaps be appreciated if we consider for a moment how far it would be possible to improve our breeds of domestic animals under the conditions which prevail among human beings.

Given, for example, a flock of sheep to be improved, but under human conditions.

First, we must not butcher any of the animals. Ovine life is to be considered as sacred as human life. We must not mutilate the animals; nor do anything to them that is inconsistent with the humanitarian spirit of the age.

The weaklings are to be preserved and given special care. In fact, all of the animals, including the poor little deformed lambs, are to be kept alive as long as possible. They are to be treated with kindness and consideration until they die of old age, or from other causes beyond our control.

To these conditions we may add the following: polygamous unions must not be permitted; nor unions between individuals related in various ways.

A man, for example, may not marry his grandmother; nor his mother; nor his sister; nor his daughter; and if we apply all the human restrictions to

sheep, we shall have our hands full indeed in merely examining the ancestry of the flock, and the relationships of the individuals to one another, so as to avoid the prohibited unions.

If we are forbidden to allow any classes of unions, we are not permitted to select the individuals that are to be mated together to improve the stock. Each individual of the flock, under the restrictions referred to, must be free to choose its own mate; and the pairing shall be for life.

We may confidently assert that under such conditions no scientific breeder would undertake to improve the flock,—it would not be possible.

THE HUMAN PROBLEM.

But these are the conditions we must face in attempting to improve our own race; and we may as well recognize, first as last, that we have no power to compel improvement.

A gleam of hope, however, appears in this connection when we realize that there is one great and fundamental difference between a community of human beings, and a flock or herd of animals: The individuals of the human community possess intelligence.

The individuals have power to improve the race, but not the knowledge of what to do. We students of genetics possess the knowledge but not the power; and the great hope lies in the dissemination of our knowledge among the people at large.

Another important difference between human beings and the lower animals, arising from intelligence, is that human beings give some thought

to their unborn progeny. All desire that their offspring may be of the best; and no one wishes to have degenerate or defective children.

The attitude of the public mind is therefore favorable to voluntary compliance with plans which appeal to the intelligence of the community as reasonable and right; and favorable to the formation of a public opinion which will compel compliance.

These are such hopeful conditions that they will bear recapitulation.

The members of a human community, both individually and collectively, desire that their descendants may, if possible, be better than themselves.

They possess intelligence to understand the laws of heredity as applicable to man; and a willingness to adopt any reasonable and practicable measures that may be formulated for the benefit of future generations.

All recognize the fact that the laws of heredity which apply to animals also apply to man; and that therefore the breeder of animals is fitted to guide public opinion on questions relating to human heredity. Without power to control, he has power to advise; and the public generally will accept his statements as sound, because based upon special knowledge and experience in the breeding of animals.

What an opportunity for the members of the American Genetic Association to benefit the human race! Most of the disputed questions of human heredity can be settled by them, and their verdict will be acquiesced in by the general public.

Statistics relating to the effect of inbreeding among animals, for example, could surely be made to guide public opinion rightly on the subject of consanguineous marriages among human beings.

So, too, statistics relating to the effect upon the offspring of maturity and immaturity in the parents of animals, would seem to have a bearing upon the question of early *versus* late marriages among human beings.

The first thing for us to do, is to make known to the public the processes that are needed to improve the race; and

then to show how, by intelligent cooperation among the members of the community, these processes may be applied.

IMPROVING RACIAL STATURE.

In considering the question of improvement, it may be well to begin by taking some specific quality of an inheritable nature and examining its distribution among the population at large.

Take stature as an example. We have pigmy races of men, and it is quite conceivable that some such race might deem it desirable to increase the general height of the population.

The members of the race all possess the desirable characteristic (height), but in varying degrees; and upon this variability depends the possibility of improvement. The difference between the extremes shows the amplitude of the variation; and if we sort out the population in accordance with the degree in which they possess the quality, we shall find a continuous series from the lowest to the highest. Some intermediate point represents the average degree in which the quality is possessed by the race.

