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HEREDITY AND EDUCATION.

A Thesis Submitted to the Faculty of the
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Heredity and Education.

It is evident that there are two important factors in producing a man and making him what he is,-- one the endowment given him at birth, the other, the environment into which he comes. No one doubts that the natural endowment is largely the result of the ancestry from which man springs, and that most of the traits that he displays are traceable to his ancestors. He has, however, certain traits which are peculiar to himself, and which are due to his environment, to his education, and to his association, with others, as well as to the variations brought about by heredity.

On account of the fact that well-educated people are usually the ones to advance to the highest positions, the effect of environment is commonly overestimated, it being forgotten that those who show the effect of education and environment most, are the ones who by heredity are best fitted to profit by them, and who would succeed in spite of their environment if it were unfavorable.

It is the object of this paper to investigate what limitations heredity imposes on education, and how education can assist heredity in the improvement of the race. Before passing to this topic, it will be necessary to consider what causes the close resemblance that exists between successive generations, what gives rise to any variations that may occur, what traits are directly inherited from generation to generation and which ones are capable of being influenced by the environment.

The fact of the close resemblance existing between successive generations has given rise to several important questions dealing with heredity. The first is:--"How is the

continuity between generations maintained so that this striking resemblance exists"; the second, "Are the individual peculiarities or modifications acquired by the parents as the result of changes in function or environment transmissible to the offspring?" Both are historic questions and have been answered in a variety of ways.

One of the first attempts to explain the resemblance between generations was the formulation of the belief that the germ which was the nucleus of a new organism, was possessed by a spirit which had previously belonged to an ancestor. Another theory was, that the germs contained in embryo all that the future organism was capable of developing into, or that the germ contained within itself miniature models of all generations to follow. Of greater scientific interest are those theories to which the term pangenesis is applied. They regard the germs of a new organism as aggregations of units, collected from the various parts of the body, which are capable of growth into cells to form structures similar to those from which they came. This was essentially the theory of Darwin who stated that every cell of the body, not too highly differentiated threw off gemmules, which multiplied by fission, but retained their peculiarities, and becoming concentrated in the reproductive elements developed into cells like those from which they were originally given off.

Darwin's theory was unsatisfactory because it involved many unverified hypotheses and Galton, Haeckel, and Brooks all offered modifications to it. Brooks in his "Law of Heredity" stated that in the developing germ it is possible to distinguish between the cells which go to build up the body of the organism and those which remain unchanged to form

the reproductive organs. In this way the germinal cells of the offspring are in direct continuity with those of the parents. Such men as Owen, Haeckel, and Galton all advocated this doctrine of germinal continuity which is one of the more modern theories.

The main idea was that very early in the life of the embryo the cells which were to form the body could be distinguished from those which formed the reproductive organs. The former changed greatly, and soon lost all resemblance to the mother cells while the latter remaining unchanged were able to transmit in turn the characteristics peculiar to the species and so keep up the race type. Since in most cases, however, the reproductive cells cannot be distinguished until development has progressed for sometime, and there does not seem to be then direct continuity of germ cells, Weismann has proposed that "what is actually continuous is the germ plasm of definite chemical and special molecular constitution. This germ-plasm has its seat in the nucleus, is extremely complex in structure, but has nevertheless great powers of persistence and growth".

Since the germ cells or plasm of the offspring is directly continuous with that of the parent, it would partake of the same properties and would naturally develop in the same way so that one would expect to find a striking resemblance between parents and offspring. The doctrine of the continuity of the germ plasm answers then our first question as to how the resemblance between successive generations is maintained.

This brings us to a consideration of the question as to how variability that exists between successive generations arises. That the offspring is different from the parents no one denies, nor that variability is the fundamental fact of all

living things, for it is recognized that it is the inheritance of the variations or differences of organisms that results in the discontinuity observed among species. Just what factors have been most important in bringing about this variability has however, been long a matter for dispute.

The Lamarckians emphasize the factors of use and disuse, and the inheritance of acquired characteristics; the Darwinians consider modifications as due to the effect of natural selection, acting on slow continuous variations beneficial to the species; while the followers of De Vries emphasize the importance of discontinuous variations, denying the influence of the environment or the usefulness to the individual of the adaptation.

Lamarck in his "Systeme des Animaux sans Vertebres" in discussing the evolution of animals gives voice to opinions which have been very commonly held, but he does not verify them. He selects examples from the animal world and attempts to show that the development of certain organs is due to their constant use for a certain purpose while their atrophy is due to disuse. He considers various animals to show how their structure has been modified by their environment or by their desires.

The giraffe on account of scarcity of herbage must feed on the foliage of trees, and must make continual effort to reach it. From this habit long continued has resulted, according to him, an elongation of the front legs and of the neck.