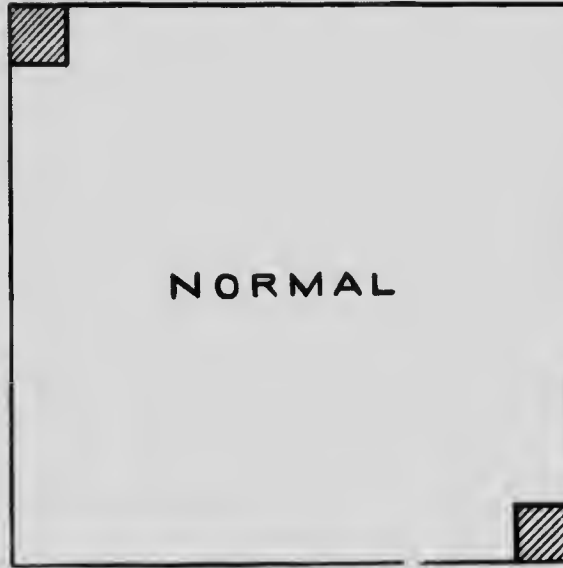
The people who are markedly above the average height will, in this case, constitute the desirable class; and those who are markedly under the average would be the undesirable.

We are accustomed to focus our attention so exclusively upon the desirable and undesirable classes that we are apt to forget that there is an intermediate class, the normal, which is many times greater than both of the others put together, constituting, indeed, the bulk of the population.

The accompanying diagram may perhaps be of assistance in realizing the relative proportions of these classes. Let the large square represent an enclosure completely filled with the people under consideration. The square then represents by its area the whole population to be improved in height.

If we look the people over, we shall find here and there exceptional individuals who stand well above the general level. Collect them together

DESIRABLE



UNDESIRABLE

THE MAKE-UP OF THE HUMAN RACE.

In discussions of eugenics, the relatively small part of the population made up by the superior and the inferior is sometimes allowed to occupy so prominent a place that we forget that the great bulk of the race is made up of normal people, as the diagram clearly shows. Mr. Bell points out that because of this overwhelming numerical preponderance of the normal people, the easiest, quickest and most natural method of raising the level of the whole race is to raise the level of this huge mass of normals, instead of devoting all our attention to reducing the relatively insignificant number of inferiors.

into a pen in one corner of the enclosure. These constitute the desirable class represented by the small shaded square at the top of the diagram, which expresses, by its area, the number of tall people found.

In a similar manner, collect the markedly undersized individuals, and place them in a separate pen represented by the shaded square in the lower corner of the diagram. These constitute the undesirable class.

The rest of the population, occupying the unshaded portion of the large square, are normal people of somewhat about the average height.

Stature is convenient as a typical illustration because in this case the desirable quality, height, is capable of measurement.

APPLICATION UNIVERSAL.

If, however, any other inheritable quality be taken as an illustration, the

people can, in a similar manner, be sorted out into the three classes shown in the diagram:

1. The great normal class possessing the quality in a normal or average degree.
2. The desirable class, possessing the quality in a markedly greater degree than the average.
3. The undesirable class, possessing it in a markedly less degree than the average.

On the scale shown in the diagram the desirable and undesirable classes each constitute 1% of the population and the normal 98%. Whatever may be the actual relative proportions, the diagram expresses the undoubted fact that the normal class constitutes the bulk of the population; and that the desirable and undesirable classes are very small as compared with the normal.

In the case considered the people generally have been of small stature as far back as their history extends. There has been no substantial change in the average height of the race within historical times. From this we may conclude that the ancestors of the present generation were mainly of the present normal height; and that only a few of them were much taller or shorter than this.

The above diagram, then, represents substantially the relative proportions of the three classes at each successive generation of the population. It typifies the future distribution, as well as the past, unless some means can be found to change it.

The desirable and undesirable classes, like the normal, are sprung mainly from normal parents; so that it is obvious that no process of interference with the marriages of these classes could much affect the relative proportions of the three classes in the next generation of the community. If, for example, the desirables and undesirables should all decide to lead celibate lives so as to leave no descendants, we would have just about as large a proportion of desirables and undesirables in the next generation of the community, born from the normal class.

SELECTION IN MARRIAGE.

The individuals belonging to the desirable and undesirable classes are not only few in number, but are scattered throughout the community. They appear only here and there as exceptional cases, and are not segregated from the others in their actual distribution in the population. If, then, they decide to marry, it is obvious that most of the desirable and undesirable individuals will marry normal persons, because normal people constitute the bulk of the community with whom they come in contact; and the offspring will tend to revert to the normal type of the race. From this it follows that, on the whole, the offspring of the desirables will be less desirable than themselves; and the offspring of the undesirables

more desirable; most of the offspring will be of the normal type.

Given a large normal class, and two small classes, the desirable and undesirable, the problem is, how to increase the proportion of desirable children born from the normal population.

This can be accomplished by marriage with members of the desirable class.

In the typical case considered, this would mean that persons of normal height would increase their liability to have tall children by marrying tall people.

Where normals marry normals a small proportion (say 1%) of the offspring will belong to the desirable class.

Where normals marry desirables the percentage of desirable offspring will be increased (say to 10%).

Of course, it is only possible for a small proportion of the normal population to marry persons belonging to the desirable class, on account of limited numbers. The range of choice, however, may be extended by marriages with brothers or sisters or close blood relatives of desirable persons. That is upon the assumption that we are here dealing with an inherited characteristic.

PROOF OF INHERITANCE.

The late Professor W. K. Brooks, of Johns Hopkins University, said:

"An inherited characteristic may, or may not, have been manifested by the parents or other ancestors. . . . If it is more common either among the ancestors or the brothers and sisters and cousins of the organism than it is in the race at large, this fact is scientific proof that it is an inherited characteristic."

Where a peculiarity manifests itself in only one member of a family we are dealing with a sporadic case; and the peculiarity may, or may not, be transmitted to the descendants: But where a number of people in the same family exhibit the same congenital peculiarity we have good reason to believe that it

¹ See appendix to Rep. Royal Comm. on Blind, Deaf and Dumb, etc., London, 1889, ii, 322; also Education of Deaf Children, Pt. II, p. 104, Volta Bureau, Washington, D. C., 1892.

is an inherited characteristic, and therefore liable to be handed down to some of the descendants by any member of the family, even by those members who do not exhibit the peculiarity in their own persons.

These considerations lead us to the conclusion that persons of normal height will increase their liability to have tall offspring by marrying into families containing a number of tall persons. In such a family the tendency to produce tall people is evidently an inherited characteristic; and the normal and undersized members of the family, as well as the taller members, will have a tendency to transmit the characteristic to some of their descendants. The tendency is in the blood, and the whole family possesses it.

INFLUENCE OF ANCESTRY.

In this connection the influence of ancestry is most marked:

(1). Where Normals (whose ancestors on the whole were normal people) marry Desirables (whose ancestors were chiefly normal), the normal partners will prove prepotent over the desirable partners in affecting the offspring. The bulk of the offspring will be normal; and only a small proportion (say 10%) desirable.

(2). But where Normals (with normal ancestry) marry Desirables (whose parents were desirable) the proportion of desirable offspring will be increased (say 20% desirable). The potency of the desirable partner to have desirable children is practically doubled, because of inheritance from both parents; and the prepotency of the normal partner is correspondingly reduced.

(3). Where Normals (with normal ancestors) marry Desirables (whose grandparents as well as parents were desirable) the proportion of desirable offspring will be still further increased (say to 45%); and the prepotency of the normal partners will be reduced almost to zero.

(4). Where Normals (with normal ancestry) marry Desirables (whose ancestors for several generations back were all desirable) it is the desirable partner who be-

comes prepotent over the normal partner in affecting the offspring. The vast majority (say 90%) will be desirable.

The influence of the normal partner will be less and less according to the number of desirable ancestors possessed by the desirable partner. With a sufficient number of generations of desirable ancestors, the desirable partner is what is known as "thoroughbred" in respect to the inherited characteristic. The normal partners, on the other hand, are not usually thoroughbreds for the normal condition; for if we examine their ancestors for the same number of generations back, we shall find, as a rule, that some of the ancestors were not normal: Some few were desirable, and some few even undesirable.

THOROUGHBREDS PREPOTENT.

We breeders are familiar with the prepotency of the thoroughbred animal over the normal animal; and we can therefore confidently assert that the human thoroughbred will be equally prepotent over the normal human being in affecting the offspring.

In spite of the smallness of the desirable class, its influence in improving the normal population would be considerable should it contain a number of highly prepotent individuals: For their marriages with normal people would result in the production of offspring almost exclusively of the desirable type (say 90 per cent. desirable). We should also remember that the brothers and sisters of the prepotent individuals will also have a strong tendency to produce desirable offspring where they marry normals with normal ancestry.

The liability of normal persons to have desirable offspring will be increased by marriages with persons of the desirable class; and diminished by marriages with undesirables.

In the latter case the proportion of *undesirable* children will be increased and if the undesirable partner is descended from undesirable ancestors the proportion of undesirable children will be still further increased.