Animals that run on hard ground have developed hoofs; the long necks of shore birds are due to a stretching of the neck in order to avoid wetting the body while reaching for food; ducks and geese have webbed feet because of the tendency to stretch the membrane between the toes when striking the water; ant-eaters, and

wood-peckers have increased the length of their tongues by stretching them into crevices to obtain their food; antelopes and gazelles have been forced to flee from enemies, and from the habits thus acquired their bodies have grown more slender, and ^{their} limbs more delicate.

In the same way disuse gradually impoverishes an organ and causes it to disappear. Those animals which swallow their food whole have the teeth undeveloped; the mole owing to its habits of burrowing makes very little use of vision and has eyes which are scarcely visible; serpents on account of the length of body would find four short legs useless, and long ones would interfere with their need of gliding, so they have lost entirely these organs normally present in reptiles.

Lamarck simply cites instances as proof for his statements, and says that the changes thus brought about are propagated and transmitted to all individuals which succeed and which are exposed to the same circumstances.

The Darwinians, while acknowledging that use strengthens parts of the body and disuse diminishes them, and that such modifications are inherited, think that the impulse to change is brought about by the action of natural selection, and that the modification must be beneficial prior to selection. If this were not the case, harmful effects would be as apt to be inherited as beneficial ones.

Brooks, a Darwinian, in his article on Lamarck criticizes sharply the reputed influence of use and disuse. He there shows the inadequacy of use and disuse to account for such modifications as the poisonous bite of a serpent, the sting of a bee or the color and fragrance of flowers. These modifications are easily enough explained by the theory of

selection, when we consider that animals having means of defense against enemies such as a poisonous bite or a sting, stand a better chance for survival in the struggle for existence than animals not so provided, as they drive away enemies, and secure prey by this means. Plants, having brilliant colors or fragrant odors, are much more apt to perpetuate their species, as they attract to themselves, insects, which carry pollen for the fertilization of their seed. Without the visits of the insects, fertilization would not be effected and the species would die. These modifications are useful to the animal or plant, but are useful only in so far as their use is exhibited in the lives of individuals other than those showing the structural adjustment. It would be impossible then to explain such modifications as color or fragrance of flowers, and organs of defense of animals, as the effect of use, since their use has no effect on the animal or plant itself. The horns of a caterpillar cannot be used for defense, but they give to the animal a terrifying appearance and serve the same purpose so far as their effect on others is concerned. The white tail of a rabbit, fleeing, acts as a danger signal to other rabbits. These instances show that the Lamarckian factor fails to account for the modifications, and has little value as a solution of the origin of species.

The wonderful fitness of workers in a hive of bees, cannot be due to inheritance of acquired characteristics, brought about by use. Such adaptations for special work as the pollen-baskets, wax -shears, honey-sac, and antenna-cleaners could not possibly be due to the inheritance of acquired characteristics as the workers themselves are sterile, producing no offspring, and the queens and drones are not structurally fitted for the

duties of the workers and lack all similar modifications. The modifications could not be accounted for either by considering them due to inheritance from a remote time when the workers were perfect females and the queens assisted in the work of the hive, as closely related species show different modifications showing that these have arisen since the workers became sterile. The adjustment here is such as to prove that the inheritance of the effect of these conditions has had no part in the production of the adaptation.

Diseases of various kinds are often spoken of as being hereditary, but in cases investigated it has been found that the disease takes hold of the offspring because they are subjected to the same conditions of nurture and environment, and that the disease is not so apt to develop where external conditions are changed. It is difficult to show too that the disease was not germinal to begin with.

In the same way, mental acquisitions are commonly thought to be inherited. A boy is an artist, a musician, an actor because of an inherited tendency in that direction. His father has become successful in a certain line, therefore his son must do the same. People who speak thus fail to take account of the fact that while family similarity cannot be disputed, that alone would not prove the inheritance of parental acquisitions as it often happens that an adopted child will follow a certain line of work, because his education has been directed that way, and because he has been surrounded by influences which lead him to take a certain course. ✓

Looking at this question from the point of view of the theory of heredity, it will be seen at once, that if the continuity between successive generations is maintained by the

germ plasm it would be impossible for an organism to be affected by any conditions that were incapable of affecting the germ cells themselves. For if a portion of the germ plasm is unchanged during development to form the rudiments of the reproductive cells of a new organism, all effects of use and disuse would be unfelt, as they would have to affect the germ cells to be transmitted at all, and this is a possibility which Weismann denies, except in so far as the germ cells may be modified along with the body cells, when they are subjected to great environmental changes, or changes in nutrition.

Galton, whose theory of inheritance is very similar to Weismann's agrees with him so far as inheritance of acquired characteristics goes. He says, "The inheritance of characteristics acquired during the life time of the parents includes much questionable evidence, usually difficult of verification. We might almost reserve our belief that the structural cells can react on the sexual elements at all and we may be confident that at most they do so in a very faint degree-- in other words that acquired modifications are barely if at all, inherited in the correct sense of that word." If this conclusion be true then the influences of function and environment affect the individual alone, and have no evolutionary value for the species.

To Weismann the sole source of evolutionary change is the intermingling of germ plasm during fertilization, and the condition of progress is found in the action of natural selection on the germinal variations which thus arise. Weismann thus ranges himself with Darwin who held that natural selection acting on beneficial variations has been the main but not the exclusive factor in evolution, the origin of variation being always assumed. Darwin thus defines his principles: "If variations

useful to any organic being ever do occur, assuredly individuals thus characterized will have the best chance of being preserved in the struggle for life; and from the strong principle of inheritance, these will tend to produce offspring similarly characterized. This principle of preservation or the survival of the fittest I have called Natural Selection. It leads to the improvement of each creature in relation to its organic and inorganic conditions of life; and consequently in most cases to what must be regarded as an advance in organization".¹

In considering how the variations first appear upon which natural selection acts, Darwin lays the chief emphasis upon those slight successive differences which accumulate from generation to generation. He says, "We have reason to believe that it is the steady accumulation of beneficial differences which has given ^{rise} ~~use~~ to all the important modifications of structure in relation to the habits of each species that causes each slight difference between parents and off-spring".²

While attributing to continuous slight differences the main role in the production of new species, Darwin does not overlook those variations which come into existence at a bound. Such variations Darwin calls sports, and although he attributes the greatest share to accumulative selection, still he does not believe that variations must be necessarily continuous. Where discontinuous variations occur, the intermediate steps may be lacking but since natural selection acts solely by the preservation of profitable modifications each new form will tend in a fully-stocked country to take the place of, and finally to exterminate its own parent form, or other less favored forms with which it comes in competition.

¹Chap. IV, Sec. 188, Origin of Species. ²Chap. V, Sec. 242, Origin of Species.

Darwin attempted no explanation of the causes of variation; he simply assumed that slight, indefinite variations occurred and that natural selection seized upon those that were favorable to the development of the species, and preserved them so that they were the ones to be transmitted.

While most Darwinians believe that natural selection has brought about discontinuity of species by acting on a continuous series of small, generally indefinite, variations, there seems to be growing a tendency to regard discontinuous variations as the source of change. The botanists, De Vries and Bateson, both emphasize discontinuous variations as causing changes in the character of organisms, and their investigations with plants strengthen the view that mutations, or discontinuous variations, have furnished the materials for evolution. From this point of view, species are not regarded as having been built up gradually through the agency of a selective process, but elementary species appear at a single step, fully formed and differing from the parent stock in many characters. The forms recognized by Darwin as varieties, are looked upon by De Vries as new species. On the Darwinian theory the later development of these varieties into new species is supposed to take place as the result of further selection; on the mutation theory as the result of the appearance of new mutations. According to this view there is no need for gradual slight changes. A species remains unchanged as long as its period of existence lasts. All of its characters vary more or less, but the type, to which all variations return, remains the same through centuries. A species changes only when it produces others;^{or} rather, it does not change but continues to exist side by side with the species newly formed. Only when among its

descendants there are types better fitted for the battle of life, a species may locally succumb, but it would require a long time before the new species would replace the old.

De Vries found too that when a new species originated, it existed not as a single individual, but was found in many, and appeared every year during the mutation period. In this way even tho the new species was weaker than the old, by appearing in sufficient numbers year after year it had a better chance to survive, and to reproduce its kind.

De Vries' conclusions accord very well with observations, and very few objections have been urged to his theory except to the explanation he gives of the way in which mutations arise. Bateson thus expresses his views: "The discontinuity of which species is an expression has its origin, not in the environment, nor in any phenomenon of adaptation but in the intrinsic nature of organisms themselves manifested in the original discontinuity of variations". This seems to be one of the weaknesses of the theory. It is regarded that the adaptive nature of the mutation is not determined by the environment; its relation to external conditions is merely one of chance. There is no selective factor in the establishment of an environment, the mutation appears, and if it happens to meet favorable conditions for its continuance it survives, if not it disappears. It thus denies the principle of utility as underlying the survival of adaptations.

It has been urged by mutationists that such adaptations as shown by the Kallima butterfly which resembles, when at rest, a dead leaf so closely as to be indistinguishable from it, could not possibly be accounted for as due to selection of slight variations and must have come about suddenly; it might

just as well be urged that unless the environment had an effect in determining the successive mutations it would be highly improbable that these would take the direction of greater adaptation to the environment in a way beneficial to the species. In the Kallima, the adaptation could not be accidental, but must be due to the fact that the butterflies not showing the resemblance perished, while the dead-leaf ones survived. Mutations, unaided by selection, could not account for the wonderful adaptations found everywhere.