The establishment of even a small

body of prepotent individuals within the undesirable class would exert a considerable harmful influence, because their marriages with normal persons would result chiefly in the production of undesirable children.

UPSETTING THE EQUILIBRIUM.

In considering the influence of marriage in affecting the distribution of the three classes in the next generation of the community, we may notice that in general the marriages of normals tend to keep things just as they are. That is, they tend to produce a large class of normals and two small classes of desirables and undesirables, in just about the same relative proportions as in the preceding generation.

The marriages of the desirables, on the whole, tend to raise the average of desirability in the community; and the marriages of the undesirables tend to lower it. The desirables pull the average upwards, the undesirables pull it downwards; and when these upward and downward tendencies are just equal they neutralize one another and a static condition prevails: The race as a whole neither advances nor recedes.

If the potency of the desirable class to produce desirable children is greater than the potency of the undesirable class to produce undesirable children, then we have a case of unstable equilibrium, and the whole race begins to move upwards.

Conversely, if the potency of the undesirable element is greater than that of the desirable element, then the race begins to move downwards.

Thus, it is the *difference* between the potencies of the desirable and undesirable classes that controls and determines the amount and direction of the racial movement.

If, then, we wish to improve the race the aim should be *to increase the potency of the desirable class to produce desirable children*; and this can be accomplished by promoting the marriages of the desirable with one another.

The moment we have a body of desirable persons *whose parents were also desirable*, improvement of the race begins through the marriage of such per-

sons with the normal population: for the proportion of desirable offspring born from the normal partners will be greater than in cases where the desirable partner had no ancestors belonging to the desirable class.

The improvement will be still greater when we have a body of desirable persons who had grandparents as well as parents desirable; and still greater with each increase in the number of desirable ancestors.

Thus, the simple process of promoting the marriages of the desirable with the desirable will, through the mixture of the descendants with the rest of the population, inaugurate an improvement of the whole race; and the movement will advance with accelerated velocity as we have more and more potent individuals of the desirable class. This process continued through a number of successive generations would ultimately result in the establishment of a prepotent stock within the desirable class, and then the improvement would be very marked indeed.

CHIEF OBJECT OF EUGENICS.

Here it is to be noted that the elevating tendency is due to the desirable class alone; and that improvement depends upon *increasing the number and proportion of desirables born in successive generations of the population*. Hence, this should be the chief object of eugenics; and it is to be regretted that the efforts of eugenicists have been mainly directed to the diminution of the undesirable class.

So much has this been the case that the very word "eugenics" is suggestive to most minds of hereditary diseases and objectionable abnormalities; and of an attempt to interfere, by compulsory means, with the marriages of the defective and undesirable. This relates to caecogenics ("badly born") rather than to eugenics ("well born").

The utmost that could be even hoped for from such a process would be to lessen the tendency to retrogression and degeneration; and even this result would not be attained, at least in any great degree, for the simple reason that

the undesirables, as a rule, are descended from normal parents.

Prohibition of marriage would not, therefore, have much effect upon the continued production of an undesirable class. We would have just about as many undesirable people appear in the next generation, *born from the normal population.*

Then again, the tendency to reversion to the normal type of the race is so strong that the children of undesirables are mainly of the normal type; so that prohibition of marriage would prevent the production of very many more normal children than undesirable children.

Whatever processes may be employed to improve the race, we shall always have the undesirable with us, because they are sprung mainly from the normal class; and *it is more practicable to improve the undesirable strains than to eradicate them.*

If undesirables marry normal or desirable partners they will not only have fewer undesirable children than if they married one another, but the potency of the offspring to produce undesirable grandchildren will be re-

duced. The undesirable blood is diluted, so to speak, by admixture with normal blood; and most of the offspring will be of the normal type.

CONCLUSION.

A public sentiment already exists that persons possessing inherited characteristics of a desirable kind should marry and have large families. This sentiment undoubtedly is favorable to the improvement of the race; but it does not go far enough.

We should impress upon the public the point that one certain means of increasing the prevalence of any hereditary characteristic in a community is to induce the individuals who possess it *to marry one another*; and thus produce a more potent stock in the next generation.

It is neither practicable nor advisable that the individuals referred to should marry exclusively among themselves, but only to a much greater extent than now prevails; and the public policy should be: Promote the marriages of the desirable with one another.