Darwin's theory, then, of natural selection modified^d so as to include mutations as the source of evolutionary change, would seem to account best for all the modifications noticed, especially among animals or plants in a state of nature, and those that survive are the ones best fitted to cope with their surroundings.

Among human beings of advanced civilization the principle of selection is not so important a factor. Those physically or mentally unfit, are cared for and protected by others, so that they are not overcome and destroyed by their better-adapted associates in the struggle for existence. Education and training are supposed to take the place of selection in improving the race. To see just what effect they can have, it will be necessary to investigate what traits are directly inherited, and what traits are variable, and capable of being modified.

Galton was one of the first to make a scientific study of heredity. He had noticed a great similarity of mental traits as well as physical traits in members of related families and wished to investigate whether mental heredity obeyed the same laws as physical heredity and was subject to

the same limitations.

It has been long conceded that the physical characteristics are directly inherited and that while the organs of the body can be strengthened by judicious use, and the bodily movements corrected by training, still there is a limit beyond which training cannot go, and which is dependent entirely upon the individual. That mental capacity is subject to the same limitations is an idea that is growing in strength every day, and is shown in the organization of schools for people of different mental abilities, but in 1863 when Galton made the investigations recorded in "Hereditary Genius" it was a common belief that the mental powers were not limited, as are the physical powers, by the nature of the individual, but that the mind, when trained, and compelled by a strong enough will to exert itself in a given direction was capable of any achievement.

Galton had already investigated the inheritance of physical characteristics and found that the resemblance of children to parents, and brothers to brothers obeyed definite laws, the amount of regression in each case being capable of exact measurement.

Since the resemblance of mental characteristics was so striking in members of related families he wished to discover whether these obeyed like laws, and in what degree natural mental ability was hereditarily transmitted.

To do this he studied lists of men who had made a reputation in their chosen line of works--men who had distinguished themselves frequently either by purely intellectual work or as leaders of opinion. These he arranged in accordance with a standard scale, using the method based on the law of frequency of error.

This law may be illustrated as follows:-- Suppose that the statures of one hundred men chosen at random were measured, and arranged in order beginning with the lowest. It would be found that the stature of the fiftieth and fifty-first man would practically be the average of all, while the other men would be ranged on either side of the average diminishing or increasing by equal grades of stature. The number of men in each grade would become less as the deviation from the average became greater, the number of those taller than the average remaining, however, in each grade the same as those as much smaller than the average.

This method, Galton applied to the men of England and found that those that had attained distinction enough to be considered worthy of a place in such lists as "Men of the Time" were as about one in four thousand when compared with the total number of men in England. It was from this class of men that he wished to choose for his investigations, and he studied lists of English Judges since the Restoration, prominent Statesmen, Commanders, Literary and Scientific men, to see what part heredity played in producing men of genius. He wished to note whether the more able men had more eminent relatives than those less able; whether the degree of ability was transmitted in whole or in part to near or more remote relations; and whether the ability transmitted was general or whether it displayed itself in the descendants in the same line of work as the eminent kinsman.

Of the two hundred and eighty six Judges considered which included those from 1660-1865 he found one hundred and nine who had one or more eminent relatives, and these one hundred and nine were members of only eighty five families.

If genius were distributed at random, the number of eminent men in a family would be very few, while in those considered there were nearly as many cases of two or more eminent relations as of one, showing that genius does cling to certain families. It was also found that fathers or sons of eminent men were much more apt to be eminent than relatives more remote. He thus explains why the nephews or adopted sons of popes are less apt to attain eminence than the sons of eminent men, even tho the education and social position be the same.

That the degree of ability affected much the power of hereditary transmission was shown by the fact that of thirty high legal officers examined twenty four, or eighty per cent had eminent relatives, while of two hundred and fifty six other judges, only ninety, or thirty six per cent were eminent.

These same facts held true in the case of commanders, statesmen, poets, musicians and artists, only in a more striking degree since in most instances these men were of higher ability than the judges.

He found, too, that ability tended to display itself, in the same special line in which eminence had been attained by other near members of the family. Of two hundred and eighty six judges more than one in nine were brother, father or son to another judge, and the other high legal relationships were even more numerous. The strongly hereditary character of the peculiar ability in musicians and artists is shown in the large number of sons of eminent fathers, who have attained eminence in the same line.

These cases seem to show that ability is transmitted along special rather than general lines. Galton also found that

where the sons of gifted men excelled in the same line as their fathers, they were decidedly more precocious and he attributes this to home influence, and to the fact that the son is especially educated for his chosen line of work, and wastes no time on profitless speculations.

Such investigations as these carried on by Galton lead us to the same conclusion that the theory of heredity did. Since only such changes as can affect the germ-plasm are transmitted to the offspring, the outward effects of education and environment cannot be inherited. They are acquired characteristics, and whatever else they can do, it is seen that the change produced by them appears in the individual alone, and can have no effect on the race.

The fact, that genius is confined to certain families, and is transmitted from generation to generation, shows that it is not a matter of education, but of inherent powers, and that it is useless for schools to attempt much intellectual improvement in the individual unless he is endowed by heredity with the capacity to benefit by it. The place where education seems to have been most effective is in the improving of morals, rather than of intellect-- in building up character, and giving loftier ideals. For this reason it is essential that every person, to reach his fullest development, be educated along the line of his capabilities and trained so far as his original nature allows. For even though it may be true that the nurture acquired by an individual is only what his natural capacity permits, still it is also true that nature permits a wide range of good and bad, and it depends on his environment whether the individual makes the best

of his nature or not.

Galton, in his "Hereditary Genius" (Preface p XXVII), in speaking of the influence of the environment says: "The improvement of the natural gifts of future generations is largely under our control. We may not be able to originate but we can guide. The processes of evolution are inconstant and spontaneous activity, some pushing toward the bad, some toward the good. Our part is to watch for opportunities to intervene by checking the former, and giving free play to the latter".

A child at birth is endowed with what he has directly inherited, and has a plastic organism which renders him capable of learning very early to respond to his surroundings. Unlike the lower animals, he has few definite instincts, few ready-made responses, but better than these he has an adaptive mechanism and a nervous system that remains plastic years longer than that of the most docile of the lower animals. This plasticity enables him to be subject to the influence of training and education for a long period of time and the responses he makes are usually those which best fit him for his environment.

With animals, it is generally agreed that training can do no more for them than to make the best of their natural ability, for they differ greatly in power to profit by experience, and the nature of each species sets impassable bounds to the power of individual animals to improve by practice. In the same way, training is variable in its results on different human individuals, because they have their physical heredity which sets certain limits for each, but the development that does take place is always directed more or less into the channels opened up by the immediate environment.

A child learns largely by imitation, and he observes closely the actions and impulses of those around him, and learns to make them his own. He has certain instinctive or impulsive tendencies, due to heredity, and as these tend to result in action, he learns to watch the effect of his own movements on those around him. If they are well received and encouraged, he repeats them again and again until they become habitual. If, however, his actions or expressions do not meet with approval, but are frowned upon, or if he is punished for them, the idea of punishment will obtrude itself upon him every time he is tempted to repeat the act and he refrains. His judgment of what those about him consider right or wrong is thus formed, and he governs himself accordingly. As the child grows older, and his environment widens, so as to include playmates, and others besides the members of his own family, he reacts on his surroundings in the same way, and learns to adapt himself to them. When he enters school, that becomes his world, and unconsciously he takes on himself the habits, and mannerisms of those about him, and acts out the suggestions given him there. He expresses himself not alone in the habitual way already learned, but accommodates himself to new conditions and accepts new standards for action. Habits of neatness, courtesy, punctuality, truthfulness and regard for others are acquired very quickly, as are, unfortunately, too the opposites so that the school becomes a very important factor in the molding of character.

+ Thorndike in discussing the function of the school says: " The importance to educational theory of a recognition of the fact of original nature and of exact knowledge of its relative share in determining life's progress is obvious.

It is wasteful to attempt to create, and folly to pretend to create capacities and interests which are assured or denied to an individual before he is born. The environment acts for the most part, not as a creative force, but as a stimulating and selective force. We can so arrange the circumstances of nurture as to reduce many undesirable activities by giving them little occasion for appearance, and to increase the desirable ones by ensuring them an adequate stimulus. But the results of our endeavors will forever be limited as a whole by the slow progress of change in the original nature of the race, and in different individuals by inborn talents and defects".¹

"The one thing that educational theorists of today seem to place as the foremost duty of the schools--the development of powers and capacities--is the one thing that the schools or any other educational forces can do least".² He sums up the work of education thus:

1. "To supply the needs of the brain's healthy growth and to remove physiological impediments to it.

2. To provide stimuli to desirable mental variations and to withhold stimuli from the undesirable.

3. To make the outcome of desirable activities pleasurable, and to inhibit their opposites by discomfort."

"The three chief practical problems of education would thus be those of hygiene, of opportunity, of incentives and deterrents".³

Thorndike-Educational Psychology

1 P. 44

2 P. 45

3 P. 79

The idea of the function of the school has changed very materially within recent years. When schools were intended for the select few whose moral instruction was largely a matter for the home, the school was regarded as a place where the intellect alone was to be appealed to and the mental powers developed. The recognition of the fact that the school has a deeper and more vital mission than the mere giving of an intellectual education, and that the integrity of the state depends upon the moral as well as intellectual training of the citizens has led to a greater interest in the education of all classes in the elementary and secondary schools of the country.

Since children of widely different interests and capacities are thus brought together, it has been felt that to make the schools most effective and to gain a hold on all pupils, the course of study must be modified to appeal to their varied interests.

For this reason the elementary schools are no longer restricted to the teaching of reading, writing and arithmetic, with a few dry facts of grammar, geography and ~~hist~~ history which are soon forgotten. The attempt is made to make the teaching more live, and vital-- to emphasize those points that are important, and to bring out as much as possible the native forces of the child, and to direct him along the line of his interests.

The introduction of manual training has been the means of interesting many a boy and girl who saw nothing in mere books and was unable to sit still long enough to learn a lesson. It is not only interesting, but at the same time teaches the eye, and the hand to obey the will and gives a child self-control. It gives him confidence too in self, when

he sees what he has accomplished and he is willing to exert his capacity along other lines.

In the secondary schools the same movement is seen in the introduction of elective courses, and in a broadening of the curriculum which leads to graduation. Formerly the High School was looked upon merely as a preparation for college, and the courses were designed with that end in view. The course was limited almost entirely to the study of Greek, Latin, and Mathematics, and only a very little time could be given to History, Government, and the English Language. When the student then finished his course in the High School he was no better prepared to understand the problems of life than the boy finishing the grammar school, and unless he entered college where he had an opportunity for broader training he was shut^{out} from intelligent participation in managing the affairs of government, and was dependent on others for his opinions. Many boys, too, failed to find anything to attract them in the courses offered and entered business colleges, where the training was very narrow, or took up any work that offered.

It was realized that to hold such boys in school, a change in the curriculum, was necessary. Courses in Manual training, and commercial studies have been introduced; the study of history has been broadened so as to include the problems of government of the present day; since this is an age of scientific investigation the important elements of science are taught; students are taught to read and appreciate the literature of the past, and at the same time to express their own thoughts clearly and forcibly in good English; modern foreign languages are studied so that students may have an

appreciation of the life and feelings of nations other than their own; and the ancient languages receive their share of attention, as it is felt that no where else can they so well get an appreciation of the refining and elevating influence of the Greeks and Romans upon art and literature and institutions even down to the present day.

This multiplication of studies has not resulted necessarily in a crowding of the curriculum as choice is permitted in the subjects of the course, and each one selects the courses in a group which appeal to him. He not only makes more progress, on account of his greater interest in the work, but he is kept for a longer time under school influence. This is an important fact for several reasons. In the first place, pupils who leave school early, and enter business world are apt on account of inexperience, and lack of information about other pursuits to become narrow-minded in their interests, and fail to appreciate their larger duties and opportunities as citizens. A public school where all meet on the same plane generates tolerance and respect for others. It breaks down class distinctions. It is purely democratic--a pupil in order to win the respect and admiration of his fellows has to show what he can do. This is true not only in games and sports, but in class work as well. In order to lead, he must have qualities which make his fellow-students consider him worthy of leadership. The desire to stand well in the eyes of his mates, and to win their respect and esteem is a motive which acts on many a boy, who would not be appealed to in any other way. In taking part in class affairs, in debating and literary societies and in the life of the school as a whole, the boy is

being prepared for his duties of citizenship.

Hanus, in discussing "What the secondary school ought to accomplish" says among other things, "It can and should arouse and persistently cultivate a desire to gain an insight into contemporary social problems--economic; political; education;^{al}-- with a view to future intelligent and helpful participation in trying to shape wisely municipal, state and national affairs".¹ In our country especially where every citizen has a right to vote, a boy needs somewhere to receive instruction which will enable him to act intelligently on questions of local and national significance, and which will direct his interests along such lines, so that he will not be content to have the control and management of governmental affairs in the hands of people who want a public office only for private gain, and who are not willing to act for the good of those concerned.

In the cities, where we have a large foreign element, it is found that nothing is so effective as the schools for giving such instruction, and for making loyal Americans of the conglomerate group that huddle together in the foreign quarters. Jacob Riis, who has for years been working for the improvement of conditions in the slum districts of New York, says: "The school might be made the means, as the house to which all the life of the neighborhood turned, of enrolling the immigrants in the perilous years when they are not yet citizens... A way must be found of claiming them, if they are not to be lost to the cause of good citizenship

The mere fact that the schoolhouse is there inviting them in, is something. When it comes to seek them out, to their own hall

¹ Education, Aims and Educational Values.

for discussion, for play, it will be a good deal, particularly if the women go along. And the enrollment of the school house could be counted as being for decency".¹

*extra
to
Melrose*

Through the efforts of Riis, and others who are interested in the welfare of the people in the slums the school houses have been opened to the public to be used as a neighborhood center. Here there are rooms where the boys can organize their clubs, and play games without any danger of molesting passersby, and where they will be removed from the temptations of the streets; a place where parents can come together to talk over matters of common interest, attend night classes, or find good literature to read.

The opening of the schools for public gatherings or for play grounds met with much opposition at first, but since 1899, when the Board of Education passed a law stating that every "rational system of education should make provision for play" more and more has been done to remove the children from the evil influences of their environment and to make the school an effective agent in preparing them for good citizenship and making of them good moral men and women.

The new schools are provided with large play grounds and gymnasiums, manual training rooms, and kindergartens, and the children are encouraged to come there not only during the regular school hours, but in the evening, on Sundays, and during their vacations. To make the school more attractive than the saloons, and common amusement halls, bands often play there in the evenings, and games and dancing are indulged in. In the districts where the schools have thus been opened, the police report that fewer arrests have been

¹ Battle with the Slums P. 212.

made, and that minor offenses such as window breaking, annoyance of passers, and stone throwing has greatly diminished while crimes are seldom heard of, where before they were of frequent occurrence.

Vacation schools, too have been the means of accomplishing much good. Not only are the traditional subjects taught in these schools, but the boys learn basketry, weaving, chair caning, fretsawing, leather and iron work, while the girls are instructed in sewing, millinery, embroidery, knitting, and the domestic arts. Nature study is taught out of doors, and plots of ground are provided where they learn to prepare the soil, and how to plant and raise fruits and vegetables. The children are kept busy, and out of mischief, are happy, and the teachers report are more amenable to discipline, play more fairly, and are more considerate of others than they ever were before.

By arranging athletic meets between the pupils of different schools, a feeling of loyalty for their own school arises, which when kept within bounds, is valuable as it makes the boys stand up for one another, and makes them feel as tho they belong somewhere, and have their reputation to sustain.

Jacob Riis is very hopeful of the moral effect upon the children, who are thus taken from the streets, and kept interested in school. He says: "With the kindergarten and manual training firmly engrafted upon the school course, and with it reaching out to enlist the boys' play through playground and vacation schools, I shall be willing to turn the boy who will not come in over to the reformatory. They will not need to build a new wing to the jail for his safe-keeping."¹
1 Battle with the Slums.

To reach the boys who are incorrigible, or whose parents keep them out of school, the compulsory education law has been passed, and truant schools have been established to receive the incorrigible. These too, show an encouraging condition of affairs, and that the schools are effective in building up character, for of those committed to these truant schools, only a very small percent has been found really incorrigible. In New York, of 2500 admitted in one year only 60 seemed at the end of that time to deserve the name.

Many attempts have been made to reach the children of the slum districts by removing them from the evil environment in which they live, and taking them to surroundings where their better natures can be appealed to, and so purifying their characters. One such experiment that seems to be showing good results was the founding in 1895 of the George Junior Republic near Freeville N. Y., by Mr. Wm. R. George. His first idea was simply to take children from the poorer districts of the city to the country during the summer, so that they might have some enjoyment. After doing this for several years, he conceived the idea of making the children work for what they received during the summer, and as discipline had to be enforced among such children, several of the boys were appointed to oversee the rest, to maintain order, and to see that the work was done.

These boys did so well in their offices that as the colony grew, more and more of the administration work was given to the citizens of the Republic, as they are called. In accordance with Mr. George's aim to introduce into the Republic as many of the conditions of ordinary life as possible,

every citizen must assume the responsibility of securing employment for himself. He is paid in accordance with the kind of labor he engages in, and must pay for the necessities, as well as any luxuries he may enjoy. The hotels and lodging houses are let to certain of the boys, who charge according to the accommodations they give, and are held responsible for the appearance of the place, and the conduct of the guests. If a boy has failed to work and so has not the money to pay for his lodging, he may stay at police quarters, but is arrested the next day for vagrancy, and has to work out the fine imposed. For this reason, there is comparatively little idleness.

Labor is done on the contract plan, each contractor hiring and paying his own employes. Boys work as carpenters, gardeners, hotelkeepers, barbers, or at almost any trade, while the girls make their way by cooking, darning, serving or doing housework.

To keep order in the community, and to punish offenders, there is a well organized police force made up of the boys themselves.

When a boy is arrested for some minor offense he is given a regular police court trial, and is fined and imprisoned or discharged at the discretion of the judge--one of their own number. If the offense is serious, he is tried by the criminal judge, and his case submitted to a jury. If the verdict be guilty, he is sentenced to hard labor and imprisonment. The punishment in such cases is severe, as the boys are not to think penal institutions enjoyable places to be in. The plan of having a jury and

judge chosen from the boys themselves, has proved to be very effective, as boys who have been indifferent and insolent when tried by adults, have broken down entirely when sentenced by boys of their own age.

Mr. George was at first president, and had a veto power over the laws of the republic, but this office is now held by one of the boys, whose veto can be set aside only by a two thirds vote of the Congress. This Congress is composed of a Senate and House of Representatives and has the power of ^{passing any laws for the government of} the community, subject to the laws of New York and the United States. These laws are strictly enforced, the punishment for violation being fines or imprisonment.

Little stress is laid on intellectual education, the main aim being to make the children moral and honest citizens. Some of the older boys are appointed schoolmasters, and they search grammars, geographies, histories, and other books for questions which are given out to the others to answer. These answers are gone over carefully, those answering correctly being paid a certain sum while the rest receive nothing. The answers have to be written in a prescribed form, and must be neatly prepared so the method may result in neatness and order, and the acquisition of certain facts, but it is doubtful if it results in the acquiring of an education. Since the police force is selected as the result of competitive examination, that acts as an incentive for many of the citizens to attend school in the winter, and learn all they can there. A writer in speaking of the results attained by Mr. George says:—"Perhaps the most noteworthy fact in connection with the George Junior Republic is that boys and

girls of the character and antecedents of the citizens are so quickly caught up into the spirit of industry and good order which pervades the Republic".

The fact that they do so quickly conform to the spirit of order and industry shows that the environment is a very important factor in the upbuilding of character and that training and education, while unable to improve or create capacities, not handed down by heredity are especially adapted for fixing habits which will result in good conduct. That education in the broadest sense does exert a great moral influence upon the individual, is shown by the marked improvement in young people who, after being arrested for some crime are committed to a reform school instead of a prison. If they had been confined in a prison with offenders worse than themselves, or if they had been allowed to stay in their own evil surroundings, they would probably have become worse and worse criminals, but being removed to a reform school, where they are trained to habits of industry and obedience, the majority of them turn out well. Even in the case of reform prisons, as in the Elmira Reformatory where adults are confined, statistics show that 80 % are set upon their feet and make a fresh start. Statistics from this same prison show too the close relation that exists between bad environment and crime for of the 10,538 prisoners received there in twenty-seven years, 77.8 % of them were found with no moral sense or practically none, yet more than that proportion were possessed of good natural mental capacity, which is to say that they had the means of absorbing it from their environment, if there had been any to absorb.

"Childrens' Aid Societies and Kindergarten records show even better results. Of 9000 children from the slum districts of San Francisco who had gone through the Golden Gate Kindergarten just one was found to have got into jail".¹

The Industrial School for Boys in our own state shows very good results. Although there is no record of the exact number, who have turned out well, it is estimated by the Superintendent, Mr. R. C. Clark, that 70 % of the boys after leaving the school become honest and useful citizens.

Since reform schools were established more for the purpose of improving^{the} individual sent there, than to punish him, the sentence is usually indeterminate, and the privileges granted, and the release of the prisoner depend upon good conduct. This stimulates self-control on the part of the prisoner, and he is much more willing to submit to discipline. In many cases the reform school is the best home the child has ever had. Many of the boys in the Industrial Home in Boonville, Missouri, knew no other home than the streets, or if they had a home the parents were unfit persons to care for them. In the Industrial Home they are well-fed and clothed, are required to keep themselves neat and clean, are sent to school half of each day, and the remainder of the time are taught some useful trade, so that they can earn their living honestly when released.

Among the industries carriedⁱ on there are farming, brickmaking, carpentering, blacksmithing, laundering, tailoring, shoe^emaking, knitting, printing, housework and cooking. All of the buildings except the main building were built by the boys, and they seem to take much pride in the place. The school is located near the edge of the town, and the grounds are kept like a park by the boys themselves, who are taught to

become expert gardeners and florists.

The cottage system is used for housing the inmates so that the bad boys may be separated from the rest. Each boy has his own bed, which he must leave in good order each morning.

They have some time for recreation and play and have in one of the buildings a bowling alley. For outdoor sports they have organized football and baseball teams, and boys in good behavior are allowed to play. The good boys, too, are rewarded by making them officers in the military company, or by allowing them to act as guides to visitors. A well organized band adds to the pleasure of the drill, and to the religious exercises which are held every Sunday. The boys, on the whole, seem content and the regular life they have to lead, and the cleanliness and order, good food, kindness and systematic work exert a wholesome influence on them with the result, as above stated, that the majority are discharged before their time is up and 70 % of them become useful and honest citizens.

With such results as these, constantly before us, no one ought to despair because investigation seems to prove that heredity is the vital force in the intellectual improvement of the race and that education can effect nothing so far as the race is concerned. The good, though, that can be done the individual by the right kind of education, by raising him morally, by instilling into him lofty ideals and by giving him mental and physical habits which will make him exert self control, and strive to live up to his ideals is immeasurable. It makes it important above all things that education which is capable of influencing to such a great extent the individual, should be modified so as to conserve the healthful functions, and

to provide an environment which will counteract disadvantageous inherited qualities, and to augment those that are beneficial.

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